

Appendix A. Plan Contributors.

Name	Affiliation	Area of Expertise
<i>Department of Conservation and Recreation</i>		
Backman, Andy	RMP Program	Planning
Baecker, Jim	RMP Program	Capital and resource planning
Bates, Steve	Park Supervisor, DEML	Operations and management
Bergfors, Robbin	Planning and Resource Protection (formerly)	Landscape architecture
Bertrand, Dan	Office of the Commissioner (formerly)	Legislative relations
Briere, Gary	Chief of Recreation	Recreation
Brightman, Milton	Park Supervisor, HBCH	Operations and management
Cavanagh, Paul	RMP Program	Planning
Carter, Jeff	Acting South Coast District Manager (formerly)	Operations and management
Comeau, James	Land Acquisition and Protection	Visitor intercept surveys
Dufour, Renee	South Coast District Manager (formerly)	Operations and management
Fiesinger, Anne	Office of External Affairs and Partnerships	Outreach
Garnett, Cathy	Planning and Resource Protection	Planning and ecology
Glavin, Marty	Engineering	Capital planning and improvements
Grahn, Robert	State Parks and Recreation	Waterfront safety
Haak, Brian	Engineering	Visitor intercept surveys
Helfeld, Ruth	Planning and Resource Protection	Landscape architecture
Howard, Jennifer	Land Acquisition and Protection	Land acquisition and protection
Johnson, Danielle	Bureau of Forestry	Forest health
Lloyd, Nathanael	GIS Program	GIS
Lowry, Kathleen	Universal Access Program	Accessible recreation
Matinzi, Don	Acting Southeast Regional Director	Operations and management
Mays, Margot	Bureau of Recreation (formerly)	DCR campgrounds
Mete, Isidore	HBCH (formerly)	Park operations
Orfant, Joseph	Chief of Planning and Resource Protection	Planning and resource protection
Ouellette, Steven	Bureau of Ranger Services	Regional DCR ranger
Piche, Mark	Recreation Facilities Repairer, HBCH	Operations and management
Plocinski, Loni	GIS Program	GIS
Provencher, Shaun	Land Acquisition and Protection	Land acquisition and cultural resources, visitor intercept surveys
Rowcroft, Jessica	RMP Program	Planning and cultural resources
Shanahan, Brian	Southeast Regional Director (formerly)	Operations and management
Silva, Raul	Engineering	Capital planning and improvements
Straub, Jim	Water Supply Protection	Lakes and Ponds Program
Teixeira, Ruth	Engineering	Capital planning and improvements
Tipton, Nathaniel	RMP Program	Planning
Valton, Tom	Engineering	Visitor intercept surveys
Warchalowski, Heather	Planning and Resource Protection (formerly)	Planning and ecology

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Appendix A. Plan Contributors. (Continued)

Name	Affiliation
	<i>Other Affiliations</i>
Annett, Brendan	Buzzards Bay Coalition
Bogart, Jamie	Lloyd Center for the Environment
Bouchard, Melanie	Friends of Horseneck Beach
Burns, Steve	Bristol County Mosquito Control
Costa, Shelli	Westport River Watershed Association
Coutinho, Jerry	Friends of Horseneck Beach
Garrett, Jennifer	Massachusetts Natural Heritage and Endangered Species Program
Erb, Lori	Massachusetts Natural Heritage and Endangered Species Program
Harper, Lynn	Massachusetts Natural Heritage and Endangered Species Program
Janik, Dave	Massachusetts Office of Coastal Zone Management
Kelly, Robert	Massachusetts Beach Buggy Association
Kelly, Suzanne	Massachusetts Beach Buggy Association
Laursen, Brad	Massachusetts Beach Buggy Association
MacDonald, Lloyd	Neighbor
Mello, Mark	Lloyd Center for the Environment
Melvin, Scott	Massachusetts Natural Heritage and Endangered Species Program
O'Reily, Mike	Town of Dartmouth Environmental Affairs Coordinator
Perkins, Tom	Westport Fishermen's Association
Poole, Alan	Senior Managing Editor, Cornell Laboratory of Ornithology
Sheppard, Jack	Director, DFG Office of Fishing and Boating
Simistre, Paul	Friends of Fall River Heritage
Veilleux, Anthony	Senator Menard's Office

Appendix B. Public Participation in this Plan.

In accordance with M.G.L. Chapter 21: Section 2F, the Resource Management Plan for the Horseneck Planning Unit was developed in conjunction with a public participation process to ensure that interested parties had an opportunity to review the draft RMP and offer input in its development. This appendix identifies the public participation process used to inform and review this RMP.

B.1. THE PUBLIC PARTICIPATION PROCESS

Input into Development of the RMP

Public input into the development of the Horseneck Planning Unit RMP began in the fall of 2009. A notice of a public meeting and of the DCR's intent to prepare a Resource Management Plan for the Horseneck Planning Unit was published in the October 26, 2009 Environmental Monitor (Volume 72, Issue 12). Additional announcements were made on the DCR web page and press releases were provided to the New Bedford Standard Times.

An initial public meeting was convened at Fall River Heritage State Park, Fall River, on November 12, 2009. Approximately fifteen people attended the meeting, which ran from 6:30–8:30 PM. One elected official and eight members of the public provided input on development of the RMP. Written input was solicited; only one set of comments was received.

Public Comment on Draft RMP

Notice of a public meeting to present the draft Resource Management Plan for the Horseneck Planning Unit was published in the November 23, 2011 Environmental Monitor (Volume 77, Issue 2). The meeting was convened at Fall River Heritage State Park, on December 5, 2011. Twenty-four registrants attended this meeting, which ran from 6:30–8:30 PM.

Notice of availability of the draft Resource Management Plan was published in the December 7, 2011 Environmental Monitor. The public comment period on the draft RMP ran from December 6, 2011 – January 6, 2011; ten sets of written comments were received during this period.

B.2. CHANGES TO THE FINAL DRAFT OF THE HORSENECK RESOURCE MANAGEMENT PLAN

Two main themes emerged from comments received on the draft RMP. The first was opposition to the closure or relocation of any of the current campsites; the second was the need for increased protection of rare species, especially piping plover, in light of recreational activities and beach maintenance at Horseneck Beach State Reservation. Other issues were raised solely by single commenters.

All comments received during the public comment period were given consideration. Those consistent with federal and state law, and the DCR's mission, regulations, and policies were used to guide revisions. In some instances the revision process required the gathering of additional information, generation of new data, or discussions with regulators.

The following changes were made to the draft RMP. Normal editing activities, such as correcting typographical errors or revising formatting, are not identified.

Executive Summary

The Executive Summary was revised to reflect new recommendations incorporated into the plan as a result of public input. In addition, two important time-sensitive recommendations, which emerged as a result of the public comment and revision processes, are now emphasized. Information on public participation in developing the plan has been updated. Finally, recommendations in the Action Plan have been revised to reflect updates to Tables 4.3.1 through 4.3.3.

Section 1. Introduction

Minor updates and corrections were made to this section, including: updating information on public participation in the planning process; correcting watershed names in the text and in Table 1.4.1; correcting the acreage of DEML in Table 1.4.1; and adding references to the two new appendices (D and E) added to the RMP.

Appendix B. Public Participation in this Plan. (Continued)

Section 2. Existing Conditions

2.2.1. Natural Resources

Existing information on barrier beaches was corrected and expanded.

Information on the range of sea level rise projections was added to the “Climate and Weather” text.

Information on the number of gallons spilled, and miles of coastline affected, by the *Bouchard No. 120* oil spill was revised to reflect the most recent estimates.

2.3.1. Natural Resources

Information was added on the reservation’s topography.

Historic shoreline change information is now presented for both Horseneck Beach and Gooseberry Neck. Two tables have been added, resulting in the renumbering of all tables in this section.

An inventory of water resources, including ponds, wetlands, vernal pools, streams, and groundwater was added. This section also now includes information on 100- and 500-year flood zones and hurricane inundation model projections.

Information was added on a recently documented occurrence of a state Threatened animal off the reservation.

Table 2.3.1 and associated text were revised to reflect updated information provided by the NHESP (French 2012). It was also renumbered to Table 2.3.3 to accommodate the addition of the two shoreline change tables.

Table 2.3.2 was revised to include updated sources of information. It was also renumbered to Table 2.3.4 to accommodate the addition of the two shoreline change tables.

2.3.2. Cultural Resources

Information on the current and future use of the concession stand has been clarified.

Table 2.3.3 was renumbered Table 2.3.5.

2.3.3. Recreation Resources

Geocaching information was updated.

Figure 2.3.1. Locations of sand fencing, as occurred during the winter of 2011-2012, have been added.

Tables 2.3.4 through 2.3.10 were renumbered to Tables 2.3.6 through 2.3.12, respectively.

2.4.1. Natural Resources

Information was added on the park’s topography.

The description of the barrier beach was revised.

An inventory of water resources, including ponds, wetlands, vernal pools, streams, and groundwater was added. This section also now includes information on the 100-year flood zones and hurricane inundation model projections.

Table 2.4.1 and associated text were revised to reflect updated information provided by the NHESP (French 2012)

Table 2.4.2 was revised to include updated sources of information.

2.4.3. Recreation Resources

Geocaching information was updated.

Section 3. Management Resources and Practices

3.3.3. Recreation Resources

Information on the installation of sand fencing has been expanded and the role of the MBBA clarified.

New information has been added on the Order of Conditions (Westport Conservation Commission 2009) that governs beach maintenance activities. Specific information has been added on the conditions identified in the NHESP’s comment letter (French 2009) and the continued need for these activities to be reviewed under the Massachusetts Endangered Species Act.

3.3.5. Interpretive Services

Information has been added on the Lloyd Center’s monarch butterfly tagging program and annual New Year’s Day walk, both of which take place on Gooseberry Neck.

Appendix B. Public Participation in this Plan. (Continued)

Section 4. Recommendations

4.2.3. Applied Land Stewardship Zoning for the Horseneck Planning Unit

Significant feature overlay information for Horseneck Beach State Reservation was updated to add an overlay for a species that occurs off the reservation and whose Priority Habitat occurs partially on the reservation.

Significant feature overlay information for Demarest Lloyd Memorial State Park was updated.

Figure 4.2.1 was updated to include a rare animal significant feature overlay.

Table 4.3.1; Goal 1. The following recommendation was added.

- Incorporate estimates of projected sea level change in future master plans and other plans involving the construction or reconstruction of infrastructure.

Table 4.3.1; Goal 2. No Changes

Table 4.3.1; Goal 3. The recommendation to “Pursue mitigation funds from the 2003 *Boucharde No. 120* oil spill...” was upgraded from medium priority to high priority.

Table 4.3.1; Goal 4. The following recommendation was added:

- Expand or establish partnerships to provide increased interpretive/educational events and programming.

An existing recommendation, “Establish a volunteer shorebird monitoring program,” was modified to place emphasis on educating park visitors.

Table 4.3.2; Goal 1. The following two recommendations were deleted:

- Continue proactive dune protection measures and sand fence repair following the 2009 Order of Conditions for beach operations.
- Renew the 2009 Order of Conditions in 2012 if the recommendation, below, is not implemented in time.

The recommendation to “Create a Habitat Management Plan for mowing practices in rare species habitat on Gooseberry Neck...” was moved to Goal 3 of this table.

The recommendation to “Combine the 2009 Order of Conditions for property management with the Barrier Beach Management Plan and obtain state and municipal agency approval by 2009” was revised as follows: “Prepare an updated Barrier Beach Management Plan to include MESA and WPA approved Operational Maintenance Plans (See Goal 3); obtain state and municipal agency approval.”

The recommendation to “Develop, permit, and implement a plan for redesigning the campground...” has been modified to emphasize the need for a new, robust public process on this issue.

In addition, the recommendation to “Restrict law enforcement and trash removal vehicles to the upper beach paved access road...” was shortened.

Table 4.3.2; Goal 2. The following recommendation was added:

- Install Mobi-Mat® RecPath, or comparable product, to provide ADA access from Central Plaza area to the beach.

In addition, the recommendation to “Explore options to create low impact sustainable trails...” was simplified to remove wording regarding “dune exploration trails.”

Table 4.3.2; Goal 3. The following four new recommendations were added:

- Upon hiring, have Coastal Ecologist meet with NHESP staff to discuss rare species management, including unresolved regulatory issues.
- Develop an updated Operational Maintenance Plan to include: beach raking, over-sand vehicle use, sand fencing, sand removal and placement, and recreation management; submit to the NHESP for review under MESA.

Appendix B. Public Participation in this Plan. (Continued)

- Incorporate the NHESP approved Operational Maintenance Plan for Horseneck Beach and an updated Operational Maintenance Plan for Gooseberry Neck into a Notice of Intent and submit it to the Westport Conservation Commission for review under the WPA.
- Conduct “rare animal” surveys to determine if this species is present on the reservation.

Table 4.3.2; Goal 4. No Changes

Table 4.3.3; Goal 1. The recommendation to “Finish updating the 1996 Barrier Beach Management Plan” has been rewritten to read “Prepare a Barrier Beach Management Plan; obtain state and municipal agency approval.”

Table 4.3.3; Goal 2. No Changes

Table 4.3.3; Goal 3. No Changes

Table 4.3.3; Goal 4. No Changes

Appendices

Appendix A. Minor additions were made to include the names of those who contributed information during the revision process.

Appendix D. A copy of the Horseneck Beach State Reservation barrier beach plan (DEM 2000) has been added to the RMP.

Appendix E. A copy of the Westport Conservation Commission’s (2009) Order of Conditions for operational maintenance plans for ongoing beach maintenance activities at Horseneck Beach and Gooseberry Neck have been added.

Appendix F. This appendix was identified as Appendix D in the December 2011 public review draft. The sequence of this appendix was changed due to the addition of the new Appendices D and E.

Appendix G. This appendix was identified as Appendix E in the December 2011 public review draft. The sequence of this appendix was changed due to the addition of the new Appendices D and E.

Minor additions were made to this appendix and the sequence of plants and animals was corrected.

Appendix H. This appendix was identified as Appendix F in the December 2011 public review draft. The sequence of this appendix was changed due to the addition of the new Appendices D and E.

Appendix I. This appendix was identified as Appendix G in the December 2011 public review draft. The sequence of this appendix was changed due to the addition of the new Appendices D and E.

Information on BioMap datalayers was updated and information on historic shoreline change spatial data was added.

Appendix J. This appendix was identified as Appendix H in the December 2011 public review draft. The sequence of this appendix was changed due to the addition of the new Appendices D and E.

Appendix K. This appendix was identified as Appendix I in the December 2011 public review draft. The sequence of this appendix was changed due to the addition of the new Appendices D and E.

Both graphs were revised to include only the most recent ten years of data. In addition, updated information (i.e., 2010 and 2011 data) on the number and productivity of piping plovers was added. This was done for data compatibility and presentation reasons. Horseneck Beach data for 1986–2003 includes information on Bakers Beach and the Westport Town Beach (i.e., non-DCR properties). Data presented in the revised figures are now consistent among years and represent only DCR properties, or state or county values. Finally, although older data are of historic interest, more recent data better reflect existing conditions and current trends. Limiting data to the ten most recent years also resulted in clearer presentation and easier interpretation of the most relevant data for conservation planning purposes.

Appendix L. This appendix was identified as Appendix J in the December 2011 public review draft. The sequence of this appendix was changed due to the addition of the new Appendices D and E.

References associated with revisions to this RMP were added or deleted, as appropriate.

Appendix C. Glossary.

Agricultural Preservation Restriction (APR). An APR is a legal agreement that prohibits future uses of agricultural lands that will have a negative impact on their agricultural viability. APRs are used to farmland for agricultural and open space purposes.

Barrier Beach. A narrow, low-lying strip of land consisting of beach and dunes extending parallel to the trend of the coast and separated from the mainland by a fresh, brackish or salt water body or marsh. Resource area protected under the Wetlands Protection Act and Regulations (310 CMR 10.29).

Barrier Spit. A barrier beach that is connected at one end to upland and unconnected at the other end.

Beach. Unconsolidated sediment subject to wave, tidal and coastal storm action that forms the gently sloping shore of a body of water and extends from the mean low waterline (including tidal flats) landward to the dune line, coastal bank line or the seaward edge of coastal engineering structures. Coastal beaches are a Resource Area protected under the Wetlands Protection Act and Regulations (310 CMR 12.27).

Beach Nourishment. The process of replenishing a beach or dune with material (usually sand) obtained from another location, by mechanical or hydraulic means.

Berm. A nearly horizontal upper part of the beach or one sloping away from the ocean.

Coastal Salt Pond. A coastal brackish pond that supports surrounding vegetative communities. Salinities vary within a salt pond dependent upon the natural opening and closing of the protective sand spit. A natural community type in Massachusetts (Swain and Kearsley 2001).

Comprehensive Conservation Management Plan (CCMP). A management plan that focuses on how local government can address non-point source pollution and the cumulative impacts of a region's growth.

Conservation Restriction (CR). A legal agreement, either voluntary or involuntary, designed to restrict use of privately owned land for conservation purposes.

Dredging. The removal of sediment or excavation of tidal or subtidal bottom to provide sufficient depths for navigation or anchorage.

Dune. Any natural hill, mound, or ridge of sediment landward of a coastal beach deposited by the wind or storm overwash; sediment deposited by artificial means and serving the purpose of storm damage prevention and flood control. Coastal dunes are a Resource Area protected under the Wetlands Protection Act and Regulations (310 CMR 10.28).

Ecoregion (i.e. ecological region). A portion of an extensive landscape "with similar geology, physiology, vegetation, climate, and land use history" (EOEA 2006).

Eelgrass. Also called sea wrack. A subtidal marine angiosperm, or 'seagrass', that grows in temperate waters. Eelgrass beds are often highly productive communities, and are ecologically important because they act as a nursery, habitat, and feeding ground for many fish, waterfowl, and invertebrates.

Estuary. A semi-closed body of water with an open connection to the sea that is measurably diluted by freshwater input.

Floodplain. The area of shorelands extending inland from the normal yearly maximum stormwater level to the highest expected stormwater level in a given period of time (e.g. 5, 50, 100 years).

Groin. A narrow elongated coastal engineering structure constructed on the beach perpendicular to the trend of the beach; its intended purpose is to trap longshore drift to build up a section of beach.

High Water Mark. Strictly defined, this is the intersection of the plane of mean high water with the shore. For specific occurrences, the highest elevation on the shore reached during a storm or rising tide, including meteorological effects.

Invasive Plant. A non-native plant that has spread into native or minimally managed plant systems. These plants cause economic or environmental harm by developing self-sustaining populations and becoming dominant and/or disruptive to those systems.

Jetty. A coastal engineering structure constructed perpendicular to the shoreline at inlets; designed to prevent longshore drift from filling in the inlet and to provide protection for navigation.

Legacy Species. When rare species occur either entirely or mostly on DCR properties and nowhere else in Massachusetts, as determined by the Massachusetts Natural Heritage and Endangered Species Program.

Appendix C. Glossary. (Continued)

Littoral Zone. Generally considered to be the zone between mean high-water and mean low-water levels. The sedimentary material moved in this zone by waves and currents, is referred to as littoral drift.

Maritime Shrubland. A natural community dominated by patches of dense shrubs and scattered open areas of low growth or bare ground. This community type occurs along the coast, out of the daily range of salt spray.

Marsh. A wetland dominated by herbaceous vegetation. Marshes often develop in shallow ponds or depressions, river margins, tidal areas and estuaries; in salt, brackish, or fresh water conditions. Prominent among the vegetation of marshes are grasses and sedges.

Mean High Water. The average height of all the high waters recorded at a given place over a 19-year period.

Mean Low Water. The average height of all of the low waters recorded at a given place over a 19-year period.

National Estuary Program (NEP). Established by the U.S. Congress in 1987 to improve the quality of estuaries of national importance, NEPs are described as effective, efficient, collaborative and adaptive community-based programs. Currently there are 28 NEPs in the United States.

National Wild and Scenic Rivers System. Created by Congress in 1968 (Public Law 90-542; 16 U.S.C. 1271 et seq.) to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations. It encourages river management that crosses political boundaries and promotes public participation in developing goals for river protection.

Natural Community. A distinct grouping of plant species that occur together in recurring patterns. Each natural community has: a definite plant species composition, consistent physical structure, and specific physical conditions. Although tracked by the NHESP, they are not legally protected.

Non-native Plant. A plant that is not native or naturally occurring (based on biology, phylogeny, distribution, and current knowledge of the species) within Massachusetts. This term is not synonymous with invasive plant, as only a small percentage of non-native plants are invasive.

Open Space. The Massachusetts Community Preservation Act (M.G.L. Ch. 44B) defines 'open space' as including, but not limited to, land to protect existing and future well fields, aquifers and recharge areas, watershed land, agricultural land, grasslands, fields, forest land, fresh and salt water marshes and other wetlands, ocean, river, stream, lake and pond frontage, beaches, dunes and other coastal lands, lands to protect scenic vistas, land for wildlife or nature preserve and land for recreational use.

Other Power-Driven Mobility Device (OPDMD). Any mobility device powered by batteries, fuel, or other engines, whether or not designed primarily for use by individuals with mobility disabilities, that is used by individuals with mobility disabilities for the purpose of locomotion, including golf cars, electronic personal assistance mobility devices (EPAMDs), such as the Segway® PT, or any mobility device designed to operate in areas without defined pedestrian routes, but that is not a wheelchair.

Overwash. The over topping of a coastal dune by storm waters. Sediment is usually carried with the water and deposited as a fan on the landward side of the dune or barrier.

Primary Dune. Essentially large sand piles built from blowing sand off the beach often held together by vegetation that captures and holds down blowing sand increasing the height and slope of the dune face. It generally has steep seaward and landward facing slopes that are subject to erosion and overtopping by high tides and waves during major coastal storms.

Revetment. An apron-like sloped coastal engineering structure constructed on a bank or fronting a seawall; designed to dissipate the force of storm waves and prevent erosion or undermining of a seawall.

Secondary Dune. A mix of open bare sandy areas and patches of vegetation, from herbaceous plants to salt sculpted scrubby trees and shrubs, that are set behind the primary dune system, making it a more stable environment compared to the primary dune. This protective feature makes it appealing for wildlife use.

Sediment. A solid fragmental material that originates from weathering rocks and is transported or deposited by air, water, or ice; essentially all unconsolidated materials.

Appendix C. Glossary. (Continued)

Tidal Flats. Marshy or muddy land areas that are covered and uncovered by the rise and fall of the tide. Protected under the Wetlands Protection Act and Regulations (310 CMR 10.27).

Upland. A general term for high land or ground that is elevated above the floodplain.

Velocity Zone (V-zone). A flood zone subject to velocity water flooding during a storm with a 100-year recurrence interval, as designated and mapped by the Federal Emergency Management Agency.

Vernal Pool. A seasonally flooded depression best known for the amphibians and invertebrate animals that use them to breed. They typically fill with water in the autumn or winter due to rising ground water and rainfall and remain ponded through the spring and into summer. Vernal pools often dry completely by the

middle or end of summer each year, or at least every few years. Occasional drying prevents fish from establishing permanent populations and preying upon many amphibian and invertebrate species.

Watershed. An area of land, delineated by topographic features, that drains to a common river, lake or ocean. Watersheds provide drinking water, offer recreational opportunities, and help sustain life.

Wrack Line. A line that generally defines the landward limit of high tide or storm wave uprush; typically consisting of seaweed, shells and other submerged organisms that have died. Insects and other invertebrates are present in decaying vegetation along the wrack line, creating a concentrated food source for shorebirds.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000)

**HORSENECK BEACH STATE RESERVATION
BARRIER BEACH PLAN**

May 2000

Commonwealth of Mass.
A. Paul Celucci, Governor

Executive Office of Environmental Affairs
Robert Durand, Secretary

Department of Environmental Management
Peter C. Webber, Commissioner

**Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
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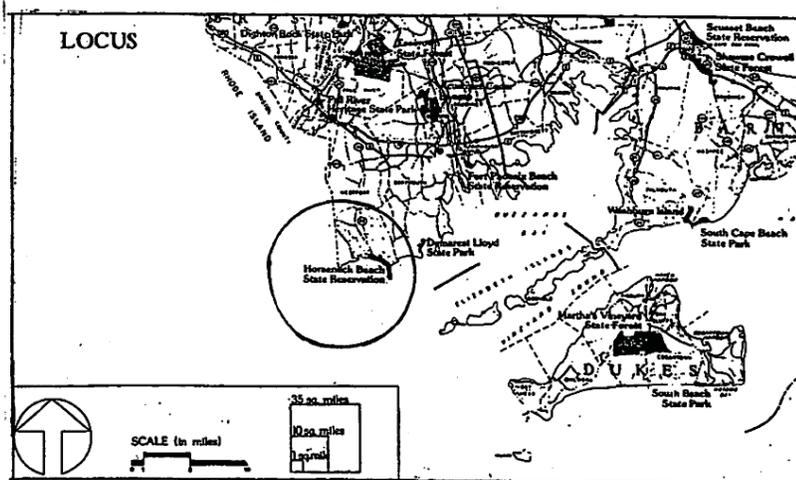
Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

BACKGROUND

Description of the State Reservation

Horseneck Beach State Reservation (HBSR) in Westport, Massachusetts, is located along the Commonwealth's southeastern shoreline just a few miles east of the Rhode Island state boundary. The Westport River enters Rhode Island Sound at the western end of Horseneck Beach adjacent to Horseneck Point. The extensive barrier beach system under the stewardship of the Department of Environmental Management (DEM) plays a critical role in the protection of the Westport River estuary, along with associated salt marsh habitat and important upland resources.

The Commonwealth, through the Department of Public Works (DPW) acquired the 537-acre HBSR in 1956. Mass. DPW developed most of the day use recreation facilities, including the administration and first aid buildings, concession stand, bathhouse and changing rooms, a picnic area, and a parking area that can accommodate 2800 cars. Management responsibility was transferred to DEM in 1968, and a 100-site campground was established in 1972. Almost half of the reservation's four miles of shoreline is a high quality sandy beach that is available for public swimming and water related activities. A boat access is available on the Gooseberry Island portion of the reservation. Visitors also enjoy walking along trails on Gooseberry Island. ORVs, mountain bikes and horses are not permitted on these trails. This combination of resources and facilities make HBSR one of Massachusetts' most popular recreation facilities, with an attendance rate of nearly one-half million people during the summer months.



Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)



Barrier Beach Inventory Project

Executive Office of Environmental Affairs
Massachusetts Coastal Zone Management
Richard F. Delaney, Director

Project Coordinator: Gary Clayton
Geologic Advisor: Jeffrey Benoit

Mass Beach Barrier Beaches subject to Executive Order No. 181.

CZM

Barrier Beach Unit Code System

Wp-3
Small Barrier unit
Barrier Beach Margins

The seaward and landward margins of all barrier beach units extend to mean low water and include contiguous marsh and/or salt flats.

--- no contiguous marsh and/or salt flats are present
--- contiguous marsh and/or salt flats are part of the barrier beach unit

Scale In Feet: 1:40,000
0 1000 2000 3000 4000 5000

North

Inset Map: Massachusetts, showing the location of the study area in the southeastern part of the state.

Westport Quadrangle
Massachusetts - Rhode Island

The geological field research and mapping was compiled and produced under contract with The Provincetown Center for Coastal Studies

Principal Investigator: Lester B. Smith, Jr.
Date of completion: April 1962

Base maps are U.S. Geological Survey Quadrangles - 7.5 Minute Series (Photoreduced)
Department of Public Works, Massachusetts

MASSACHUSETTS DEPARTMENT OF PUBLIC WORKS

The production of this publication was funded by the Office of Coastal Zone Management, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, under a program implementation grant to the Commonwealth of Massachusetts.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

Purpose of the Plan

DEM's primary mission and legal mandate is the protection of natural and cultural resources and the provision of high quality recreational opportunities. DEM is committed to preserving the natural resources of the coastal environment while providing public access, following guidelines of Executive Order 181 on Barrier Beaches (1980), and policies described in DEM's Ocean Beach Restoration Initiative (1988) and the Executive Office of Environmental Affairs' Guidelines for Barrier Beach Management (1994).

