Massachusetts Department of Conservation and Recreation
Bureau of Planning and Resource Protection
Resource Management Planning Program

RESOURCE MANAGEMENT PLAN

Horseneck Planning Unit

Including Horseneck Beach State Reservation and Demarest Lloyd Memorial State Park

April 2012

dcr
Massachusetts

Horseneck Planning Unit

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RESOURCE MANAGEMENT PLAN

2012

Deval L. Patrick, Governor
Timothy P. Murray, Lt. Governor
Richard K. Sullivan, Jr., Secretary
Edward M. Lambert, Jr., Commissioner
Jack Murray, Deputy Commissioner for Parks Operations

Resource Management Plans provide guidelines for management of properties under the stewardship of the Department of Conservation and Recreation (DCR). Resource Management Plans are an opportunity to assemble existing resource information, assess known needs, issues and challenges, identify additional planning needs and provide recommendations. They are intended to be living documents to assist with setting priorities, enabling the DCR to adapt to changing fiscal, social and environmental conditions. The planning process provides a forum for communication and cooperation with park visitors and the surrounding communities to ensure transparency in the DCR's stewardship efforts.

Horseneck Beach State Reservation is one of the DCR's most popular facilities. It welcomes hundreds of thousands of visitors per year, largely during the peak summer season, to experience the beach and enjoy the recreational opportunities provided. Nearby Demarest Lloyd Memorial State Park is a smaller, quieter facility that provides a protected swimming area and extensive picnic grounds, both of which are popular with families from southeastern Massachusetts and Rhode Island. The opportunities provided by each facility are due to the wealth of natural and cultural resources; resources that agency staff works hard to protect and balance with extensive recreational use. As we look towards the future and our ability to be responsible stewards of these properties, and consider ways that the DCR can enhance or improve management of all of the resources that make these places so special to visitors, this Resource Management Plan will serve as our guide.

Edward M. Lambert, Jr.
Commissioner

The Massachusetts Department of Conservation and Recreation (DCR), an agency of the Executive Office of Energy and Environmental Affairs, oversees 450,000 acres of parks and forests, beaches, bike trails, watersheds, dams, and parkways. Led by Commissioner Edward M. Lambert, Jr., the agency's mission is to protect, promote, and enhance our common wealth of natural, cultural, and recreational resources. To learn more about DCR, our facilities, and our programs, please visit us at www.mass.gov/dcr. Contact us at mass.parks@state.ma.us.

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EXECUTIVE SUMMARY

INTRODUCTION

For more than a half century, Horseneck Beach State Reservation and Demarest Lloyd Memorial State Park have offered high quality, affordable opportunities for outdoor recreation in a scenic coastal setting. Both properties are located along the western shore of Buzzards Bay at the mouth of two rivers. Horseneck Beach is a barrier beach that protects the Westport River estuary from the open ocean. Demarest Lloyd is located on a barrier spit at the mouth of the Slocums River. Both properties are continually being reshaped by coastal forces, including wind, waves, and currents.

Massachusetts and Rhode Island residents, and to a lesser degree residents of other states and countries, visit these popular facilities to find relaxation and fun with their families and friends. Horseneck Beach State Reservation, which is well known for its active surf, is one of the most highly visited ocean beach facilities in the Department of Conservation and Recreation (DCR) system. In contrast, Demarest Lloyd Memorial State Park, with its lower visitation and calmer waters, provides a quieter visitor experience that is popular with young families. The recreational popularity combined with the fragile nature of these coastal properties requires thoughtful protection and management to ensure their long-term enjoyment.

Resource Management Plans (RMPs) are working documents that compile existing documentation about the historic and current conditions of a forest, park, or reservation in order to stimulate thinking about its current management and future. Plans include an inventory and assessment of known natural, cultural, and recreation resources; identify unique characteristics and values; record and evaluate current management practices; and develop management goals and objectives. RMPs are intended to be living documents to inform priorities, guide capital and operational budgeting, resource allocation and staffing, and enhance communication and mutual understanding with park advocates, visitors, and the larger community.

The DCR is guided by a legislative mandate (M.G.L. Chapter 21: Section 2F) to prepare management plans for "all reservations, parks, and forests under the management of the department." All RMPs are required to incorporate public review and input and must be reviewed and adopted by the Department of Conservation and Recreation Stewardship Council.

This plan covers the Horseneck Planning Unit. The planning unit is comprised of Horseneck Beach State Reservation (including Gooseberry Neck), Demarest Lloyd Memorial State Park, and six nearby properties on which the DCR holds Conservation or Agricultural Preservation Restrictions. Demarest Lloyd Memorial State Park is included in this planning unit because of its physical proximity to Horseneck Beach and because the two facilities share a common management.

MANAGEMENT PRINCIPLE AND GOALS

The Resource Management Planning process for Horseneck Beach State Reservation and Demarest Lloyd Memorial State Park has established the following management principle: *Achieve a sustainable balance between the conservation of important coastal resources in a dynamic ecosystem, with the provision of recreational opportunities for all.*

The following four management goals have been identified to achieve the management principle. These goals are of equal importance and are not placed in priority order.

Goal 1. Protect and enhance the functions of the dynamic barrier beach geology and ecosystem to make them more resilient in the face of climate change.

Goal 2. Maintain and enhance sustainable recreational opportunities through thoughtful use of limited operational resources and by facility design and improvements appropriate to a barrier beach ecosystem.

Goal 3. Increase our understanding of significant natural and cultural resources and protect and enhance these resources through appropriate stewardship strategies.

Goal 4. Promote public awareness and understanding of natural and cultural resources to increase support of the Department of Conservation and Recreation's stewardship strategies.

PRIORITY RECOMMENDATIONS

This RMP identifies 102 management recommendations. Of these, 32 are identified as high priorities. Resources are currently available to implement 17 high priority recommendations. It is anticipated that resources will be available in the next five years to implement an additional 11. These recommendations, and the lead DCR unit responsible for their implementation, are identified in the Action Plan at the end of this Executive Summary.

Implementation of two high priority recommendations should be completed in advance of the upcoming recreation season. The first involves resolving an outstanding Massachusetts Endangered Species Act compliance issue and the second involves a new filing and review under the Massachusetts Wetlands Protection Act. Both recommendations involve beach operations at Horseneck Beach and their timely implementation is critical to balancing conservation and recreation.

Among the 70 lower priority recommendations are three projects first proposed in the Horseneck Beach Draft Environmental Impact Report (I.T. Almy Associates and Caputo and Wick, Ltd. 1999). These projects are the construction of two additional Americans with Disabilities Act compliant dune crossings, removing six acres of impervious surface from the Central Plaza, and establishing volleyball and basketball courts in the campground area. Because these projects were developed through a lengthy planning process with significant public involvement and regulatory review, they are reiterated in this RMP.

PUBLIC PARTICIPATION IN DEVELOPING THIS RESOURCE MANAGEMENT PLAN

Notice of a public meeting for the Horseneck Planning Unit's RMP appeared in the October 26, 2009 issue of *The Environmental Monitor* (Volume 72, Issue 12). Announcements were posted on the DCR web page and press releases provided to the *Fall River Herald News*, *New Bedford Standard Times* (including *South Coast Today*), and the *Providence Journal*. Announcements were also directly distributed to individuals, regional and local stakeholder organizations, and local officials identified by DCR staff. An initial public meeting occurred on November 12, 2009 at Fall River Heritage State Park. A second public meeting was held at the same location, on December 5, 2011. The draft RMP was made available on the DCR website on December 6, 2011 and public comments were solicited from December 6, 2011 to January 6, 2012; ten sets of comments were received and incorporated into the final RMP.

This plan was submitted to the DCR's Stewardship Council on February 17, 2012 and adopted by the Council on April 6, 2012.

Action Plan 2012–2016

Priority Action	DCR Lead Unit
Goal 1. Protect and enhance barrier beach functions.	
Prepare an updated Barrier Beach Management Plan for Horseneck Beach to include MESA and WPA approved Operational Maintenance Plans; obtain state and municipal agency approval.	Planning
Prepare a Barrier Beach Management Plan for Demarest Lloyd Memorial State Park; obtain state and municipal agency approval.	Planning
Explore grant opportunities to purchase sand fencing and other dune protection materials for long-term management of the barrier beach system.	Planning
Continue partnership efforts with the Massachusetts Beach Buggy Association to assist DCR staff with winter sand fence installation at Horseneck Beach, in accordance with approved maintenance plans.	Operations
Review conceptual plans and finalize the design for the Central Plaza enhancement and dune restoration. Consult the 2008 draft Request for Design Services proposal.	Planning
Goal 2. Maintain and enhance sustainable recreational opportunities.	
Provide staff training in the use of portable AED units.	Ranger Bureau
Provide for greater ADA accessibility to the water.	Operations
Obtain visitorship data to determine visitor demographics and to assess additional operational needs.	Planning
Return to the previous method of communicating park status and traffic conditions at Horseneck Beach to travelers along Route I-195; request that MassDOT install a sign to inform east-bound travelers.	Operations
Install new gates and replace the deteriorating gates at the East Lot at Horseneck Beach and offer a one-way lane along the access road behind the Beach Services Building and an exit only lane from the East Lot.	Operations
Adjust the radio frequency for improved radio communication. Provide eight radios, for essential staff, that will be equipped to work on two channels simultaneously at Horseneck Beach.	Operations
Install security cameras at Horseneck Beach's Lots 2 and 3.	Operations
Evaluate the potential to restrict public access to the northern spit of beach (beyond public boat ramp) at Demarest Lloyd to promote shorebird breeding success and to enhance public safety by addressing unsafe swimming conditions in this area.	Planning Operations
Install universally accessible picnic tables at Demarest Lloyd.	Operations

Continued on next page.

Action Plan 2012–2016 (Continued)

Priority Action	DCR Lead Unit
Goal 3. Increase our understanding of significant natural and cultural resources.	
Upon hiring, have Coastal Ecologist meet with NHESP staff to discuss rare species management, including unresolved regulatory issues.	Planning
Develop an updated Operational Maintenance Plan for Horseneck Beach to include: beach raking, over-sand vehicle use, sand fencing, sand removal and placement, and recreation management; submit to the NHESP for review under the Massachusetts Endangered Species Act.	Planning Operations
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 Massachusetts Wetlands Protection Act.	Planning
Offer annual Rare Species Management and Beach Operations training for seasonal and lifeguard staff, heavy equipment operators, and shorebird monitors.	Planning
Request yearly operational funding for rare shorebird and endangered species protection.	Planning
Maintain the symbolic shorebird fencing at Horseneck Beach through the fall migration season (August–October) to protect important feeding and resting zones of imperiled bird species. Replace restricted area signs with critical migration habitat signs.	Planning
Pursue mitigation funds from the 2003 *Bouchard No. 120* oil spill for predator control activities for the purpose of rare species protection.	Planning
Precede any ground disturbance activities by an archaeological survey to identify sensitive resources.	Operations
Secure the observation towers on Gooseberry Neck to prevent public entry and injury and establish routine monitoring of towers by park staff to ensure that measures taken are not removed by vandals.	Operations
Create a Habitat Management Plan for mowing practices in rare species habitat on Gooseberry Neck and for the removal of Japanese knotweed at Horseneck Beach and along the trails of Gooseberry Neck. Obtain NHESP and Westport Conservation Commission approval.	Planning
Relocate picnic tables at Demarest Lloyd when diamond-back terrapins nest nearby and predator exclosures are not an option.	Operations
Coordinate implementation of the Bristol County Mosquito Control Project's plans to restore drainage ditches leading to George's Pond for greater tidal flushing and reductions in common reed populations.	Planning Operations
Evaluate the potential impacts of the Bristol County Mosquito Control Project removing several large rocks that restrict tidal flow within the marsh creek. Consultation with the DEP, CZM, NHESP, Dartmouth Conservation Commission, and DCR's Office of Cultural Resources and Ecology Program is required.	Planning
Goal 4. Promote public awareness and understanding of natural and cultural resources.	
Post animal regulations on durable and visible signs and increase enforcement of all DCR regulations.	Operations Rangers
Establish a volunteer program to educate park visitors about shorebird ecology and management; provide yearly trainings and oversight of volunteers.	Planning Operations

Slocums River, as viewed from Demarest Lloyd Memorial State Park.

SECTION 1. INTRODUCTION

The Department of Conservation and Recreation's Mission:
To protect, promote and enhance our common wealth
of natural, cultural and recreational resources.

1.1. AN INTRODUCTION TO RESOURCE MANAGEMENT PLANS

The Massachusetts Department of Conservation and Recreation (DCR) is required to prepare management plans for every reservation, park, and forest in order to provide management guidelines for the protection and stewardship of natural and cultural resources and to ensure consistency between recreation, resource protection, and sustainable forest management (M.G.L. Chapter 21: Section 2F). This legislative mandate also requires the incorporation of public review and input into the development of these plans and review and adoption by the DCR Stewardship Council.

Resource Management Plans (RMPs) consider the past, present, and future of a forest, park, or reservation. Through an assessment of resources, clear management goals are developed and short and long-term action plans are identified for the management of properties under the stewardship of the DCR. They are intended to be living documents for setting priorities, budgeting and resource allocation, and enhancing communication with park visitors and the surrounding communities.

To help guide planning priorities, staff undertook a statewide survey in 2008–2009. This was done to assess the level of existing resource and available planning data and correlate this with operation and management considerations in order to develop a strategic plan for the RMP Program. As a result of the statewide survey, facilities were grouped into planning units – these units consist of facilities that are physically located near each other, often managed jointly – as a means to address RMPs in an efficient manner.

Information contained in RMPs may be used for comparison across properties, to identify common issues, challenges, and opportunities on a regional and statewide basis. Property managers are provided with full-sized versions of the RMP's maps to be used for planning.

Resource Management Plans are written to meet the information needs of a diverse audience: from the decision-makers directly involved in the operation and management of a property, to a variety of outside stakeholders. Finally, RMPs are of value to users that are interested in learning more about that property, the challenges it faces, and how decisions affecting it are made.

1.2. The Planning Process

Resource Management Plans are being developed by the staff of the DCR's Bureau of Planning and Resource Protection through a process of data gathering, public input, and analysis. At the start of each RMP, a meeting is convened on-site for field staff, staff of the Bureau of Planning and Resource Protection, and other DCR offices and programs to discuss resources and issues. Existing information – administrative, cultural, ecological, recreational, social, and spatial – is then assembled from interviews with DCR staff, site visits, a public meeting, review of administrative files and reports, legal documents, map data, and municipal and regional plans.

A draft RMP is distributed for internal review, followed by revision and distribution for public review and comment. Drafts are made available to the public via the DCR web page. Comments received during the public review period are used to further develop the draft RMP. A final draft RMP is submitted to the Stewardship Council for review and adoption as the official plan to guide stewardship of the planning unit.