The majority of the existing facilities at HBSR are no longer adequate to meet the needs of the many visitors. In August 1996 DEM submitted an Environmental Notification Form for Major Facility Improvements at HBSR. The MEPA Certificate included a directive for DEM to develop a Barrier Beach Management Plan with a focus on the management of rare species habitat. The purpose of this barrier beach plan is to identify resource issues and set guidelines for coastal resource protection, in order to establish a framework within which DEM will conduct sustainable recreation planning and facility improvements. The primary goal for management planning at HBSR is to provide public swimming, camping, picnicking, and environmental education in a safe environment, while protecting the dune system and important ecological features of the reservation.

This barrier beach plan will be submitted with a Notice of Intent (NOI) to the Westport Conservation Commission, with copies to the Department of Environmental Protection and DFW Natural Heritage & Endangered Species Program. The Conservation Commission will review the management activities described in the plan in regards to meeting performance standards of the Wetlands Protection Act. A separate NOI will be submitted related to construction activities associated with major facility improvements.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

Natural History

The Horseneck barrier beach is composed of sediments that were deposited as the glacier receded from this area approximately 12,000 years ago. As sea level gradually rose to the location of the current shoreline, waves and currents eroded glacial deposits, and redeposited the sand to form shoals, beaches and barrier spits. Winds and storm surges redeposited the beach sands to form dunes, and marshes formed in sheltered bays.

Between 5000 and 3000 years ago the Horseneck barrier system formed as rising sea level eroded offshore ledges and glacial headlands. The large ground moraine of glacial drift, which is referred to today as Gooseberry Island, provided a source of easily erodable material for the formation of the barriers. During the early stages of development, the beaches were part of a transgressive barrier system, which gradually built upward and moved landward as sea level continued to rise (Fitzgerald et.al. 1992).

The rate of sea level rise decreased approximately 2800 years ago (Redfield & Rubin 1962), and combined with abundant offshore sediment sources, this resulted in the continued growth and dynamic stability of the Horseneck barrier beach system. The Horseneck barrier is a dynamic system that continues to evolve as a result of complex interactions between waves, winds, tides, longshore currents, currents associated with inlets and the Westport River estuary, and the gradual rise of sea level.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

The Barrier Beach System

The barrier beach is generally composed of the foreshore, a sloping portion facing the ocean, and the backshore, stretching from the berm crest to the dunes. The berm is the region most directly affected by waves during storms and is therefore quite unstable. The dune zone consists of a single dune ridge, which into the barrier flat. The barrier flat is a wide plain supporting beach grass and shrub thickets. The following diagram (Godfrey 1976) depicts a typical barrier beach environment, and the accompanying map shows Horseneck Beach with vegetation zones.

HBSR includes the eighth largest barrier beach in the state, and the largest on state-owned land. The beach acts as a barrier between Rhode Island Sound and the Westport River estuary. The tidal flats, beach, the dune system that has developed between the beach and the salt marsh, and all associated water bodies are the key components of this extensive barrier.

[Insert photocopy of text from top of page 8 - Horseneck sustainable document]

As a barrier beach, HBSR plays a significant role in providing storm protection for both humans and wildlife in the Westport River harbor and upland areas behind the barrier. In addition, the barrier beach provides plant and wildlife habitat for many different species, including several that are listed as Threatened, Endangered or Special Concern according to state and federal Endangered Species Acts.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

REGULATIONS & POLICIES

Protection of the resources associated with the HBSR barrier beach system will be managed under the guidelines of the following laws, regulations, policies and permitting requirements.

Wetlands Protection Act

The beach/sand dune habitat is composed of sandy and cobble beaches, sand dunes, and barrier beach all of which are legally defined as wetlands under the Massachusetts Wetlands Protection Act (M.G.L/ c.131 s.40) and are called coastal beach, coastal dune and barrier beach respectively. The Wetlands Protection Act regulates the many activities that may occur at Horseneck Beach State Reservation including:

- construction of buildings, walkways, roads, parking areas and other facilities
- beach nourishment and dune construction or restoration projects; and
- beach cleaning activities involving heavy equipment

Management of these activities is addressed in the *Recommended Conditions for Activities on Barrier Beaches* (June 1993) established by the Massachusetts Department of Environmental Protection and included in the Guidelines for Barrier Beach Management in Massachusetts Office of Coastal Zone Management. The *Recommended Conditions* are included as Attachment B, Appendix B.

Massachusetts Endangered Species Act, Federal Endangered Species Act, Federal Migratory Bird Treaty Act

The resource system at Horseneck Beach State Reservation includes areas defined by the Department of Fisheries and Wildlife's Natural Heritage and Endangered Species Program as habitat for piping plovers and terns. These areas are regulated by the Massachusetts Endangered Species Act, 321 CMR 10:00-10:70, the Federal Endangered Species Act, and the Federal Migratory Bird Treaty Act, U.S.C., 1936, amended 1978, Sections 703-711. These regulations and their implementation are addressed in the *Guidelines for Managing Recreational Use of Beaches to Protect Piping Plovers, Terns, and Their Habitats in Massachusetts* established by the Massachusetts Division of Fisheries and Wildlife and included in Appendix B. U.S. Fish & Wildlife Service guidelines for protecting rare shorebird habitat are also included in Appendix B.

Massachusetts Environmental Policy Act (MEPA)

M.G.L. c.30 ss.61-62H requires that all agencies of the Commonwealth determine the impact on the natural environment of all works, projects, or activities conducted by them and use all practicable means and measures to avoid or minimize environmental harm that has been identified. The Horseneck Beach State Reservation barrier beach plan and facilities master plan must be reviewed under MEPA with an Environmental Impact Report.

M.G.L. c.91 - (310 CMR 9.00)

Regulations concerning public rights to shorelines and tidal areas.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000). (Continued)

New Title V Standards

The Department of Environmental Protection established new Title V standards that are effective as of March 31, 1995. The standards are detailed in 310 CMR 15.00. Revisions apply to construction in velocity zones and regulatory floodways (310 CMR 15.213). In particular, the revisions regulate placement of septic tanks and construction of soil absorption systems in velocity zones on coastal beaches, barrier beaches, dunes and regulatory floodways.

State Building Code

The Massachusetts State Building Code, 780 CMR, Section 2102, details the regulations for Flood Resistant Construction.

FEMA Flood Insurance Zone Regulations

Flood Insurance Zones and flood plain management measures were developed for the Horseneck Beach State Reservation area in July 1992 by the Federal Emergency Management Agency (FEMA). The study investigated historic flood elevations, estimated shoreline levels considering stillwater and wave run-up for various frequency storms and projected inland propagation of the storm surge.

The attached map (Figure 2) shows the various Flood Insurance Zones within Horseneck Beach State Reservation as established by this study. The following provides a further description of the zone designation:

Zones AI-A30 Special Flood Hazard Areas - Areas of 100 year flood; base flood elevations and flood hazard factors determined.

Zones VI-V30 Special Flood Hazard Areas - Area of 100 year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

Zone B Areas between the Special Flood Hazard Area and the limits of the 500 year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; also, areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than one square mile. Zone B is not subdivided.

Executive Order 181: Barrier Beaches (1980)

This Executive order established statewide policies to mitigate future storm damage to the Commonwealth's barrier beach areas.

DEM's Ocean Beach Restoration Initiative: Sandcastles & Sandpipers

In 1988 DEM completed this comprehensive coastal planning and design guide for developing and managing ocean beach recreation areas.

Guidelines for Barrier Beach Management in Massachusetts

The Massachusetts Coastal Zone Management Office (MCZM), published the Guidelines in 1994 to serve as a reference tool to those charged with the responsibility of preparing, reviewing and implementing barrier beach management plans.

**Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)**

Massachusetts Acts and Resolves of 1983, Ch.589, Section 17, 310 CMR 9.00
Measures for the protection of the Massachusetts coastline.

Executive Office of Environmental Affairs – Massachusetts Coastal Zone Management
301 CMR 20.00 – 22.00 .

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

RESOURCE PROTECTION ISSUES

DEM's management of HBSR will strive to balance protection of the reservation's sensitive natural resources, with the need to enhance public recreation opportunities.

This section identifies and describes the significant resource protection issues at Horseneck Beach.

- ◆ Storm damage protection & storm-related maintenance.
- ◆ Dune stabilization and protection.
- ◆ Rare species protection and habitat management.
- ◆ Westport River protection.
- ◆ Wildlife management.
- ◆ Groundwater protection.

The Department addresses these issues with the assistance of several resource protection partners to meet the management needs of the coastal and upland resources at Horseneck Beach. A list of partners is provided in the appendices.

Additionally, these issues will be an integral component of the Department's environmental education and interpretive programs at Horseneck Beach.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

Dune Stabilization and Protection

Many of DEM's natural resource management and protection measures at HBSR focus on the dune area. The Massachusetts Wetlands Protection Act defines coastal dune as "...any natural 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." Dunes are the key natural component in a barrier beach system, since these sandy formations are the major component of the barrier, which in most cases prevent damage to natural or developed areas behind the dunes.

HBSR benefits from the existence of a heavily vegetated and expansive dune system that covers more than half the total acreage of the reservation. Dune vegetation traps windblown sand, stabilizing the dunes and preventing the sand and other debris from covering developed portions of the property.

DEM is designing a system of elevated boardwalks to provide pedestrian access to the main beach area while minimizing impacts to the dune system. The elevated boardwalks can also be used to provide platforms for year-round scenic viewing and interpretive opportunities.

The Department's dune protection and stabilization efforts have recently been subsidized by the Federal Emergency Management Agency (FEMA). HBSR is eligible to receive FEMA funding for improvements related to storm damage. FEMA Hazard Mitigation Funding for Hurricane Bob (1992) has resulted in over \$100,000 in funding for the installation of new boardwalks, dune restoration and interpretive signs at Horseneck Beach. Also, as part of the current facility rehabilitation and improvement project, campsites will be relocated off of the primary dune, allowing a natural restoration process for the dune system that may be enhanced with beach grass plantings.

Lastly, DEM is working to enhance dune protection by providing opportunities for environmental education. Platforms or resting areas with benches along boardwalks can provide sites for interpretive programs or signs that educate visitors regarding significant natural resources, such as dune vegetation or rare nesting birds. Currently, wherever access to the dunes is restricted, signs are in place to explain the rationale for protection.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

~~MANAGEMENT RECOMMENDATIONS~~

- DEM will maintain and, where necessary, rehabilitate boardwalks in existing locations, and establish new elevated boardwalks to facilitate public access to the main beach area, and eliminate pedestrian activities in the dunes. The boardwalks will be elevated at least two feet above the dunes to allow for dune growth and migration. (See Master Plans for Proposed Facilities in the Facility Improvements section, pages 27 & 28, for boardwalk locations.)
- An interpretive plan for HBSR will include education related to dune systems and barrier beaches. By educating residents and visitors about the importance of dune dynamics, DEM will strive to increase public awareness and stewardship attitudes towards these coastal resources.
- DEM will continue to use planting of dune grass and add additional native beach species to increase the stability of the dune system.
- DEM will continue to collaborate with its resource protection partners and volunteers to supplement the natural plants with occasional dune and beach grass plantings, in areas that will not adversely effect piping plover nesting habitat. Fore-dune stabilization with planting of beach grass and other native species will be concentrated in areas located seaward of recreation facility structures to provide additional protection from storm tides.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

Rare Species Protection and Habitat Management

The protection of rare and endangered species, and the related management of their habitat at Horseneck Beach, is done in cooperation with the Division of Fisheries and Wildlife (DFW), Natural Heritage and Endangered Species Program (NHESP). DEM has established management policies and departmental regulations that comply with the *Guidelines for Barrier Beach Management*.

Recreational off road vehicles (ORVs) are expressly prohibited at Horseneck Beach State Reservation. Currently, this prohibition is well known and recreational ORVs are not a management issue at Horseneck Beach. Only those vehicles necessary for maintenance or emergency purposes are allowed on the beach (see Appendix A and page 10 of the Massachusetts guidelines in Appendix B).

The primary rare species concerns at Horseneck relate to shorebirds that are recognized as rare or endangered at the state or federal level. Piping Plover use portions of Horseneck Beach for feeding and nesting, and Least Tern find food at the Reservation. Currently management issues related to the birds and their habitat is handled by the Reservation staff in cooperation with the Lloyd Center for Environmental Studies.

Typically, nest sites have been concentrated at either end of the main beach. There was also one occurrence of a nest site in the west parking lot of the day use area. Lloyd Center surveys show that HBSR has been the most important plover nesting site in Bristol County over the last ten years, supporting up to sixteen breeding pairs per year. The 1999 season was the most successful to date, producing forty-two fledged chicks from fifteen nests. Figure 3 indicates the location of nesting sites in 1999.

Piping Plovers nest on coastal beaches above the high tide line, on sand flats at the end of sand spits, on gently sloping foredunes, and in blow-outs or overwash areas between or behind coastal dunes. Its nest is a simple scrape in the sand or mixtures of sand, gravel and shells. The nest is typically placed on open sand or in patches of sparse to moderately dense beach grass and other dune vegetation. Recent Lloyd Center studies indicate that the unvegetated berm, the vegetated berm, and the vegetated foredune are equally important nesting habitat areas at HBSR. The nesting periods of the Least Tern are similar to those of the Piping Plover. However, terns nest in colonies while plovers nest in isolated pairs.

In addition to the rare birds, scientists have recently discovered a number of Northeastern Tiger Beetles at HBSR. This species is classified as Threatened by the U.S. Fish & Wildlife Service, and as Endangered by Massachusetts DFW (NHESP). The management measures recommended by NHESP to protect the shoreline habitat for the Tiger Beetle are similar to those already practiced by DEM to protect habitat of the Piping Plover (see Appendix B).

DEM's current management practices for HBSR includes, cleaning of the shoreline area as needed along the intensively used portion of the beach in front of the lifeguard stations, to enhance public safety and enjoyment of Horseneck beach. This occasional practice temporarily removes the wrack line. The wrack is an important source of food for both rare and common

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

shorebirds, and also helps to trap sand, contributing to dune formation. In most weather conditions, the wrack is replenished on the beach within several hours. The wrack is removed by DEM when it has become dry and buggy, but is left undisturbed during the off-season.

DEM considers the habitat issues at HBSR as a dual challenge: 1) to manage species listed as rarities, 2) to protect species which have recently recovered in numbers. HBSR has played an important role in the successful recovery of the Osprey. The work of volunteers, who have erected Osprey nesting towers in several locations, has been a key element in this recovery. This area supports nearly half of the entire population of Osprey in Massachusetts.

MANAGEMENT RECOMMENDATIONS

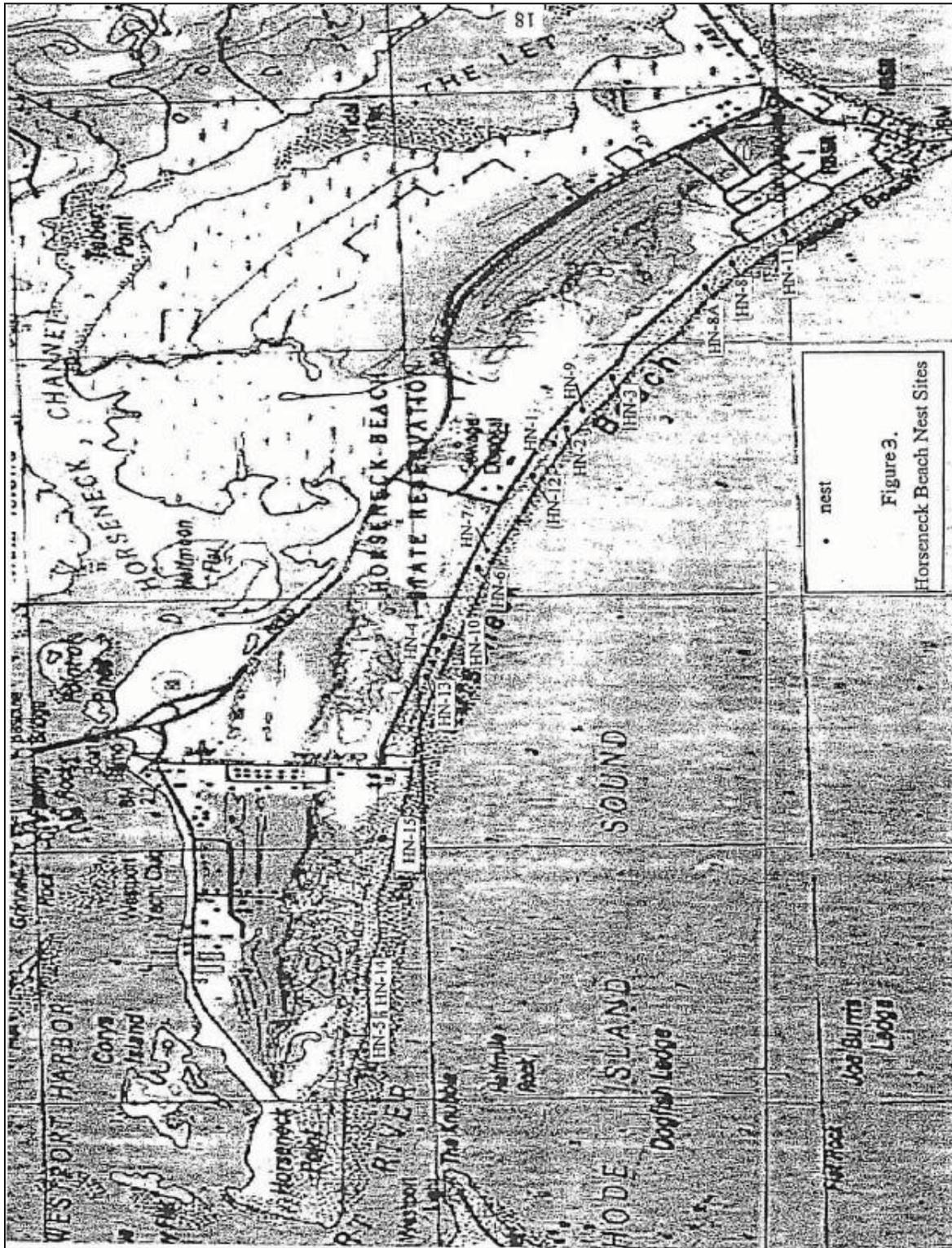
- Prohibition of ORV use will continue.
- Fireworks may be allowed by Special Use Permit, but not during the nesting season.
- Nests and chicks shall be monitored and protected from pedestrians and vehicles as required by the Wetlands Protection Act and the Massachusetts Endangered Species Act (see Appendix B, pages 7 - 10, Massachusetts guidelines).
- ~~DEM will continue to request annual funding for plover~~ monitors, and will cooperate with the Lloyd Center to monitor HBSR for nesting sites. At least one qualified person is needed to monitor the abundance, distribution, and reproductive success of Piping Plovers, seek to determine causes of nest and chick loss, and to provide protection to rare shorebirds, their nests and habitat. The monitors will help provide technical assistance to DEM staff regarding rare shorebird management issues. At least one monitor should be present on the beach at least 5 days per week, including both weekend days, between mid-April and late-May, and 7 days per week from Memorial Day through mid to late-August.
- DEM will continue to request funding for necessary materials and staff to implement appropriate nest protection measures, including symbolic and predator exclosure wire fences around nests. A symbolic refuge area, up to 50-foot radius where feasible, will be provided around nests, and public access will be restricted from mid to late-April through August 15. Interpretive programs will also be used to raise awareness for rare shorebird protection.
- In order to maintain credibility and effectiveness of symbolic fencing, the fencing will be removed after the birds leave the area.
- DEM will take necessary steps to protect nests that may unexpectedly be established on paved areas of HBSR.
- During the winter, snow fencing is in place midway between the ocean and the day use recreation facilities for beach stabilization. In the spring, the fencing is removed and used to protect potential shorebird habitat in a refuge area

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

between the day use and camping areas. The fencing will be moved as early as possible in the spring, contingent on seasonal staffing availability.

- DEM will continue to train lifeguards and other seasonal staff to assist in protecting nest sites by educating visitors about the purpose of symbolic fencing, to prohibit kite flying within 200 yards of nests, and to prohibit visitors from bringing dogs to the Reservation from March 1 through October 15 (CMR change required).
- DEM will continue to manage the beach, from east of the day use facilities to an area west of the campground, as a shorebird refuge area, using symbolic fencing, signs and the other techniques listed above.
- Interpretive programs can be used to increase public awareness and stewardship for rare shorebirds.
- During the active recreation season, DEM rakes the wrack line and other debris from the most heavily used day use visitor area of the beach on nearly a daily basis. This is an important management activity related to public safety, including access for rescue operations. Whenever feasible, DEM will move a portion of the organic wrack materials to shorebird habitat areas to enhance the cover and foraging substrate.
- Northeastern Beach Tiger Beetles have been found to occur at the far western end of HBSR. In order to avoid mortality of adult beetles or larvae, vehicles used for law enforcement and trash removal at the western end of the beach should drive only on the upper beach paved access road, except in emergency situations. The wrack line will be left untouched during the off-season, and bulldozing of sand will be conducted as necessary for maintenance related to public health and safety.
- DEM will continue to cooperate with organizers of the Osprey Recovery Project, to develop a stronger network of volunteers to improve data collection related to predation and nest failures.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

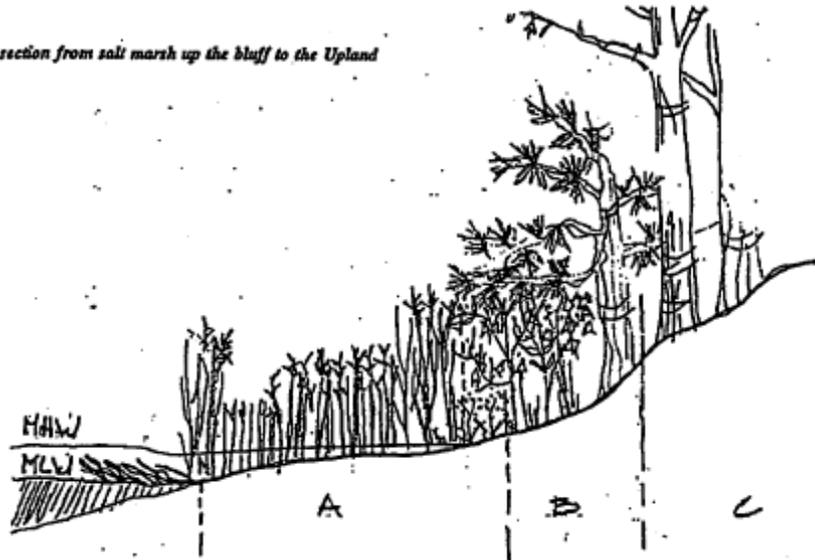


Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

Westport River Protection

HBSR includes nearly fifty acres of land behind the dunes that is adjacent to the Westport River. This area includes a salt marsh, portions of the East Branch of the Westport River and its tributaries, and a trail through a linear strip of pitch pine and scrub oak trees. Shellfish are harvested in the estuary near HBSR and bird hunters use the salt marsh in this area. DEM has not yet established programming in this area of the reservation.

Typical section from salt marsh up the bluff to the Upland



<u>ZONE</u>	<u>DESCRIPTION</u>	<u>SPECIES</u>
A	SALT MARSH	Spartina sp. Juncus sp.
B	SLOPE ON BLUFF	Zosteria marina Pinus rigida Juniperus virginiana Iva frutescens
C	UPLAND TREES	Myrica sp. Quercus sp. Acer sp. Carya sp.

The Westport River portion of the reservation is important for several reasons. It provides significant habitat for the fish-eating osprey, which has recently recovered in numbers. The presence of osprey, along with a variety of other birds and mammals in the salt marsh and mud flats, are indicative of the constantly improving ecology of the Westport River. Herons, egrets, willets, and black-bellied plovers are among the species that now thrive in the area. The Westport River Watershed Alliance is an important partner in the conservation and protection of the river, marsh, mud flats and woodland strips at the northern end of HBSR.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

MANAGEMENT RECOMMENDATIONS

- DEM will establish interpretive programming for the area adjacent to the Westport River to increase awareness of river protection issues.
- DEM will continue to encourage the strong partnership with the Westport River Watershed Alliance. Cooperative educational programs will reinforce the importance and ecological significance of this area.
- DEM will maintain a management presence on the north side of John Reed Road in the horse barn and related facilities.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

Wildlife Management

HBSR provides habitat for many different wildlife species. DEM, assisted by partners such as the Lloyd Center for Environmental Studies in nearby Dartmouth, manages the reservation's wildlife species, especially those classified as Threatened or Endangered, using measures recommended by NHESP. In addition, the reservation plays a significant role in conserving native wildlife because sufficient acreage, cover and biological diversity are available to encourage the presence of a variety of birds, mammals (terrestrial and marine), insects and invertebrates.

The shoreline not only accommodates rarities, but also hosts numerous species of more common coastal waterbirds, including sandpipers, sanderlings, oystercatchers and dowitchers. The dunes accommodate fox, skunk, squirrel, raccoon and deer. The ocean waters off the beach provide sightings of occasional grey seals and feature several species of gulls as well as a variety of seabirds, such as loons, eiders and scoters.

The Westport River hosts species that prefer the salt marsh, including herons, egrets, willets, and black-bellied plovers. Many other wildlife species find habitat on the marsh and mud flats, including tree swallows, rough-winged swallows, brown bats, and a variety of invertebrates, such as coffee bean snails, stone crabs and periwinkles.

Management practices differ at Gooseberry Neck, where autumn and winter hunters pursue the northern bobwhite (quail) or eastern cottontail rabbit. Hunting of these species is a form of management, which serves to keep populations of game species somewhat in balance with the area they inhabit.

The migration of wildlife is one of the evolutionary miracles of natural history. Marine mammals, migratory mammals such as the brown bat, and especially migratory birds, have probably been breeding and feeding, nesting and resting at Horseneck Beach for ten to twelve thousand years.

On occasion DEM may have to remove or bury marine mammals that have washed up on the beach. Mammals that are found still alive receive necessary care and attention, usually under the leadership of the New England Aquarium marine mammal scientists. Many of the agency's resource protection partners regularly assist in efforts to revive and/or transport such animals - either back to the sea or to the aquarium. Dead animals or sea creatures that are found washed ashore are either buried in a remote portion of the property, or removed by Environmental Police Officers.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

MANAGEMENT RECOMMENDATIONS

- DEM will continue to work with the Division of Fisheries and Wildlife, through the Bournedale District Office, to manage hunters, game species and surf fishing.
- DEM will manage the reservation to sustain the diversity of habitats that provide food sources and vegetative cover for both the native and resident species, and for those migrants that prefer HBSR.
- DEM will continue to work cooperatively with our Resource Protection Partners (Appendix C) to conduct wildlife management activities in the Reservation.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

LAND STEWARDSHIP ZONING

A Land Stewardship Zoning system has been developed by all the land managing agencies within the Executive Office of Environmental Affairs, i.e. the Department of Food & Agriculture; the Department of Fisheries and Wildlife; the Metropolitan District Commission; and the Department of Environmental Management. The system is intended to increase the consistency of management across all state-owned conservation land, and to improve interagency cooperation, especially in areas where two or more state agencies manage closely related properties.

The zoning classification system guidelines make it possible to regulate activities within certain areas so that sensitive and significant resources are protected. In addition, it is possible to guide future development and improvements to sites that can tolerate intensive use.

ENVIRONMENTAL PROTECTION ZONE: Highly sensitive areas requiring a high degree of protection, such as steep erodible slopes, unique wetland areas, or fragile archeological sites are within this zone.