1.3. Public Participation in Developing this Resource Management Plan

Notice of a public meeting for the Horseneck Planning Unit RMP appeared in the October 26, 2009 issue of *The Environmental Monitor* (Volume 72, Issue 12). Announcements were posted on the DCR web page and press releases provided to the *Fall River Herald News*, *New Bedford Standard Times* (including *South Coast Today*), and the *Providence Journal*. Announcements were also directly distributed to individuals, regional and local stakeholder organizations, and local officials identified by DCR staff. A public meeting occurred on November 12, 2009 at Fall River Heritage State Park. A second public meeting was held, at the same location, on December 5, 2011. The draft RMP was made available on the DCR website on December 6, 2011 and public comments were solicited from December 6, 2011 to January 6, 2012; ten sets of comments were received and incorporated into the final RMP.

This plan was submitted to the DCR's Stewardship Council on February 17, 2012 and adopted by the Council on April 6, 2012.

Additional information on public participation in the development of this RMP may be found in Appendix B.

1.4. The Horseneck Planning Unit

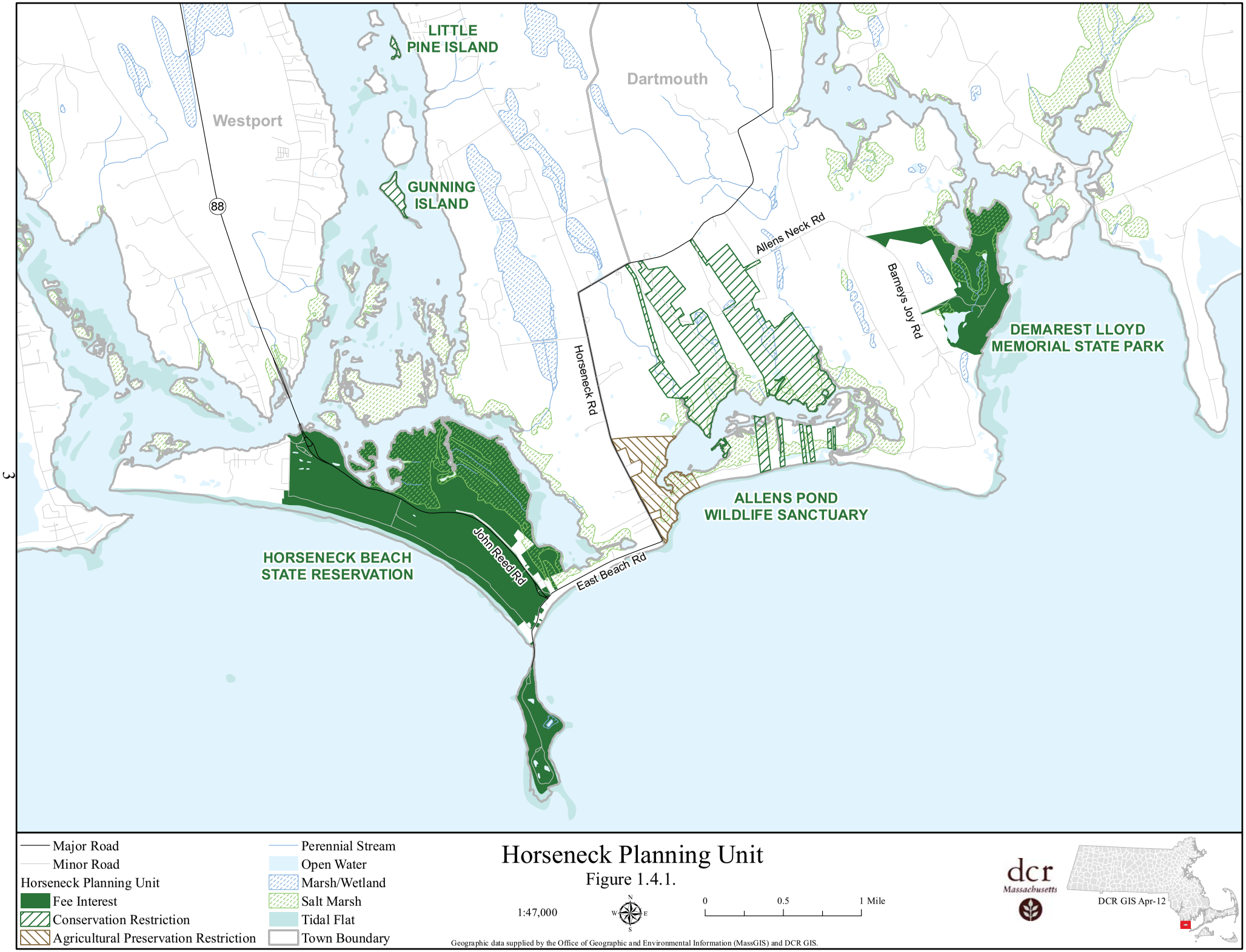
1.4.1. Properties Included in this RMP

The Horseneck Planning Unit is comprised of Horseneck Beach State Reservation, Demarest Lloyd Memorial State Park, and six nearby properties on which the DCR holds a Conservation or Agricultural Preservation Restriction. These properties are included in this planning unit because of their physical proximity to each other and, in the case of DCR-owned and managed properties, because they share a common management structure. A description of each of these properties is provided below and their locations are indicated in Figure 1.4.1.

Horseneck Beach State Reservation (HBCH)

This reservation, located in Westport, is a heavily used recreation facility with one of the most popular beaches and campgrounds in the DCR system. Established as a recreation area in 1956 by the Department of Public Works, Horseneck Beach was transferred to the Department of Natural Resources (a predecessor of the DCR) in 1968.

Gooseberry Neck, an island connected to the mainland by the Thomas Edward Pettey Causeway, is part of Horseneck Beach State Reservation. It too is located entirely in the Town of Westport.



Horseneck Planning Unit

Figure 1.4.1.

Geographic data supplied by the Office of Geographic and Environmental Information (MassGIS) and DCR GIS.

Horseneck Beach State Reservation is characterized by:

- Recreational opportunities offered by four miles of barrier beach, an adjoining campground, and an 81.5 acre barrier island; it is one of the DCR's most popular facilities attracting visitors from throughout southeastern New England and beyond.
- Easy, high speed vehicular access to regional and interstate highway systems.
- The largest barrier beach ecosystem on the south coast, substantial dunes bordered by maritime shrublands and oak-holly forests, and protecting the biologically rich Westport River estuary.
- Cultural resources that help to tell the story of coastal defense and safety.

Demarest Lloyd Memorial State Park (DEML)

Donated to the Commonwealth by the Lloyd family in 1953 for establishment of a state park, Demarest Lloyd Memorial State Park in neighboring Dartmouth is a quiet day use facility that draws fewer visitors to its calmer waters.

Demarest Lloyd Memorial State Park is characterized by:

- A quiet, low key family friendly swimming beach with relatively calm waters and attractive picnic areas.
- Several high quality coastal habitats that serve to protect the Commonwealth's rich biodiversity including 15 documented rare species.
- Less well-known than HBCH, it draws local visitors.
- Constrained access through rural, secondary roads.

Both facilities provide a variety of water based recreational opportunities and ways for visitors to experience beautiful barrier beach ecosystems and their associated estuaries. Their recreational popularity, combined with the fragile nature of these coastal features, requires their thoughtful protection and management to ensure their long term enjoyment.

Other Properties

In addition to the two state parks, the DCR holds five Conservation Restrictions (CRs) and a single Agricultural Preservation Restriction (APR) on the following lands. Definitions of these and other technical terms may be found in the Glossary (Appendix C).

Dabney-Mass Audubon CR

Fee Holder: Mass Audubon

CR Holder: DCR

Date of Acquisition of Interest: 2000

Description: Comprised of 84 acres of upland forest, salt marsh, open fields, and beach on the north and south shores of Allens Pond in Dartmouth; a four-car parking area provides access to the northern parcel.

Dartmouth Natural Resources Trust (DNRT) CR

Fee Holder: DNRT

CR Holder: DCR

Date of Acquisition of Interest: 2005

Description: Comprised of approximately 28 acres of marsh land on opposite sides of the Slocums River.

Fernandez-Mass Audubon CR

Fee Holder: Mass Audubon

CR Holder: DCR

Date of Acquisition of Interest: 2005

Description: Comprised of approximately 104 acres of forest, open fields, and salt marsh located between Horseneck Road and Allens Pond in Dartmouth. A home and associated equestrian facility are located on the property under a license agreement.

Gunning and Little Pine Island CR

Fee Holder: Mass Audubon

CR Holder: DCR

Date of Acquisition of Interest: 2005

Description: Comprised of the 11 acre Gunning Island and the 3 acre Little Pine Island, the CR protects 14 acres of tidelands, vegetated wetland, salt marsh, and associated uplands.

Issacs-Mass Audubon CR

Fee Holder: Mass Audubon

CR Holder: DCR

Date of Acquisition of Interest: 1999

Description: Comprised of 201 acres of noncontiguous land on both the northern and southern sides of Allens Pond in Dartmouth, this land contains upland forest, open fields, salt marsh, and beach.

Yacubian APR

Fee Holders: Dale Lenzer, Edward Mathias, and Mass Audubon

APR Holders: DCR, DAR and the Town of Dartmouth Conservation Commission

Date of Acquisition of Interest: 1985

Description: Encompasses a total of 87.8 acres of agricultural land, associated buildings, structures, and stone walls along the eastern side of Horseneck Road in Dartmouth. In 1986, Yacubian sold 69.6 acres to Mass Audubon and at a later date, sold the remaining 18.2 acres to Lenzer/Mathias. While now in multiple ownerships, the APR remains unchanged.

Although the resources within the properties on which the DCR holds restrictions are not directly addressed within this RMP, they are considered in the overall management recommendations for the planning unit.

1.4.2. Regional Context

HBCH and DEML are situated along the most southern coastline of Massachusetts within the New England Seaboard Lowland physiographic zone. This zone encompasses the area from the New England uplands down through the coastal plain to the shoreline. It consists of eroded bedrock surfaces, which were subsequently overlain by coastal plain and continental shelf sediments, forming a north-south trending ridge and valley system (Begley 1998).

Ecological landscapes of the state have further been distinguished over time; HBCH and DEML are located in the Narragansett-Bristol Lowland ecoregion (Griffith et al. 2009). The Narragansett-Bristol Lowland ecoregion is characterized by flat gently rolling plains with numerous wetlands, coastal areas with bays, peninsulas and islands, some crop/pasture land, cranberry bogs, and primarily mixed deciduous forest (Griffith et al. 2009). Rivers and low gradient streams with silt, sand and gravel substrates drain this area to Buzzards Bay (Griffith et al. 2009).

Southeast Massachusetts has been populated by humans since the PaleoIndian period (12,500–9500 years before present). With well drained soils, access to rivers, and large wetlands, the environmental conditions in the Westport and Dartmouth area served as an important core of pre-contact settlement. Fishing, whaling, and agriculture served as the local economic engines from the colonial period through the mid 19th century. Small scale industry and summer resort development appeared at the turn of the 20th century, changing the landscape and bringing new residents and visitors to the region.

HBCH and DEML are located in the Buzzards Bay Watershed, which encompasses 278,400 acres, and includes 11 major rivers and 17 cities and towns. The Commonwealth owns or holds CRs or APRs on 63% (over 38,000 acres) of all the protected land in the Buzzards Bay Watershed (Williams 2009).

Facing the Atlantic Ocean along the southwestern boundary of Buzzards Bay, with a small barrier island that is connected via a causeway – Gooseberry Neck – HBCH is a barrier beach that protects the mouths of both the East and West branches of the Westport River. DEML, a satellite property of HBCH, is located approximately five miles east of Horseneck Beach on a protected cove of Buzzards Bay at the mouth of the Slocums River (see Figure 1.4.1).

The Allens Pond Wildlife Sanctuary is located between these two parks, creating a network of non-contiguous, but protected open space. Gunning Island and Little Pine Island are two of the islands located within the East Branch of the Westport River. All three of these properties are owned and operated by Massachusetts Audubon Society (Mass Audubon) and are subject to CRs and an APR held by the DCR (see Figure 1.4.1).

Table 1.4.1. Physical, ecological, and political settings of the Horseneck Planning Unit.

DCR Management Structure:	Planning Unit:	Horseneck
	District:	South Coastal
	Region:	Southeast
	Division:	State Parks and Recreation

Properties:	**Town**[a]	**Area (acres)**[b]	**Perimeter (miles)**[b]	**Coastline (miles)**[b]
Horseneck Beach State Reservation (HBCH)	Westport	816.0	13.1	4.2
Demarest Lloyd Memorial State Park (DEML)	Dartmouth	207.9	4.3	0.8

Ecoregion:	Bristol Lowland/Narragansett Lowland	
Watershed:	Buzzards Bay Watershed	
Legislative Districts:		
Senate District	First Bristol and Plymouth	Senator Michael J. Roderigues
	Second Bristol and Plymouth	Senator Mark C. Motigny
House District	Eighth Bristol	Representative Paul Schmid
	Ninth Bristol	Representative Christopher M. Markey

Restrictions:	**Type**[c]	**Name**	**Area (acres)**[d]	**Fee Owner(s)**
	CR	Dabney - Mass Audubon	84	Mass Audubon
	CR	Dartmouth Natural resources Trust	28	Dartmouth Natural Resources Trust
	CR	Fernandez - Mass Audubon	104	Mass Audubon
	CR	Gunning and Little Pine Islands	14	Mass Audubon
	CR	Isaacs - Mass Audubon	201	Mass Audubon
	APR	Yacubian	88	Dale Lenzer, Edward Mathias, Mass Audubon

a. All properties are located in Bristol County, Massachusetts.
b. Values were determined through the use of a Geographic Information System (GIS).
c. APR = Agricultural Preservation Restriction; CR = Conservation Restriction. See Section 1.4.1 for additional information on these restrictions.
d. Acreage as indicated in restrictions, rounded to the nearest whole acre.

1.4.3. History of the Planning Unit

Horseneck Beach State Reservation

Documented accounts of early European explorations along the shores of Buzzards Bay indicate that these areas were inhabited by various Native American groups affiliated with the Wampanoag tribe. The name Horseneck is believed to have come from the Wampanoag word "Hassneghk," which means a house made of stone. Local lore is that the remains of a stone cellar existed in the area. It is likely that Wampanoags visited Horseneck Beach to harvest waterfowl, shellfish, fish, and berries (Begley 1998).

Early colonial settlement occurred in the region when the territory known as Old Dartmouth was purchased by members of nearby Plymouth Colony from Massasoit in 1652. In the 17th through the 19th centuries, Gooseberry Neck served as grazing land; animals were herded over the sandbar connecting Gooseberry Neck to the mainland at low tide (Wertz and Sanford 1987). In the late 19th century, commercial cranberry bogs and a screen house were located at Horseneck Beach. At the turn of the century, the area also started to become a popular resort destination, after a bridge connected the beach to Westport Point in 1893. Large homes lined the beach for summer visitors and bird hunters would stay at lodgings on the beach during the fall hunting season (Low 1997; Begley 1998).

The Humane Society of Massachusetts erected its 69th [Westport Beach] Lifesaving Station at the mouth of the Westport River in 1888. In 1894, it was

moved to its existing location at the east end of Horseneck Beach to improve access and provide more boat launching options.

A causeway to Gooseberry Neck was built on an existing sandbar, first by laying a row of parallel stones along the sandbar in 1913, to trap sand and cobbles to build up the sandbar, followed by construction of a roadway on top of the sandbar c. 1923 (Paull 1969). A developer intending to build a summer colony subdivided the Neck into 212 lots, naming it "Rest Isle," but the plans were abandoned with the onset of the Great Depression (Anonymous n.d.). In 1931, Thomas Edward Pettey, a highway department employee, died during construction of the causeway; it has since been named in his honor (Chapter 297 of the Acts of 2000). The hurricane of 1938 soon followed, wiping out virtually all residences and damaging the causeway.

The U. S. Army Corps of Engineers (ACOE) rebuilt the Gooseberry causeway c. 1942 and constructed three concrete observation towers (disguised to look like a lighthouse and associated buildings) on Gooseberry as a fire control station for coastal defense purposes. The taller of these two towers now serves as a navigational aid and its location is indicated on the National Oceanic and Atmospheric Administration nautical chart for the region (see Chart # 13228; http://www.charts.noaa.gov/OnLineViewer/AtlanticCoastViewerTable.shtml). Following World War II, small summer cottages were built on the island; most were quickly destroyed by Hurricane Carol in 1954.

In the wake of Hurricane Carol, the Town of Westport petitioned the state to take over Horseneck Beach. The Massachusetts Department of Public Works (DPW) acquired Horseneck Beach in 1956. A comfort station, first aid station, administration building, concession facility, and three large parking lots were constructed in 1957, making Horseneck Beach the major public beach in southeastern Massachusetts.

Construction of the Normand Edward Fountaine Bridge over the Westport River in the late 1950s, followed by the construction of Route 88 in the early 1960s, vastly improved vehicular access to the reservation. In 1969, state legislation (Chapter 81 of the Resolves of 1969) authorized the Department of Natural Resources, the predecessor agency to the DCR, to "conduct a comprehensive study for the development of Horseneck Beach and Gooseberry Neck in the Town of Westport." The study's (Phillips et al. 1969) implemented recommendations included the removal of informal camping and off highway vehicle (OHV) use from Gooseberry Neck and the development of the current campground in the early 1970s in an area that had previously been the eastern most parking lot.

Significant events in the planning unit's history are identified Table 1.4.2.

Demarest Lloyd Memorial State Park

Dartmouth's coastline provided fish, shellfish, and marine animals to Native Americans prior to European settlement (pre-contact). An archaeological reconnaissance survey conducted by the Public Archaeology Laboratory found a number of pre-contact Native American sites along the Slocums River near sources of fresh water (PAL 2002).

In 1682, Peleg Slocum, a Quaker minister from Portsmouth, RI, settled in Dartmouth on what became known as Slocum Neck, which included the future state park (Metcalf 1912). The area remained predominantly agricultural through the 18th and 19th centuries; Slocum descendants raised cattle on Nashawena Island during the summer and wintered their cattle on Slocum Neck. Cattle boats landed at what was then known as Deepwater Point (now the park beach) and cattle were held in an adjacent stone pound. During prohibition (1920–1933), local fisherman provided shuttle services between rum-runners operating floating liquor markets and Deepwater Point (Allen 1979).

Table 1.4.2. Significant planning unit events.

Year(s)	Event
1893	Bridge constructed between Westport Point and Horseneck Beach.
1894	Lifesaving Station #69 moved to the eastern end of Horseneck Beach.
c. 1923	Original causeway to Gooseberry Neck built.
1938	Hurricane destroys homes on Horseneck Beach.
c. 1942	U.S. Army Corps of Engineers rebuilds the Gooseberry Neck causeway and constructs fire control station submarine towers.
1953	Lloyd family donates land, which becomes Demarest Lloyd Memorial State Park.
1954	Hurricane Carol destroys summer homes built on Horseneck Beach.
1956	Massachusetts Department of Public Works acquires Horseneck Beach for use as a regional public swimming beach.
1957	Construction of bath house, administrative, and refreshment buildings. Gooseberry Neck acquired by the Commonwealth for recreational purposes.
1958	Westport Point Bridge constructed; it is renamed the Norman Edward Fontaine Bridge in 1983.
1961–1965	Route 88 constructed, providing easy access to Horseneck Beach State Reservation.
1967	Massachusetts legislature directs the Department of Natural Resources (DNR), a predecessor to the DCR, to construct a recreation area on Gooseberry Neck.
1968	Horseneck Beach State Reservation transferred to the DCR.
1985	The Department of Environmental Management, a predecessor to the DCR, and the Department of Agricultural Resources purchase an Agricultural Preservation Restriction on the Yacubian property.
1987	Congress accepts Buzzards Bay into the National Estuary Program spurring the creation of one of the country's first coastal watershed Comprehensive Conservation Management Plan.
1999–2005	The DCR acquires Conservation Restrictions from Mass Audubon and the Dartmouth Natural Resources Trust.
2007–2009	Construction of new comfort stations, elevated boardwalks and Beach Services Building at Horseneck Beach.

In 1925, Demarest Lloyd, Sr., son of Henry Demarest Lloyd and a foreign correspondent for the Christian Science Monitor, purchased a summer home at Potomska Point on the east side of the Slocums River. In 1931, he purchased the 300 acre Barney's Joy Farm, located south of the state park. In 1947, Angelica Lloyd Russell purchased Barney's Joy Farm from her father's estate.

In the early 1950s, Angelica Lloyd Russell and two of her daughters purchased 313 acres abutting Barney's Joy Farm, including what is now the state park, to prevent its development. Ninety-three acres were retained for agricultural fields and 220 acres were donated to the Commonwealth in memory of her father, Demarest Lloyd, Sr. and her brother, Demarest Lloyd, Jr., a WWII Navy fighter pilot killed in action over Guam.

1.4.4. Recent Planning and Capital Improvements

Horseneck Beach State Reservation

As HBCH entered the 1990s, it faced the challenge of balancing high visitor use, aging facilities, and unsustainable development on a fragile barrier beach ecosystem. To address these challenges, the agency undertook master planning efforts followed by a series of construction projects to improve HBCH's infrastructure while decreasing its footprint on a shifting sand dune with rare species.

In 1995, the DEM developed sustainable recreation planning guidelines; these were expanded into a Sustainable Recreation Master Plan (Cecil and Rizvi, Inc. and Nucci Vine Associates 1995). This was a conceptual plan intended to provide guidance for enhancing existing facilities and recreational opportunities, within the context of a more focused approach to environmental protection. Included in this plan were proposals to widen John Reed Road, modify parking lots, construct new buildings, and

modify the water supply system and sewage treatment facilities.

In August of 1996, an Environmental Notification Form (ENF) was filed with the Executive Office of Environmental Affairs for review under the Massachusetts Environmental Policy Act (MEPA; 301 CMR 11.00). The proposed project involved major improvements at HBCH consistent with the 1995 master plan. The Secretary of Environmental Affairs issued a certificate in September of that year that identified the need for a Draft Environmental Impact Report (DEIR) to address specific information needs.

In accordance with the Secretary's certificate, a DEIR was prepared (I. T. Almy Associates and Caputo and Wick, Ltd. 1999). This DEIR, which built upon the earlier Sustainable Recreation Master Plan, included a Barrier Beach Management Plan (I. T. Almy Associates and Caputo and Wick Ltd. 1998), flood zone refinement study, archaeological reconnaissance survey (Begley 1998), public water supply recommendations, sewage treatment recommendations, and a report on a groundwater monitoring program.

The DEIR proposed a suite of improvements, including: additional beach access boardwalks; construction of a central Public Water Supply; upgrades to the existing sewage treatment facility; removal of the existing beach facility and reconstruction of the primary dune system; relocating some campsites; and upgrades to the campsite's waste disposal systems. Collectively, these improvements are referred to as the "Alternative Sustainable Recreation Master Plan." It is important to note that there is no separate document with this name.

The Barrier Beach Management Plan included in the DEIR was revised and expanded to better identify resource issues and to set guidelines for the management of coastal resources on the reservation (DEM 2000). This plan was submitted to and approved by the Westport Conservation Commission. It continues to guide much of the operation and rare species management activities at HBCH. A copy of this management plan is included as Appendix D of this RMP.

In November 2006, the DCR submitted a Notice of Project Change (NPC) that proposed a scaled-back version of the facility improvement project and addressed concerns expressed by different agencies about the original ENF. In lieu of submitting an EIR, the December 2006 MEPA Certificate indicated that the 2000 Barrier Beach Management Plan should be updated and that any potential project impacts could be addressed in the permitting process. In 2007, an updated Barrier Beach Management Plan (DCR 2007*a*) was developed. It remains in draft form; in need of finalization and review and approval by state and municipal agencies. An Order of Conditions issued by the Westport Conservation Commission (2009) regulates ongoing beach maintenance. A copy of this order is included as Appendix E of this RMP.

In 2010, the DCR completed the first phase of capital improvements at Horseneck Beach at a total cost of $9 million and based upon the Alternative Sustainable Recreation Master Plan (i.e. the DEIR). The objectives of these improvements were to:

- Move park buildings landward of the 100-year storm wave velocity zone;
- Reduce impervious surfaces;
- Increase habitat for state-listed shorebirds;
- Improve dune protection and allow for dune growth;
- Replace outdated/deteriorated infrastructure;
- Reduce operational/repair costs;
- Reduce energy consumption;
- Reduce nitrogen loading;
- Reduce water consumption;
- Provide Americans with Disabilities Act (ADA) accessibility; and
- Bring public restroom facilities into compliance with the State Sanitary Code.

These objectives were achieved through the following projects:

- Construction of two new comfort stations, elevated boardwalks, a new Beach Services Building, campground contact station and electrical system, a centralized Public Water Supply (PWS) well, and a new septic system.
- Upgrades to the campground's dumping station.
- Removal of the former comfort station and central administrative building.

- Placement of a new seasonal concessions stand at the Central Plaza for the 2011 recreation season.
- Design and permitting for traffic and circulation improvements for the day use parking lots.

Recent improvements at HBCH respond to threats of global climate change while balancing the recreation and natural resource needs of the property. Design features of the new comfort stations and the central Beach Services Building at HBCH incorporate energy efficient features including natural light features, sensor lights, recycled building materials, waterless composting toilets, installation of exterior, cold water sand rinse stations in lieu of indoor hot water showers, and the use of native plants that do not require an irrigation system. Waterless composting technology, cold water rinse stations and the elimination of the need for a wastewater treatment plant result in a 40% reduction in water consumption and a reduction in energy consumption. The Beach Services Building and comfort stations are located beyond the Federal Emergency Management Agency (FEMA) Velocity Zone to reduce damage from coastal storms; they are raised to allow free movement of sand and sediment in the dune system. Fragile dunes are protected by collecting pedestrian access to the beach onto raised boardwalks.

Not all of the projects identified in the 2006 NPC have been implemented. Still remaining is the construction of two more elevated, ADA compliant dune crossings, the removal of six acres of impervious surface in the Central Plaza, and the establishment of a sand volleyball court and paved basketball court at the campground. These projects await funding. The NPC also proposed the relocation of 32 campsites from the primary dune in order to facilitate dune recovery and expansion. Other approaches to enhancing dune protection at the campground have been proposed since the NPC; none are being actively considered.

Demarest Lloyd Memorial State Park

In 1996, twin 48-inch concrete culverts replaced failing metal culverts under the park road. This improved tidal flow in George's Pond and storm water drainage along the road.

In 2007, the comfort station was updated, including Title V improvements and installation of ADA compliant toilets and outside rinse stations. Family style bathroom and changing spaces were provided in addition to traditional bathroom features.

The DEML parking lot storm water drainage was improved in 2006 with the installation of rain gardens, planted with native coastal plants.

Currently there are no additional capital improvements planned or funded for DEML, although this RMP does recommend potential capital projects for the park (Appendix F).

1.5. Management Principle and Goals

The planning process developed a management principle and four associated goals for the Horseneck Planning Unit.

Management Principle

Achieve a sustainable balance between the conservation of important coastal resources in a dynamic ecosystem, with the provision of recreational opportunities for all.

Management Goals

Management goals are broad categories of actions to manage the natural, cultural, and recreation resources consistent with the management principle. The following management goals were identified for the Horseneck Planning Unit. These goals are not prioritized.

Goal 1. Protect and enhance the functions of the dynamic barrier beach geology and ecosystem to make them more resilient in the face of climate change.

> Climate change may subject coastal areas to a variety of impacts that can affect the beach and dune structure and coastal ecology. These include sea level rise, changes in sediment transport, increase in water and air temperatures, seasonal disruption, changes in precipitation, and increased storm intensity. Understanding these vulnerabilities and selecting adaptation options is critical to protect this fragile system and its recreational opportunities for future enjoyment.

Goal 2. Maintain and enhance sustainable recreational opportunities through thoughtful use of limited operational resources and by facility design and improvements appropriate to a barrier beach ecosystem.

Recreational activities and facilities must be compatible with the sensitive natural and cultural resources and feasible to be managed with available staff and equipment.

Goal 3. Increase our understanding of significant natural and cultural resources and protect and enhance these resources through appropriate stewardship strategies.

These coastal properties provide essential habitat for rare flora and fauna, unique natural communities, and complex sediment transport systems which require protection and understanding for continued preservation. These properties also have a range of cultural resources that require protection.

Goal 4. Promote public awareness and understanding of natural and cultural resources to increase support of the Department of Conservation and Recreation's stewardship strategies.

Opportunities for public and staff education related to natural and cultural resources, biological interactions, and management techniques associated with coastal ecosystems will help encourage compliance with and support of our resource stewardship efforts.

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Oceanfront camping at Horseneck Beach State Reservation, showing encroachment onto the primary dunes.

SECTION 2. EXISTING CONDITIONS

2.1. INTRODUCTION

Barrier beaches provide habitat for wildlife and protection to inland development. However, they are more widely appreciated for their recreational qualities. This dichotomy is evidenced in the DCR's properties in the Horseneck Planning Unit.

This section briefly describes the existing conditions of the natural, cultural, and recreation resources of the planning unit, in general, and HBCH and DEML, in particular. When available and appropriate, historic information is incorporated to provide a broader context in which to interpret current conditions.

2.2. HORSENECK PLANNING UNIT

The Buzzards Bay Watershed of Southeastern Massachusetts has been the focus of a variety of natural and cultural resources research efforts. As a result, an extensive amount of valuable information exists for the watershed, which provides a regional context for this RMP.

2.2.1. Natural Resources

Physical Features

Irregular bedrock and glacial topography have produced a coastline with numerous embayments (Fitzgerald et al. 2002). This coastline is changed in shape and size by rise in sea level, erosion, natural shifts in barrier beach sediments, storms, and human alteration (Smith 1983). Management and level of recreational activity at DCR properties within the planning unit are influenced by these ever changing coastal conditions.