CONSERVATION ZONE: Areas in this zone are moderately sensitive, and may include managed woodlands, water resources, wildlife habitats, and agricultural resources. Opportunities for dispersed recreation are provided within this zone.

INTENSIVE USE ZONE: Areas where resources can accommodate high levels of visitor use, and associated structures or maintenance facilities.

The management guidelines that correspond to the land stewardship zones are included in detail in the Appendices.

In addition to these zones that are based on the sensitivity of natural and cultural resources, some resources are noted on federal, state, regional or local lists and registers, such as endangered species lists and historical registers, or have attributes of statewide importance related to public recreation. These significant resources are identified under DEM's zoning system and will be managed according to guidelines and recommendations from the listing agency.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

The zoning classification for Horseneck Beach State Reservation is as follows:

Environmental Protection Zone: Primary dune system and salt marsh.

Conservation Zone: Undeveloped back dune area, and most of Gooseberry Island.

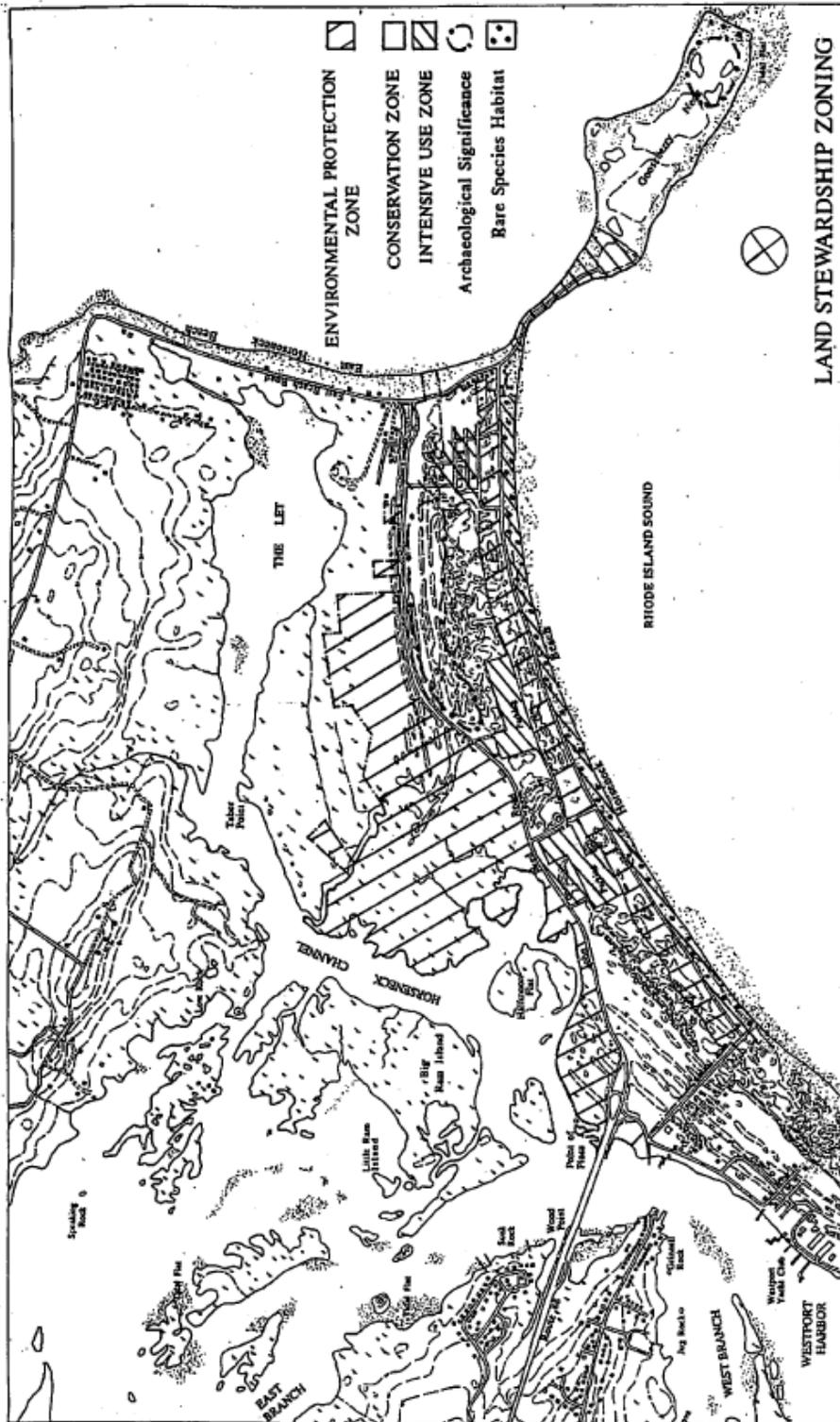
The Public Archaeology Lab, Inc. (PAL) conducted an archaeological reconnaissance survey in 1998. The report is included in the appendices of the DEIR and indicates an area of high archaeological sensitivity in the back dune area between the east parking lot and the campground, and another near the tip of Gooseberry Island. These areas are in the Conservation Zone with a significance overlay to recognize the potential archaeological resources. The area will be managed following guidelines and recommendations included in the PAL report and from the Massachusetts Historical Commission.

Intensive Use Zone: Administration, parking (including Gooseberry Island parking), camping, and the swimming beach are included in this zone.

The entire beach includes a significance overlay recognizing the rare shorebird habitat, with specific management considerations described in this plan within the section Rare Species Protection and Habitat Management.

The zoning classification for HBSR highlights the beach, an area characterized by intensive visitor use that is also rare species habitat, as the greatest challenge and a focus for resource stewardship.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
 (Continued)



Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

ROUTINE MANAGEMENT & MAINTENANCE

Several tasks that are conducted by DEM staff on a regular basis could potentially have an impact on coastal resources. These activities should be reviewed and conditioned by the Westport Conservation Commission. Routine park management includes: ATV patrols of the beach by EPOs and park staff; removal of unsafe debris from the wrack line; using mechanical equipment to clean and rake the intensively used portion of the beach in front of the lifeguard stations approximately twice per week during the recreation season; litter pick-up; trash removal from containers located in the parking areas, next to the food concession and comfort stations; seasonal installation and removal of fencing; annual removal of drifted sand from snow fence on the seaward side of the paved access road and spread back to beach; periodic removal of drifting sand from paved surfaces and boardwalks; removal of sand from catch basins, drainage pipes and discharge swales; maintenance and repair of water supply and sewage treatment systems, roads, parking lots, boat ramp, and boardwalks.

MANAGEMENT RECOMMENDATIONS

- Patrol ATVs should be ridden at very low speeds when adjacent to symbolic fences and the refuge area. ATVs should avoid the wrack line whenever possible and travel along tidal flats rather than higher beach areas (see page 10 of Appendix B).
- Leave sufficient wrack on the beach to provide seed source, nutrient source and foraging habitat for shorebirds. Only the amount of material that is a public health or safety hazard should be removed. Detritus in the wrack line should not be removed from the refuge area, and if removed from other areas, should be redeposited close to nesting sites as a food source and to deter people from entering the habitat areas.
- Remove litter from the beach on a daily basis and encourage the carry in / carry out policy for beach visitors.
- Follow Best Management Practices for maintenance of roads, parking lots, catch basins, bridges and culverts.
- Dead or injured marine animals are occasionally discovered along the beach. Park personnel should contact the Division of Fisheries and Wildlife and the New England Aquarium to request necessary care for injured marine mammals. Dead animals or fish will either be buried in a remote location within the Reservation or removed by EPOs.
- Also, please refer to the Rare Species Protection and Storm Related Maintenance sections for additional routine activities

A Notice of Intent will be submitted to the Westport Conservation Commission with this barrier beach plan attached, referencing these routine maintenance activities. The Order of Conditions for protection of coastal wetland resources will be valid for a three-year period, and can be extended with approval from the conservation commission.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

FACILITY IMPROVEMENTS

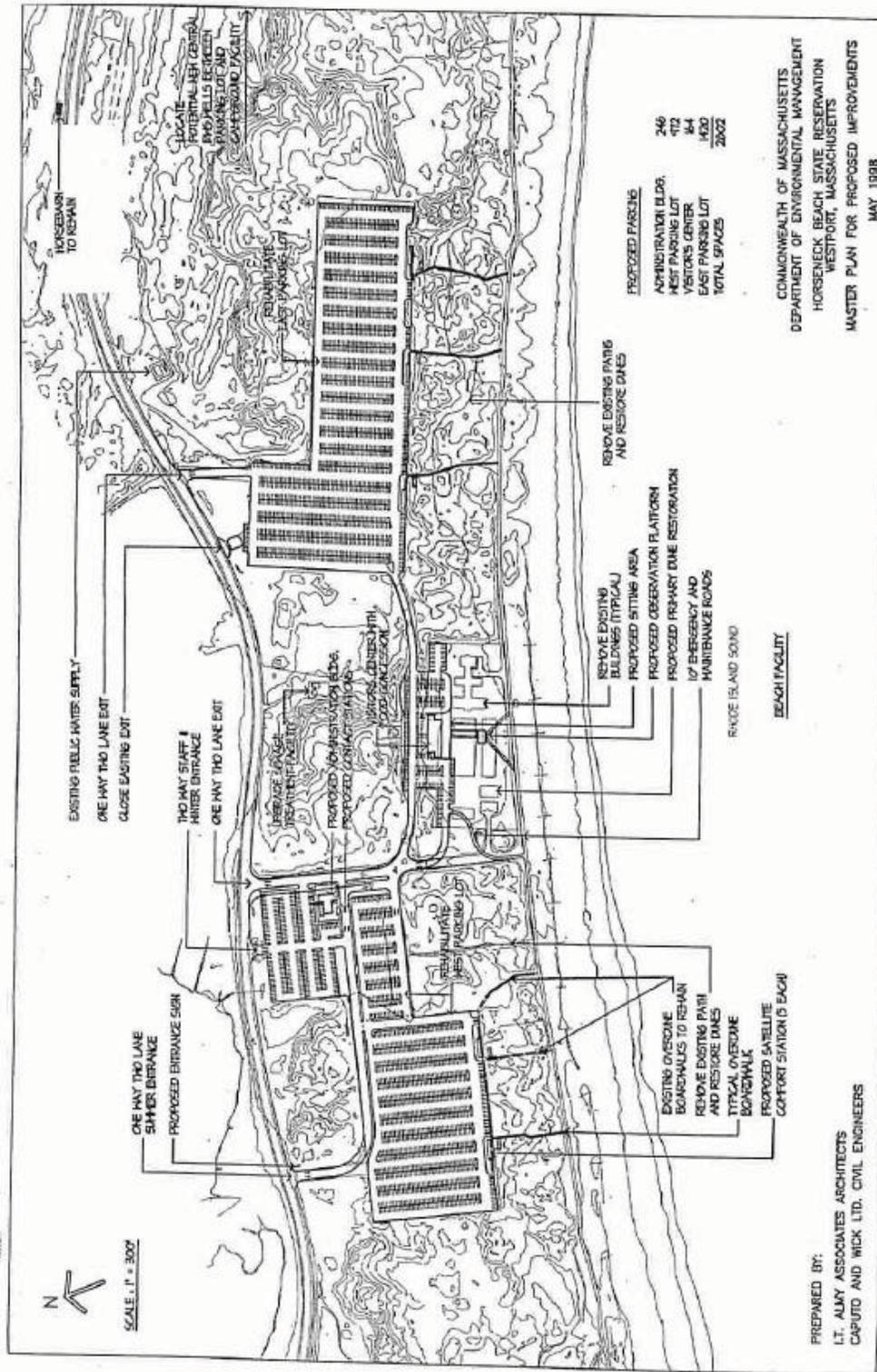
Horseneck Beach State Reservation has facilities for visitor services, park administration and maintenance. Most of the existing facilities at the day use beach area were constructed during the 1950s. All of the campground structures were built in 1972. The existing facilities have been evaluated for compatibility with park programs, visitor needs, structural conditions, and resource protection issues. Almost all of the existing facilities require improvements to meet the current needs of the reservation.

New facilities (DEIR Sect. III, pp. 2-5) are evaluated related to siting (DEIR Sect. VI, pp. 1-7), environmental impacts (DEIR Sect. VI, pp. 11-23), and mitigation (DEIR Sect. VI, p. 25). In general, any new structure or rebuilding of existing structures in the Velocity Zone would need to comply with Section 2102.4 of the State Building Code, and guidelines of the Massachusetts Wetlands Protection Act intended to allow natural dune migration. This section requires that structures be elevated on adequately anchored pilings or columns, so that the lowest portion of the structure is elevated above the one hundred-year flood level.

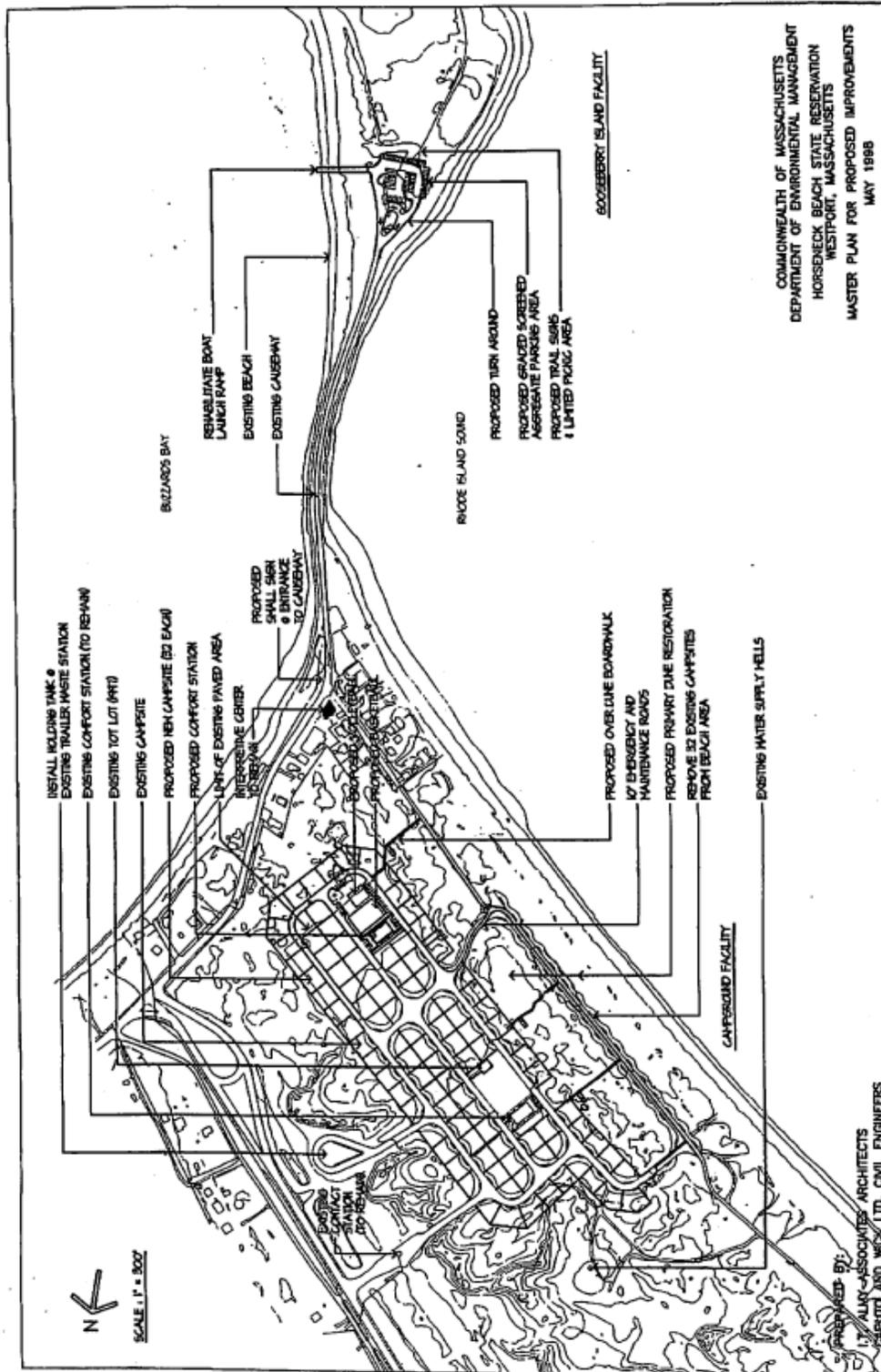
MANAGEMENT RECOMMENDATIONS

- In an effort to further protect the shore and dune system at Horseneck Beach, DEM is committed to concentrating structures and facilities in centralized areas where the primary dune meets the 540 square foot cross-section rule-of-thumb, and avoiding additional disturbance of the primary dune.
- All proposed elements will be located out of the Velocity Zone with the exception of the lifeguard stations.
- All new buildings will be located behind portions of the primary dune that meets the 540 square foot rule.
- Construction activities will be staged to allow for protection of rare species and to allow the beach to remain open during the recreation season.
- Boardwalk elevations will take into consideration potential dune migration and restoration.
- Construction activities associated with the major facilities improvement project will be covered by a separate Notice of Intent filed with the Westport Conservation Commission.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)



Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)



**Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)**

APPENDIX A

DEM and Official Vehicle Use on the Beach

Please fill out a separate form for each management activity at your park that involves the use of a vehicle on the beach. Do not combine different activities on the same form. For items 3, 4, and 5, check off all that apply.

Park/Reservation: Horseneck Beach

1. Activity: Lifeguarding Function

2. Brief Description of the Activity: Used to patrol beach and assist with rescues.
All lifeguard activities.

3. Type of Vehicle:

<input type="checkbox"/> 1/2 ton pick up	<input checked="" type="checkbox"/> 4 wheel ATV
<input type="checkbox"/> trash packer truck	<input type="checkbox"/> 3 wheel ATV
<input type="checkbox"/> 3/4 ton stake truck	<input type="checkbox"/> tractor
<input type="checkbox"/> front end loader	<input type="checkbox"/> private vehicle
<input type="checkbox"/> rescue vehicle	<input type="checkbox"/> other - what?
<input type="checkbox"/> beach cleaner	

4. Type of Use:

<input checked="" type="checkbox"/> emergency/rescue	<input type="checkbox"/> winter snowfence setup
<input type="checkbox"/> environmental police	<input type="checkbox"/> winter snowfence removal
<input type="checkbox"/> municipal police	<input type="checkbox"/> beach grass planting
<input type="checkbox"/> garbage collection	<input type="checkbox"/> rare species monitoring
<input type="checkbox"/> beach cleaning	<input type="checkbox"/> rare species protection
<input type="checkbox"/> storm cleanup/repair	<input type="checkbox"/> handicapped access
<input type="checkbox"/> spring setup(boardwalks, etc.)	<input type="checkbox"/> other - what?
<input type="checkbox"/> end-of-season removal(boardwalks, etc.)	

5. Where on Beach Is Vehicle Driven:

<input checked="" type="checkbox"/> along water's edge	<input checked="" type="checkbox"/> above high tide
<input checked="" type="checkbox"/> at wrack line(high tide line)	<input checked="" type="checkbox"/> along edge of dune
<input checked="" type="checkbox"/> in wet sand area	<input checked="" type="checkbox"/> in or through dunes

6. Season of activity(or from what date to what date): From opening day to
closing date.May to Sept.

7. Frequency of use(how often), time(s) of day: Used 7 days a week from 9:00 A.M.
5:00 P.M. From opening date to closing date.

8. Can this activity be done in a different way, or without a vehicle? _____
If so, how? An ATV is more practical

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

APPENDIX B



Natural Heritage &
Endangered Species
Program

Commonwealth of Massachusetts
Division of Fisheries & Wildlife
100 Cambridge Street
Boston, MA 02202
(617) 727-9194

MASSACHUSETTS ENDANGERED WILDLIFE

Northeastern Beach Tiger Beetle
(*Cicindela dorsalis dorsalis*)

DESCRIPTION: The Northeastern Beach Tiger Beetle is an active coastal predator, approximately 13.0 to 15.5 mm (0.5 to 0.6 inches) in length, with a bronze green head and thorax, long slender legs, and white or tan elytra (wing covers) which are often finely imprinted with dark lines. Tiger beetles are so named because of their "tiger-like" behavior of chasing down prey and capturing the victims with their long mandibles.

The larval form of the Northeastern Beach Tiger Beetle is pale in color, with one pair of antennae on the head; an iridescent black and green pronotum (analogous to a "neck") covered with setae (hairs), and a long segmented abdomen.

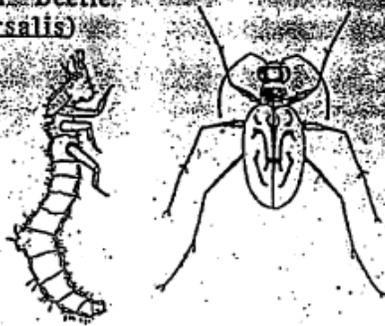
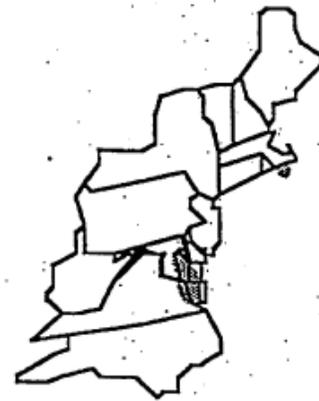


Illustration of adult beetle by Josephine Thoms, 1989
Illustration of larval beetle from Dillon & Dillon,
Common Beetles of Eastern North America, 1972

SIMILAR SPECIES IN MASSACHUSETTS: The Northeastern Beach Tiger Beetle is one of four subspecies of *C. dorsalis*; however, none of the other three subspecies occurs in Massachusetts, and it is not easily confused with other tiger beetle species occurring in the state. *Cicindela hirticollis* is found on coastal beaches, including the single beach in the state inhabited by *C. dorsalis dorsalis*; however, its elytra are much darker and differently patterned. *C. lepida* more closely resembles *C. dorsalis dorsalis* because it also has white elytra but its body is more slender and much smaller in size; furthermore, this species has been documented in the state only once, over 75 years ago.

RANGE: The Northeastern Beach Tiger Beetle is very restricted in range. Historically it could be found along the Atlantic coastline from Massachusetts to Virginia. Today, it is found only at the extremes of its former range, in the Chesapeake Bay area adjacent to Maryland and Virginia, and a single beach on one of Massachusetts' offshore islands.

HABITAT IN MASSACHUSETTS: In general, *C. dorsalis dorsalis* requires large, highly exposed beaches with fine sand particles and a low amount of human disturbance. The sole population of Northeastern Beach Tiger Beetles in Massachusetts inhabits an exposed offshore barrier beach, ranging in width from 15.5 to 34 meters (50' to 110 feet), with a mixture of high, well defined dunes and low, unstable dunes at the upper end of the beach. The predominant form of vegetation on the dunes and upper beach is beach grass (*Ammophila breviligulata*). The beach is relatively pristine and undisturbed by human activities.



Current Range of
Northeastern Beach Tiger Beetle

(continued overleaf)

1991

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

(Northeastern Beach Tiger Beetle, continued)

LIFE CYCLE / BEHAVIOR: Emergence of adult Northeastern Beach Tiger Beetles occurs from early June to mid-August, peaking in mid-July. The adults forage in the intertidal zone where they scavenge on dead fish and prey on invertebrates for much of their food. They are primarily diurnal, but they are also quite active at night from mid-July to late August. Mating occurs from late July to early August, after which the female Northeastern Beach Tiger Beetles oviposit (lay their eggs) in the intertidal zone. By September, most if not all of the adult beetles have died.

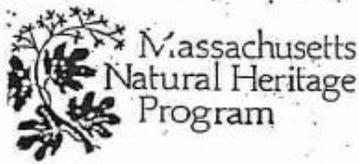
Northeastern Beach Tiger Beetles have a two-year life cycle. Older larvae (2nd and 3rd "instars" or larval stages) which overwintered first appear in late May and June, while 1st instar larvae appear in mid-August. The larvae dig tiny vertical burrows in the sand. The position of the burrows changes over the course of the year; in late spring, the burrows of larvae that have overwintered are located well up the beach near or beyond the edge of vegetation. In midsummer, the burrows of young recently-hatched larvae are within a few meters of the high-tide line; by autumn, the burrows are once again at the upper end of the beach. The changes in larval burrow location parallel the erosion-accretion cycle of the beach: the beach widens in the summer as sand is deposited, and narrows in the fall and winter as stronger winds and waves transport the sand offshore. The depth of the burrows also increases with each successive instar.

Older larvae appear to be dormant through much of the summer, but the young larvae are extremely voracious. Their sensory organs can detect the vibrations made by nearby invertebrate prey; when the prey is close enough, the larval tiger beetle's head lunges out of its burrow opening and captures its victim with its strong serrated jaws, then drags it into the burrow and devours it. Larvae develop through 3 instars and overwinter twice before finally emerging as adults. The primary food of larvae is "sand fleas" (amphipods), which can be very numerous and occur in wet sand and under the sea-wrack.

POPULATION STATUS IN MASSACHUSETTS: The Northeastern Beach Tiger Beetle is classified as an Endangered species in Massachusetts and is also federally classified as Threatened. Only one current site has been documented in the state for *C. dorsalis dorsalis*. The Northeastern Beach Tiger Beetle formerly inhabited several beaches on outer Cape Cod and a number of the offshore islands, but it has not been found at any of these beaches (with one exception) for many years. Increased human recreational pressure on these beaches, particularly intensive off-road vehicle traffic, is believed to be largely responsible for the disappearance of these populations, as well as many others along the Atlantic Coast. ORV's can kill adults and larvae directly by crushing them. ORV's also can continually damage the larval burrows; as a result, the larvae must reduce their feeding time and expend a considerable amount of energy to repair the burrows.

The proximity of the larval burrows to the high-tide line in mid-summer increases their chance of being washed away; a severe storm or early season hurricane at this time could potentially wipe out the entire state population; this likelihood makes the probability of extinction very high.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)



Natural Heritage Program
MA Division of Fisheries and Wildlife
100 Cambridge Street, Boston, MA 02202
(617) 727-9194

MASSACHUSETTS RARE AND ENDANGERED WILDLIFE

Least Tern
Sterna antillarum

DESCRIPTION. The Least Tern is the smallest of the four species of terns that nest in Massachusetts. It ranges from 8.5 to 9.5 in. (21.6-24.1 cm) in body length and has a wingspread of about 20 inches (50.8 cm). It is a predominately gray bird with a black capped head and nape. Its forehead is white with a black line running from its crown through its eye to the base of its bill. Its bill is orange-yellow with a black tip. Its outer wings are edged with a black strip on the primaries and the primary coverts (outer wing feathers). Its tail is deeply forked and in comparison with other terns, rather short. Its underparts are white and its legs are orange-yellow. Juveniles have pinkish brown underparts patterned with black u shaped markings and a dark shoulder bar on the wings. Its crown is sooty black and there is a black patch over its eyes. Sexes are alike in appearance, with females slightly smaller.



RANGE. The Least Tern breeds along coastal and freshwater habitats of North, Central, and South America, and the Caribbean Islands (American Ornithological Union). In North America, the Least Tern is found along the Atlantic coast from Maine to Florida and along the Pacific coast from Central California south to the Gulf Coast. It is also found along the major tributaries of the Mississippi and Missouri river drainage systems, and the Colorado and Rio Grande rivers. Although the winter range of the Least Tern is not well known, a portion of the North American population winters off the northern coast of South America from Venezuela to northeastern Brazil.

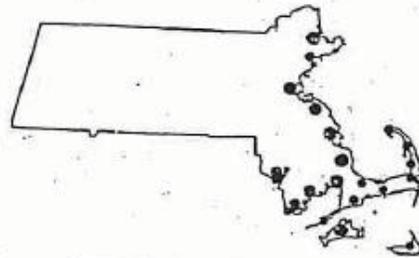
Habitat Suitability Index
Models: Least Tern, U.S.
Dept. Interior, Fish and
Wildlife Service, Aug. 1985.