Barrier Beaches

There are six barrier beaches situated between the mouths of the Westport and Slocums rivers. Two of these, the Horseneck Beach and East Beach Road barrier beaches, are located at HBCH. These beaches protect Westport Harbor and the associated branches of the Westport River from the open waters of Rhode Island Sound and Buzzards Bay.

Little Beach is located south of Allens Pond and abuts properties on which the DCR holds CRs. This barrier beach protects Allens Pond and associated uplands.

Along the eastern side of the planning unit, at DEML, a barrier beach extends north into the open water of the Slocums River estuary. Here the dune system provides a natural protective barrier between the waters of Buzzards Bay and the salt marshes surrounding George's Pond and Giles Creek. Two small barrier beaches are located south of the park.

Coastal Processes

Sediment Transport. The movement of sand along a coastline, referred to as littoral transport, is naturally influenced by waves and currents, and often interfered with by artificial structures, such as groins, walls, breakwaters, and jetties. Sediment transport can result in either localized or extensive areas of erosion or accretion (Aubrey Consulting Inc. 1997). Sand or sediment enters the littoral zone from many sources along the southern New England coast including the rivers that flow into the ocean bordering Massachusetts, Rhode Island, and Connecticut (Phillips et al. n.d.), and eroding shoreline or offshore features. The flood control dams along these rivers, as well as coastal armoring (e.g. walls and revetments), have reduced the natural supply of sand available to the system (Phillips et al. n.d.; Smith 1983).

Tidal current is the most important factor influencing sediment transport (Howes and Goehringer 1996). Two major current patterns predominate during ebb and flood tides in Buzzards Bay. The first major current runs parallel to Naushon Island and terminates near Woods Hole; the second runs along the northwest shore of the Bay (Massachusetts Ocean Management Taskforce 2004). Smaller localized currents can be influenced by wind and waves.

In the southern portion of the planning unit, between the Pettey Memorial Causeway and the inlet to the Westport River, sediments move in an east-to-west and cross-shore direction (Aubrey Consulting, Inc 1997). Gooseberry Neck does not supply a significant source of sand to adjacent beaches, but it does stabilize the eastern end of Horseneck Beach along East Beach Road by breaking waves from the east and impounding sand that migrates east during prevailing southwest wave patterns (Aubrey Consulting, Inc. 1997). The lack of new sand entering the system has caused the local exposure of cobble and gravel.

Coastal Engineering Structures. A natural characteristic of barrier beaches is their tendency to shift landward (CZM 1994; Smith 1983). Attempts to stabilize a barrier beach in a fixed position can narrow a beach and can increase beach erosion rates (CZM 1994; Smith 1983). Shoreline management and protection using coastal engineering structures (e.g. groins, jetties, and seawalls) is minimal for the Westport and western Dartmouth shoreline (Aubrey Consulting Inc. 1997). Shoreline erosion control structures in the planning unit are concentrated at the most western limit of Horseneck Beach (i.e. Horseneck Point), Westport River Inlet, and along Gooseberry Neck (Bourne Consulting Engineering 2009).

In 2006, Massachusetts established a Coastal Hazards Commission (CHC) to identify the vulnerability of the state to coastal hazards (CZM 2007). The Infrastructure Plan Working Group of the CHC assessed the condition of state-owned structures, their ability to provide coastal protection and the probable cost of repairs (Bourne Consulting Engineering 2009). Barrier beaches were also inspected and their conditions assessed due to their natural function as coastal protection assets. The ability of barrier beaches to withstand storms differed throughout the planning unit. A summary of these assessments may be found in the *2009 Massachusetts Coastal Inventory and Assessment Project* (Bourne Consulting Engineering 2009).

Climate and Weather

Climate

Air Temperature. In Westport, the average air temperature is 31° F in January and 74° F in July (http://countrystudies.us/united-states/weather/massachusetts, accessed June 15, 2011).

Precipitation. Precipitation is relatively uniform during the year with a small drop during the summer (Howes and Goehringer 1996). Westport's average amount of precipitation in January is 4.3 inches and 3.1 inches in July (http://countrystudies.us/united-states/weather/massachusetts, accessed June 15, 2011).

Climate Change

Recent climate models have predicted that by the end of the century, under a scenario in which the world remains highly dependent on fossil fuels for economic growth, summers in the Northeast could be longer, dryer and hotter (Manomet Center for Conservation Sciences and Massachusetts Division of Fisheries and Wildlife 2010; NECIA 2006).

Predicted Changes. If few steps are taken to reduce human influences on global climate change, the annual temperature of Massachusetts is predicted to increase 5–10° F by the year 2100 (Executive Office of Energy and Environmental Affairs and the Adaptation Advisory Committee (EOEEA and AAC) AAC 2011). Associated with increased temperature is an increase in sea level.

Projections of sea level rise vary among models and are heavily influenced by assumptions about future carbon emissions. Models predict a 7 to 79 inch rise in Massachusetts' sea level by the year 2100 (EOEEA and AAC 2011). In Buzzards Bay, accelerated sea level rise would likely result in increased coastal erosion, shoreline retreat, property destruction, and salt water intrusion into bays, rivers, and groundwater resources (Buzzards Bay NEP 2012). The severity of these effects will depend on the actual magnitude of sea level rise.

If greenhouse gas emissions are curtailed, climate change patterns and sea level rise are predicted to continue for centuries due to the timescales associated with climate processes and feedbacks (Intergovernmental Panel on Climate Change 2007).

Weather

Coastal Storms. The Bermuda high pressure system controls weather conditions in the North Atlantic region (Ocean Management Taskforce 2004). Weather conditions include springs and summers with frequent showers, thunderstorms, high humidity, and low wind speeds and winters with frequent and abrupt day-to-day variations in pressure, wind, and weather (Ocean Management Taskforce 2004).

The prevailing winds in the region are predominantly southwesterly in the summer and northwesterly in the winter (Howes and Goehringer 1996). Major storms often blow from the north and northeast, however storms with centers passing to the west of Buzzards Bay tend to produce the most flooding and erosion (Howes and Goehringer 1996). Inundation maps predict that Category 1 or 2 hurricanes could cause considerable coastal flooding hazards, potentially resulting in costly infrastructure damage to DCR properties (ACOE 1994). Information on the likely impacts of hurricane-related inundation on individual parks in the planning unit is presented in sections 2.3.1 and 2.4.1.

Most properties within the planning unit lie within a coastal flood zone (MassGIS 1997). Structures within such flood zones are subject to influences of sea level rise and damage by coastal storms. Storm surge is a hazard characterized by elevated sea level along the coast caused by storms. Coastline shape, nearshore depth, and wind strength and direction all determine the severity of storm surges (Ocean Management Taskforce 2004). Storm surges and the frequency and intensity of storms are predicted to increase as a product of climate change (Ocean Management Taskforce 2004). Information on each park's 100- and 500-year flood zones is presented in sections 2.3.1 and 2.4.1.

During large storm events, extensive erosion of the beach can occur in the form of a full breach through the dune system into the waters behind a barrier beach (Smith 1983). For example, the Horseneck barrier beach system experienced considerable erosion extending 125 feet into the major dune system during the Hurricane of 1938, a Category 2 hurricane with a storm surge of 13 feet (Brown 1939; NOAA 2005). During this hurricane, and visible in 1939 aerial photographs, a breach occurred just north of the western parking lot, close to the center and narrowest point of Horseneck Beach (Paull 1969). It is reputed that the day after an 1815 hurricane, a local resident rowed through a similar breach from ocean to river in this area (Paull 1969).

Water Resources

Tidal Range

Each day Buzzards Bay experiences two high and two low tides. The tidal range is relatively small, averaging approximately 3 feet (Aubrey Consulting Inc. 1997; Fitzgerald et al. 2002; Redfield 1980).

The tidal current (flood current four hours after low tide) runs at about 0.6 knots along the shores of Westport and about 0.3 knots along the Dartmouth shoreline (Howes and Goehringer 1996).

Water Temperature

Water temperatures range from a low 28° F in winter to a summer maximum of 71.6° F (Buzzards Bay NEP 2012).

Bay Depth

In Buzzards Bay, mean low water depths average 36 feet and range from 16–33 feet at the head of the bay to over 66 feet at the mouth (Howes and Goehringer 1996).

Water Quality

Sources of pollution into Buzzards Bay come in many forms including storm water runoff, industrial discharges, agricultural fertilizers, septic system failures, and landfills (Howes and Goehringer 1996).

Nutrients. Nutrient overloading from the surrounding watershed is the greatest long-term threat to the Buzzards Bay ecosystem (http://www.savebuzzardsbay.org/Document.Doc?id=276). Recommendations from the 1991 Comprehensive Conservation Management Plan (CCMP) focused heavily on correcting point and non-point pollution sources and influenced current Title V regulations.

The DCR Storm Water Management Plan describes policies and practices used to manage storm water on DCR properties (DCR 2007*b*, available at http://www.mass.gov/dcr/stewardship/stormwater).

It is unlawful to dump a boat's holding tank into Buzzards Bay and the Westport River; they are designated as "No Discharge" zones. The Westport and Dartmouth Harbormasters provide a free pump-out service, which they operate seasonally on-demand.

Petrochemicals. Nearly two billion gallons of hydrocarbon material are shipped through Buzzards Bay yearly (http://www.buzzardsbay.org). In April 2003, the second largest oil spill in Buzzards Bay occurred off the shores of Westport. An estimated 98,000 gallons of number six fuel oil was released from the tank barge *Bouchard No. 120* (Buzzards Bay NEP n.d.). This thick, damaging oil disseminated across more than 90 miles of coastline. A Response Action Outcome statement was published in 2004 explaining the initial impacts of the spill at various DCR properties (GeoInsight Inc. 2004). In the wake of the *Bouchard No. 120* oil spill, a Buzzards Bay Geographical Response Plan (Buzzards Bay GRP) for Oil Spill Mitigation was generated in 2005. Additional information on the Massachusetts Marine Oil Spill Prevention and Response Program, including the Buzzards Bay GRP, can be found at http://www.mass.gov/dep/cleanup/oilsprep.htm.

Wildlife

In order to conserve the state's wildlife, the Massachusetts Department of Fish and Game (DFG) produced the Massachusetts State Wildlife Action Plan. It is organized around 22 habitat types and lists 257 wildlife species in greatest need of conservation; it includes information on their life histories, conservation status ranking, state distribution and abundance, and conservation threats (DFW 2005). Natural resources information for Buzzards Bay, applicable to the entire planning unit, may be found in Howes and Goehringer (1996).

Birds

Buzzards Bay is believed to have been named after the area's ospreys, which reminded European explorers of the buzzards (i.e. robust bodied hawks with broad wings) of their homelands (Howes and Goehringer 1996). The osprey population suffered during the years of unregulated use of the pesticide DDT (Howes and Goehringer 1996), but they are now abundant within Massachusetts. The Westport River Watershed Alliance (WRWA), Mass Audubon's Allens Pond Wildlife Sanctuary, the Lloyd Center for the Environment (the Lloyd Center), and dedicated volunteers have all contributed to the local success of this species. Several Westport ospreys wear satellite transmitters, funded by the WRWA, and the tracks of those birds can be viewed on the following website: http://www.bioweb.uncc.edu/Bierregaard/maps09/2009_map_links.htm (accessed April 15, 2011).

The past ten years of management has seen a consistent number of pairs within the Westport River Watershed. Westport and Dartmouth currently support nearly 30% (70–80 active pairs) of the Commonwealth's breeding osprey population (Poole 2009). It is unknown whether nest sites are a limiting factor to population growth for the Westport and Dartmouth ospreys (Buzzards Bay NEP 2012). The Lloyd Center erected two osprey platforms within the marsh system of DEML; the newest

platform has seen no breeding activity, while the older platform has supported a pair with several years of breeding success (Bogart 2011). Additional locations for new platforms exist within the planning unit (Poole 2009).

Coastal habitats, worldwide, are besieged by development, recreation, pollution, and dwindling food supplies that have contributed to the decline of nearly half of all coastally migrating shorebirds (North American Bird Conservation Initiative, U.S. Committee 2009). The varying landscapes of Bristol County provide important habitat for birds throughout the year. Mass Audubon has designated nearly 5,000 acres of land within Allens Pond and the Westport River Watershed as an Important Bird Area (IBA). These areas were designated as an IBA because of the established long-term monitoring programs, habitat diversity, and the number of birds concentrating in significant numbers. The nomination of this IBA helps to designate key sites for the preservation of species, offer land management recommendations, and provide opportunities for public education and outreach.

Fish

The marine species in Buzzards Bay are typical of those found along the east coast from Chesapeake Bay to Cape Cod. Since 1914, Buzzards Bay has had a direct connection, via the Cape Cod Canal, to northern cold water currents. This unique feature creates an environment where semi-tropical and Arcadian species can be found in Buzzards Bay. Information can be found about a wide range of species utilizing Buzzards Bay's resources, including over 200 recorded fish species (Fiske et al. 1968; Howes and Goehringer 1996). Striped bass, bluefish, bonito, little tunny, tautog, fluke, and weakfish are popular recreational fishing species of the area (http://www.mass.gov/dfwele/pab/pab_facilities.htm).

Anadramous fish runs are important fisheries in Buzzards Bay (Howes and Goehringer 1996). The Westport River and Slocums River are two anadramous fish runs providing access to brackish and freshwater spawning grounds for rainbow smelt, alewife, and brown trout (Howes and Goehringer 1996). (Scientific names of the plants and animals mentioned in this RMP are identified in Appendix G.) A list of 39 fish species taken or reported from the Westport River prior to 1970 may be found in Phillips et al. (n.d.).

Shellfish

Buzzards Bay provides habitat for a variety of shellfish. Commercially important species include bay scallop, channeled and knobbed whelk, eastern oyster, American lobster, northern quahog, soft-shelled clam, and blue mussel. Distributions of these species are determined by the sediment characteristics of the sea floor.

Resource-related Designations

Buzzards Bay National Estuary Program. Congress accepted Buzzards Bay into the National Estuary Program (NEP) in 1987. The Buzzards Bay NEP is an advisory and planning unit of the Office of Coastal Zone Management (CZM). At its inception, a myriad of scientific and technological studies were implemented to better understand the grave health of the estuary. By 1992, Massachusetts and the United States Environmental Protection Agency approved one of the country's first coastal watershed CCMPs for Buzzards Bay. The CCMP has established priorities for activities, research, and funding for the Buzzards Bay estuary, a useful tool for resource management and planning (Buzzards Bay NEP 1991). To date, over half of the 100 CCMP recommendations have been fulfilled, new environmental challenges have arisen, and new regulations are in place. The 1991 CCMP was revised in 2010; a draft is available on the following website: http://www.buzzardsbay.org. The Buzzards Bay NEP maintains a website of potential grant opportunities for technical assistance, as well as wetlands and habitat restoration.