HABITAT IN MASSACHUSETTS. In Massachusetts, the Least Tern inhabits coastal beaches and barrier islands. It is not found inland. It nests in dry, exposed, unvegetated areas on dunes or ocean beaches in the area between the drift line and the upland. The substrate is usually a mixture of sand, pebbles, and shells as well as fine grained sand, and also include dredge materials.

(Continued overleaf)



Range



- Verified since 1978
- Reported prior to 1978

Breeding Distribution in Massachusetts
by Town

1988

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

FEEDING HABITS The Least Tern is an opportunistic feeder which forages on nearly any species of fish under 8 or 9 cm (3-3.7 in.) long. Most frequently it consumes small minnows, sand lance, herring, and hake. It is rarely found feeding over land. The feeding techniques exhibited by the Least Tern include hovering, diving, and skimming the surface of the water. It has been observed diving from heights of up to 10 m (34 ft).

LIFE HISTORY AND ECOLOGY Least Terns arrive on their breeding grounds around May 10. Colonies are established containing several to several hundred pairs. Courtship behavior is characterized by high speed pursuits, posturing and sweeping flight. The female Least Tern forms a shallow scrape in the sand and lays 2 to 3 cryptically colored eggs between May 23 and June 10. If the first clutch is lost to predation or storms, up to two additional clutches may be laid later in the season.

Incubation is performed by both sexes and lasts 20-23 days. The chicks are active 24-36 hours after hatching and fledge in approximately 28 days. The young are fed by both parents. Least Terns leave their breeding grounds as soon as the young fly and are seldom seen in Massachusetts past early September.

PREDATION AND DEFENSE The Least Tern is threatened by a host of avian and mammalian predators such as owls, Black Crowned Night Herons, Herring and Great Black-backed Gulls, red foxes, raccoons, skunks, house cats, and people. Several adaptive mechanisms are employed by the Least Tern to discourage predation and increase nesting success. Within the colony, synchronous egg laying establishes a brood of similarly aged young which provides some degree of safety in numbers. Following widespread predation, pairs suffering egg or chick losses will typically reneest, producing a wide range of nesting stages within the colony. In the event of additional intrusions by predators, the more varied-aged chick population may be less vulnerable and less likely to experience catastrophic losses.

Other anti predator mechanisms include cryptically colored eggs and chicks who respond to danger by sinking to the ground in an attempt to blend in with the surroundings. From a distance, adults are camouflaged by their coloration. The Least Tern will attempt to discourage avian and mammalian intruders by attacking, mobbing, calling loudly, and dropping excrement.

POPULATION STATUS The Least Tern is listed by the Massachusetts Division of Fisheries and Wildlife as a Species of Special Concern. In the 1870's and 1880's, the Least Tern was a common bird in Massachusetts. At the turn of the century however, the Least Tern was heavily exploited in the millinery trade and experienced virtual eradication from the state. By the 1930's, the Least Tern had made a noticeable recovery following the Migrator Bird Treaty Act of 1818 and the Lacey Act of 1901 which made it illegal to take birds for their feathers. Since 1930, populations have fluctuated between 800 and 2500 breeding pairs. Censuses from 1987 reported 2109 pairs from 41 stations in Massachusetts, an 8% decline from the previous year.

Several important factors are attributed to reproductive failure in northeastern populations. Predation, loss of nesting habitat to natural disaster, development and human activity have all taken a toll on this species. Victimization by predators may prevent nesting from taking place and can force the Least Tern to abandon traditional nest sites.

Given its affinity for nesting on sandbars, this bird frequently loses its nests during exceptionally high tides or storms. Erosion of nests is more likely in soils consisting solely of sand. Impermeability of finer grained soils causes egg loss during periods of high rainfall. More frequently however, suitable habitat is lost to development and nests and eggs are destroyed by Off Road Vehicles and beach goers.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000). (Continued)



Piping Plover

(*Charadrius melodus*)

Piping plovers have been described as everything from wind-ups to tennis balls rolling along the sandy beaches of the coast. Sometimes they blend into the beach so thoroughly that they are most impossible to see. Like other plovers, they run in short starts and stops.

The piping plover's name comes from its call notes, plaintive fl-like whistles that are often heard before the birds are seen. When sitting still, their buff-colored plumage, black necks, and black forehead bands make them virtually invisible in the sand. From a distance, the scrapes in the sand that are their nests and their buff-colored eggs speckled with tiny black dots are indistinguishable from the beach. But although these adaptations protect plovers from natural predators, they do not help protect them from human activities, which have become the greatest threat to their survival.

Life History

The piping plover breeds on coastal beaches from Newfoundland and the Gulf of Maine to North Carolina. They winter primarily on the Atlantic Coast from the Carolinas to Florida, but also as far south as the Yucatan Peninsula, the Bahamas, and the West Indies. Between March and April, piping plovers make the long flight from their wintering grounds to the beaches of the mid- and north Atlantic. They establish territories on these beaches, mate, and scratch out shallow nests in the unvegetated sand above the high tide line. Nests are no more than shallow depressions lined with shell fragments or pebbles.

Adults tend to return to beaches where they previously nested, arriving at breeding grounds on Gulf of Maine beaches in early April. Mating involves courtship displays that include mock nest scraping, pebble-tossing, tilts, and low, shallow flights. Incubation responsibilities are shared by both the male and the female. Their four eggs hatch after approximately 28 days, and the hatchlings soon follow their parents to forage for marine worms, crustaceans, and insects on the beach.

Once the hatchlings emerge, it generally takes about 30 to 35 days for them to learn to fly. If a predator or intruder approaches, the young become motionless while their parents try to divert the intruder's attention themselves, often by pretending to hobble around with a broken wing.

Distribution, Abundance, and Threats

Historically, piping plovers were abundant in sandy coastal habitat throughout their range. But by the late 1800s, commercial hunting for feathers—primarily to decorate hats—nearly wiped out the species. Federal protection by the Migratory Bird Treaty Act of 1918 allowed piping plovers to recover to record numbers in the 1940s, but recent habitat loss and disturbance on beaches has caused a new and serious decline in their population. Most recent surveys count the entire Atlantic population at less than 1,000 pairs. Two other breeding populations of piping plovers exist in the United States; one on the Great Plains and the other in the Great Lakes region.

Human disturbance currently is the greatest threat to the piping plover's survival. People may intentionally or accidentally destroy nests and eggs by walking or driving over them on the beach. Hatchlings may often seek shelter in tire tracks left on beaches. This further camouflages them and makes them especially vulnerable to beach vehicles. Pets can harass adults off their nests long enough to cause overheating or chilling of eggs or even complete abandonment of chicks, exposing them to natural predators such as crows, gulls, red foxes, skunks, or rats.

Both human activities and natural changes in the piping plover's habitat have had serious impacts on the future of this species in the Gulf of Maine. Recently, beach erosion between breeding seasons



Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)



© Josephine Ewing

Eliminated nesting sites along the Morse River in Phippsburg, Maine. In the 1960s, construction of a housing development in Scarborough, Maine, completely eradicated a prime nesting area for piping plovers and least terns. Summer storms with high winds or tides can bury or wash out nests. Vegetation can encroach and crowd out plovers, and even dune restoration programs must remain sensitive to the dune characteristics plovers need for their nests.

Protecting the Piping Plover

The piping plover came under the protection of the Endangered Species Act in January of 1986. It is listed as a threatened species, which means that without protection the remaining population would continue to decline. The Endangered Species Act prohibits taking, harassing, or harming piping plovers and assists in efforts to protect their habitat.

Piping Plover Facts

- Plovers have been recorded making as many as 5 nesting attempts in a single season, laying a total of 18 eggs.
- If left unattended long enough on sunny days when beachgoers often share plover habitat, plover eggs can actually cook on the hot sand.
- Piping plovers are one of several species of shorebirds nesting in Maine. Others are killdeer, willets, spotted sandpipers, snipe, and woodcock.

Since listing the piping plover, the U.S. Fish and Wildlife Service has formed recovery teams for the inland and Atlantic coast populations. These U.S. and Canadian research teams establish conservation priorities and procedures for restoring populations. Several projects are underway in the Gulf of Maine to protect the plover's breeding and wintering range. Nest enclosures (wire mesh fences around nest sites to exclude predators) and extensive use of informational signs to inform the public about sensitive areas are helping to protect plover habitat. Negotiations for purchase, easements, and consent agreements are underway with landowners. In some cases, predator control and habitat creation have kept nesting areas intact.

U.S. Fish and Wildlife Service

Protection of migratory birds, seabirds, anadromous fish, and endangered species in the Gulf of Maine is the responsibility of the U.S. Fish and Wildlife Service. The Service established the Gulf of Maine Project in Portland, Maine, to protect and restore the watershed's ecosystems and habitats by providing a bridge between all Service programs in the Gulf of Maine and by building partnerships among state and federal agencies, local organizations, and private citizens working to improve coastal habitats. The Gulf of Maine Project participates in EPA's National Estuary Program in Massachusetts Bays and Casco Bay, Maine; providing information on fish and wildlife habitat needs in order to promote thorough consideration of living resources in the management planning process. The Project has brought together state, federal, and non-governmental representatives from each jurisdiction in the watershed to conduct a priority habitat identification process as part of the international initiative of the Gulf of Maine Council on the Marine Environment, and has developed a GIS (Geographic Information System) that includes data-sharing and coordination with state fish and wildlife agencies. The Project has established partnerships with local conservation groups and land trusts, and is conducting wetland trends analyses in the watershed to target specific areas for local action. For more information, contact the Gulf of Maine Project in Portland, Maine, at (207) 828-1080.

November 1993

Production of this publication was funded by the U.S. Environmental Protection Agency. ©EPA

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

APPENDIX C

Resource Protection Partners

DEM's efforts to manage the natural resources at Horseneck Beach would not be fully successful without the help of the following resource protection organizations:

Horseneck Beach Advisory Committee

The advisory committee assists DEM through periodic meetings to review existing management and future improvements to the property. The group includes local officials, local and state enforcement officers, local residents and abutters to the property as well as representatives from the Lloyd Center, the Westport Land Trust and the Westport River Watershed Alliance. It provides the Department with the local and regional perspective on issues related to DEM and the reservation.

The Lloyd Center For The Environment

As the primary non-profit natural resource organization on the southwest shore of Massachusetts, the Lloyd Center assists Horseneck Beach staff with rare species management and monitoring, interpretive programs and resource protection issues.

Westport River Watershed Alliance

The Watershed Alliance is the lead organization for the protection of the Westport River, including the tributary which forms the northwest boundary of the reservation's property.

Coastal Zone Management

The Massachusetts Office of Coastal Zone Management is responsible for the protection and stabilization of all the commonwealth's shoreline areas. CZM provides support for the Department's management of the commonwealth's coastal resources, and assists with assessment of storm damage and recovery.

Massachusetts Audubon Society: Coastal Waterbird Program

The Massachusetts Audubon Society assists with the protection and management of rare shorebirds and offers a variety of informational educational sessions.

Massachusetts Department of Fisheries, Wildlife, and Environmental Law Enforcement

The *Natural Heritage & Endangered Species Program* provides information and management recommendations relative to the Department's rare species protection measures. The *Osprey Restoration and Protection Project* maintains a population study and Osprey Inventory Database. The database includes the Westport River, which accounts for 50% of the Commonwealth's Osprey population. The *Environmental Police-Law Enforcement* provide much needed enforcement services for DEM staff. Officers assist with traffic control, enforcing rules and regulations, monitoring sportsmen licenses and responding to emergencies.

Massachusetts Emergency Management Agency

The Massachusetts Emergency Management Agency assists DEM before, during and after major storm events. In particular MEMA acts as DEM's liaison to obtain FEMA money.

United States Coast Guard

The Coast Guard maintains air patrols over the Massachusetts coastline, including Horseneck Beach, using helicopters. In particular, the Coast Guard assists with emergency rescues, either off shore or on jetties.

University of Massachusetts - Dartmouth Campus

Students from UMASS-Dartmouth often visit Horseneck Beach for field trips and the Environmental Studies Department provides data from field analyses conducted by students.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

APPENDIX D

ENVIRONMENTAL PROTECTION ZONE: Highly sensitive areas requiring a high degree of protection, such as rare species habitats or fragile archeological sites, are within this zone.

Recreation

- o Only low impact activities permitted in this zone, including dispersed and non-motorized recreation.
- o Intensive, development-dependent recreation not permitted.
- o New trail construction permitted if limited to stable areas and located to avoid adverse impacts to rare species, and known or potential archaeological sites.

Visual Resources

- o Retain area in natural state or preserve and enhance existing natural or cultural landscape.
- o Minimal cutting to maintain or enhance vistas permitted.

Vegetation & Wildlife Habitat

- o Intensive habitat manipulation not permitted except as recommended under the following guidelines.
- o Natural Heritage & Endangered Species Program recommendations used to restore, maintain and enhance habitat of rare and endangered species, and rare exemplary communities.
- o Research which causes no adverse impact to sensitive resources will be permitted through a formal written proposal process, approved in advance by the Director of Forests & Parks or his designee.
- o Vegetation management allowed: Under silvicultural plans (see below), and utilizing native species to control erosion, for stabilization of dunes, enhancement of ecosystem diversity, and achieving other objectives consistent with protection of existing resources; or under historic landscape restoration plan.
- o Cutting of vegetation allowed for maintenance of trails and existing roads.

Water Resources

- o Sensitive wetland resource areas and associated buffers will be managed to protect and enhance habitat and water quality.

Silviculture

- o Timber harvesting operations allowed under guidelines protecting or enhancing rare & endangered species habitat.

Forest Protection

- o Spread of major forest pathogens will be controlled with procedures compatible with existing sensitive resources.
- o Research stations for monitoring forest health may be established.
- o Wildfires will be extinguished by Bureau of Fire Control personnel and Forest & Park staff, coordinating with municipal fire departments.
- o Fire breaks may be maintained in fire prone types of vegetation.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

Transportation

- o No new roads will be constructed.
- o Passage through zone allowed on existing stable roadbeds or trails.

Facilities

- o No new construction except for small scale, low impact facilities such as interpretive exhibits, handicapped ramps, and boardwalks.
- o No new construction in historic or cultural resource areas unless part of a formal protection or restoration plan.

CONSERVATION ZONE: Areas in this zone are moderately sensitive, and may include managed woodlands, water resources, wildlife habitats, and agricultural resources. Opportunities for dispersed recreation are provided within this zone.

Recreation

- o Opportunities for appropriate dispersed recreation will be provided.

Visual Resources

- o Vistas will be opened in appropriate locations and open fields will be maintained.
- o At least 50% shade will be maintained in a buffer strip along public access corridors.

Vegetation & Wildlife Habitat

- o A high priority will be given to enhancing ecosystem diversity.
- o Wildlife nesting and den habitat areas will be encouraged.
- o Activities adjacent to wetlands will be undertaken with adherence to regulations developed under the Wetlands Protection Act in order to avoid adverse impacts.

Water Resources

- o Emphasis will be on maintaining and enhancing surface and ground water quality.

Agriculture

- o Suitable agricultural uses will be encouraged where appropriate.

Silviculture

- o Forest lands are divided into productivity classes (high yield and standard) with only high yield sites managed intensively.
- o Management systems will be utilized to secure adequate natural regeneration and age class diversity.
- o Timber Stand Improvement operations will be used to improve the quality and vigor of stands.
- o Upon completion of operation, skid roads and landings will be stabilized.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

Forest Protection

- o Spread of major forest pathogens will be controlled through environmentally sound programs.
- o Research stations for monitoring forest health may be established.
- o Wildfires will be extinguished by Bureau of Fire Control personnel and Forest & Park staff, coordinating with municipal fire departments.
- o Fire breaks will be maintained in fire prone types of vegetation.
- o Research plots for prescribed burning and other techniques of fuel management may be established in this zone.

Transportation

- o New road construction permitted in stable areas.
- o Skid roads and truck roads will be carefully laid out by the forester considering grades, drainage and stream integrity.

Facilities

- o Small scale facilities are permitted such as gravel parking areas, picnic areas, boardwalks, 2-4 stall comfort stations, and viewing platforms.
- o Visitor centers, bathhouses, maintenance facilities, playfields, intensive camping areas, and major developments are not appropriate in this zone.
- o Utility corridors are permitted.
- o Adaptive reuse of historic structures is permitted in conjunction with a historic restoration plan.
- o New construction in a historic or cultural resource area must be recommended as part of a formal protection or restoration plan, or historic landscape restoration plan.

INTENSIVE USE ZONE: Areas where resources can accommodate high levels of visitor use, and associated structures or maintenance facilities.

Recreation

- o Legitimate recreational activities recognized by DEM, including intensive development-dependent recreation, are permitted in appropriate locations.
- o Hunting will generally be excluded for safety reasons. MGL Ch.90B prohibits the discharge of firearms within 500 feet of occupied structures.

Visual Resources

- o New structures and landscape treatments will be designed to blend in with natural or cultural surroundings, including use of trees and shrubs to screen utility buildings from view.
- o Existing vistas will be maintained, and additional vistas may be cleared.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

Vegetation & Wildlife Habitat

- o Vegetation in natural resource areas will be managed by clearing out exotic species wherever possible, and maintaining trees and shrubs when their presence does not adversely impact public safety or access.
- o Emphasis will be on maintaining vegetation with value to nongame wildlife species.
- o Small scale wildlife habitat improvements may be conducted.
- o Landscape plantings will consist of native materials in natural resource areas and historically compatible species in cultural resource areas.

Water Resources

- o Surface water resources may be used for recreation within constraints of maintaining public safety and water quality.
- o Surface water and associated wetland vegetation will be managed following guidelines established in the Wetlands Protection Act.
- o Ground water resources may be utilized for day use and camping facilities.

Silviculture

- o Acreage in this zone is excluded from allowable harvest calculations.
- o Treatments will be conducted to improve public safety related to hazard trees and fire suppression, and improve access for recreation and education programs.

Forest Protection

- o Spread of major forest pathogens will be controlled through environmentally sound programs.
- o Wildfires will be extinguished by Bureau of Fire Control personnel coordinating with municipal fire departments.

Transportation

- o All main roads and bridges will be constructed or maintained to support a 75,000 pound load.
- o Use of roads by logging trucks may be restricted during periods of high visitor use.

Facilities

- o Construction directly related to appropriate forms of recreation will be allowed, and will conform to state health, building and environmental codes.
- o Administration buildings, maintenance areas, storage facilities, parking lots, operational structures, visitors centers, bathhouses, playfields, and intensive day use and camping areas will be located in this zone.
- o Utility corridors will be permitted.
- o Historic restoration, rehabilitation or reconstruction for interpretation or adaptive reuse of historic structures is permitted in conjunction with an historic restoration plan.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

APPENDIX E

ABUTTER NOTIFICATION : DEM BEACH MANAGEMENT PLANS

The Mass. Wetlands Protection Act was amended in April, 1994. The new addendum pertains to notifying abutters when a project is proposed which is (a) within 100' of a coastal or inland wetland and, (b) likely to result in impact(s) to natural resources in the proposed project area.

As DEM composes and distributes management plans for its Barrier Beaches, the department is not legally obligated to notify abutters to the DEM beaches, since (a) management plans are paper tools, and do not constitute any physical/environmental impacts, (b) the management actions described in the plans are normal, operational procedures, such as maintenance and access controls, and (c) the structural impacts to the agency's beaches are temporary, such as boardwalks and porta-potties.

In some instances, where the DEM has few abutters to one of its barrier beaches, and where compatible management by DEM is much appreciated by the agency's neighbors, DEM WILL notify the abutters.** (See below)

This will be done by at least notifying them of any dates and times when DEM staff are meeting with Conservation Commissioners, and by providing a copy of the related Barrier Beach Management Plan to the abutters upon their request, or by request of the appropriate Conservation Commission.

In other instances, where DEM's beaches exist in an area of coastal high-density commercial or residential development, the department will request a waiver of abutter notification from the appropriate DEP regional or central (Boston) office. (In most cases, when only normal, operational beach actions are involved in management, the DEP allows the sponsoring agency to determine the applicability of abutter notices).

Lastly, if any of DEM's Barrier Beach Management Plans include a recommended action to construct additional, permanent structures on the subject coastal property, all abutters will be legally notified.

**DEM IS currently notifying abutters of management plans, at Scusset Beach, Ellisville Harbor State Park, and Sylvia Beach.

The DEM also notifies cooperating public or non-profit agencies who are involved in coastal property management with the department: US Fish and Wildlife Service, Mass. Audubon Society (MAS), the US Army Corps of Engineers, and The Trustees of Reservations (TTOR) are current cooperators with DEM.

+Please see attached page:Wetlands Act, Abutter Notice Info

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

310 CMR Wetlands Protection Act

7: Coastal Beaches

(1) **Preamble.** Coastal beaches, which are defined to include tidal flats, are significant to storm damage prevention and flood control. In addition, tidal flats are likely to be significant to the protection of marine fisheries, and, where there are shellfish, to land containing shellfish.*

When coastal beaches are determined to be significant to storm damage prevention or flood control, the following characteristics are critical to the protection of those interests:

- (a) volume (quantity of sediments) and form, and
- (b) the ability to respond to wave action.

(3) Any project on a coastal beach, except any project permitted under 310 CMR 10.30(3)(a), shall not have an adverse effect by increasing erosion, decreasing the volume or changing the form of any such coastal beach or an adjacent or downdrift coastal beach.

25: Coastal Dunes

(1) **Preamble.** All coastal dunes are likely to be significant to storm damage prevention and flood control, and all coastal dunes on barrier beaches and the coastal dune closest to the coastal beach in any area are per se significant to storm damage prevention and flood control.

Coastal dunes aid in storm damage prevention and flood control by supplying sand to coastal beaches. Coastal dunes protect inland coastal areas from storm damage and flooding by storm waves and storm elevated sea levels because such dunes are higher than the coastal beaches which they border. In order to protect this function, coastal dune volume must be maintained while allowing the coastal dune shape to conform to natural wind and water flow patterns.

Vegetation cover contributes to the growth and stability of coastal dunes by providing conditions favorable to sand deposition.

On retreating shorelines, the ability of the coastal dunes bordering the coastal beach to move landward at the rate of shoreline retreat allows these dunes to maintain their form and volume, which in turn promotes their function of protecting against storm damage or flooding.

When a proposed project involves the dredging, filling, removal or alteration of a coastal dune, the issuing authority shall presume that the area is significant to the interests of storm damage prevention and flood control. This presumption may be overcome only upon a clear showing that a coastal dune does not play a role in storm damage prevention or flood control, and if the issuing authority makes a written determination to that effect.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

When a coastal dune is significant to storm damage prevention or flood control, the following characteristics are critical to the protection of those interest(s):

- (a) the ability of the dune to erode in response to coastal beach conditions;
- (b) dune volume;
- (c) dune form, which must be allowed to be changed by wind and natural water flow;
- (d) vegetative cover; and
- (e) the ability of the dune to move landward or laterally.

(2) Definition. "Coastal Dune" means any natural 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.

When a coastal dune is determined to be significant to storm damage prevention or flood control, the following regulations shall apply:

(3) Any alteration of, or structure on, a coastal dune or within 100 feet of a coastal dune shall not have an adverse effect on the coastal dune by:

- (a) affecting the ability of waves to remove sand from the dune;
- (b) disturbing the vegetative cover so as to destabilize the dune;
- (c) causing any modification of the dune form that would increase the potential for storm or flood damage;
- (d) interfering with the landward or lateral movement of the dune; or
- (e) causing removal of sand from the dune artificially.

(4) Notwithstanding the provisions of 310 CMR 10.28(3), when a building already exists upon a coastal dune, a project accessory to the existing building may be permitted, provided that such work, using the best commercially available measures, minimizes the adverse effect on the coastal dune caused by the impacts listed in 310 CMR 10.28(3)(b) through 10.28(3)(e). Such an accessory project may include, but is not limited to, a small shed or a small parking area for residences. It shall not include coastal engineering structures.

(5) The following projects may be permitted, provided that they adhere to the provisions of 310 CMR 10.28(3):

- (a) pedestrian walkways, designed to minimize the disturbance to the vegetative cover;
- (b) fencing and other devices designed to increase dune development; and
- (c) plantings compatible with the natural vegetative cover.

10.29: Barrier Beaches

(1) Preamble. Barrier beaches are significant to storm damage prevention and flood control and are likely to be significant to the protection of marine fisheries and, where there are shellfish, the protection of land containing shellfish.

Barrier beaches protect landward areas because they provide a buffer to storm waves and to sea levels elevated by storms. Barrier beaches protect from wave action such highly productive wetlands as salt marshes, estuaries, lagoons, salt ponds and fresh water marshes and ponds, which are in turn important to marine fisheries.

Barrier beaches are maintained by the alongshore movement of beach sediment caused by wave action. The coastal dunes and tidal flats on a barrier of beach consist of sediment supplied by wind action, storm wave overwash and tidal inlet deposition. Barrier beaches in Massachusetts undergo a landward migration caused by the landward movement of sediment by wind, storm wave overwash and tidal current processes. The continuation of these processes maintains the volume of the landform which is necessary to carry out the storm and flood buffer function.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

When a proposed project involves dredging, removing, filling, or altering a coastal bank, the issuing authority shall presume that the area is significant to storm damage prevention and flood control. This presumption may be overcome only upon a clear showing that a coastal bank does not play a role in storm damage prevention or flood control, and if the issuing authority makes a written determination to that effect.

When issuing authority determines that a coastal bank is significant to storm damage prevention or flood control because it supplies sediment to coastal beaches, coastal dunes or barrier beaches, the ability of the coastal bank to erode in response to wave action is critical to the protection of that interest(s).

When the issuing authority determines that a coastal bank is significant to storm damage prevention or flood control because it is a vertical buffer to storm waters, the stability of the bank, i.e., the natural resistance of the bank to erosion caused by wind and rain runoff, is critical to the protection of that interest(s).

(2) **Definition.** "Coastal Bank" means the seaward face or 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.

When a coastal bank is determined to be significant to storm damage prevention or flood control because it supplies sediment to coastal beaches, coastal dunes or barrier beaches, the following regulations shall apply:

(3) No new bulkhead, revetment, seawall, groin or other coastal engineering structure shall be permitted on such a coastal bank, except that such a coastal engineering structure shall be permitted when required to prevent storm damage to buildings constructed prior to the effective date of these regulations or constructed pursuant to a Notice of Intent filed prior to the effective date of these regulations, including reconstructions of such buildings subsequent to the effective date of these regulations, provided that the following requirements are met:

- (a) a coastal engineering structure or a modification thereto shall be designed and constructed so as to minimize, using best available measures, adverse effects on adjacent or nearby coastal beaches due to changes in wave action, and
- (b) the applicant demonstrates that no method of protecting the building other than the proposed coastal engineering structure is feasible.
- (c) protective planting designed to reduce erosion may be permitted.

(4) Any project on a coastal bank or within 100 feet landward of the top of a coastal bank, other than a structure permitted by 310 CMR 10.30(3), shall not have an adverse effect due to wave action on the movement of sediment from the coastal bank to coastal beaches or land subject to tidal action.

(5) The Order of Conditions and the Certificate of Compliance for any new building within 100 feet landward of the top of a coastal bank permitted by the issuing authority under this Act shall contain the specific condition: 310 CMR 10.30(3) of the Wetlands Regulations, promulgated under M.G.L. c. 131, s. 40, requires that no coastal engineering structure, such as a bulkhead, revetment, or seawall shall be permitted on an eroding bank at any time in the future to protect the project allowed by this Order of Conditions.

When a coastal bank is determined to be significant to storm damage prevention or flood control because it is a vertical buffer to storm waters, the following regulations shall apply:

(6) Any project on such a coastal bank or within 100 feet landward of the top of such coastal bank shall have no adverse effects on the stability of the coastal bank.