Westport River. A National Wild and Scenic River designation is currently being proposed for the Westport River by local citizens and nonprofit agencies. Designating the Westport River as a Wild and Scenic River would help to create a framework for local and federal stewardship of the river's remarkable values.

2.2.2. Cultural Resources

Cultural resources include all landscapes, buildings, structures, sites, or objects over 50 years of age. Both properties in the planning unit contain cultural resources that predate their establishment as parks, as well as resources associated with their

development as park facilities. Both time periods are critical to understanding the development of facilities and landscapes. None of these resources are currently listed on either the State or National Register of Historic Places, nor have they been evaluated for their significance.

2.2.3. Recreation Resources

Recreation facilities in the planning unit are focused on providing saltwater based recreational opportunities, including swimming, fishing, and boating. Camping also occurs within the planning unit; athletic courts are associated with the campground. (See Section 2.3.3 for additional information.) Non-facility based recreation includes walking, running, biking, and nature study.

Planning efforts have focused on improving or creating recreation facilities that achieve a balance between infrastructure that meets the recreational needs and expectations of the public and protecting the facilities' natural and cultural resources.

Accessibility

Universally accessible facilities and equipment are available, to some degree, at both properties in the planning unit in an effort to accommodate visitors of all abilities. Although notable progress was made with building ADA compliant facilities during the recent infrastructure improvements to HBCH, additional universally accessible opportunities are desirable.

Both parks lack independent access to the beach for individuals with disabilities; federal law stipulates ADA beach access to the high water mark every one-half mile (http://www.access-board.gov/outdoor/draft-final.htm; 42 U.S.C. 12101 et seq.; Appendix H). The planning unit currently offers no ADA accessible picnic tables or camping areas; the state Architectural Access Board law requires a minimum of 5% of picnic and camping facilities be accessible (521 CMR 19.00). If federal monies are used in planning projects, then federal regulations for ADA access must be followed (42 U.S.C. 12101; Appendix H).

A Department of Justice ruling under the Americans with Disabilities Act, effective March 15 2011, requires that those providing public recreational opportunities make reasonable changes in their policies, practices, or procedures to permit the use of other power-driven mobility devices (OPDMD) by individuals with mobility disabilities, unless the public entity can show that the class of OPDMD cannot be operated in accordance with legitimate safety, resource protection or other requirements (42 U.S.C. 12131; Appendix H). This new ruling is currently being addressed by the DCR and will be applied, where appropriate, to this planning unit.

Demographics

Visitor intercept surveys were conducted in 2011 to identify the geographic origins of visitors to the Horseneck Planning Unit. While visitors stopped at contact stations to pay access fees, staff counted the number of people per vehicle (PPV) and recorded the vehicle's state of registration. If time permitted, drivers were also asked their ZIP Code of origin. ZIP Code data were grouped by town; towns from which one or more percent of the visitors originated were used to calculate a demographic unit.

Demographic units varied between the parks in the planning unit. Because of this, demographic information is presented by individual property, rather than for the entire planning unit. See sections 2.3.3 and 2.4.3 for additional information.

2.3. Horseneck Beach State Reservation

2.3.1. Natural Resources

A study authorized by an Act of the Massachusetts Legislature was conducted c. 1970 to aid in the development of a master plan (Phillips et al. n.d.). It documented 53 plant species on the reservation, as well as shellfish productivity in the surrounding waters, and 39 fish species taken or reported from the Westport River prior to 1970 (Phillips et al. n.d.). Recent information indicates a similar, low number of plant species (Appendix J). Although these efforts do provide some guidance, a comprehensive inventory of flora and fauna has not been conducted.

Extensive information is available on the reservation's birds. This is due to the popularity of the Westport-Dartmouth area with birders, who frequently bird HBCH and report on their findings (e.g. Cassie 2010). Over 170 species have been identified in recent years (Appendix J).

Physical Features

Topography

Topography varies from south to north. Along the south shore, including the Central Plaza/main beach and the campground, elevations range from sea level to approximately 20 feet above sea level. A row of dunes, the highest of which reach 50 feet above sea level, cover the reservation's interior running parallel to the shore. Farther northward, along the southern edge of John Reed Road, the elevation drops to approximately ten feet. The elevation continues to drop to the north, returning to sea level in the salt marshes along the reservation's northern boundary. Gooseberry Neck is relatively low, with the highest elevation around 25-feet (MassGIS 2005).

Dune and Beach System

HBCH has nearly 500 acres of barrier beach containing sandy dune and shoreline, cobble beach, salt marsh, tidal flats, maritime shrubland and forest, and a barrier island (Gooseberry Neck). Horseneck Beach, including the town portion, is the eighth largest barrier beach system (of 681) in the state (Hankin et al. 1985). Approximately half the length of the four-mile, state-owned barrier beach consists of sandy substrate; this central area is considered the main day use beach. A thick layer of cobble covers the western section of beach and acts as natural armor against erosion (Smith 1983).

The elaborate dune system, with primary and secondary dunes phasing into tall forested dunes, contributes to the beauty and popularity of this property. Dunes cover approximately 50% of the total acreage of the reservation, typically extending 10 to 20 feet above the height of the upper beach (i.e. 15 to 30 feet above sea level; DEM 1995).

An assessment of the ability of these dunes to protect against coastal storms ranked their condition as Fair (Bourne Consulting Engineering 2009). This rating indicates that the beach requires a moderate level of action to repair minor deterioration, yet moderate damage would occur during a major coastal storm.

A more slender dune system, stabilized by pockets of shrub and tree vegetation, occurs along northern portions of John Reed Road, parallel to the fringing salt marshes of the Westport River. Few footpaths occur along this dune and it appears to be in stable condition. This portion of the dune system offers flooding protection to John Reed Road and may provide habitat for rare salt marsh turtles, which seek sandy upland areas to lay nests.

Both rare and common species of birds, reptiles, amphibians, mammals, and insects use the dune system, tidal flats, and marsh areas as foraging areas, resting areas, or breeding habitat (Swain and Kearsley 2001). Besides offering unique wildlife habitat, dunes and their stabilizing vegetation are the primary defense against flooding and storm surges and provide a source of sand to nourish beaches and near shore sandbars (CZM 1984; Smith 1983).

Shoreline Change

Historic shoreline change data (CZM 2008; MassGIS n.d.) reveal a sequence of increases and decreases in Horseneck Beach since 1844, with an overall loss of approximately 13 acres (see Table 2.3.1). The largest recorded decrease occurred between 1978 and 1994. These shoreline change data reflect all possible sources of erosion or accretion, including sea level rise, coastal storms, dredging and filling, and impacts of coastal structures. It is unknown to what extent these individual processes influenced shoreline change at Horseneck Beach.

Table 2.3.1. Historic shoreline change at Horseneck Beach State Reservation, excluding Gooseberry Neck.[a]

Year 1	Year 2	Acres Lost (-) or Gained (+)	Change (%)
1844	1895	-5.34	-0.76
1895	1934	+0.92	+0.13
1934	1978	+10.70	+1.53
1978	1994	-19.47	-2.74
1844	1994	-13.19	-1.87

a. Includes DCR-owned property on East Beach Road

In contrast, the pattern of shoreline change at Gooseberry Neck has been one of loss since the late 1890s, with a cumulative loss of approximately 21% of the land area (see Table 2.3.2). This loss has occurred despite filling associated with repeated causeway construction activities in the first half of the 20th century.

Table 2.3.2. Historic shoreline change at Gooseberry Neck.

Year 1	Year 2	Acres Lost (-) or Gained (+)	Change (%)
1844	1895	+0.33	+0.41
1895	1934	-5.11	-6.37
1934	1978	-8.35	-11.11
1978	1994	-3.63	-5.43
1844	1994	-16.76	-20.97

Estuarine Marsh System

The remote northeast section of HBCH, hugging the East Branch of the Westport River, contains various wet habitats abutting low maritime forests. The associated habitats within this area include extensive salt marsh, potential brackish marsh, and open bog-like areas embedded within the thickets of forest and bursting with cranberries, orchids, and sundews. This marshy area and its margins provide excellent wildlife habitat and potentially scenic views if resource sensitive trails can be established. Mapping potential locations of prairie cordgrass within brackish marsh will help identify valuable habitat for the state-listed spartina borer moth and help focus management efforts to discrete areas.

John Reed Road runs down the spine of the barrier beach contributing to a fragmented ecosystem. Several culverts run under John Reed Road connecting portions of vegetated wetland, often dominated by invasive common reed, to the fringing salt marsh system of the east branch of the Westport River. An expanding population of invasive common reed is growing along both sides of John Reed Road and may be negatively impacting rare species, which are dependent upon native salt marsh vegetation (Mello and Bogart 2010). Two 24-inch culverts leading under the road have been assessed as rotting and in poor condition, and are negatively affecting a combined 1.64 acres of vegetated wetland (Buzzards Bay NEP 2002). The estimated cost of upgrading these culverts at the time of assessment was $125,400 (Buzzards Bay NEP 2002).

Gooseberry Neck

Gooseberry Neck is an 81.5 acre barrier island. It is fringed by cobble beach interspersed with pockets of soft sand. Three salt ponds and an expanse of maritime shrubland occur; both habitats are known to support imperiled state listed species. Both are also extremely degraded and in need of restoration (DFW 2006). Restoration of the maritime shrubland community via prescribed burns would help to reestablish habitat for hundreds of individuals of fire dependent rare invertebrate species (Mello and Bogart 2010) as well as improve habitat for some species of migratory birds.

Gooseberry Neck is terrific habitat for various migrating bird and invertebrate species (DWF 2006). A variety of wildlife seeks cover and forages in shrubland habitats during fall migration. Gooseberry Neck has been home to the area's largest tree swallow roost, numbering in the tens of thousands (Boucher 1995). Migrating monarch butterflies and common green darners have also been observed in the thousands (Boucher 1995; Cassie 2006; Nikula and Sones 2003).

Water Resources

Ponds

There are no ponds.

Wetlands

Nearly one-third of the reservation (32.9%) is covered by wetlands. The largest expanse of wetlands, chiefly salt marsh, occurs north of John Reed Road. Small pockets of shrub swamps and emergent marshes occur to the north of the road, along the edge of the salt marsh and throughout the limited uplands. A long, narrow strip of emergent marsh occurs along the south side of John Reed Road, between the east parking lot and the campground. A single, isolated emergent marsh is located east of the main entrance and three additional emergent marshes are present on Gooseberry Neck.

Vernal Pools

There are no certified vernal pools. Two potential vernal pools are located in uplands north of John Reed Road, approximately 1,500 feet west of the DCR maintenance garage.

Streams

Numerous man-made ditches and several unnamed tidal creeks drain the salt marsh north of John Reed Road.

Groundwater

There are no known aquifers.

Flood Zones

The 100-year flood zone covers 776.5 acres (95.2%) of the reservation and includes all developed areas. The 500-year flood zone covers an additional 9.0 acres (1.1%). Only the highest interior dunes are outside of these zones.

Hurricane Inundation

Nearly all of the reservation is susceptible to inundation caused by hurricanes. Models predict that a Category 1 hurricane will inundate approximately one-third of the reservation (36.0%), including the salt marshes north of John Reed Road; the shores in front of the campground and along East Beach Road; and the southern tip of Gooseberry Neck. A Category 2 storm is projected to inundate approximately two-thirds of the reservation (65.5%), including John Reed Road; the DCR maintenance garage and barn; all day-use parking lots; the southern beach from the campground west to the main beach area; the shore of East Beach Road; and the east side of Gooseberry Neck. Category 3 and 4 storms are projected to inundate 82.3% and 93.0% of the reservation, respectively. These higher category storms will affect the Central Plaza area, the historic Westport Beach Lifesaving Station, the causeway to Gooseberry Neck, and the submarine observation towers. Only the reservation's highest dunes are projected to escape inundation.

These predictions are based on worst case scenarios and assume the most damaging track and tide height when a hurricane makes landfall.

Rare Species

Seventy-eight percent of the reservation has been designated as Priority Habitat under MESA (321 CMR 10.00; Appendix H) and activities that may alter this habitat are subject to regulatory review to minimize adverse impacts to rare species. According to the Massachusetts Natural Heritage and Endangered Species Program's (NHESP) database, four rare species are known to occur on, and an additional three rare species forage along the ocean shore near, the reservation (see Table 2.3.3). Several of these species require diligent seasonal management.

Nine additional state-listed species, all birds, have been observed by birders, but are not included in the NHESP database. This includes migrants passing through HBCH (e.g. peregrine falcon, upland sandpiper) and breeding and wintering species in offshore waters (e.g. roseate tern, common loon).

One state Threatened species, a rare animal, was recorded just west of the reservation in 2011. It potentially occurs on the reservation.

Table 2.3.3. State-listed species that have been documented on Horseneck Beach State Reservation, including Gooseberry Neck.

Species	Type[a]	MESA[b]	Presence[c]
Arctic tern	B	SC	A
Chain dot geometer	I	SC	C
Common tern	B	SC	A
Least tern	B	SC	C
Piping plover[e]	B	T	C
Roseate tern[f]	B	E	A
Spartina borer moth	I	SC	C

a. Types of state-listed species include: B = Bird; and I = Insect.
b. Status of species listed under the Massachusetts Endangered Species Act (MESA): E = Endangered; SC = Species of Special Concern; and T = Threatened.
c. Presence of state-listed species at HBCH: A = Confirmed over waters adjacent to the reservation; and C = Confirmed on the reservation (French 2012).
d. This species is also listed as Threatened under the U.S. Endangered Species Act.
e. This species is also listed as Endangered under the U.S. Endangered Species Act.

The Horseneck barrier beach system has accommodated some of the largest concentrations of breeding piping plovers in the region, competing closely with populations at Allens Pond (Bogart et al. 2010; Appendix K). Both piping plovers and least terns have also used nesting habitat at Gooseberry Neck with little reproductive success (Appendix K); the plovers select the south tip for nesting habitat (Bogart et al. 2010). Early accounts of terns nesting on Gooseberry Neck have been documented in a recreation assessment survey for Gooseberry Neck (Weeks 1969).

Currently, human disturbance and predators (primarily red fox, striped skunk, and birds) negatively impact the reproductive success of rare beach nesting birds at HBCH (Bogart et al. 2010).

Although signs are posted with dates for dog restrictions, dog walkers are often on the beach early in the morning and after hours and are generally off-leash (Bogart et al. 2010). Dogs mimic the species' natural predators (e.g. red fox and eastern coyote), which can cause nest abandonment, or they may crush or eat eggs and chicks (DFW 1993). Gooseberry Neck has little management oversight and direct conflicts between dog walkers and nesting rare beach species are common, particularly because the beach is very narrow. Currently, dogs are allowed on-leash at Gooseberry Neck year-round, although the leash law is not commonly followed or enforced.