(7) Bulkheads, revetments, seawalls, groins or other coastal engineering structures may be permitted on such a coastal bank except when such bank is significant to storm damage prevention or flood

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

When a proposed project involves removal, filling, dredging or altering of a barrier beach, the issuing authority shall presume that the barrier beach, including all of its coastal dunes, is significant to the interest(s) specified above. This presumption may be overcome only upon a clear showing that a barrier beach, including all of its coastal dunes, does not play a role in storm damage, flood control, or the protection of marine fisheries, or land containing shellfish and if the issuing authority makes a written determination to such effect.

When a barrier beach is significant to storm damage prevention and flood control, the characteristics of coastal beaches, tidal flats and coastal dunes listed in 310 CMR 10.27(1) and 10.28(1) and their ability to respond to wave action, including storm overwash, sediment transport, are critical to the protection of the interests specified above.

(2) Definition. "Barrier Beach" means 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 at one or both ends.

(3) When a Barrier Beach is Determined to be Significant to Storm Damage Prevention, Flood Control, or Marine Fisheries. 310 CMR 10.27(3) through 10.27(6) (coastal beaches) and 10.28(3) through 10.28(5) (coastal dunes) shall apply to the coastal beaches and to all coastal dunes which make up a barrier beach.

30: Coastal Banks

(1) Preamble. Coastal banks are likely to be significant to storm damage prevention and flood control. Coastal banks that supply sediment to coastal beaches, coastal dunes and barrier beaches are per se significant to storm damage prevention and flood control. Coastal banks that, because of their height, provide a buffer to upland areas from storm waters are significant to storm damage prevention and flood control.

Coastal banks composed of unconsolidated sediment and exposed to vigorous wave action serve as a major continuous source of sediment for beaches, dunes, and barrier beaches (as well as other land forms caused by coastal processes). The supply of sediment is removed from banks by wave action, and this removal takes place in response to beach and sea conditions. It is a naturally occurring process necessary to the continued existence of coastal beaches, coastal dunes and barrier beaches which, in turn, dissipate storm wave energy, thus protecting structures of coastal wetlands landward of them from storm damage and flooding.

Coastal banks, because of their height and stability, may act as a buffer or natural wall, which protects upland areas from storm damage and flooding. While erosion caused by wave action is an integral part of shoreline processes and furnishes important sediment to downdrift landforms, erosion of a coastal bank by wind and rain runoff, which plays only a minor role in beach nourishment, should not be increased unnecessarily. Therefore, disturbances to a coastal bank which reduce its natural resistance to wind and rain erosion cause cuts and gullies in the bank, increase the risk of its collapse, increase the danger to structures at the top of the bank and decrease its value as a buffer.

Bank vegetation tends to stabilize the bank and reduce the rate of erosion due to wind and rain runoff. Pedestrian and vehicular traffic damages the protective vegetation and frequently leads to gully erosion or deep "blowouts" on unconsolidated banks. Therefore, any project permitted by 310 CMR 10.30 should incorporate, when appropriate, elevated walkways.

A particular coastal bank may serve both as a sediment source and as a buffer, or it may serve only one role.

Appendix D. Horseneck Beach State Reservation Barrier Beach Plan (DEM 2000).
(Continued)

APPENDIX F

COMMONWEALTH OF MASSACHUSETTS

By His Excellency

EDWARD J. KING
Governor

EXECUTIVE ORDER NO. 181

BARRIER BEACHES

Preamble

A barrier beach is 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 marsh system. It is a fragile buffer that protects landward areas from coastal storm damage and flooding.

The strength of the barrier beach system lies in its dynamic character; its ability to respond to storms by changing to a more stable form. Frequently man induced changes to barrier beaches have decreased the ability of landform to provide storm damage prevention and flood control. Inappropriate development on barrier beaches has resulted in the loss of lives and great economic losses to residents and to local, state and federal governments. The taxpayer, who often cannot gain access to barrier beach areas, must subsidize disaster relief and flood insurance for these high hazard areas.

Since barrier beaches are presently migrating landward in response to rising sea level, future storm damage to development located on the barriers is inevitable.

WHEREAS, the Commonwealth seeks to mitigate future storm damage to its barrier beach areas;

NOW, THEREFORE, I, Edward J. King, Governor of the Commonwealth of Massachusetts, by virtue of the authority vested in me by the Constitution and laws of the Commonwealth, do hereby order and direct all relevant state agencies to adopt the following policies:

1. Barrier beaches shall be given priority status for self-help and other state and federal acquisition programs and this priority status shall be incorporated into the Statewide Outdoor Comprehensive Recreation Plan. The highest priority for disaster assistance funds shall go towards relocating willing sellers from storm damaged barrier beach areas.
2. State funds and federal grants for construction projects shall not be used to encourage growth and development in hazard prone barrier beach areas.

Appendix E. Order of Conditions for Operational Maintenance Plan, Horseneck Beach State Reservation (Westport Conservation Commission 2009).



Massachusetts Department of Environmental Protection
 Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
 Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

SE 80 -1790
 MassDEP File Number

Document Transaction Number
 Westport
 City/Town

A. General Information ORIGINAL

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.




1. From: Westport
Conservation Commission
2. This issuance is for (check one): a. Order of Conditions b. Amended Order of Conditions
3. To: Applicant:

<u>Jeff</u>	<u>Carter</u>
a. First Name	b. Last Name
<u>DCR</u>	<u>BK 9476 PG 173</u>
c. Organization	<u>08/18/09 11:28 DOC. 21495</u>
<u>P.O. Box 86</u>	<u>Bristol Co. S.D.</u>
d. Mailing Address	
<u>Carver</u>	<u>MA</u>
e. City/Town	f. State
	<u>02366</u>
	g. Zip Code
4. Property Owner (if different from applicant):

<u>Same</u>	
a. First Name	b. Last Name
c. Organization	
d. Mailing Address	
e. City/Town	f. State
	g. Zip Code
5. Project Location:

<u>John Reed Road and East Beach Road</u>	<u>Westport</u>
a. Street Address	b. City/Town
c. Assessors Map/Plat Number	d. Parcel/Lot Number
Latitude and Longitude, if known:	
e. Latitude	f. Longitude
6. Property recorded at the Registry of Deeds for (attach additional information if more than one parcel):

a. County	b. Certificate Number (if registered land)
<u>BK1612-PG 717 BK1613-PG 789</u>	<u>BK1616-PG 291 BK1819 PG 346</u>
c. Book	
<u>BK 2092-PG 924 BK2092 Page 927 BK 4139-PG 266</u>	
7. Dates:

a. Date Notice of Intent Filed	b. Date Public Hearing Closed	c. Date of Issuance
<u>5-13-09</u>	<u>6-2-09</u>	<u>6-5-09</u>
8. Final Approved Plans and Other Documents (attach additional plan or document references as needed):

a. Plan Title	
b. Prepared By	c. Signed and Stamped by
d. Final Revision Date	e. Scale
<u>Correspondence from DFW NHESP</u>	
f. Additional Plan or Document Title	g. Date
	<u>May 5, 2009</u>

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Appendix E. Order of Conditions for Operational Maintenance Plan, Horseneck Beach State Reservation (Westport Conservation Commission 2009). (Continued)

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Massachusetts Department of Environmental Protection
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B. Findings

1. Findings pursuant to the Massachusetts Wetlands Protection Act:

Following the review of the above-referenced Notice of Intent and based on the information provided in this application and presented at the public hearing, this Commission finds that the areas in which work is proposed is significant to the following interests of the Wetlands Protection Act (the Act). Check all that apply:

- a. Public Water Supply
- b. Land Containing Shellfish
- c. Prevention of Pollution
- d. Private Water Supply
- e. Fisheries
- f. Protection of Wildlife Habitat
- g. Groundwater Supply
- h. Storm Damage Prevention
- i. Flood Control

2. This Commission hereby finds the project, as proposed, is: (check one of the following boxes)

Approved subject to:

- a. the following conditions which are necessary in accordance with the performance standards set forth in the wetlands regulations. This Commission orders that all work shall be performed in accordance with the Notice of Intent referenced above, the following General Conditions, and any other special conditions attached to this Order. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, these conditions shall control.

Denied because:

- b. the proposed work cannot be conditioned to meet the performance standards set forth in the wetland regulations. Therefore, work on this project may not go forward unless and until a new Notice of Intent is submitted which provides measures which are adequate to protect the interests of the Act, and a final Order of Conditions is issued. A description of the performance standards which the proposed work cannot meet is attached to this Order.
- c. the information submitted by the applicant is not sufficient to describe the site, the work, or the effect of the work on the interests identified in the Wetlands Protection Act. Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides sufficient information and includes measures which are adequate to protect the Act's interests, and a final Order of Conditions is issued. A description of the specific information which is lacking and why it is necessary is attached to this Order as per 310 CMR 10.05(6)(c).

Inland Resource Area Impacts: Check all that apply below. (For Approvals Only)

3. <input type="checkbox"/> Buffer Zone Impacts: Shortest distance between limit of project disturbance and Bank or Bordering Vegetated Wetland boundary (if available)				
Resource Area	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
4. <input type="checkbox"/> Bank	a. linear feet _____	b. linear feet _____	c. linear feet _____	d. linear feet _____
5. <input type="checkbox"/> Bordering Vegetated Wetland	a. square feet _____	b. square feet _____	c. square feet _____	d. square feet _____
6. <input type="checkbox"/> Land Under Waterbodies and Waterways	a. square feet _____	b. square feet _____	c. square feet _____	d. square feet _____
	e. c/y dredged _____	f. c/y dredged _____		

Appendix E. Order of Conditions for Operational Maintenance Plan, Horseneck Beach State Reservation (Westport Conservation Commission 2009). (Continued)

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B. Findings (cont.)

Resource Area	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
7. <input type="checkbox"/> Bordering Land Subject to Flooding Cubic Feet Flood Storage	a. square feet _____	b. square feet _____	c. square feet _____	d. square feet _____
	e. cubic feet _____	f. cubic feet _____	g. cubic feet _____	h. cubic feet _____
8. <input type="checkbox"/> Isolated Land Subject to Flooding Cubic Feet Flood Storage	a. square feet _____	b. square feet _____		
	c. cubic feet _____	d. cubic feet _____	e. cubic feet _____	f. cubic feet _____
9. <input type="checkbox"/> Riverfront Area	a. total sq. feet _____	b. total sq. feet _____		
Sq ft within 100 ft	c. square feet _____	d. square feet _____	e. square feet _____	f. square feet _____
Sq ft between 100-200 ft	g. square feet _____	h. square feet _____	i. square feet _____	j. square feet _____

Coastal Resource Area Impacts: Check all that apply below. (For Approvals Only)

10. <input type="checkbox"/> Designated Port Areas	Indicate size under Land Under the Ocean, below			
11. <input type="checkbox"/> Land Under the Ocean	a. square feet _____	b. square feet _____		
	c. c/y dredged _____	d. c/y dredged _____		
12. <input checked="" type="checkbox"/> Barrier Beaches	Indicate size under Coastal Beaches and/or Coastal Dunes below			
13. <input checked="" type="checkbox"/> Coastal Beaches	na			
	a. square feet _____	b. square feet _____	c. c/y nourishmt. _____	d. c/y nourishmt. _____
14. <input checked="" type="checkbox"/> Coastal Dunes	na			
	a. square feet _____	b. square feet _____	c. c/y nourishmt. _____	d. c/y nourishmt. _____
15. <input type="checkbox"/> Coastal Banks	a. linear feet _____	b. linear feet _____		
16. <input type="checkbox"/> Rocky Intertidal Shores	a. square feet _____	b. square feet _____		
17. <input type="checkbox"/> Salt Marshes	a. square feet _____	b. square feet _____	c. square feet _____	d. square feet _____
18. <input type="checkbox"/> Land Under Salt Ponds	a. square feet _____	b. square feet _____		
	c. c/y dredged _____	d. c/y dredged _____		
19. <input type="checkbox"/> Land Containing Shellfish	a. square feet _____	b. square feet _____	c. square feet _____	d. square feet _____
20. <input type="checkbox"/> Fish Runs	Indicate size under Coastal Banks, Inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above			
	a. c/y dredged _____	b. c/y dredged _____		
21. <input type="checkbox"/> Land Subject to Coastal Storm Flowage	a. square feet _____	b. square feet _____		

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Appendix E. Order of Conditions for Operational Maintenance Plan, Horseneck Beach State Reservation (Westport Conservation Commission 2009). (Continued)

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C. General Conditions Under Massachusetts Wetlands Protection Act

The following conditions are only applicable to Approved projects.

1. Failure to comply with all conditions stated herein, and with all related statutes and other regulatory measures, shall be deemed cause to revoke or modify this Order.
2. The Order does not grant any property rights or any exclusive privileges; it does not authorize any injury to private property or invasion of private rights.
3. This Order does not relieve the permittee or any other person of the necessity of complying with all other applicable federal, state, or local statutes, ordinances, bylaws, or regulations.
4. The work authorized hereunder shall be completed within three years from the date of this Order unless either of the following apply:
 - a. the work is a maintenance dredging project as provided for in the Act; or
 - b. the time for completion has been extended to a specified date more than three years, but less than five years, from the date of issuance. If this Order is intended to be valid for more than three years, the extension date and the special circumstances warranting the extended time period are set forth as a special condition in this Order.
5. This Order may be extended by the issuing authority for one or more periods of up to three years each upon application to the issuing authority at least 30 days prior to the expiration date of the Order.
6. Any fill used in connection with this project shall be clean fill. Any fill shall contain no trash, refuse, rubbish, or debris, including but not limited to lumber, bricks, plaster, wire, lath, paper, cardboard, pipe, tires, ashes, refrigerators, motor vehicles, or parts of any of the foregoing.
7. This Order is not final until all administrative appeal periods from this Order have elapsed, or if such an appeal has been taken, until all proceedings before the Department have been completed.
8. No work shall be undertaken until the Order has become final and then has been recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land upon which the proposed work is to be done. In the case of the registered land, the Final Order shall also be noted on the Land Court Certificate of Title of the owner of the land upon which the proposed work is done. The recording information shall be submitted to the Conservation Commission on the form at the end of this Order, which form must be stamped by the Registry of Deeds, prior to the commencement of work.
9. A sign shall be displayed at the site not less than two square feet or more than three square feet in size bearing the words,

"Massachusetts Department of Environmental Protection" [or, "MassDEP"]

"File Number E 80-1790 "

Appendix E. Order of Conditions for Operational Maintenance Plan, Horseneck Beach State Reservation (Westport Conservation Commission 2009). (Continued)

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C. General Conditions Under Massachusetts Wetlands Protection Act

10. Where the Department of Environmental Protection is requested to issue a Superseding Order, the Conservation Commission shall be a party to all agency proceedings and hearings before MassDEP.
11. Upon completion of the work described herein, the applicant shall submit a Request for Certificate of Compliance (WPA Form 8A) to the Conservation Commission.
12. The work shall conform to the plans and special conditions referenced in this order.
13. Any change to the plans identified in Condition #12 above shall require the applicant to inquire of the Conservation Commission in writing whether the change is significant enough to require the filing of a new Notice of Intent.
14. The Agent or members of the Conservation Commission and the Department of Environmental Protection shall have the right to enter and inspect the area subject to this Order at reasonable hours to evaluate compliance with the conditions stated in this Order, and may require the submittal of any data deemed necessary by the Conservation Commission or Department for that evaluation.
15. This Order of Conditions shall apply to any successor in interest or successor in control of the property subject to this Order and to any contractor or other person performing work conditioned by this Order.
16. Prior to the start of work, and if the project involves work adjacent to a Bordering Vegetated Wetland, the boundary of the wetland in the vicinity of the proposed work area shall be marked by wooden stakes or flagging. Once in place, the wetland boundary markers shall be maintained until a Certificate of Compliance has been issued by the Conservation Commission.
17. All sedimentation barriers shall be maintained in good repair until all disturbed areas have been fully stabilized with vegetation or other means. At no time shall sediments be deposited in a wetland or water body. During construction, the applicant or his/her designee shall inspect the erosion controls on a daily basis and shall remove accumulated sediments as needed. The applicant shall immediately control any erosion problems that occur at the site and shall also immediately notify the Conservation Commission, which reserves the right to require additional erosion and/or damage prevention controls if it may deem necessary. Sedimentation barriers shall serve as the limit of work unless another limit of work line has been approved by this Order.

NOTICE OF STORMWATER CONTROL AND MAINTENANCE REQUIREMENTS

18. The work associated with this Order (the "Project") is (1) is not (2) subject to the Massachusetts Stormwater Standards. If the work is subject to the Stormwater Standards, then the project is subject to the following conditions:
 - a) All work, including site preparation, land disturbance, construction and redevelopment, shall be implemented in accordance with the construction period pollution prevention and erosion and sedimentation control plan and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Construction General Permit as required by Stormwater Condition 8. Construction period erosion, sedimentation and pollution control measures and best management practices (BMPs) shall remain in place until the site is fully stabilized.

Appendix E. Order of Conditions for Operational Maintenance Plan, Horseneck Beach State Reservation (Westport Conservation Commission 2009). (Continued)



Massachusetts Department of Environmental Protection
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C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

- b) No stormwater runoff may be discharged to the post-construction stormwater BMPs unless and until a Registered Professional Engineer provides a Certification that:
- i. all construction period BMPs have been removed or will be removed by a date certain specified in the Certification. For any construction period BMPs intended to be converted to post construction operation for stormwater attenuation, recharge, and/or treatment, the conversion is allowed by the MassDEP Stormwater Handbook BMP specifications and that the BMP has been properly cleaned or prepared for post construction operation, including removal of all construction period sediment trapped in inlet and outlet control structures;
 - ii. as-built final construction BMP plans are included, signed and stamped by a Registered Professional Engineer, certifying the site is fully stabilized;
 - iii. any illicit discharges to the stormwater management system have been removed, as per the requirements of Stormwater Standard 10;
 - iv. all post-construction stormwater BMPs are installed in accordance with the plans (including all planting plans) approved by the issuing authority, and have been inspected to ensure that they are not damaged and that they are in proper working condition;
 - v. any vegetation associated with post-construction BMPs is suitably established to withstand erosion.
- c) The landowner is responsible for BMP maintenance until the issuing authority is notified that another party has legally assumed responsibility for BMP maintenance. Prior to requesting a Certificate of Compliance, or Partial Certificate of Compliance, the responsible party (defined in General Condition 18(e)) shall execute and submit to the issuing authority an Operation and Maintenance Compliance Statement ("O&M Statement") for the Stormwater BMPs identifying the party responsible for implementing the stormwater BMP Operation and Maintenance Plan ("O&M Plan") and certifying the following: i.) the O&M Plan is complete and will be implemented upon receipt of the Certificate of Compliance, and ii.) the future responsible parties shall be notified in writing of their ongoing legal responsibility to operate and maintain the stormwater management BMPs and implement the Stormwater Pollution Prevention Plan.
- d) Post-construction pollution prevention and source control shall be implemented in accordance with the long-term pollution prevention plan section of the approved Stormwater Report and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Multi-Sector General Permit.
- e) Unless and until another party accepts responsibility, the landowner, or owner of any drainage easement, assumes responsibility for maintaining each BMP. To overcome this presumption, the landowner of the property must submit to the issuing authority a legally binding agreement of record, acceptable to the issuing authority, evidencing that another entity has accepted responsibility for maintaining the BMP, and that the proposed responsible party shall be treated as a permittee for purposes of implementing the requirements of Conditions 18(f) through 18(k) with respect to that BMP. Any failure of the proposed responsible party to implement the requirements of Conditions 18(f) through 18(k) with respect to that BMP shall be a violation of the Order of Conditions or Certificate of Compliance. In the case of stormwater BMPs that are serving more than one lot, the legally binding agreement shall also identify the lots that will be serviced by the stormwater BMPs. A plan and easement deed that grants the responsible party access to perform the required operation and maintenance must be submitted along with the legally binding agreement.
- f) The responsible party shall operate and maintain all stormwater BMPs in accordance with the design plans, the O&M Plan, and the requirements of the Massachusetts Stormwater Handbook.

Appendix E. Order of Conditions for Operational Maintenance Plan, Horseneck Beach State Reservation (Westport Conservation Commission 2009). (Continued)



Massachusetts Department of Environmental Protection
 Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
 Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

BK 9476 PG 179

SE 80 -1790
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C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

- g) The responsible party shall:
 1. Maintain an operation and maintenance log for the last three (3) consecutive calendar years of inspections, repairs, maintenance and/or replacement of the stormwater management system or any part thereof, and disposal (for disposal the log shall indicate the type of material and the disposal location);
 2. Make the maintenance log available to MassDEP and the Conservation Commission ("Commission") upon request; and
 3. Allow members and agents of the MassDEP and the Commission to enter and inspect the site to evaluate and ensure that the responsible party is in compliance with the requirements for each BMP established in the O&M Plan approved by the issuing authority.
- h) All sediment or other contaminants removed from stormwater BMPs shall be disposed of in accordance with all applicable federal, state, and local laws and regulations.
- i) Illicit discharges to the stormwater management system as defined in 310 CMR 10.04 are prohibited.
- j) The stormwater management system approved in the Order of Conditions shall not be changed without the prior written approval of the issuing authority.
- k) Areas designated as qualifying pervious areas for the purpose of the Low Impact Site Design Credit (as defined in the MassDEP Stormwater Handbook, Volume 3, Chapter 1, Low Impact Development Site Design Credits) shall not be altered without the prior written approval of the issuing authority.
- l) Access for maintenance, repair, and/or replacement of BMPs shall not be withheld. Any fencing constructed around stormwater BMPs shall include access gates and shall be at least six inches above grade to allow for wildlife passage.

Special Conditions (if you need more space for additional conditions, please attach a text document):

D. Findings Under Municipal Wetlands Bylaw or Ordinance

1. Is a municipal wetlands bylaw or ordinance applicable? Yes No
2. The Conservation Commission hereby finds (check one that applies):
 - a. that the proposed work cannot be conditioned to meet the standards set forth in a municipal ordinance or bylaw specifically:

1. Municipal Ordinance or Bylaw

2. Citation

Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides measures which are adequate to meet these standards, and a final Order of Conditions is issued.

Appendix E. Order of Conditions for Operational Maintenance Plan, Horseneck Beach State Reservation (Westport Conservation Commission 2009). (Continued)

	Massachusetts Department of Environmental Protection Bureau of Resource Protection - Wetlands	BK 9476 PG 180
	WPA Form 5 – Order of Conditions	SE 80 -1780 <small>MassDEP File Number</small>
	Massachusetts Wetlands Protection Act M.G.L. c. 131, §40	Document Transaction Number
		Westport <small>City/Town</small>
D. Findings Under Municipal Wetlands Bylaw or Ordinance (cont.)		
b. <input type="checkbox"/> that the following additional conditions are necessary to comply with a municipal ordinance or bylaw:		
1. Municipal Ordinance or Bylaw	2. Citation	
3. The Commission orders that all work shall be performed in accordance with the following conditions and with the Notice of Intent referenced above. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, the conditions shall control.		
The special conditions relating to municipal ordinance or bylaw are as follows (If you need more space for additional conditions, attach a text document):		
<hr/> <hr/> <hr/> <hr/>		
<small>wpaform5.doc • rev. 11/08</small>		
<small>Page 8 of 11</small>		

Appendix E. Order of Conditions for Operational Maintenance Plan, Horseneck Beach State Reservation (Westport Conservation Commission 2009). (Continued)

BK 9476 PG 181



Massachusetts Department of Environmental Protection
 Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
 Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

SE 80 -1790
 MassDEP File Number
 Document Transaction Number
 Westport
 City/Town

E. Signatures and Notary Acknowledgement

This Order is valid for three years, unless otherwise specified as a special condition pursuant to General Conditions #4, from the date of issuance. Please indicate the number of members who will sign this form. This Order must be signed by a majority of the Conservation Commission. The Order must be mailed by certified mail (return receipt requested) or hand delivered to the applicant. A copy also must be mailed or hand delivered at the same time to the appropriate Department of Environmental Protection Regional Office, if not filing electronically, and the property owner, if different from applicant.

6-5-09
 1. Date of Issuance
 6
 2. Number of Signers

Signatures:

Notary Acknowledgement

Commonwealth of Massachusetts County of Bristol

On this 5th of June 2009
Day Month Year

Before me, the undersigned Notary Public, personally appeared R. Michael Sullivan
Name of Document Signer

proved to me through satisfactory evidence of identification, which was/were

Known to me
Description of evidence of identification

to be the person whose name is signed on the preceding or attached document, and acknowledged to me that he/she signed it voluntarily for its stated purpose.

As member of Westport Conservation Commission
City/Town

 Signature of Notary Public
Leone F. Farias
 Printed Name of Notary Public
11-6-11
 My Commission Expires (Date)

Place notary seal and/or any stamp above.

This Order is issued to the applicant as follows:

by hand delivery on

by certified mail, return receipt requested, on

7005 1820 0005 7823 9200

Date

Date 6-5-09

Appendix E. Order of Conditions for Operational Maintenance Plan, Horseneck Beach State Reservation (Westport Conservation Commission 2009). (Continued)



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

BK 9476 PG 182

SE 80 - 1780
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F. Appeals

The applicant, the owner, any person aggrieved by this Order, any owner of land abutting the land subject to this Order, or any ten residents of the city or town in which such land is located, are hereby notified of their right to request the appropriate MassDEP Regional Office to issue a Superseding Order of Conditions. The request must be made by certified mail or hand delivery to the Department, with the appropriate filing fee and a completed Request of Departmental Action Fee Transmittal Form, as provided in 310 CMR 10.03(7) within ten business days from the date of issuance of this Order. A copy of the request shall at the same time be sent by certified mail or hand delivery to the Conservation Commission and to the applicant, if he/she is not the appellant.

Any appellants seeking to appeal the Department's Superseding Order associated with this appeal will be required to demonstrate prior participation in the review of this project. Previous participation in the permit proceeding means the submission of written information to the Conservation Commission prior to the close of the public hearing, requesting a Superseding Order, or providing written information to the Department prior to issuance of a Superseding Order.

The request shall state clearly and concisely the objections to the Order which is being appealed and how the Order does not contribute to the protection of the interests identified in the Massachusetts Wetlands Protection Act (M.G.L. c. 131, § 40), and is inconsistent with the wetlands regulations (310 CMR 10.00). To the extent that the Order is based on a municipal ordinance or bylaw, and not on the Massachusetts Wetlands Protection Act or regulations, the Department has no appellate jurisdiction.

Section G, Recording Information, is available on the following page.

Appendix E. Order of Conditions for Operational Maintenance Plan, Horseneck Beach State Reservation (Westport Conservation Commission 2009). (Continued)



Commonwealth of Massachusetts

Division of Fisheries & Wildlife

Wayne F. MacCallum, Director

May 5, 2009

Westport Conservation Commission
856 Main Road
Westport, MA 02790-4311

Horseneck Beach S.R.
Dept. of Conservation and Recreation
Commonwealth of Massachusetts
P.O. Box 66
Carver, MA 02366

RE: Applicant: Dept. of Conservation and Recreation
 Project Location: NOI (1): John Reed Road, Westport
 NOI (2): John Reed Road, Westport
 Project Description: NOI (1): Operation plan for on-going beach maintenance
 NOI (2): Operational maintenance plan for Gooseberry Island
 DEP Wetlands File No.: NOI (1) & NOI (2): Not available
 NHESP Tracking No.: 09-26512

Dear Commissioners & Applicant:

The Natural Heritage & Endangered Species Program (NHESP) of the Massachusetts Division of Fisheries & Wildlife has reviewed two Notices of Intent with plans submitted in compliance with the rare wildlife species section of the MA Wetlands Protection Act Regulations (310 CMR 10.37).

Based on a review of the information that was provided and the information contained in our database, the NHESP has determined that portions of this project, as currently proposed, will occur within the actual habitat of the following state-listed species:

<i>Charadrius melodus</i>	Piping Plover	Bird	Threatened*
<i>Sternula antillarum</i>	Least Tern	Bird	Special Concern
<i>Sterna hirundo</i>	Common Tern	Bird	Special Concern
<i>Sterna paradisaca</i>	Arctic Tern	Bird	Special Concern

These species are state-listed in accordance with the Massachusetts Endangered Species Act (MESA, MGL c131A) and its implementing regulations (321 CMR 10.00). *The Piping Plover is also federally protected as "Threatened" pursuant to the U.S. Endangered Species Act (ESA, 50 CFR 17.11). In Massachusetts, Piping Plovers nest on sandy coastal beaches and dunes which are relatively flat and generally free of vegetation or sparsely vegetated. They often build their nests in a narrow area of land between the high tide line and the foot of the coastal dunes. Terns also nest on dunes and beaches with some or no vegetation and forage for

www.masswildlife.org

Division of Fisheries and Wildlife
Field Headquarters, One Rabbit Hill Road, Westborough, MA 01581 (508) 389-6300 Fax (508) 389-7890
An Agency of the Department of Fish and Game

Appendix E. Order of Conditions for Operational Maintenance Plan, Horseneck Beach State Reservation (Westport Conservation Commission 2009). (Continued)

Westport, NHESP Tracking No. 09-26512, Page 2 of 3

small fish, crustaceans, and other invertebrates in bays, inlets, salt marshes, etc. Fact sheets for these species can be found at www.nhesp.org.

WETLANDS PROTECTION ACT (WPA)

For projects within *Estimated Habitat*, the WPA Regulations state that "...if a proposed project is found by the issuing authority to alter a resource area which is part of the habitat of a state-listed species, such project shall not be permitted to have any short or long term adverse effects on the habitat of the local population of that species" (310 CMR 10.37, 10.59), and that "no project may be permitted within the riverfront area which will have any adverse effect on specified habitat sites of rare wetland or upland, vertebrate or invertebrate species, ... or which will have any adverse effect on vernal pool habitat certified prior to the filing of the Notice of Intent" (310 CMR 10.58(4)(b)).

NOI (1): Operation plan for on-going beach maintenance

The NHESP has determined that the proposed project must be conditioned in order to avoid adverse effects on the Resource Area Habitats of state-listed wildlife species (310 CMR 10.37). Therefore, the NHESP requires the following conditions:

- No removal of winter snow fence or the placement or bulldozing of sand on the beach shall occur between April 1 and August 31 unless explicitly approved by the NHESP. Please note that if work is to occur during this time period, the beach areas to be impacted must be surveyed by a qualified shorebird monitor, as determined by NHESP, to determine status and locations of state-listed shorebirds. Upon receipt of this information, the NHESP shall determine whether work may proceed and what conditions may be necessary to avoid impacts to the Resource Area Habitats of state-listed shorebird species.
- Any areas proposed for mechanical beach cleaning / raking after May 20 shall be surveyed by a qualified shorebird monitor, as determined by NHESP, to determine whether the proposed work is within 100 yards of any unfledged Piping Plover and Tern chicks. If chicks are present, said monitor shall be present during any beach cleaning / raking activities until the chicks have fledged.
- On or before April 1 each year, all areas of suitable Piping Plover nesting habitat at the following locations at Horseneck Beach State Reservation shall be delineated with symbolic fencing and warning signs: 1) the foredunes and beach above the high tide line that extend from the campground west to the major break in the line of foredunes that occurs approximately 300 feet southeast of the old DCR office building, and 2) the western-most approximately 1,500 feet of upper beach and foredunes on the Reservation. All vehicular access, including vehicles used for beach raking, fence removal, transporting and bulldozing sand, and trash removal, shall be prohibited inside fenced areas. These areas shall remain fenced as long as viable eggs, unfledged chicks, or territorial or courting Piping Plovers are present.
- All other areas of beachfront shall be monitored at least 3 times per week, beginning April 1 each year, by a qualified shorebird monitor as determined by the NHESP. If Piping Plovers are found to be nesting or "scraping" (a behavior that is a direct precursor to nesting) at other locations on the beach, then those areas of habitat shall be delineated and protected with warning signs and symbolic fencing of at least a 50 yard radius around the nest or scrapes and above the high tide line. All vehicular access shall be prohibited inside fenced areas. These areas shall remain fenced as long as viable eggs, unfledged chicks, or territorial or courting Piping Plovers are present.

Provided the above conditions are adhered to and included in any final Order of Conditions, the project will not adversely affect the Resource Area habitat of state-listed wildlife. Please note that the NHESP

Appendix E. Order of Conditions for Operational Maintenance Plan, Horseneck Beach State Reservation (Westport Conservation Commission 2009). (Continued)

Westport, NHESP Tracking No. 09-26512, Page 3 of 3

approves dredging and beach nourishment projects for a maximum of a three-year period, at which time we require additional review pursuant to the WPA. We remind the Conservation Commission that a copy of any Order of Conditions associated with the proposed project must be sent to the NHESP at the same time it is sent to the applicant, as required by 310 CMR 10.05(6)(e).

NOI (2): Operational maintenance plan for Gooseberry Island

The NHESP has determined that the proposed Operational Maintenance Plan for Gooseberry Island will not adversely affect the Resource Area Habitats of state-listed wildlife species. Therefore the project, as proposed, meets the rare species requirements of the WPA and its implementing regulations for the issuance of Orders of Conditions approving the project with regards to rare species. A copy of the final Order of Conditions shall be sent to the NHESP simultaneously with the applicant as stated in the Procedures section of the WPA (310 CMR 10.05(6)(e)). Please note that the NHESP approves dredging projects for a maximum of a three-year period, at which time we require additional review pursuant to the WPA. This determination addresses only the matter of state-listed wildlife habitat and does not pertain to other wildlife habitat issues that may be pertinent to the proposed project.

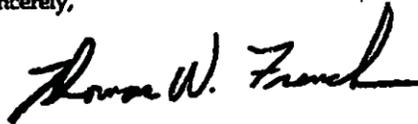
MASSACHUSETTS ENDANGERED SPECIES ACT (MESA)

The MESA is administered by the NHESP of the MA Division of Fisheries & Wildlife, and prohibits the "take" of state-listed species. The "take" of state-listed species is defined as "in references to animals to harass, harm, pursue, hunt, shoot, hound, kill, trap, capture, collect, process, disrupt the nesting, breeding, feeding or migratory activity or attempt to engage in any such conduct, or to assist such conduct...Disruption of nesting, breeding, feeding or migratory activity may result from, but is not limited to, the modification, degradation or destruction of Habitat." (321 CMR 10.02).

The project is located within mapped Priority Habitat and the applicant is therefore REQUIRED to file directly with the NHESP pursuant to the MESA. The NHESP website, www.nhosp.org ("Regulatory Review" Tab), has details regarding the MESA regulations, filing requirements, and fees. After receiving the requested information, NHESP will review the proposed project for compliance with the MESA. NHESP's review pursuant to the MESA is ongoing. No soil or vegetation disturbance, work, clearing, grading or other activities related to the subject filing should be conducted anywhere on this project site until the NHESP has completed its review.

This evaluation is based on the most recent information available in the Natural Heritage database, which is constantly being expanded and updated through ongoing research and inventory. Should your site plans change, or new rare species information become available, this evaluation may be reconsidered. If you have any questions regarding this letter please contact Dr. Scott Melvin at 508-389-6345.

Sincerely,

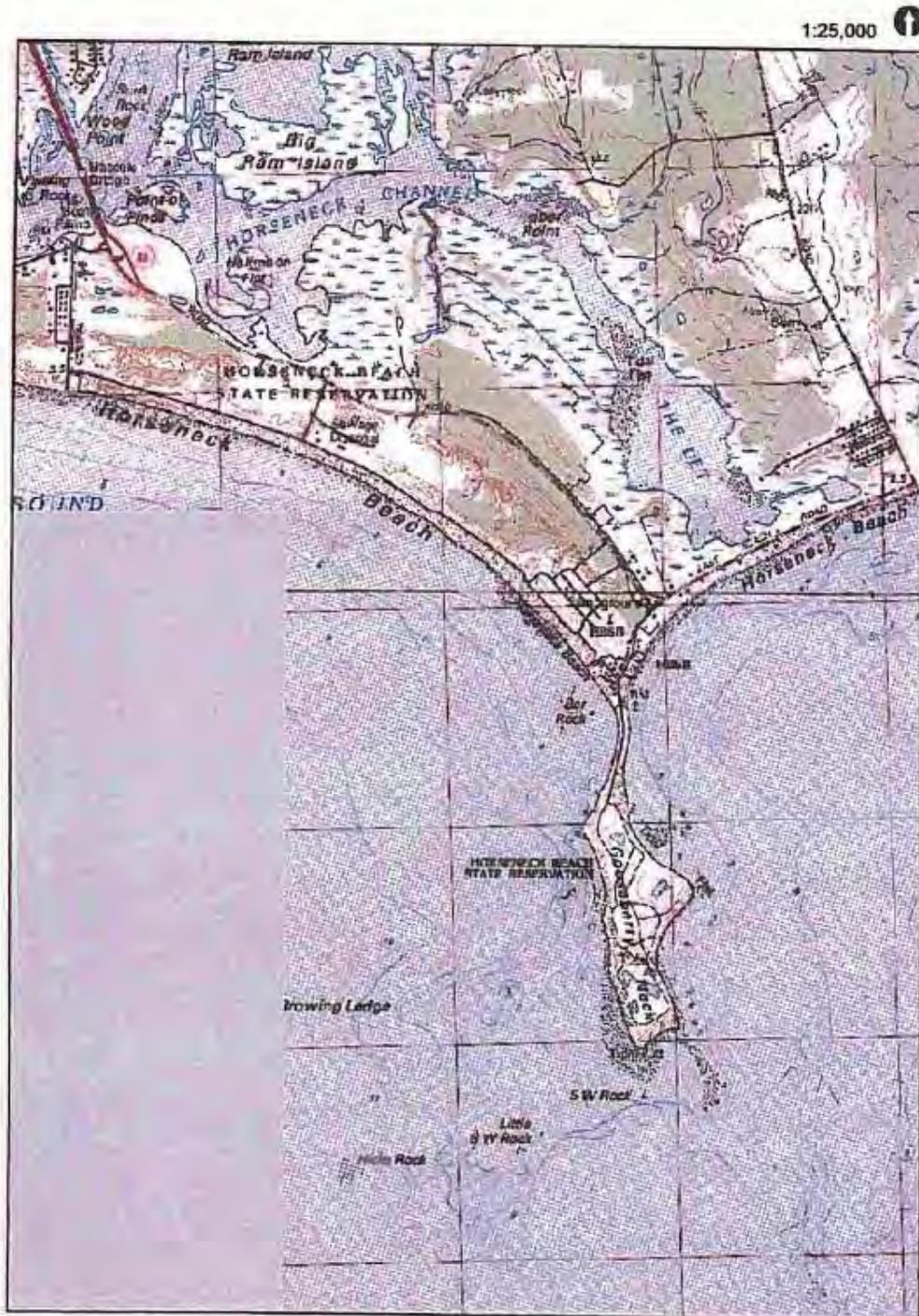


Thomas W. French, Ph.D.
Assistant Director

cc: Jeff Carter, DCR
Susie von Oettingen, U.S. Fish and Wildlife Service, New England Field Office
DEP Southeast Regional Office, Wetlands Program

Appendix E. Order of Conditions for Operational Maintenance Plan, Horseneck Beach State Reservation (Westport Conservation Commission 2009). (Continued)

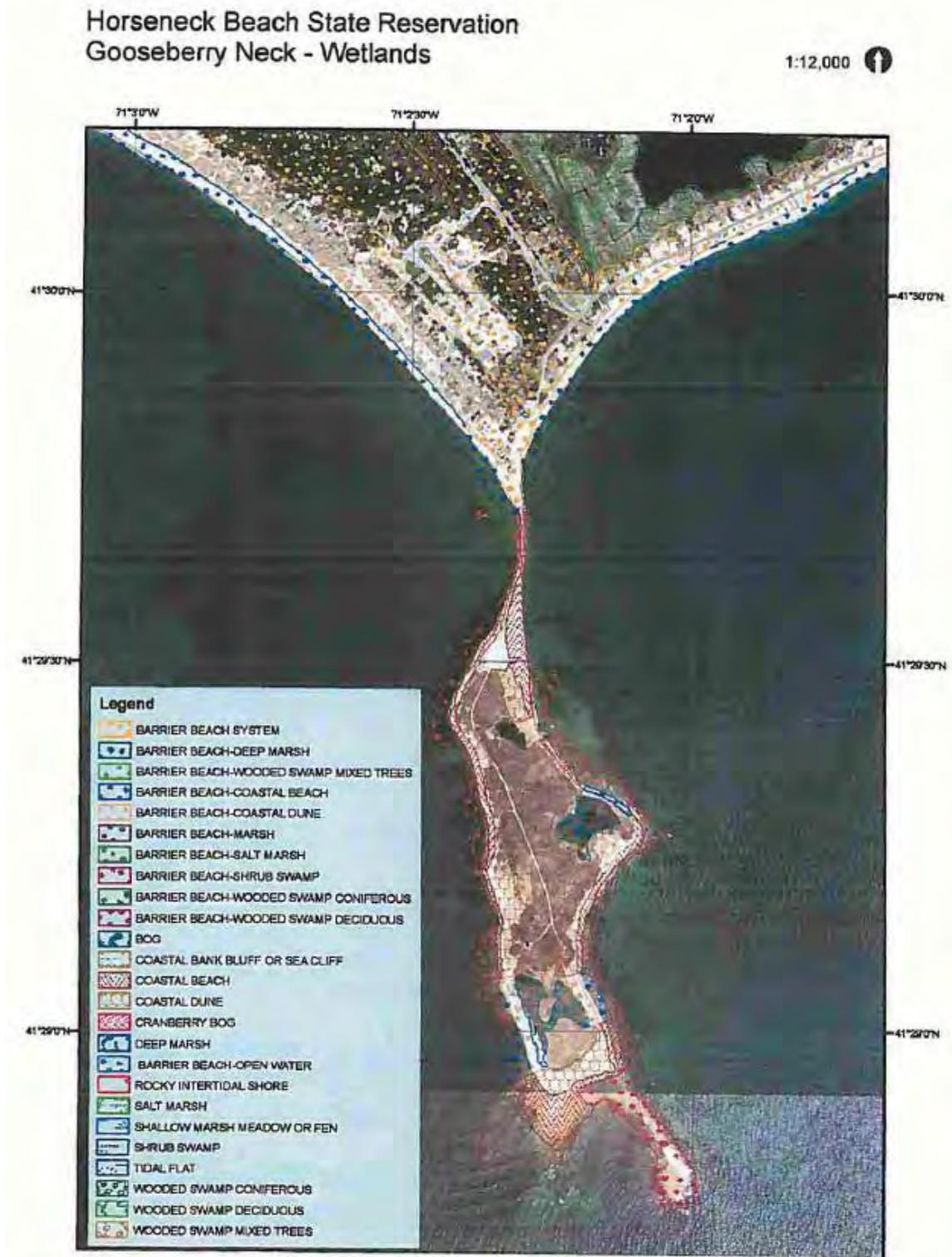
Horseneck Beach State Reservation



Appendix E. Order of Conditions for Operational Maintenance Plan, Horseneck Beach State Reservation (Westport Conservation Commission 2009). (Continued)



Appendix E. Order of Conditions for Operational Maintenance Plan, Horseneck Beach State Reservation
 Gooseberry Neck - Wetlands (Westport Conservation Commission 2009). (Continued)



Appendix E. Order of Conditions for Operational Maintenance Plan, Horseneck Beach State Reservation (Westport Conservation Commission 2009). (Continued)

**Department of Conservation and Recreation
Operational Maintenance Plan
Horseneck Beach State Reservation**

- 1. Removal of winter snow fence – Snow fence is removed during the months of March and April. In order to remove the fencing staff uses front-end loader, bulldozer, ATV, Gator, and 4x4 pick-up truck. When fencing is removed a front-end loader and bulldozer are used to spread the sand that has built up along the fence over the winter.**
- 2. Install snow fence – Installation is done during the months of September and October. Staff transports fencing and material to the beach using Gator, pick-up truck, and front-end loader. Snow fence is installed to prevent sand from blowing into and across the parking areas.**
- 3. Reclamation of sand – this is year round routine maintenance but the majority of the maintenance is done in the spring. Staff use front end loader and dump truck to remove sand that has blown into the boardwalks and parking areas. This sand is then returned back the to public beach area. Any discolored or contaminated sands are separated and not put on the beach.**
- 4. Beach cleaning – All beach cleaning is done between the months of April and September and is performed as a 5-7 day a week operation. The operation consists of a tractor pulling a Barber Surf Rake. This operation helps staff keep the beach clean from debris that is left from patron that is spread out over a large area. Staff is sensitive to endangered and threatened shorebirds and is trained to operate heavy equipment in sensitive areas. This area is also monitored by the DCR's staff coastal ecologist as well as the Lloyd Center. Both entities provide staff with operation recommendation and provide staff with current updates of nesting behavior. Staff does not remove any wet portions of the wrack line to provide this as a food source for shorebirds.**
- 5. Old snow fence poles – occasionally old portions of snow fence will become exposed on a dune. When this happens staff will try to dig out by hand and if them fail will remove unsafe portion with a front-end loader.**
- 6. John Reed Road – twice during the summer a tractor pulling a mower will cut the side of the road. Tree limbs will be cut on a as needed basis.**

Appendix E. Order of Conditions for Operational Maintenance Plan, Horseneck Beach State Reservation (Westport Conservation Commission 2009). (Continued)

- 7. Guard Shack – during the months of May-September a shack is placed on the beach and is operated as a first-aid headquarters and lifeguard station.**

Appendix E. Order of Conditions for Operational Maintenance Plan, Horseneck Beach State Reservation (Westport Conservation Commission 2009). (Continued)

**Department of Conservation and Recreation
Operational Maintenance Plan
Gooseberry Island and East Beach Road Property**

1. **Gooseberry Island – The parking lot on the island has a base of crushed blue stone. Heavy equipment is used to do the routine maintenance of the lot. This ongoing maintenance consists of re-grading the parking area and maintaining the boat ramp to ensure it is free from sand and seaweed build-up. Staff also uses a front end loader to maintain the dirt access road to the tower. No expansion of the existing parking lot is proposed.**

Appendix F. Identified Capital Projects.

A challenge facing all DCR facilities is achieving a balance between protecting resources with meeting the recreational needs and expectations of the public. A goal of the recent capital improvements to HBCH was to conduct the improvements while trying to attain this balance. Emphasis was placed on reducing impervious surfaces, restoring coastal dunes and the barrier beach, and improving rare species habitat while undertaking significant improvements to infrastructure.

Capital projects, repairs, and purchases that continue to implement the Sustainable Recreation Master Plan and meet the goals stated above for HBCH, and improve DEML, are presented in Table D.1. Please note that many of these resources are considered historic and are in sensitive natural resource zones – please refer to those sections of this RMP for additional guidance.

The following criteria were developed and applied to help develop and assess capital improvement recommendations:

- Stabilization and enhancement of identified natural, cultural, and recreation resources;
- Reduction of facility environmental impact;
- Public health, safety, and universal access benefits;
- Funding availability and reduction of operating costs;
- Response to expressed visitor needs and potential for private partner support;
- Meets legal or regulatory obligations; and
- Next phase of an integrated project.

Table F.1. Identified Capital Projects

Facility/Location	Project
HBCH Central Plaza	Design and construct parking spaces behind the new Beach Services Building for staff and ADA access; restore the frontal dune after removing impervious pavement; create a seating area with shade pergolas; and provide a promenade for pedestrian and emergency vehicle access to the beach.
HBCH Campground	Renovate existing comfort station.
HBCH Campground	Design and permit camping facilities for 100 tents, trailers, and recreational vehicles with elevated dune boardwalks, restored primary dune, walk-in tent sites with satellite parking, electrical hook-ups for recreational vehicles, and native coastal landscape plantings.
HBCH	Expand the wind power feasibility study to include assessments of economic, visual, and wildlife impacts of alternative turbine configurations.
HBCH	Establish ecologically sensitive dune and Westport River interpretive trails.
HBCH West Parking Lot	Finalize and implement design plans to establish a separate right lane for the main park entrance along John Reed Road; provide landscaped rain garden medians to improve visual quality and filter storm water; create a passenger drop-off location at comfort station; and install proper circulation and information signs.
HBCH East Parking Lot	Remove excess parking surface; install rain garden medians and storm water collection features; replace deteriorating gates; create passenger drop-off locations near comfort station; and install circulation and informational signs.
Gooseberry Neck	Secure WWII observation towers from public trespass and plan for future reuse as interpretive feature.
Gooseberry Neck	Provide ADA accessible interpretive trail and improve parking lot landscape and design.
Planning Unit	Establish a modern day use fee collection, accounting and storage system.
DEML	Replace existing administrative building and contact station with a single building on the site of the existing contact station.
DEML	Provide two elevated boardwalks for beach access; keep two at grade beach access points for lifeguard, vehicular, and emergency vehicle access; and eliminate excess beach access trails.
DEML	Upgrade well pump house and provide a water fountain at the comfort station.
DEML	Install a guardrail system with picnic drop off locations between Picnic Area 2 and the main parking lot. Install a curb along Demarest Lloyd Memorial State Park Road where it crosses over Giles Creek.

Appendix G. Common and Scientific Names of Plants and Animals Referenced in this RMP. ^a

Common Name	Scientific Name	Type ^a	MESA ^b
Alewife	<i>Alosa pseudoharengus</i>	Animal	-
Arethusa (Dragon's mouth)	<i>Arethusa bulbosa</i>	Plant	T
Bass, striped	<i>Morone saxatilis</i>	Animal	-
Bittersweet, Oriental	<i>Celastrus orbiculatus</i>	Plant	-
Blazing star, New England	<i>Liatris scariosa</i> var. <i>novae-angliae</i>	Plant	SC
Bluefish	<i>Pomatomus saltatrix</i>	Animal	-
Bluet, attenuated	<i>Enallagma daeckii</i>	Animal	SC
Bonito, Atlantic	<i>Sarda sarda</i>	Animal	-
Butterfly, monarch	<i>Danaus plexippus</i>	Animal	-
Cherry, black	<i>Prunus serotina</i>	Plant	-
Clam, soft-shelled	<i>Mya arenaria</i>	Animal	-
Clam, hard-shelled (Northern quahog)	<i>Mercenaria mercenaria</i>	Animal	-
Cordgrass, freshwater	<i>Spartina pectinata</i>	Plant	-
Cordgrass, prairie	<i>Spartina pectinata</i>	Plant	-
Coyote	<i>Canis latrans</i>	Animal	-
Crab, horseshoe	<i>Limulus polyphemus</i>	Animal	-
Cranberry	<i>Vaccinium macrocarpon</i>	Plant	-
Darner, common green	<i>Anax junius</i>	Animal	-
Dog, domestic	<i>Canis familiaris</i>	Animal	-
Eastern oyster	<i>Crassostrea virginica</i>	Animal	-
Eelgrass (Sea wrack)	<i>Zostera marina</i>	Plant	-
Falcon, peregrine	<i>Falco peregrinus</i>	Animal	E
Fluke	<i>Paralichthys dentatys</i>	Animal	-
Fox, gray	<i>Urocyon cinereoargenteus</i>	Animal	-
Fox, red	<i>Vulpes vulpes</i>	Animal	-
Foxtail, bristly (Marsh bristlegrass)	<i>Setaria parviflora</i>	Plant	SC
Gamagrass, northern (Eastern gamagrass)	<i>Tripsacum dactyloides</i>	Plant	E
Geometer, chain-dot	<i>Cingilia catenaria</i>	Animal	SC
Harrier, northern	<i>Circus cyaneus</i>	Animal	T
Holly	<i>Ilex</i> sp.	Plant	-
Honeysuckle, Japanese	<i>Lonicera japonica</i>	Plant	-
Honeysuckle, Morrow's	<i>Lonicera morrowii</i>	Plant	-
Knotweed, Japanese	<i>Polygonum cuspidatum</i>	Plant	-
Lobster, American	<i>Homerus americanus</i>	Animal	-
Loon, common	<i>Gavia immer</i>	Animal	SC
Moth, dune noctuid	<i>Oncocnemis riparia</i>	Animal	SC
Moth, drunk apamea	<i>Apamea inebriata</i>	Animal	SC
Moth, pale green pinion	<i>Lithophane viridipallens</i>	Animal	SC
Moth, pink sallow	<i>Psectraglaea carnosae</i>	Animal	SC
Moth, spartina borer	<i>Spartiniphaga inops</i>	Animal	SC
Moth, waxed sallow	<i>Chaetoglaea cerata</i>	Animal	SC
Mussel, blue	<i>Mytilus edulis</i>	Animal	-
Northern parula	<i>Parula americana</i>	Animal	T
Oak	<i>Quercus</i> sp.	Plant	-
Olive, autumn	<i>Elaeagnus umbellata</i>	Animal	-
Orchid	Orchidaceae Family	Plant	-
Osprey	<i>Pandion haliaetus</i>	Animal	-
Oyster, eastern	<i>Crassostrea virginica</i>	Animal	-

Continued on next page.

**Appendix G. Common and Scientific Names of Plants and
Animals Referenced in this RMP.^a (Continued)**

Common Name	Scientific Name	Type ^a	MESA ^b
Pine, pitch	<i>Pinus rigida</i>	Plant	-
Plover, piping	<i>Charadrius melodus</i>	Animal	T
Quahog, northern	<i>Mercenaria mercenaria</i>	Animal	-
Rose of Plymouth (Sea pink)	<i>Sabatia stellaris</i>	Plant	E
Reed, common	<i>Phragmites australis</i>	Plant	-
Raccoon	<i>Procyon lotor</i>	Animal	-
Rose, multiflora	<i>Rosa multiflora</i>	Plant	-
Salamander, marbled	<i>Ambystoma opacum</i>	Animal	T
Sandpiper, upland	<i>Bartramia longicauda</i>	Animal	E
Sassafras	<i>Sassafras albidum</i>	Plant	-
Scallop, bay	<i>Argopecten irradians</i>	Animal	-
Sea pink	<i>Sabatia stellaris</i>	Plant	E
Shark, white	<i>Carcharodon carcharias</i>	Animal	-
Skunk, striped	<i>Mephitis mephitis</i>	Animal	-
Smelt, rainbow	<i>Osmerus mordax</i>	Animal	-
Spadefoot, eastern	<i>Scaphiopus holbrookii</i>	Animal	-
Sundew	<i>Drosera</i> sp.	Plant	-
Swallow, tree	<i>Tachycineta bicolor</i>	Animal	-
Tautog	<i>Tautog onitis</i>	Animal	-
Tern, artic	<i>Sterna paradisaea</i>	Animal	SC
Tern, common	<i>Sterna hirundo</i>	Animal	SC
Tern, least	<i>Sterna antillarum</i>	Animal	SC
Tern, roseate	<i>Sterna dougallii</i>	Animal	E
Terrapin, diamond-backed	<i>Malaclemys terrapin</i>	Animal	T
Trout, brown	<i>Salmo trutta</i>	Animal	-
Tunny, little	<i>Euthynnus alletteratus</i>	Animal	-
Turtle, eastern box	<i>Terrapene carolina</i>	Animal	SC
Watermilfoil, pinnate (Cutleaf watermilfoil)	<i>Myriophyllum pinnatum</i>	Plant	SC
Weakfish	<i>Cynoscion regalis</i>	Animal	-
Whelk, channeled	<i>Busycon canaliculatus</i>	Animal	-
Whelk, knobbed	<i>Busycon carica</i>	Animal	-

a. Taxonomy follows NatureServe (2011) and United States Department of Agriculture, Natural Resources Conservation Service (2011).

b. Status under the Massachusetts Endangered Species Act; E = Endangered, SC = Species of Special Concern, and T = Threatened.