Piping plover nesting locations at HBCH are generally along the berm of the beach, but they do select sandy blowouts in the dune (Bogart et al. 2010). Concerns exist at HBCH where piping plovers nest in the back dunes adjacent to or even directly on parking lots (Bogart et al. 2002). The chicks are exposed to the dangers of traffic or the long treacherous route for food. Additional management strategies may assist with their protection when this occurs.

A data sensitive rare insect, last observed at HBCH in 2005, is afforded limited protection when symbolic fencing is erected for shorebird protection (Bogart et al. 2010; DFW 2006). This insect is extremely vulnerable to pedestrian and vehicular traffic or natural storm erosion to beach strand habitat. The Lloyd Center conducts yearly surveys for this rare insect and suggests additional protection measures for the species when required.

The salt marsh system of HBCH and adjacent sandy upland areas has the potential to attract diamond-backed terrapins, yet none have been documented at HBCH during limited surveys by the Lloyd Center. Turtles may nest along the marsh transition zone leading from high marsh to upland sandy areas.

Gooseberry Neck provides habitat for rare insects, plants, piping plover, and least terns. Restoration of the maritime shrubland community via prescribed burns would help to reestablish habitat for hundreds of individuals of fire dependent rare invertebrate species (Mello and Bogart 2010) as well as improve habitat for migrating bird species.

Vegetation

Invasive Species

The Massachusetts Invasive Plant Advisory Group (MIPAG) defines an invasive plant as non-native species that has spread into native or minimally managed plant systems in the state. Their spread poses a risk to the diversity of native plants and animals and can cause economic harm disrupting ecosystems (MIPAG 2005). MIPAG categorizes non-native plants in the state as "invasive," "likely invasive," or "potentially invasive" (MIPAG 2005).

Five species of invasive plants (MIPAG 2005) have been documented at HBCH. No reservation-wide surveys have been conducted to determine the abundance and distribution of these plants or the presence of additional invasive species.

Oriental bittersweet, Japanese knotweed, multiflora rose, and common reed, categorized as invasive to Massachusetts (MIPAG 2005), are encroaching the native coastal shrublands of Gooseberry Neck and various portions of HBCH.

Common reed and Japanese honeysuckle were documented on HBCH as early as 1970 (Phillips et al. n.d.). Common reed was documented on Gooseberry Neck in 1969 (Weeks 1969).

An expanding population of Japanese knotweed in need of immediate control is located along the beach access road between the east parking lot boardwalk and the Central Plaza. A small population of Japanese knotweed is located along the trail system of Gooseberry Neck. Post 2007 capital improvements, Japanese knotweed emerged within the landscaped grounds around the comfort stations and received limited control. An assessment of the current extent of this population will help determine the level of control required to contain its expansion within the dune system and at Gooseberry Neck. Invasive species monitoring and control efforts are critical to the long-term viability of the dune ecosystem.

Morrow's honeysuckle and oriental bittersweet threaten the persistence of the reservation's rare maritime oak-holly forest. (See Natural Communities, below.) This community extends beyond DCR property boundaries and could be threatened by invasive species (DFW 2006). A prevention and control program is needed to identify

and control populations of these invasive species in order to preserve this uncommon community (DFW 2006).

Eelgrass

Meadows of submerged eelgrass (i.e. sea wrack) hug the eastern and southern edges of Gooseberry Neck (MassGIS 2006). Eelgrass meadows are also located in the open water of the most eastern branch of the Westport River abutting the HBCH salt marsh (MassGIS 2006). Eelgrass habitat is extremely valuable to coastal food webs and can be influenced by many natural factors, but the most dramatic lasting changes are influenced by humans (Costa 1988).

Natural Communities

Natural communities harbor important components of biodiversity (Swain and Kearsley 2001). They can be locally restricted or widespread, but conservation priority should be directed to those with limited distribution across the state or globally. Six natural communities are known to occur at HBCH. The natural communities of HBCH and an indicator of their rarity in Massachusetts can be found within Table 2.3.4. Full descriptions of these community types may be found in Swain and Kearsley (2001).

Table 2.3.4. Natural communities of Horseneck Beach State Reservation, including Gooseberry Neck.

Community Type[a]	System[b]	Source[c]	State Rank[d]
Gravel/sand beach	E	Swain RMP	S4
Maritime beach strand	T	French	S3
Maritime dune	T	Swain	S2
Maritime oak-holly forest	T	French	S1
Maritime shrubland	T	DFW	S3
Salt marsh	E	DFW	S3

a. Classified according to Swain and Kearsley (2001).
b. E = Estuarine; T = Terrestrial.
c. Information was obtained from the following sources: DFW = DFW (2006); French = French (2012); RMP = as interpreted by Resource Management Planner; and Swain = communication with Patricia Swain, NHESP.
d. Communities are ranked from the most rare (S1) to the most common (S5).

Maritime oak-holly forest, a rare occurrence within the state, is characterized by a dominance of pitch-pine and mixed hardwood trees, including a variety of oak, holly, black cherry, and sassafras species. This forest type provides critical food and cover for a variety of mammals, moths, butterflies, and both migrating and year-round birds (Swain and Kearsley 2001). At HBCH, the trees tend to be salt and wind pruned and generally less than 30 feet tall (DFW 2006). A mosaic of primarily native shrubs, vines, and herbaceous vegetation is found under the tree canopy. No official trails are located in this forest type, yet people have created a network of paths in portions of this forest which can eventually degrade this unique community (DFW 2006).

The maritime dune community, located behind the primary dune, grades into shrublands, woodlands, or parking lots at HBCH. Invasive species and uncontrolled foot or vehicular traffic are immediate threats to this community (DFW 2006); several unauthorized footpaths access this community from the primary dune.

Vernal Pools

When a vernal pool is certified by the Natural Heritage Endangered Species Program (NHESP) it is protected under the Massachusetts' WPA (310 CMR 10.00; Appendix H). There are no certified vernal pools at HBCH. Two potential vernal pools may exist at HBCH; field surveys can help determine this. Rare species may exist in the potential vernal pools and certifying them, if they are qualified, will support their future protection. Vernal pools can occur within dune communities and serve as important feeding and breeding areas for a variety of reptiles, amphibians, invertebrates, and birds and mammals (Swain and Kearsley 2001).

Shellfish

Waters adjacent to Horseneck Beach, including the mouth of the Westport River, Rhode Island Sound, and Buzzards Bay are open for shellfishing.

Horseshoe Crabs

Horseshoe crabs are harvested by licensed individuals along the Westport River, both for biomedical research and for use as bait.

2.3.2. Cultural Resources

Cultural resources include all landscapes, buildings, structures, sites or objects over 50 years of age. HBCH contains cultural resources that predate its establishment as a park, as well as resources associated with its development as a park. Both time periods are critical to understanding the development

of the reservation. Known cultural resources are identified in Table 2.3.5. None of these resources are currently listed on either the State or National Register of Historic Places, nor have they been evaluated for their significance.

Archaeological Resources

Horseneck Beach is part of a large barrier beach ecosystem composed of shifting sands, barrier dunes, and buffering salt marshes. This land type is continually changing in shape and size; pre-contact use was likely limited to seasonally visited camps or work sites that were temporary in nature. The Westport River and the barrier beach provided access to a wide variety of marine mammals, fish, shellfish, and birds, but the constant action of wind, tide, and shifting sand would leave little evidence of these seasonal occupations (Begley 1998). An archaeological reconnaissance survey, prepared by the Public Archaeology Laboratory (1998), indicated that there are no documented Native American sites within HBCH. Regardless, the distribution of known Native American sites within the lower Westport River Watershed is evidence that this area was important to Native American populations (Begley 1998).

The hurricane of 1938 significantly impacted the summer resort community that had become established on Horseneck Beach after the turn of the 20th century. This community of homes lined both sides of a paved road that extended the length of Horseneck Beach; now the reservation's narrow beach access road behind the primary dune. Although some post-storm redevelopment occurred, the combined effects of the 1938 hurricane and Hurricane Carol in 1954 resulted in most of this community being lost. The archaeological reconnaissance survey did not identify the presence of any archaeological remains of the summer homes within HBCH (Begley 1998).

Although no archaeological sites were documented, the survey identified two areas within the park's boundaries that may have archaeological sensitivity. One may contain archaeological resources associated with the Native American use of the area based on its proximity to marine food resources, well-drained soils, level topography, and undisturbed condition (Begley 1998). The other area may contain additional archaeological evidence relating to the military use of the area during World War II (Begley 1998).

Historic Resources

The original Central Plaza beach service facilities included a building housing the administrative offices and lockers, an attached first aid and lifeguard building, a concession stand, a comfort station and storage building, as well as a nearby high voltage shed. This complex of highly sculptural single story, modern concrete and brick buildings designed by Coletti Brothers, Architects, were built in 1956-57 for the DPW development of the park. The Central Plaza also originally included a swimming pool and volleyball court.

The original concrete comfort station and storage building, administration building and lockers, first aid and lifeguard building were demolished in 2010.

The concession building, with a concrete barrel arched roof with a wide overhang and brick walls fared better in the beachfront environment due largely to the curve of its roof line. Concrete flying buttresses help support the roof. This building, which is no longer used as a concession stand, is currently used as a shade shelter. It will eventually be removed from the primary dune area. The nearby high voltage shed, located north of the Central Plaza, also dates to the 1956-57 development of the plaza and is of a similar design and materials, with a flat roof that has a projecting overhang with angled side walls.

Table 2.3.5. Cultural resources and infrastructure of Horseneck Beach State Reservation.

Resource	Type[a]	Condition[b]	Date[c]	MHC #[d]
Horseneck Beach State Reservation	LA	3	1957	WSP.903
East Beach area				
Lifesaving Station #69	BU	1	1888 (moved 1894)	WSP.732
Fishermen's Association Information Center	BU	1	c.1900–1920	WSP.732
Horseneck Beach area				
Concession Building	BU	3	1956	-
High Voltage Shed	BU	2	1956	-
West Comfort Station	BU	1	2008	-
East Comfort Station	BU	1	2008	-
West Parking Lot Contact Station	BU	2	-	-
Elevated Boardwalks with Shade Shelters (2)	ST	1	2008	-
Beach Services Building	BU	1	2009	-
Campground area				
Campground Comfort Station	BU	3	1972, 1994	-
Campground Contact Station	BU	1	2009	-
Campground Recycling Center	BU	2	-	-
John Reed Road area				
Water Pump Station and Storage Tank	BU	2	-	-
Maintenance Garage	BU	2	c.1994	-
State Police Horse Barn	BU	2	c.1994	-
Town Boat Launch	ST	2	-	-
Gooseberry Neck				
Gooseberry Neck	LA	3	c.1942	WSP.903
Thomas Edward Pettey Causeway	ST	2	1913, 1923, c.1942, 1969	WSP.902
WW II Observation Tower (three story)	ST	4	c.1942	WSP.901
WW II Observation Tower (two story)	ST	4	c.1942	WSP.901
Public Boat Launch	ST	3	-	-

a. Resource types include the following: BU = Buildings; ST = Structures; LA = Landscape; SI = Sites; and OB = Objects.
b. Windshield- level Condition Assessment using the Building System and Equipment Condition Code as used in the Massachusetts Capital Asset Management Information System (CAMIS); the following codes are used: 1 = Excellent – Easily restorable to like new condition, minimal routine maintenance; 2 = Good – Routine maintenance required; 3 = Adequate – Some corrective and preventative maintenance required; 4 = Fair – Excessive corrective maintenance and repair required; 5 = Poor – Renovation needed; and 6 = Fail
c. Date provided, when available
d. The Massachusetts Historical Commission (MHC) inventory form number is included only for those resources where an inventory form currently exists. The existence of an inventory form does not convey any particular status regarding the significance of a resource, nor should it be interpreted that the lack of an inventory form means a resource is not historic.

In 1998, the DCR acquired the 69th [Westport Beach] Lifesaving Station and three abutting properties located at the east end of Horseneck Beach, near the Gooseberry Neck causeway (see Figure 2.3.2). The lifesaving station, constructed in 1888 by the Humane Society of Massachusetts, was moved to this location in 1894 and remained in active use until c. 1913. Additions were later made to the building as it was transformed for commercial uses. In 2008, the DCR entered into an agreement with the Westport Fishermen's Association (WFA) to lease the property for 25 years through the agency's Historic Curatorship Program. Later additions to the lifesaving station were razed and the building was restored to its original appearance. An adjacent commercial building was renovated to serve as an information center for the station. Renovations were completed in December 2009. The DCR is now leasing the lifesaving station to the WFA. The building is significant as a rare, surviving example of the sea rescue stations established by the Humane Society of Massachusetts in the late 19th century.

In c. 1942, the U.S. Army Corps of Engineers built a submarine observation station on Gooseberry Neck as part of the WWII coastal defense system. At that time, the causeway was renovated to accommodate heavier traffic and three poured concrete towers were constructed, disguised to look like a lighthouse and portions of other buildings. Two of the observation towers remain. One tower is approximately two stories in height, completely open to the weather, and contains a diagonal line on one side showing where a wood frame building was once attached to the structure. The other tower is three stories in height and retains the remnants of an observation platform at the top story. The metal door once sealing this structure has been damaged by vandals. These buildings are in a deteriorated condition, but are historically significant as remnants of the coastal defense system.

The current black and white striped paint scheme dates from 1999 and is used as a visual navigation aid by local small craft. The taller tower also appears on the NOAA nautical chart for the region.

2.3.3. Recreation Resources

Popular recreational activities at HBCH include swimming, fishing, motorized boating, camping, walking, jogging, and nature observation. Visitor use also includes geocaching on Gooseberry Neck (http://www.geocaching.com, accessed January 27, 2012). HBCH is one of 76 parks participating in the DCR's Parks Passport Program to encourage exploration of the state park system; 12 parks participate in the Southeast Region.

Demographics

The geographic origins of day use visitors to HBCH were identified from visitor intercept surveys conducted in July through September, 2011; 1,695 valid ZIP Codes were recorded. (See Section 2.2.3 for additional information on these surveys.) Visitors came from 150 Massachusetts cities and towns, 27 Rhode Island cities and towns, 22 states, and three foreign countries. Twenty-three cities and towns were home to over one percent of visitors surveyed (see Table 2.3.6). These municipalities constitute the Horseneck Demographic Unit (HDU).

Table 2.3.6. Municipalities in the Horseneck Demographic Unit and the percentages of visitors surveyed that originated from these municipalities.

Municipality[a]	% of visitors
Fall River	8.1
Providence, RI	3.8
New Bedford	3.7
Acushnet	3.4
Taunton	3.4
Westport	3.1
Dartmouth	3.0
Swansea	2.7
Attleboro	2.7
Brockton	2.2
Somerset	2.2
Boston	1.9
East Providence, RI	1.8
Worcester	1.7
Fairhaven	1.5
North Attleborough	1.5
Franklin	1.5
Bridgewater	1.5
Pawtucket, RI	1.4
Tiverton, RI	1.3
Freetown	1.2
Raynham	1.2
Norton	1.1
Total	55.9

a. All municipalities are in Massachusetts unless indicated.