Appendix H. Applicable Regulations.

CMR ^a	Title	Comments
105 CMR 440.00	Minimum Standards for Developed Family Type Campgrounds (State Sanitary Code, Chapter VI)	Regulates campgrounds where three or more families or groups stay overnight or for longer periods.
105 CMR 445.00	Minimum Standards for Bathing Beaches (State Sanitary Code, Chapter VII)	Specifies water quality monitoring and closure posting requirements at bathing beaches (e.g. swim areas at Horseneck Beach State Reservation or Demarest Lloyd Memorial State Park.)
301 CMR 11.00	Massachusetts Environmental Policy Act (MEPA)	Requires the systematic review of any work or activity undertaken by an agency (e.g. the DCR); involving State permitting or financial assistance; or a transfer of State land.
301 CMR 20.00	Coastal Zone Management (CZM) Act	Federal activities or development projects are subject to federal consistency review if they are within or affect the Massachusetts Coastal Zone.
301 CMR 21.00	CZM Federal Consistency Regulations	Helps to carry out the purpose of the federal Coastal Zone Management Act and to specify the manner in which the Massachusetts Coastal Zone Management program will implement federal consistency review.
304 CMR 7.00	Management Plans and Massachusetts Wildlands	Requires a management plan for each state reservation, park, and forest under the control of the Department of Environmental Management. This regulation was superseded by MGL Chapter 21: Section 2F, which requires management plans for all DCR “reservations, parks, and forests.”
304 CMR 12.00	Forest and Park Rules	Regulations for former DEM forests and parks including; leash requirements, trail use, hunting, camping, fishing, boating, regulation enforcement by rangers, the issuance of special use permits, and traffic. Limits use of reservations to the period from dawn to dusk. An updated version of these regulations is in development.
310 CMR 9.00	Waterways	<p>These regulations protect and promote the public’s interest in tidelands, Great Ponds, and non-tidal rivers; preserve and protect the public’s rights in tidelands; protect the public health, safety, and general welfare as it may be affected by any project in tidelands, Great Ponds, or non-tidal rivers; support efforts to revitalize unproductive property along urban waterfronts; and foster the rights of the people to values identified in Article XCVII of the Massachusetts Constitution.</p> <p>These regulations define Great Ponds, and assign their control to the DEP. Chapter 91 permits or licenses are required for the construction, alteration, or removal of both temporary and permanent structures, and the placement of fill. Licenses are also required for beach nourishment, dredging, disposal of unconsolidated material below the low water mark, burning rubbish upon the water, and lowering the water level.</p>
310 CMR 10.00	Wetlands Protection Act	Regulates many activities within 100-feet of wetlands and certified vernal pools, and within 200-feet of perennial rivers.
310 CMR 15.00	Title 5: State Environmental Code	Standard requirements for the siting, construction, inspection, upgrade and expansion of on-site sewage treatment and disposal systems for the transport and disposal of septage.

Continued on next page.

Appendix H. Applicable Regulations. (Continued)

CMR ^a	Title	Comments
310 CMR 22.00	Drinking Water	Includes regulations for Transient Non-community Water Systems, which provide water to 25 or more persons at least 60 days/year.
314 CMR 4.00	Massachusetts Surface Water Standards	These standards “secure to the Commonwealth the benefits of the Clean Water Act.” They designate the most sensitive uses for which the waters of the Commonwealth shall be enhanced, maintained and protected; prescribe minimum water quality criteria; and contain regulations necessary to achieve designated uses and maintain water quality. These standards include the identification and regulation of Outstanding Resource Waters.
314 CMR 19.00	Oil Spill Prevention and Response	Provisions to prevent or reduce the risk of oil spills from tank vessels operating in Buzzards Bay and designated areas of special interest within Massachusetts’ waters.
321 CMR 2.00	Miscellaneous Regulations Relating to Division of Fisheries and Wildlife	Addresses a variety of fish and wildlife issues, including scientific collecting permits and the importation, liberation, and transportation of fish, amphibians, reptiles, birds, and mammals.
321 CMR 3.00	Hunting	Regulates hunting and trapping in Massachusetts.
321 CMR 10.00	Massachusetts Endangered Species Act (MESA)	MESA protects rare species and their habitats by prohibiting the “Take” of any plant or animal species listed as Endangered, Threatened, or Special Concern. Activities that may alter rare species habitat (e.g. trail maintenance, vista pruning, digging archaeological test pits) are subject to regulatory review. On state-owned land, “all practicable means and measures shall be taken to resolve conflicts between the protection, conservation, and restoration of state-listed species...and other uses of such lands in favor of the listed species.”
322 CMR 7.10	Recreational Saltwater Fishing Permits	Identifies the persons who must apply for or are exempt from a recreational saltwater fishing permit, sets forth the application and permits requirement applicable to individual and for-hire permits.
333 CMR 10.00	Certification and Licensing of Pesticide Applicators	Requires that anyone applying herbicides, insecticides, or other pesticides on non-residential property (i.e. all DCR properties) must be certified and licensed.
521 CMR 19.00	Architectural Access Board; Recreational Facilities	Accessibility standards for rinks, pools, beaches, playgrounds, picnic areas, campsites, and other indoor and outdoor facilities. Requires that 5% of picnic facilities be accessible.
521 CMR 19.00	Architectural Access Board; Parking and Passenger Loading Zones	Specifies dimensional, pavement marking, and sign requirements for accessible parking spaces and passenger loading zones.
950 CMR 71.00	Protection of Properties Included in the State Register of Historic Places	Requires Massachusetts Historical Commission notification of “any project either undertaken by the state body or prior to the state body’s funding or licensing, in whole or in part, a private project.”

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Appendix H. Applicable Regulations. (Continued)

U.S.C. ^b	Title	Comments
16 U.S.C. 1451, et. seq.	Coastal Zone Management Act	A national policy to preserve, protect, and where possible, to restore or enhance, the resources of the nation's coastal zone.
16 U.S.C 1531, et. seq.	Federal Endangered Species Act of 1973 (ESA)	The ESA was adopted in 1973 and amended in 2008 and aids in the conservation of ecosystems upon which threatened and endangered species of fish, wildlife and plants depend. It authorizes the determination and listing of species as endangered or threatened; prohibits the unauthorized taking, possession, sale and transport of endangered species; provides authority to acquire land for the conservation of listed species; and authorizes the assessment of civil and criminal penalties for violating the Act or regulations.
16 U.S.C. 3501, et. seq.	Coastal Barrier Resources Act	Enacted in 1982, this Act designated various undeveloped coastal barrier islands for inclusion in the Coastal Barrier Resources System. Designated areas were made ineligible for direct or indirect federal financial assistance that might support development. There were several amendments made to this law.
33 U.S.C. 401	Rivers and Harbors Act of 1899	Prohibits the construction of any bridge, dam, dike, causeway, pier, wharf, jetty, or other structure over or in navigable waterways without congressional approval.
33 U.S.C. 1251, et. seq.	Clean Water Act, Section 404	Programs to regulate the discharge of dredged or fill material into the waters of the U.S. The U.S. Army Corps of Engineers enforces provisions of Section 404 and administers individual and general permit decisions. The U.S. environmental Protection Agency also enforces 404 provisions and reviews and comments on individual permit applications. States have a role in Section 404 decisions, through state program general permits, water quality certification, or program assumption.
42 U.S.C. 4001, et. seq.	National Flood Insurance Act	Congress implemented the Act to make flood insurance coverage available to persons who have the need for such protection in flood prone areas
42 U.S.C. 12101, et. seq.	Equal Opportunity for Individuals with Disabilities	Enacted in 1990 to provide a clear and comprehensive national mandate for the elimination of the discrimination against individuals with disabilities. It affords individuals with disabilities civil rights and equal opportunities.
42 U.S.C. 12131	Prohibitions Against Discrimination and other General Applicable Provisions	A final Title II Regulation of the Americans with Disabilities Act of 1990. Individuals with a disability who, with or without reasonable modifications to rules, policies, or practices, the removal of architectural, communication, or transportation barriers, or the provision of auxiliary aids and services, meets the essential eligibility requirements for the receipt of services or the participation in programs or activities provided by a public entity.

a. A variety of state regulations apply to both the operation of state parks and the behavior of visitors to these parks. This table includes only those regulations directly related to topics addressed in the main body of this RMP. The Code of Massachusetts Regulations, or CMR, "contains regulations promulgated by state agencies" (Massachusetts Trial Court Law Libraries 2010). These regulations "have the force and effect of law like statutes."

b. The United States Code, or U.S.C. is the codification by subject matter of the general and permanent laws of the United States.

Appendix I. GIS Supplemental Information.

METHODOLOGY

The following is a summary of the GIS methodology used by the Department of Conservation and Recreation (DCR) GIS Program to generate and present data within the Horseneck Planning Unit Resource Management Plan (RMP).

Property Boundaries

The digital boundaries for each property within the Horseneck Planning Unit can be described, based on the source data, one of three ways: highly accurate, reasonably accurate and less than accurate. Just over half (51%) of the digital boundaries are based on highly accurate data, e.g. surveys and/or hydrographic or town boundaries. Approximately 35% of the digital boundaries are based on reasonably accurate data, e.g. draft parcel data, georeferenced plans and/or orthophotography. Finally, a small percentage of the digital boundaries (14%) are based on less than accurate data, e.g. a digital sketch or an undocumented source.

Report-sized Maps

Central Plaza/Main Beach (in part), Campground and Picnic Areas. A DCR GIS Specialist digitized the infrastructure points (e.g. contact stations, campsites and picnic areas) and polygons/footprints (e.g. parking areas and buildings) in ArcGIS using field verified documentation of the resources and the 2008–2009 Color Orthophotography datalayer as references.

The Horseneck Beach State Reservation 2011–2012 sand fence data were collected by a DCR GIS Specialist in February, 2012. A GPS application was developed by the DCR GIS Program in an attempt to standardize the data.

The Demarest Lloyd Memorial State Park trails data were collected by consultants in the fall of 2007. A GPS application was developed by the DCR GIS Program in an attempt to standardize the data. However, it is important to note that several of the trails attributes are subjective, e.g. trail width and condition. It is assumed that the individual collecting the data used their best judgment when populating these attributes.

Land Stewardship Zoning. A DCR GIS Specialist digitized the Zone 1, Zone 2, Zone 3 and Significant Feature Overlay datalayers in ArcGIS. The 2008–2009 Color Orthophotography datalayer was used to determine the significant natural and/or cultural areas (e.g. primary and secondary dunes) within each property and in turn, each property’s Zone 1. The 2008–2009 Color Orthophotography datalayer was also used to determine the existing, developed areas within each property and in turn, each property’s Zone 3. Finally, information from the Natural Heritage and Endangered Species Program was used to delineate the Significant Feature Overlay datalayer. Every attempt was made to utilize “on the ground features,” such as roads or wetlands, as the boundary for each zoning datalayer in an effort to make the areas easily identifiable for DCR field staff.

Wall-sized Maps

Infrastructure. See the *Central Plaza/Main Beach (in part), Campground and Picnic Areas* description for the report-sized maps, above.

Land Stewardship Zoning. See the *Land Stewardship Zoning* description for the report-sized maps, above.

DATALAYERS

A summary of the GIS datalayers used by the Department of Conservation and Recreation (DCR) GIS Program to generate and display data within the Horseneck Planning Unit Resource Management Plan (RMP) is presented below, in Table I.1.

Table I.1. Summary of datalayers used to create the Horseneck Planning Unit RMP.^a

Datalayer Name	Source	Additional Information
100-Year Flood Zone	MassGIS	http://www.mass.gov/mgis/nfhl.htm
2008–2009 Color Orthophotography	MassGIS	http://www.mass.gov/mgis/colororthos2008.htm
500-Year Flood Zone	MassGIS	http://www.mass.gov/mgis/nfhl.htm
Aquifers	MassGIS	http://www.mass.gov/mgis/aq.htm
Barrier Beach	MassGIS	http://www.mass.gov/mgis/barrierb.htm
Community Groundwater Source	MassGIS	http://www.mass.gov/mgis/pws.htm
Demarest Lloyd Memorial State Park	MassGIS	http://www.mass.gov/mgis/osp.htm
Eelgrass	MassGIS	http://www.mass.gov/mgis/eelgrass.htm
Elevation (Topographic) Data	MassGIS	http://www.mass.gov/mgis/elev_2005.htm
Flood Insurance Rate Map Zones V and AO	MassGIS	http://www.mass.gov/mgis/firmaov.htm
Horseneck Beach State Reservation	MassGIS	http://www.mass.gov/mgis/osp.htm
Hurricane Surge Inundation	US ACE	http://www.nae.usace.army.mil/projects/hurEvacMA.htm
Hydrography	MassGIS	http://www.mass.gov/mgis/wetdep.htm ; http://www.mass.gov/mgis/hd.htm
Infrastructure (Points, Lines and Polygons)	DCR GIS	
Interim Wellhead Protection Area (IWPA)	MassGIS	http://www.mass.gov/mgis/ziis.htm
NHESP BioMap 2	MassGIS	http://www.mass.gov/mgis/biomap2.htm
NHESP Certified Vernal Pool	MassGIS	http://www.mass.gov/mgis/cvp.htm
NHESP Estimated Habitat of Rare Wildlife	MassGIS	http://www.mass.gov/mgis/esthab.htm
NHESP Natural Communities	MassGIS	http://www.mass.gov/mgis/natcomm.htm
NHESP Potential Vernal Pool	MassGIS	http://www.mass.gov/mgis/pvp.htm
NHESP Priority Habitat of Rare Species	MassGIS	http://www.mass.gov/mgis/prihab.htm
Non-Community Groundwater Source	MassGIS	http://www.mass.gov/mgis/pws.htm
Roads	MassGIS	http://www.mass.gov/mgis/eotroads.htm
Shoreline Change	CZM GIS	http://www.mass.gov/mgis/moris_layers.htm
Significant Feature Overlay	DCR GIS	
State Outline	MassGIS	http://www.mass.gov/mgis/outline.htm
Town Boundary	MassGIS	http://www.mass.gov/mgis/townssurvey.htm
Zone 1, 2, and 3	DCR GIS	

a. All spatial data used in the preparation of this RMP were current as of the date of the RMP.

Appendix J. Flora and Fauna.

Table J.1. Plants of the Horseneck Planning Unit. Taxonomy follows USDA (2010).

Family	Common Name	Scientific Name	MESA ^a	Invasive ^b	DEML ^c	HBCH ^c	Source ^d
Aceraceae	Red maple	<i>Acer rubrum</i>				X	2, 5
Maple Family	Silver maple	<i>Acer saccharinum</i>			X		1
	Red maple	<i>Acer saccharum</i>			X		1
Anacardiaceae	Eastern poison ivy	<i>Toxicodendron radicans</i>			X	X	1, 2, 3, 5
Sumac Family							
Aquifoliaceae	Inkberry	<i>Ilex glabra</i>				X	2, 5
Holly Family							
Asclepiadaceae	Unid. milkweed	<i>Asclepias</i> sp.				X	2
Milkweed Family	Swamp milkweed	<i>Asclepias incarnata</i>			X		3
Araliaceae	Wild sarsaparilla	<i>Aralia nudicaulis</i>				X	2
Ginseng Family							
Asteraceae	Oldwoman	<i>Artemisia stelleriana</i>			X		1
Aster Family	Unid. aster	<i>Aster</i> sp.			X		3
	Eastern baccharis	<i>Baccharis halmifolia</i>			X		3
	Canadian horseweed	<i>Conyza canadensis</i>			X		3
	Slender goldetop	<i>Euthamia caroliniana</i>			X		3
	Unid. cudweed	<i>Gnaphalium</i> sp.				X	2
	Jesuit's bark	<i>Iva frutescens</i>			X		1, 4
	Seaside goldenrod	<i>Solidago sempervirens</i>			X	X	1, 2
	Eastern annual saltmarsh aster	<i>Symphotrichum subulatum</i>			X		4
Brassicaceae	Sea rocket	<i>Cakile eduntula</i>			X	X	1, 2
Mustard Family							
Caprifoliaceae	Morrow's honeysuckle	<i>Lonicera morrowi</i>		I		X	2
Honeysuckle Family	Unid. honeysuckle	<i>Lonicera</i> sp.				X	5
	Southern arrowwood	<i>Viburnum recognitum</i>			X	X	2, 3, 5
Celastraceae	Oriental bittersweet	<i>Celastrus orbiculatus</i>		I		X	2, 5
Bittersweet Family							
Chenopodiaceae	Russian thistle	<i>Salsola kali</i>				X	2
Goosefoot Family							
Cistaceae	Woolly beachheather	<i>Hudsonia tomentosa</i>			X	X	2, 3
Rock-rose Family							
Clethraceae	Coastal sweetpepperbush	<i>Clethra alnifolia</i>				X	2
Clethra Family							
Clusiaceae	Virginia marsh St. Johnswort	<i>Triadenum virginicum</i>			X		3
Mangosteen Family							
Cornaceae	Blackgum	<i>Nyssa sylvatica</i>				X	5
Dogwood Family							
Cupressaceae	Eastern redcedar	<i>Juniperus virginiana</i>			X	X	1, 3, 5
Cypress Family							
Cyperaceae	Pennsylvania sedge	<i>Carex pensylvanica</i>			X	X	2, 3
Sedge Family	Beach sedge	<i>Carex silicea</i>			X		3
	Unid. sedge	<i>Carex</i> sp.				X	2
	Chairmaker's bulrush	<i>Schoenoplectus americanus</i>			X	X	2, 3
Dennstaedtiaceae	Western brackenfern	<i>Pteridium aquilinum</i>				X	2
Bracken Fern Family							

Continued on next page.

Appendix J. Flora and Fauna.

Table J.1. Plants of the Horseneck Planning Unit (Continued). Taxonomy follows USDA (2010).

Family	Common Name	Scientific Name	MESA ^a	Invasive ^b	DEML ^c	HBCH ^c	Source ^d
Ericaceae	Kinnikinnick	<i>Arctostaphylos uva-ursi</i>				X	2
Heath Family	Eastern teaberry	<i>Gaultheria procumbens</i>				X	2, 5
	Black huckleberry	<i>Gaylussacia baccata</i>				X	2
	Blue huckleberry	<i>Gaylussacia frondosa</i>				X	2
	Unid. huckleberry	<i>Gaylussacia</i> sp.				X	5
	Sheep laurel	<i>Kalmia angustifolia</i>				X	5
	Mountain laurel	<i>Kalmia latifolia</i>			X		1
	Unid. azalea	<i>Rhododendron</i> sp.				X	5
	Highbush blueberry	<i>Vaccinium corymbosum</i>			X	X	1, 5
Fabaceae	Beach pea	<i>Lathyrus japonicus</i>				X	2
Pea Family							
Fagaceae	White oak	<i>Quercus alba</i>			X	X	1, 2, 5
Beech Family	Scarlet oak	<i>Quercus coccinea</i>			X	X	1, 5
	Black oak	<i>Quercus velutina</i>			X	X	1, 2, 5
Gentianaceae	Rose of Plymouth (Sea pink)	<i>Sabatia stellaris</i>	E		X		4
Gentian Family							
Haloragaceae	Marsh mermaidweed	<i>Proserpinaca palustris</i>				X	2
Water Milfoil Family	Cutleaf watermilfoil (Pinnate watermilfoil)	<i>Myriophyllum pinnatum</i>	SC			X	2
Iridaceae	Harlequin blueflag	<i>Iris versicolor</i>			X		3
Iris Family							
Juglandaceae	Mockernut hickory	<i>Carya alba</i>			X		1
Walnut Family							
Juncaceae	Canadian rush	<i>Juncus canadensis</i>			X		3
Rush Family	Soft rush	<i>Juncus gerardii</i>			X		1, 3
	Greene's rush	<i>Juncus greenei</i>			X		3
	Poverty rush	<i>Juncus tenuis</i>			X		3
Juncaginaceae	Seaside arrowgrass	<i>Triglochin maritima</i>			X		4
Arrow-grass Family							
Lamiaceae	Northern bugleweed	<i>Lycopus uniflorus</i>			X		3
Mint Family							
Lauraceae	Sassafras	<i>Sassafras albidum</i>				X	2, 5
Laurel Family							
Liliaceae	Canada mayflower	<i>Maianthemum canadense</i>				X	2
Lily Family							
	Starry false lily of the valley	<i>Maianthemum stellatum</i>				X	2
Malvaceae	Crimsoneyed rosemallow	<i>Hibiscus moscheutos</i>			X	X	2, 3
Mallow Family							
Myricaceae	Northern bayberry	<i>Morella pensylvanica</i>			X	X	1, 2, 3, 5
Bayberry Family	Sweetgale	<i>Myrica gale</i>			X		1
Onagraceae	Marsh seedbox	<i>Ludwigia palustris</i>				X	2
Evening Primrose Family							
Pinaceae	Pitch pine	<i>Pinus rigida</i>			X	X	1, 2, 5
Pine Family							
Plantaginaceae	Goose tongue	<i>Plantago maritima</i>			X		4
Plantain family							

Continued on next page.

Appendix J. Flora and Fauna.

Table J.1. Plants of the Horseneck Planning Unit (Continued). Taxonomy follows USDA (2010).

Family	Common Name	Scientific Name	MESA ^a	Invasive ^b	DEML ^c	HBCH ^c	Source ^d
Plumbaginaceae Leadwort Family	Lavender thrift	<i>Limonium carolinianum</i>			X		1, 4
Poaceae Grass Family	Unid. bentgrass	<i>Agrostis</i> sp.			X		3
	American beachgrass	<i>Ammophila breviligulata</i>			X	X	1, 2, 3, 5
	Wavy hairgrass	<i>Deschampsia flexuosa</i>			X	X	2, 3
	Unid. rosette grass	<i>Dicanthelium</i> sp.			X	X	2, 3
	Salt grass	<i>Distichlis spicata</i>			X		1
	Virginia wild rye	<i>Elymus virginicus</i>			X		4
	Switchgrass	<i>Panicum virgatum</i>			X		3, 4
	Common reed	<i>Phragmites australis</i>		I	X	X	2, 3
	Smooth cordgrass	<i>Spartina alterniflora</i>			X		1
	Saltmeadow cordgrass	<i>Spartina patens</i>			X		1, 4
	Prairie cordgrass	<i>Spartina pectinata</i>				X	2
Polygonaceae Buckwheat Family	Common sheep sorrel	<i>Rumex acetosella</i>			X		3
Primulaceae Primrose Family	Whorled yellow loosestrife	<i>Lysimachia quadrifolia</i>			X		3
	Starflower	<i>Trientalis borealis</i>				X	2
Rosaceae Rose Family	Canadian serviceberry	<i>Amelanchier canadensis</i>				X	2
	Unid. serviceberry	<i>Amelanchier</i> sp.			X	X	1, 5
	Beach plum	<i>Prunus maritima</i>			X	X	1, 2
	Black cherry	<i>Prunus serotina</i>				X	2, 5
	Rugosa rose	<i>Rosa rugosa</i>			X	X	1, 5
	Virginia rose	<i>Rosa virginiana</i>			X		3
	Bristly dewberry	<i>Rubus hispidus</i>			X	X	3, 5
	Steeplebush	<i>Spiraea tomentosa</i>			X		3
Rubiaceae Madder Family	Common buttonbush	<i>Cephalanthus occidentalis</i>			X		1
Salicaceae Willow Family	Bigtooth aspen	<i>Populus grandidentata</i>				X	2
	Black willow	<i>Salix nigra</i>			X		1
Scrophulariaceae Figwort Family	Saltmarsh false foxglove	<i>Agalinis maritima</i>			X		4
	Canada toadflax	<i>Nuttallanthus canadensis</i>			X		3
Smilacaceae Catbrier Family	Roundleaf greenbrier	<i>Smilax rotundifolia</i>			X	X	1, 2
	Unid. greenbrier	<i>Smilax</i> sp.				X	5
Thelypteridaceae Marsh Fern Family	Eastern marsh fern	<i>Thelypteris palustris</i>			X		3
Vitaceae Grape Family	Virginia creeper	<i>Parthenocissus quinquefolia</i>				X	2, 5

Continued on next page.

Appendix J. Flora and Fauna.

Table J.1. Plants of the Horseneck Planning Unit (Continued). Taxonomy follows USDA (2010).

Family	Common Name	Scientific Name	MESA ^a Invasive ^b	DEML ^c	HBCH ^c	Source ^d
Zosteraceae	Sea wrack	<i>Zostera marina</i>		X		1
Eel-grass Family						

- a. Status of plants listed under the Massachusetts Endangered Species Act (MESA): E = Endangered; T = Threatened; and SC = Species of Special Concern.
- b. These species have been evaluated by the Massachusetts Invasive Plant Advisory Group (MIPAG 2005) and determined to be invasive (I) or likely invasive (L).
- c. DEML = Demarest Lloyd Memorial State Park; HBCH = Horseneck Beach State Reservation
- d. Information contained in this table was obtained from the following sources:
 1. DEM (1996).
 2. DFW (2006).
 3. Aquatic Control Technology, Inc. (2006).
 4. Flatebo (1982).
 5. Unpublished 2011 data for CFI plots 3472, 3473, 3381, 3382, 3383, 7741, and 7744; Massachusetts DCR.

Appendix J. Flora and Fauna.

Table J.2. Birds of the Horseneck Planning Unit. Family, common, and scientific names and the sequence in which they are presented follow American Ornithologists' Union (2011).

Family	Common Name	Scientific Name	MESA ^a	DEML ^b	HBCH ^b	Source ^c	BBA ^d
Anatidae	Snow goose	<i>Chen caerulescens</i>		X		1	
Geese, Swans, and Ducks	Brant	<i>Branta bernicla</i>				4	
	Canada goose	<i>Branta canadensis</i>		X	X	1, 7, 11	X
	Mute Swan	<i>Cygnus olor</i>		X	X	1, 10	X
	Wood duck	<i>Aix sponsa</i>			X	6	
	Gadwall	<i>Anas strepera</i>		X		1	
	American black duck ^e	<i>Anas rubripes</i>		X	X	1, 11	X
	Mallard	<i>Anas platyrhynchos</i>		X	X	1, 2, 10	X
	Blue-winged teal	<i>Anas discors</i>		X		1	
	Green-winged teal	<i>Anas crecca</i>		X		1	
	Canvasback	<i>Aythya valisineria</i>		X		1	
	Greater scaup	<i>Aythya marila</i>		X		1	
	King eider	<i>Somateria spectabilis</i>			X	5	
	Common eider ^e	<i>Somateria mollissima</i>		X	X	1, 2, 3, 4, 5, 7, 9, 10, 11, 12	X
	Surf scoter	<i>Melanitta perspicillata</i>		X	X	1, 5, 9, 11, 12, 13	
	White-winged scoter	<i>Melanitta fusca</i>		X	X	1, 5, 11, 12	
	Black scoter	<i>Melanitta americana</i>			X	5, 11	
	Long-tailed duck ^e	<i>Clangula hyemalis</i>		X	X	1, 11	
	Bufflehead	<i>Bucephala albeola</i>		X	X	1, 11	
	Common goldeneye	<i>Bucephala clangula</i>		X	X	1, 10, 11	
	Red-breasted merganser	<i>Mergus serrator</i>		X	X	1, 5, 11	
Phasianidae	Ring-necked pheasant	<i>Phasianus colchicus</i>		X		1	
Pheasants	Wild turkey	<i>Meleagris gallopavo</i>					X
Gaviidae	Red-throated loon	<i>Gavia stellata</i>		X	X	1, 5, 11, 13	
Loons	Common loon ^e	<i>Gavia immer</i>	SC	X	X	1, 5, 11, 12	X
Podicipedidae	Pied-billed grebe ^e	<i>Podilymbus podiceps</i>	E	X		1	
Grebes	Horned grebe	<i>Podiceps auritus</i>		X	X	1, 5, 11	
	Red-necked grebe	<i>Podiceps grisegena</i>			X	5	
	Western grebe	<i>Aechmophorous occidentalis</i>			X	5	
Procellariidae	Wilson's storm petrel	<i>Oceanites oceanicus</i>			X	12	
Petrels, shearwaters, and storm petrels							
Sulidae	Northern gannet	<i>Morus bassanus</i>			X	5, 8, 12, 13	
Boobies and Gannets							
Phalacrocoracidae	Double-crested cormorant	<i>Phalacrocorax auritus</i>		X	X	1, 2, 3, 9, 10, 11	X
Cormorants	Great cormorant	<i>Phalacrocorax carbo</i>		X	X	1, 11	
Ardeidae	Great blue heron	<i>Ardea herodias</i>		X	X	1, 11	X
Bitterns and Herons	Great egret	<i>Ardea alba</i>		X		1, 2, 3	X
	Snowy egret ^e	<i>Egretta thula</i>		X		1, 2, 3	X
	Green heron ^e	<i>Butorides virescens</i>		X		1	X
Threskiornithidae	Glossy ibis	<i>Plegadis falcinellus</i>		X		3	X
Ibis							
Cathartidae	Turkey vulture	<i>Cathartes aura</i>		X	X	1, 11	X
American Vultures							
Pandionidae	Osprey	<i>Pandion haliaetus</i>		X	X	1, 2, 3, 7, 9, 10	X
Osprey							

Continued on next page.