U.S. Census Bureau data for the Horseneck Demographic Unit provides insight into visitors and likely visitors to HBCH. The U.S. Census was last conducted in 2010 and not all data are currently available. Because of this, the demographic description of the HDU includes information from both the 2000 and 2010 censuses. County subdivision-level data were used for all analyses.

The age structure of the HDU is similar to that for all Massachusetts residents (see Table 2.3.7). The percentage of children and seniors is slightly lower than the state average. Correspondingly, the percentage of adults is slightly lower than the state average. Given the similarity of the HDU and state age structures, it is unlikely that the observed variation reflects the need for unique facilities or management approaches at HBCH.

Table 2.3.7. Age of population in the Horseneck Demographic Unit.[a]

Age	#	%	State Average (%)
Children	353,594	20.5	21.7
Adults	1,166,523	67.6	64.5
Seniors	205,699	11.9	13.8
Total	1,725,816	100.0	100.0

a. Data compiled, by municipality, from 2010 Demographic Profile SF (DP1) dataset (http://factfinder2.census.gov).

The HDU differs from the Massachusetts average in the primary language spoken at home (see Table 2.3.8). Approximately 30% of households have primary languages other than English. This is a much higher proportion than the state average. All non-English languages are more commonly spoken at home in the HDU than in Massachusetts in its entirety. This linguistic diversity reflects the ethnic diversity associated with Massachusetts and Rhode Island's largest cities; cities from which many visitors to HBCH originate.

Table 2.3.8. Primary language spoken in households in the Horseneck Demographic Unit[a].

Language	#	%[b]	State Average (%)
English	1,106,673	70.3	81.3
Spanish	171,893	10.9	6.2
Other Indo-European	219,356	13.9	8.9
Asian	58,295	3.7	2.9
Other	17,283	1.1	0.7
Total	1,573,500	99.9	100.0

a. Data compiled, by municipality, from 2000 SF4 Sample Data (DP-2) dataset (http://factfinder2.census.gov).
b. Total differs from 100% due to rounding error.

The HDU also differs from the Massachusetts average in household income (see Table 2.3.9). There are more low income and fewer high income households in the demographic unit. The percentage of medium income households is consistent with the state average. This highlights the need for, and importance of, no cost and low cost recreational opportunities.

Table 2.3.9. Household income within the Horseneck Demographic Unit.[a]

Income Range	#	%	State Average (%)
Low (Under $25,000)	224,664	34.3	24.5
Medium ($25k–$74,999)	298,103	45.5	45.0
High ($75,000 and over)	131,927	20.2	30.5
Total	654,694	100.0	100.0

a. Data compiled, by municipality, from 2000 SF4 Sample Data (DP-3) dataset (http://factfinder2.census.gov).

In general, visitors to HBCH are similar in age structure to the Massachusetts average, but are more linguistically diverse and have lower household incomes.

Recreation Areas

Four distinct recreation areas exist at HBCH:

- ***Central Plaza/Main Beach.*** A lifeguarded beach facility and associated infrastructure including new comfort stations, elevated boardwalks with shade shelters, a mobile concession stand, and a centralized Beach Services Building with a first aid station. (Figure 2.3.1)
- ***Campground.*** A campground with 100 partially paved sites, ten water hookups, a comfort and dumping station, a playground, basketball and volleyball courts, and access to unguarded beach. (Figure 2.3.2)
- ***Gooseberry Neck.*** An unstaffed barrier island with walking trails, access to unguarded beach, a boat ramp and remnants of two World War II observation towers.
- ***Westport River Boat Ramp.*** This boat ramp is located on the southern end of the Norman Edward Fontaine Bridge, a DFG facility on DCR land. This boat ramp offers free public access to ocean and river recreation.

Recreation resources associated with each of these four areas are identified in Table 2.3.10. Additional information on recreational activities at each of these locations follows below.

Table 2.3.10. Inventory of recreation resources at Horseneck Beach State Reservation.

	Lifeguarded Beach - Linear Feet (# of lifeguard chairs)	Unguarded Beach - Linear Fee t	Bathhouse(s)	First Aid Building	Boat Ramp	Campground (# of Sites)	Trails/Paths (Miles)	Picnic Tables - Approximate #	Volleyball Court	Playground	Basketball Court
Central Plaza/Main Beach	2,700 (9)	4,865	2	1	-	-	2.0	-	-	-	-
Campground	-	1,737	1	-	-	100		100	1	1	1
Gooseberry Neck	-	9,611	-	-	1	-	1.1	-	-	-	-
Westport River Boat Ramp	-	-	-	-	1	-	-	-	-	-	-

Central Plaza/Main Beach

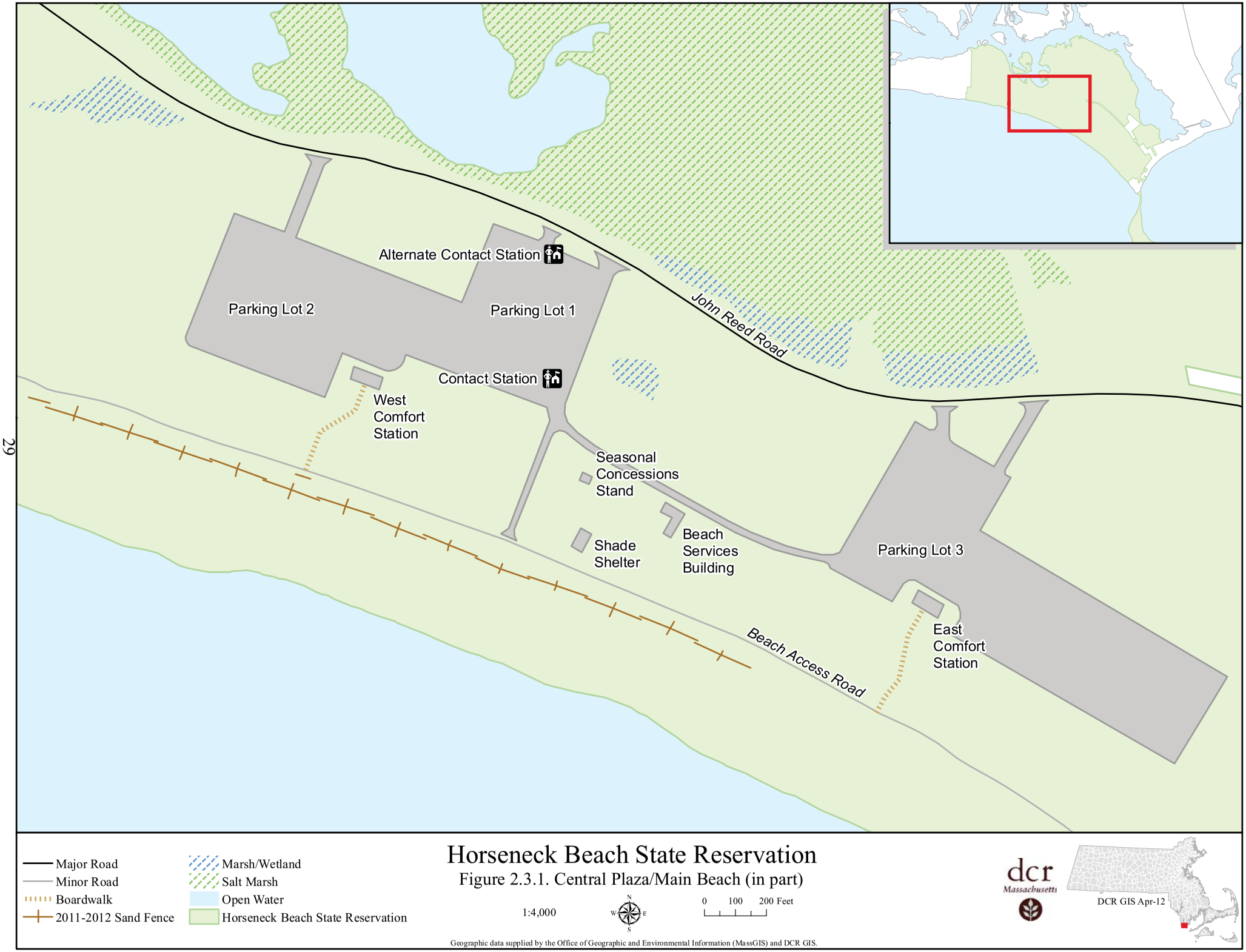
This guarded beach facility, also known as the day use beach, is adjacent to the support infrastructure for visitor use (see Figure 2.3.1). Visitors to HBCH primarily use designated dune crossings, both elevated and at-grade, from the parking lots to access the beach. Sand fencing, which parallels sensitive areas along the beach access road or along at-grade footpaths, helps contain foot traffic to paved surfaces. Gaps exist along the extensive dune system where no sand fencing occurs, contributing to uncontrolled dune access. Most visitors concentrate along the guarded day use beach.

The waterfront area of HBCH is rarely closed due to poor water quality and is more often closed due to unsafe surf or weather conditions. Of 14 tested water samples in 2008, none exceeded state standards (Dorfman and Rosselot 2009). In 2009, seventeen water samples were collected, 6% of which exceeded state standards, which was likely due to heavy rainfall events, and resulted in one water quality advisory day for the reservation (Dorfman and Rosselot 2010). Although water quality may not close waterfront areas, certain recreational activities may be regulated depending on surf condition (e.g. only wading to knees; DCR 2007*c*).

Lifeguards protect swimmers from the various elements that make ocean recreation both exciting and dangerous. Sudden storms, constant breezes, powerful currents (rip current) and dominating waves are not uncommon to Horseneck Beach. At times the lifeguards have performed up to ten rescues per day (Briere et al. 2011).

The eastern portion of Horseneck Beach, an area of unguarded waters, is dominated by a thick cover of cobble and portions are seasonally restricted for rare shorebird protection, therefore it is more attractive for beachcombing and less attractive for beach blankets. When visitors maximize space along the day use beach, beach bathers will move east to this unguarded section and clear it of cobble; these stones are rarely put back in place. Although it is not appropriate to move cobble along a beach (310 CMR 10.29), piping plovers have used these artificial sandy spots for potential nesting locations.

The lifeguard staff is tested in accordance with American Red Cross standards and must hold a number of certifications. (See Section 3.2.3.) Some have served the public at HBCH for many years. The number of lifeguard stations on HBCH has varied over the years from up to 30 to no fewer than 9; the number of seasonal lifeguards has varied from a peak number of 56 guards in the 1960s and 70s to around 32 over the past several years, resulting in less guarded area.



Horseneck Beach State Reservation

Figure 2.3.1. Central Plaza/Main Beach (in part)

Geographic data supplied by the Office of Geographic and Environmental Information (MassGIS) and DCR GIS.

Horseneck Beach State Reservation

Figure 2.3.2. Campground

Geographic data supplied by the Office of Geographic and Environmental Information (MassGIS) and DCR GIS.

Campground

From May through October campers flock to the campground of HBCH. The entrance of the campground is located southeast of the main entrance along John Reed Road. It may also be accessed by foot, bike, and car or emergency vehicle along the paved beach access road or by following the shoreline due east past the Central Plaza.

The 100 pull-through linear campsites at HBCH are located primarily within the footprint of a former beach parking lot constructed in the 1950s (see Figure 2.3.2). Construction of the current campground in the 1970s removed select areas of the original parking lot and leveled portions of the primary and secondary dune to further define the current roadways and campsite parking spots. Thirty-two of the campsites were installed in the leveled area that originally formed the fore slope of the primary dune system, compromising its function and increasing the threat of coastal storm damage and flooding to the campground facility. The remaining campsites, some of the roadway system, and the comfort station were built in a leveled section of the secondary dune system. The cumulative impact of this damage along with the thousands of campers accessing this campground yearly has taken a significant toll on the natural barrier beach ecosystem, including dune growth and migration. Dune removal also eliminated an important sand source for beach nourishment accelerating beach erosion. Additionally, wildlife habitat has been compromised by uncontrolled foot traffic to the beach over the remaining low dune.

Campsites are sited close together without landscape buffers and lack shade and wind protection. Each site is provided a picnic table and grill for fires or cooking.

Boats on trailers, kayaks, and bikes are often placed by campers on the dune vegetation abutting campsites, primarily due to a lack of designated storage space for this equipment and the lack of resource protection measures such as signs or fencing. This further contributes to the erosion of the dune system and can kill essential beach vegetation needed to stabilize the dunes.

The HBCH campground includes a centralized comfort station (constructed in 1972) with kitchen wash sinks, a playground, basketball court, and informal volleyball court to the east of the comfort station. (Figure 2.3.2) The playground, built in 1997, is in good condition, but lacks a shade feature. The basketball and volleyball courts are in poor condition; there is no volleyball net and the basketball nets are frequently stolen. The reservation's only bike rack is located within the campground.

Recent improvements include a new septic system and mounded leaching field in the southeast corner, which reduces nitrogen loading to the area, a new trailer dump station (tight tank system), an improved contact station, and water, electric, and sewer lines.

Future Capital Improvements. The DCR anticipates renovating the aging campground as part of the overall capital improvements made to HBCH to accommodate current camping modes while protecting the sensitive coastal environment that is the basis for its existence and continued popularity.

The DCR has committed to a public planning process for any campground redesign efforts. Past MEPA filings for the reservation (i.e. the Alternative Sustainable Recreation Master Plan) proposed the relocation of 32 waterfront campsites from the coastal dunes to less sensitive locations further inland, behind the FEMA designated Velocity Zone. This proposal has been controversial among campers, although current coastal wetland regulations would not allow their construction and would ban reconstruction of sites lost to storm damage. Their current location increases the risk of storm damage to them and the larger campground. (Appendix H).

Additional desired campground improvements include:

- Provision of ADA compliant elevated boardwalks with shade shelters over the dune;
- Universally accessible camping;
- Incorporation of native landscape design elements;
- Additional parking for campground staff and over-flow parking for campers, bicycle, and motorcycle parking;
- Improved traffic circulation within the campground;
- Vending machines and camp store concession;
- Comfort station improvements;

- Designated areas for different camping styles (e.g. large recreational vehicles (RVs), small RVs, cars, tent-only, or yurt);
- Improved trash and recycling disposal areas; and
- Improved active recreation areas.

Gooseberry Neck

Visitors flock to Gooseberry Neck to launch a kayak or boat from the boat ramp, use the trails to gain access to excellent fishing locations, nature observation, or relax on the beach. Kite surfing is popular along the often choppy and windy surf on the western side of the causeway. Mountain bikes, OHVs, and horses are not permitted.

Gooseberry Neck is a valued bird watching destination. During the fall and spring migration season, bird watchers seek songbirds, shorebirds, seabirds, ducks, and raptors all in the same visit.