Appendix J. Flora and Fauna.

Table J.2. Birds of the Horseneck Planning Unit. (Continued) Family, common, and scientific names and the sequence in which they are presented follow American Ornithologists' Union (2011).

Family	Common Name	Scientific Name	MESA ^a	DEML ^b	HBCF ^b	Source ^c	BBA ^d
Accipitridae Kites, Eagles, and Hawks	Northern harrier ^e	<i>Circus cyaneus</i>	T	X	X	1, 7	X
	Sharp-shinned hawk ^e	<i>Accipiter striatus</i>	SC	X	X	1, 5	X
	Cooper's hawk	<i>Accipiter cooperii</i>		X	X	1, 5, 7	X
	Red-shouldered hawk	<i>Buteo lineatus</i>		X		1	
	Red-tailed hawk	<i>Buteo jamaicensis</i>		X		1	X
Falconidae Falcons	American kestrel ^e	<i>Falco sparverius</i>		X	X	1, 9	
	Merlin	<i>Falco columbarius</i>			X	5, 7	
	Pergerine falcon ^e	<i>Falco peregrinus</i>	E	X	X	1, 5	
Rallidae Rails	Clapper rail	<i>Rallus longirostris</i>					X
	Virginia rail	<i>Rallus limicola</i>					X
Charadriidae Plovers and Lapwings	Black-bellied plover	<i>Pluvialis squatarola</i>		X	X	1, 5, 9, 10	
	American golden-plover	<i>Pluvialis dominica</i>			X	5, 7	
	Semipalmated plover	<i>Charadrius semipalmatus</i>		X	X	1, 4, 7, 9, 10	
	Piping plover ^e	<i>Charadrius melodus</i>	T	X		1, 2, 3	X
	Killdeer	<i>Charadrius vociferus</i>		X	X	1, 3, 9	X
Haematopodidae Oystercatchers	American oystercatcher ^e	<i>Haematopus palliatus</i>					X
Scolopacidae Sandpipers and Allies	Solitary sandpiper	<i>Tringa solitaria</i>			X	7	
	Greater yellowlegs	<i>Tringa melanoleuca</i>		X	X	1, 3, 9	
	Willet	<i>Catoptrophorus semipalmatus</i>		X	X	1, 2, 3, 5	X
	Lesser yellowlegs	<i>Tringa flavipes</i>		X		3	
	Upland sandpiper ^e	<i>Bartramia longicauda</i>	E		X	9	
	Whimbrel ^e	<i>Numenius phaeopus</i>			X	5, 12	
	Spotted sandpiper	<i>Actitis macularia</i>		X	X	1, 9, 10, 12, 13	
	Ruddy turnstone ^e	<i>Arenaria interpres</i>		X	X	1, 2, 5, 9, 10, 13	
	Red knot ^e	<i>Calidris canutus</i>			X	5	
	Sanderling ^e	<i>Calidris alba</i>		X	X	1, 2, 5, 9, 10	
	Semipalmated sandpiper	<i>Calidris pusilla</i>		X	X	1, 2, 5, 7, 9	
	Least sandpiper	<i>Calidris minutilla</i>		X	X	1, 3, 5, 9, 10	
	White-rumped sandpiper	<i>Calidris fuscicollis</i>		X	X	2, 5	
	Baird's sandpiper	<i>Calidris bairdii</i>			X	10	
	Pectoral sandpiper	<i>Calidris melanotos</i>		X	X	5, 7	
	Purple sandpiper	<i>Calidris maritima</i>			X	5, 11	
	Dunlin	<i>Calidris alpina</i>		X	X	1, 5, 11	
	Buff-breasted sandpiper	<i>Tryngites subruficollis</i>			X	5	
	Short-billed dowitcher ^e	<i>Limnodromus griseus</i>			X	9, 12	
	American woodcock ^e	<i>Scolopax minor</i>		X		1	X
	Laridae Jaegers, Gulls, Terns, and Skimmers	Black-legged kittiwake	<i>Rissa tridactyla</i>			X	5
Bonaparte's gull		<i>Chroicocephalus philadelphia</i>		X	X	1, 5, 11, 13	
Black-headed gull		<i>Chroicocephalus ridibundus</i>			X	5	
Laughing gull ^e		<i>Larus atricilla</i>		X	X	1, 3, 9, 10, 11	X
Ring-billed gull		<i>Larus delawarensis</i>		X	X	1, 9, 10, 11	X
Herring gull		<i>Larus argentatus</i>		X	X	1, 7, 9, 10, 11	X
Iceland gull		<i>Larus glaucoides</i>			X	5	
Lesser black-backed gull		<i>Larus fuscus</i>			X	6	
Great black-backed gull		<i>Larus marinus</i>		X	X	1, 9, 10, 11	X
Least tern ^e		<i>Sterna antillarum</i>	SC	X	X	1, 2, 12	X
Roseate tern ^e		<i>Sterna dougallii</i>	E		X	9	
Common tern ^e		<i>Sterna hirundo</i>	SC	X	X	1, 9, 10	X
Forster's tern		<i>Sterna forsteri</i>		X	X	1, 10, 13	
Black skimmer		<i>Rhynchops niger</i>		X		1	

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Appendix J. Flora and Fauna.

Table J.2. Birds of the Horseneck Planning Unit. (Continued) Family, common, and scientific names and the sequence in which they are presented follow American Ornithologists' Union (2011).

Family	Common Name	Scientific Name	MESA ^a	DEML ^b	HBCH ^b	Source ^c	BBA ^d
Columbidae	Rock pigeon	<i>Columba livia</i>		X	X	1, 10, 11	X
Pigeons and Doves	Mourning dove	<i>Zenaida macroura</i>		X	X	1, 2, 7, 9, 10	X
Cuculidae	Yellow-billed cuckoo	<i>Coccyzus americanus</i>			X	13	
Cuckoos and Allies	Black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>			X	9, 12	X
Strigidae	Eastern screech-owl	<i>Megascops asio</i>		X		1	
Typical Owls	Great horned owl	<i>Bubo virginianus</i>					X
	Snowy owl	<i>Nyctea scandiaca</i>			X	5	
	Barred owl	<i>Strix varia</i>					X
Apodidae	Chimney swift	<i>Chaetura pelagica</i>			X	9	X
Swifts							
Trochilidae	Ruby-throated hummingbird	<i>Archilochus colubris</i>			X	9, 10, 12	X
Hummingbirds							
Alcedinidae	Belted kingfisher	<i>Ceryle alcyon</i>			X	11	X
Kingfishers							
Picidae	Red-bellied woodpecker	<i>Melanerpes carolinus</i>		X		1	X
Woodpeckers	Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>					X
	Downy woodpecker	<i>Picoides pubescens</i>		X	X	1, 9, 11	X
	Hairy woodpecker	<i>Picoides villosus</i>					X
	Northern flicker	<i>Colaptes auratus</i>		X	X	1, 6, 7	X
Tyrannidae	Eastern wood-pewee	<i>Contopus virens</i>		X		13	X
Tyrant Flycatchers	Alder flycatcher	<i>Empidonax alnorum</i>			X	7, 13	
	Willow flycatcher ^e	<i>Empidonax trailii</i>					X
	Least flycatcher	<i>Empidonax minimus</i>		X		1	
	Eastern phoebe	<i>Sayornis phoebe</i>		X	X	1, 7, 9, 10	X
	Great-crested flycatcher	<i>Miarchus crinitus</i>		X	X	1, 6	X
	Eastern kingbird	<i>Tyrannus tyrannus</i>		X	X	1, 2, 6, 9, 12	X
Vireonidae	Yellow-throated vireo	<i>Vireo flavifrons</i>			X	5, 6	
Vireos	Blue-headed vireo	<i>Vireo solitarius</i>			X	5, 7	
	White-eyed vireo	<i>Vireo griseus</i>					X
	Red-eyed vireo	<i>Vireo olivaceus</i>			X	5, 7, 10	X
Corvidae	Blue jay	<i>Cyanocitta cristata</i>		X		1	X
Jays, Magpies, and Crows	American crow	<i>Corvus brachyrhynchos</i>					X
Hirundinidae	Tree swallow	<i>Tachycineta bicolor</i>		X	X	2, 5, 9, 10, 12	X
Swallows	Bank swallow	<i>Riparia riparia</i>			X	12, 13	
	Barn swallow	<i>Hirundo rustica</i>		X	X	2, 9, 12	X
	Unid. swallow	-		X		2	
Tyrannidae	Eastern wood-pewee	<i>Contopus virens</i>		X		13	X
Tyrant Flycatchers	Alder flycatcher	<i>Empidonax alnorum</i>			X	7, 13	
	Willow flycatcher ^e	<i>Empidonax trailii</i>					X
	Least flycatcher	<i>Empidonax minimus</i>		X		1	
	Eastern phoebe	<i>Sayornis phoebe</i>		X	X	1, 7, 9, 10	X
	Great-crested flycatcher	<i>Miarchus crinitus</i>		X	X	1, 6	X
	Eastern kingbird	<i>Tyrannus tyrannus</i>		X	X	1, 2, 6, 9, 12	X

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Appendix J. Flora and Fauna.

Table J.2. Birds of the Horseneck Planning Unit. (Continued) Family, common, and scientific names and the sequence in which they are presented follow American Ornithologists' Union (2011).

Family	Common Name	Scientific Name	MESA ^a	DEML ^b	HCBH ^b	Source ^c	BBA ^d
Vireonidae	Yellow-throated vireo	<i>Vireo flavifrons</i>			X	5, 6	
Vireos	Blue-headed vireo	<i>Vireo solitarius</i>			X	5, 7	
	White-eyed vireo	<i>Vireo griseus</i>					X
	Red-eyed vireo	<i>Vireo olivaceus</i>			X	5, 7, 10	X
Corvidae	Blue jay	<i>Cyanocitta cristata</i>		X		1	X
Jays, Magpies, and Crows	American crow	<i>Corvus brachyrhynchos</i>					X
Hirundinidae	Tree swallow	<i>Tachycineta bicolor</i>		X	X	2, 5, 9, 10, 12	X
Swallows	Bank swallow	<i>Riparia riparia</i>			X	12, 13	
	Barn swallow	<i>Hirundo rustica</i>		X	X	2, 9, 12	X
	Unidentified swallow	-		X		2	
Paridae	Black-capped chickadee	<i>Poecile atricapilla</i>		X	X	1, 7, 11, 12	X
Titmice	Tufted titmouse	<i>Baeolophus bicolor</i>		X		1	X
Sittidae	Red-breasted nuthatch	<i>Sitta canadensis</i>			X	6, 7, 10	X
Nuthatches	White-breasted nuthatch	<i>Sitta carolinensis</i>		X		1	X
Troglodytidae	Carolina wren	<i>Thryothorus ludovicianus</i>		X	X	1, 11	X
Wrens	House wren	<i>Troglodytes aedon</i>		X	X	1, 7	X
	Marsh wren	<i>Cistothorus palustris</i>			X	7	
Turdidae	Eastern bluebird	<i>Sialis sialis</i>					X
Bluebirds and Thrushes	Veery	<i>Catharus fuscescens</i>					X
	Wood thrush ^e	<i>Hylocichla mustelina</i>					X
	American robin	<i>Turdus migratorius</i>		X	X	1, 2, 7, 12	X
Mimidae	Gray catbird	<i>Dumetella carolinensis</i>		X	X	1, 2, 7, 9, 10	X
Mimic Thrushes	Northern mockingbird	<i>Mimus polyglottos</i>		X		1, 2	X
	Brown thrasher ^e	<i>Toxostoma rufum</i>		X		1, 2	X
Sturnidae	European starling	<i>Sturnis vulgaris</i>					X
Starlings							
Motacillidae	American pipit	<i>Anthus rubescens</i>			X	5, 7	
Wagtails and Pipits							
Bombycillidae	Cedar waxwing	<i>Bombycilla cedrorum</i>			X	7, 10	X
Waxwings							
Parulidae	Blue-winged warbler ^e	<i>Vermivora pinus</i>					X
Wood Warblers	Northern parula ^e	<i>Parula americana</i>	T		X	6, 7, 10	
	Yellow warbler	<i>Dendroica petechia</i>		X	X	1, 2, 6, 7, 9, 10, 12	X
	Magnolia warbler	<i>Dendroica magnolia</i>			X	6, 7	X
	Cape May warbler	<i>Dendroica tigrina</i>			X	5	
	Yellow-rumped warbler	<i>Dendroica coronata</i>		X	X	1, 5, 11	
	Black-throated blue warbler	<i>Dendroica caerulescens</i>		X		1, 5	
	Black-throated green warbler	<i>Dendroica virens</i>		X	X	1, 5, 6, 9, 10	X
	Yellow-throated warbler	<i>Dendroica dominica</i>			X	8	
	Pine warbler	<i>Dendroica pinus</i>			X	12	X
	Prairie warbler ^e	<i>Dendroica discolor</i>			X	5, 10	X
	Palm warbler	<i>Dendroica palmarum</i>			X	5, 6, 7, 10	
	Blackpoll warbler ^e	<i>Dendroica striata</i>	SC		X	6, 7, 10	
	Black-and-white warbler	<i>Mniotilta varia</i>		X		1	X
	Wilson's warbler	<i>Wilsonia pusilla</i>			X	5, 6, 10	
	American redstart	<i>Setophaga ruticilla</i>		X	X	1, 6, 7, 10	X
	Ovenbird	<i>Seiurus aurocapillus</i>					X
	Northern waterthrush	<i>Parkesia noveboracensis</i>			X	6, 9, 10	

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Appendix J. Flora and Fauna.

Table J.2. Birds of the Horseneck Planning Unit. (Continued) Family, common, and scientific names and the sequence in which they are presented follow American Ornithologists' Union (2011).

Family	Common Name	Scientific Name	MESA ^a	DEML ^b	HBCF ^b	Source ^c	BBA ^d
Parulidae (continued) Wood Warblers	Connecticut warbler	<i>Oporonis agilis</i>			X	6	
	Common yellowthroat	<i>Geothlypis trichas</i>		X	X	1, 6, 7, 9, 10, 12	X
	Yellow-breasted chat	<i>Icteria virens</i>			X	5	
Emberizidae Towhees, Sparrows, and Allies	Eastern towhee ^e	<i>Pipilo erythrophthalmus</i>		X	X	1, 2, 9, 10, 12	X
	American tree sparrow	<i>Spizella arborea</i>			X	11	
	Chipping sparrow	<i>Spizella passerina</i>			X	5, 12	X
	Field sparrow ^e	<i>Spizella pusilla</i>					X
	Savannah sparrow	<i>Passerculus sandwichensis</i>			X	5, 10	X
	Saltmarsh sharp-tailed sparrow ^e	<i>Ammodramus caudacutus</i>					X
	Seaside sparrow ^e	<i>Ammodramus maritimus</i>					X
	Song sparrow	<i>Melospiza melodia</i>		X	X	1, 2, 7, 9, 10, 11, 12	X
	Lincoln's sparrow	<i>Melospiza lincolnii</i>				6	
	Swamp sparrow	<i>Melospiza georgiana</i>			X	5, 7	
	White-throated sparrow ^e	<i>Zonotrichia albicollis</i>		X	X	1, 7	X
	White-crowned sparrow	<i>Zonotrichia leucophrys</i>		X	X	1, 5, 13	
	Dark eyed junco	<i>Junco hyemalis</i>			X	5, 7	
Cardinalidae Tanagers, Grosbeaks, and Buntings	Summer tanager	<i>Piranga rubra</i>			X	13	
	Scarlet tanager	<i>Piranga olivacea</i>		X	X	1, 8, 10	X
	Northern cardinal	<i>Cardinalis cardinalis</i>		X	X	1, 7, 9, 11	X
	Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>		X	X	1, 6	X
	Indigo bunting	<i>Passerina cyanea</i>		X	X	1, 7, 13	X
	Dickcissel	<i>Spiza americana</i>			X	6	
Icteridae Blackbirds, Orioles, and Allies	Bobolink	<i>Dolichonyx oryzivorus</i>			X	7, 10	X
	Red-winged blackbird	<i>Agelaius phoeniceus</i>		X	X	1, 7, 9, 10	X
	Eastern meadowlark ^e	<i>Sturnella magna</i>					X
	Common grackle	<i>Quiscalus quiscula</i>		X	X	1, 7, 9, 10	X
	Brown-headed cowbird	<i>Molothrus ater</i>		X	X	1, 9	X
Orchard oriole	<i>Icterus spurius</i>			X	8	X	
Baltimore oriole	<i>Icterus galbula</i>		X	X	1, 10, 12	X	
Fringillidae Fringilline Finches	House finch	<i>Carpodacus mexicanus</i>			X	9, 10, 1	X
	Pine siskin	<i>Spinus pinus</i>			X	12	X
	American goldfinch	<i>Carduelis tristis</i>		X	X	2, 7, 9	X
Passeridae Old World Finches	House Sparrow	<i>Passer domesticus</i>			X	9, 10, 12	X

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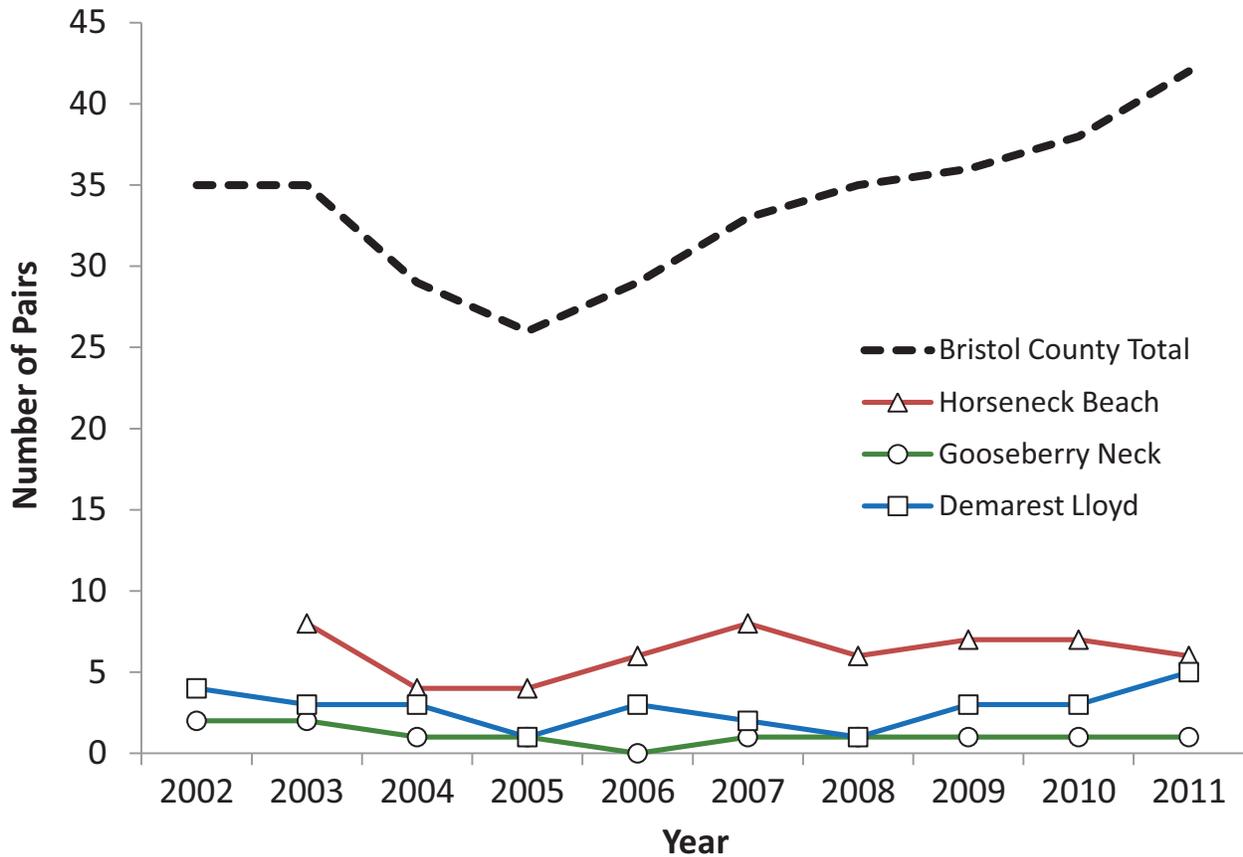
Appendix J. Flora and Fauna.

Table J.2. Birds of the Horseneck Planning Unit. (Continued) Family, common, and scientific names and the sequence in which they are presented follow American Ornithologists' Union (2011).

-
- a. Status of birds listed under the Massachusetts Endangered Species Act (MESA): E = Endangered; T = Threatened; and SC = Species of Special Concern.
 - b. DEML = Demarest Lloyd Memorial State Park; HBCH = Horseneck Beach State Reservation.
 - c. Information contained in this table was obtained from the following sources:
 1. DEM (1996).
 2. Bogart (2010*a*).
 3. Bogart (2010*b*).
 4. Bogart (2010*c*).
 5. Boucher (1995).
 6. Cassie (2010).
 7. Champlin (2010).
 8. Champlin (2011).
 9. Davies (2010*a*).
 10. Davies (2010*b*).
 11. Davies (2010*c*).
 12. Lynch (2009).
 13. Paulson (2010).
 - d. Breeding Bird Atlas (BBA) data for blocks 1703, 1706, 1706.5, and 1713 for the years 2007 through July 27, 2011 (USGS and Mass Audubon 2011). These data include some birds associated with habitats that do not occur in the planning unit.
 - e. This species has been designated a Species in Greatest Need of Conservation (Massachusetts Division of Fisheries and Wildlife 2006, Table 4).

Appendix K. Recent trends in piping plover abundance and productivity at Horseneck Beach State Reservation and Demarest Lloyd Memorial State Park, Bristol County, Massachusetts.

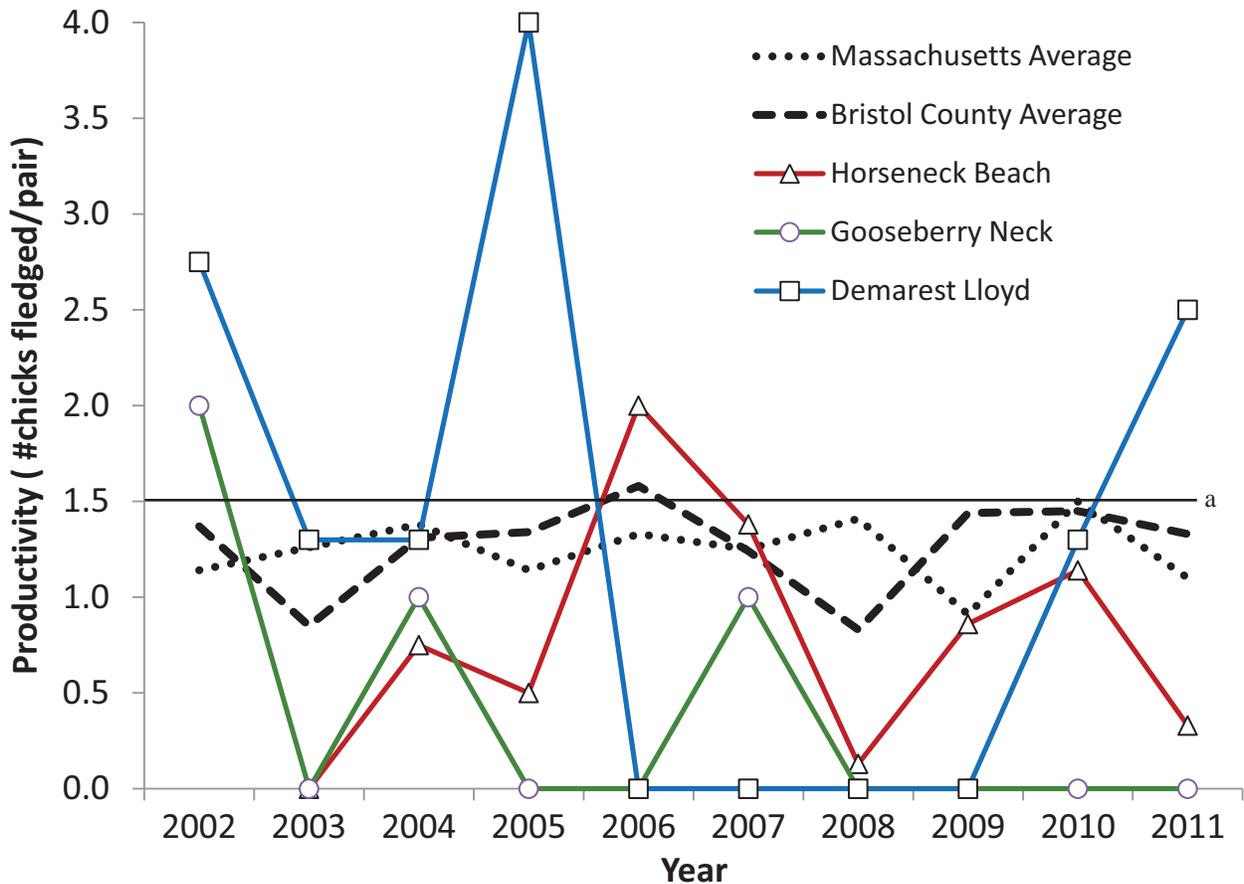
Figure K.1: Number of pairs of piping plover at Horseneck Beach State Reservation, Gooseberry Neck, Demarest Lloyd Memorial State Park, and Bristol County; 2002-2011.



Continued on next page.

Appendix K. Recent trends in piping plover abundance and productivity at Horseneck Beach State Reservation and Demarest Lloyd Memorial State Park, Bristol County, Massachusetts. (Continued)

Figure K.2: Productivity of piping plover at Horseneck Beach State Reservation, Gooseberry Neck, Demarest Lloyd Memorial State Park, Bristol County, and all of Massachusetts; 2002-2011.



a. The recovery plan for the Atlantic Coast population of piping plover has identified a 5-year average productivity of 1.5 chicks fledged per breeding pair in each of the four recovery units (i.e., Atlantic Canada, New England, New York-New Jersey, and southern) among the criteria that must be met for the population to be considered for delisting (Atlantic Coast Piping Plover Recovery Team 1996).

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