Visitors enjoy walking the Gooseberry Neck Trail, a loop trail starting from the parking lot and extending around the neck. The interior trail is heavily used by fishermen and some side trails have formed to access the shoreline. The trail encounters rare maritime shrubland habitat, coastal salt ponds inundated with the invasive common reed, World War II observation towers, and a mixed cobble and sand coastline. Trail maintenance is discussed in section 2.6.

In 1995, an intern evaluated the existing trail system of Gooseberry Neck, providing recommendations on developing a self-guided interpretive trail system, highlighting the natural and cultural resources as well as ways to improve the current trail system for increased resource protection.

Piping plovers and least terns routinely select the southern tip of the island to nest, although the beach is relatively narrow along this portion. Often there is little separation between the visitor and the protected species despite efforts to symbolically rope off nesting habitat. Dogs are regularly exercised on the island leading to direct conflicts between rare wildlife and recreational activity. Piping plover reproductive success has historically been poor on Gooseberry Neck (Appendix K) due to human disturbance and predators (Bogart et al. 2010).

Boat access is available on Gooseberry Neck via a small concrete boat launch topped with compacted sand. Kayaks are often launched here. The boat ramp also serves as an emergency access point for first responders.

Currently, there are no permanent bathrooms, shade shelters, picnic tables, or trailheads provided for recreational users at Gooseberry Neck. During the recreation season, three non-ADA compliant port-a-johns are located in the parking lot, occupying a few parking spaces. They are often vandalized.

Future Capital Improvements. Future parking lot improvements have been identified for the island (see the Roads and Parking section). Two year-round accessible composting toilets have also been recommended to replace temporary facilities. The installation of interpretive signs at the trailhead of Gooseberry Neck has been proposed in the Master Planning documents.

Securing the observation towers may decrease the vandalism and provide coastal viewing platforms with interpretive features.

Westport River Boat Ramp

The Massachusetts Department of Fish and Game's Office of Fishing and Boating Access constructed this coastal boat and canoe launch located near the mouth of the Westport River. The two-lane concrete ramp is in good condition (http://maps.massgis.state.ma.us/dfg/OFBA_GMAP.htm ?OFBA_ID=122). It offers free access to pleasure boating and ocean fishing. The parking lot accommodates 60 vehicles, including boat trailer parking. This facility was rebuilt approximately 15 years ago (Sheppard 2010).

Trails

In the absence of an extensive trail system, as compared to other state parks, HBCH visitors will use the paved beach access road, the parking lots (during the off season), or walk the beach for exercise.

HBCH has a two-mile ADA accessible Healthy Heart Trail, starting at Bridge Street and continuing through the reservation along the beach access road. The sweeping dunes of HBCH entice human curiosity and are now speckled with exploration trails despite the agency's efforts to consolidate dune crossings at fixed locations. Although exploration of these dunes can result in deep appreciation and interest in their protection, excessive pedestrian traffic compromises their function (Smith 1983;

CZM 1994). Additional valuable educational opportunities exist if sustainable low impact trails are created to interpret the sensitive, yet highly productive Westport River estuary and the high elevation forested dunes, which provide sweeping vistas of the coast line. The importance of protecting and enhancing the coastal dunes are important considerations when planning recreation resources at HBCH.

Facility Use Estimates

Central Plaza/Main Beach

Yearly day use attendance estimates are compiled by field staff and collected by the DCR's Bureau of Recreation. These attendance estimates are generated by applying a "Person Per Vehicle" multiplier (2.5 people per vehicle) to the number of day use tickets sold. Park staff has been estimating visitor numbers for the past 30 years for HBCH. The average annual attendance for HBCH during this time period is estimated at 500,000. Attendance varies from year to year and week to week, due primarily to weather. On sunny summer weekends, the park staff typically face a long queue of vehicles, sometimes stretching miles northward on Route 88.

In 2011, HBCH collected day use fees from 57,856 vehicles. Staff also sold 2,700 ParksPasses, including in-state passes, second-car passes to in-state vehicles, and out of state passes. Twenty-two bus passes were also sold. No-cost senior passes were distributed to 526 people. Visitor use surveys conducted at HBCH in the summer of 2011 identified an average of 2.47 persons per vehicle entering the park. Applying this to the number of vehicle passes sold or distributed produces a use estimate of 150,873 visitors. This is an underestimate of true level of visitation because it does not include visitors to the park when fees are not being collected, visitors to Gooseberry Neck, or walk-ins.

Campground

Reservations. Camping reservations have increased in recent years. When compared with the previous calendar year, reservations at HBCH increased 11.8% in 2009 (2,146 reservations, compared with 1,920 reservations in 2008) and 6.5% in 2010 (2,286 reservations). The spike in reservations is similar to year-to-year increases for the overall DCR campground system (in 2009, reservations were up 13%; in 2010 reservations were up 9%). The increase is attributed to the recent economic recession that reduced household disposable income and subsequently resulted in households taking more affordable vacations closer to home. Data from the 2008 camping season at HBCH shows the number of nights reserved per reservation was the highest of all DCR campgrounds that year, at over five nights per reservation (statewide average was just over three nights per reservation).

Geographic Origin of Campers. Table 2.3.11 shows the number and proportion of individual camping reservations aggregated by geographic origin for the 2008, 2009, and 2010 recreation seasons. Ninety-two percent of campers who made reservations at HBCH travelled from Massachusetts, Rhode Island, Connecticut, New York, or Quebec. Over three-quarters of the 6,352 reservations made at the campground for the 2008, 2009, and 2010 recreation seasons were made by Massachusetts residents. Further analysis of Massachusetts reservations indicates that nearly three-quarters of Massachusetts reservations originate from Bristol County (61%) and Plymouth County (11%). Roughly 2,280 reservations were booked by Bristol County and Plymouth County residents in 2008 and 2009.

Table 2.3.11. Geographic origin of camping reservations at Horseneck Beach State Reservation; 2008, 2009, and 2010 data, combined.[a]

State/Province	# of Reservations	% of Reservations
Massachusetts	4,892	77.0
Rhode Island	539	8.5
Connecticut	188	3.0
New York	140	2.2
Quebec	73	1.2

a. Information from Reserve America.

Accessibility

Both the east and west parking lots include accessible parking and ADA compliant boardwalks to the ADA compliant beach access road. The new east and west comfort stations have been designed to be fully compliant with ADA.

The two mile ADA accessible Healthy Heart Trail is located within a shifting dune and sand often covers portions of the paved access road. Constant

maintenance is required to keep this road safe for ADA and emergency use.

Five swimming, sand, and sunbathing beach wheelchairs are available for visitor use. The wheelchairs are made of PVC pipe and feature umbrella holders, fishing rod holders, a moveable arm for transfer, and large balloon tires for travel across sand to the water. There is no fee for their use. Universal access information for DCR parks, including beaches with ADA wheelchairs, may be found on the agency's website (http://www.mass.gov/dcr/universal_access/index.htm#news). Planned rehabilitation of the Central Plaza will provide an ADA drop-off location, parking, access to the Beach Services Building for beach wheelchairs, and closer access to a concession stand and a shade pavilion.

Tent camping has been made more accessible to wheelchair users at designated hard-packed level sites in HBCH (www.mass.gov/dcr/universal_access/index.htm#news). The designated sites offer pedestal grills and accessible picnic tables. Future campground improvements will feature ADA accessible sites and over dune access to the campground beach.

Illegal Uses

In addition to the authorized recreational activities described above, recreation in violation of park regulations also occurs.

Off-leash dogs may be found throughout the reservation all year long. Dogs both on-leash and off-leash are present during the restricted bird nesting season. Dogs are welcomed at the campground, although posted rules state that they are restricted from the beach to help protect rare wildlife. This rule is often broken by campers.

Regulatory signs are installed throughout the reservation; they have not been inventoried.

At least two illegal entry points exist along the western property line fence at Bridge Street. These entry points allow uncontrolled foot traffic into sensitive secondary and forested dune habitat. Evidence of illegal dumping and garbage due to people congregating in the woods is present.

At the other end of the reservation, visitors illegally park their vehicles in a remote area of upland habitat nearly surrounded by salt marsh. People access this area by using an informal unpaved road, which was previously a driveway, at the western end of East Beach Road. A sign identifies the property as part of HBCH, but it is often ignored. There is no gate to deter illegal parking at this location.

Recreational hunters use the salt marsh system along the Westport River, although hunting is not allowed within the boundaries of HBCH (http://www.mass.gov/dcr/recreate/hunting.htm). Deer hunting stands have been found within the woodland habitat behind the maintenance garage of HBCH. "No Hunting" signs are posted along the southern boundary of John Reed Road.

2.3.4. Infrastructure

Property Boundaries

An interagency *Conservation, Watershed Preservation, and Agricultural Preservation Restriction Stewardship Policy* is currently in development for agencies within the Executive Office of Energy and Environmental Affairs. Future monitoring and enforcement of CRs and APRs within this planning unit will be consistent with this policy.

Roads and Parking

Visitors arrive predominantly by car and HBCH maintains large centralized parking lots for their vehicles. Accommodating the volume of visitors on busy days presents a challenge, as traffic on roadways entering the facility can come to a standstill, leaving vehicles idling in line and detracting from the overall visitor experience. Alternative transportation options are limited, as the regional public transit bus system does not service this facility.

Roads

All beach parking lots are accessed from John Reed Road, a municipal road. This road is the southern extension of State Route 88 and is the primary access road for the reservation. East Beach Road provides secondary access to John Reed Road. Gooseberry Neck is accessed from West Shore Road.

Within the reservation, West Beach Road serves as the primary east-west travel route for park vehicles, bicycles, pedestrians, and private vehicles. It

parallels the shore, connecting the campground to the main beach.

Parking

Horseneck Beach. Currently up to 2,450 spaces are provided for vehicles at day use lots (see Table 2.3.12). The capital improvements undertaken in 2008 resulted in 350 fewer total available parking spaces at HBCH, as the new bathhouses were constructed on areas formerly used for parking. Although a loss of parking spaces appears to have minimal adverse impacts on visitors, the current parking lot design and traffic circulation pattern creates visitor confusion and conflicts with ease of operations.

Table 2.3.12. Parking capacity at Horseneck Beach State Reservation.

Name of Lot	# of spaces
Main Beach, West - Lots 1 & 2	~ 1,100
Main Beach, East - Lot 3	~ 1,350
Campground	100
Gooseberry Neck (gravel)	60
Westport River Boat Ramp[a]	60

a. DCR owns the land on which this facility is located, but this is not a DCR facility.

The west lots (Lot 1 and Lot 2; Figure 2.3.1) are the first parking areas encountered by visitors when arriving via Route 88 and John Reed Road. The contact station here is staffed regularly and these lots are always open during the summer season. Staff members are not always available to collect fees separately for the east parking area (i.e. Lot 3) and this lot and the new comfort station are less frequently used as a result. (Figure 2.3.1) Lot 1 is monitored by video surveillance, Lots 2 and 3 are not.

During peak recreation months, visitors arriving in a vehicle or bus enter the main entrance to pay a fee or show an annual ParksPass or Senior Pass at the contact station. At the start of the season until early July, staff will set up an alternate contact station adjacent to the main entrance specifically for processing ParksPass users and on-site ParksPass sales. This is done to help facilitate traffic flow at the main entrance, as on-site sales transactions of ParksPasses takes more time than standard parking fee collection and the use of ParksPasses currently requires staff to double check and record the license plate numbers of users. This alternate contact station does not have a drop box safe, so revenue (in the form of both cash and checks) is collected periodically during the day. Two staff members are typically assigned to the alternate contact station, meaning less staff available for other duties such as staffing the east parking area contact station.

Visitors occasionally have to be turned away after waiting in line due to full parking lots. Communication to travelers summarizing the current traffic conditions on Route 88 and the status of the park could help improve this situation. In previous years, park staff contacted the Massachusetts State Police when the lots reached capacity and were closed. The police would then contact MassDOT to activate the early warning signs at the north end of Route 88. In 2011, the DCR tried communicating traffic conditions and park status via a sign on Route 88. This approach was unsuccessful because frequent battery problems made sign operation unreliable and turning on the sign required park staff to leave the park, travel north on Route 88, activate the sign through the use of an access code, and then slowly return to the park in heavy traffic.

Vehicle and pedestrian traffic can be treacherous between 2 p.m. and 4 p.m. on peak recreation days, a critical change-over time for those leaving and entering the reservation. Fee collection ends at 5:30 p.m. during the recreation season. Problems exist where traffic from the east lot and west lots merge and when traffic exiting the reservation turns left across John Reed Road to access Route 88.

There is currently one bike rack on the reservation, located in the campground.

Future Capital Improvements. Horseneck Beach's parking lots require improved storm water drainage features. The DCR's Lakes and Ponds Program funded a design project in 2008 to address storm water runoff and improve groundwater recharge within the parking lots; these designs were captured in the 2009 Stormwater Runoff Improvement Project plans by means of designing a series of linear rain gardens with native coastal plants.

Funding is required to implement the 2009 Stormwater Runoff Improvement Project design plans. The project will improve traffic circulation patterns, create passenger drop-off lanes and pedestrian walkways, provide designated ADA parking at each comfort station, create

comprehensive signs, improve storm water management, minimize paved surfaces, restructure parking lot design, provide additional bike racks, and install double and single-leaf service gates and guardrails. Temporary solutions may exist to maintain traffic flow into the main gate of HBCH and filter traffic to all three parking lots for even distribution of use of the new comfort stations and parking lots. For example, offer one-way traffic to the east lot along the access road behind the central Beach Services Building and establish an exit only lane from the east lot. Currently, the gates in the west lots are in good working condition but the gates in the east lot are old and deteriorating and will need to be replaced if temporary solutions are implemented as suggested above.

Independent of the parking lot and circulation improvements, conceptual plans for the Central Plaza currently propose reserved staff and ADA parking surrounding the Beach Services Building as well as new bike racks. A centralized staff parking area is important for management purposes. Until Central Plaza improvements are implemented, a temporary designated staff parking zone along the access road, behind the Beach Services Building, was implemented in 2011. Several ADA parking options will be temporarily provided to the east side of the Beach Services Building, allowing easier access to beach wheel chairs and the first aid station.

Horseneck Beach has been identified by ICF International, on behalf of the Massachusetts Technology Collaborative, "to be well-suited for cost effective on-site wind power" (Kelleher 2008). A brief, pro-bono study was conducted at HBCH and concluded that power for HBCH, based on the 2008 electricity bills, could be produced by either one 80kW Wind Energy Solutions (WES) turbine or four 10kW Bergey turbines (Kelleher 2008). There are currently no plans to install wind turbines.

Gooseberry Neck. The parking lot at Gooseberry Neck accommodates 60 vehicles and parking fees are not charged here. Public access to this island is popular because it provides a free recreation resource, including a busy boat ramp. The lot is often near capacity during the recreation season. Although a boat ramp exists with reserved parking for boat trailers, the parking lot is often congested and parking is unorganized. Cars will sometimes illegally park along the narrow causeway or temporarily drop off fishing gear. Regulation signs are not posted to deter illegal parking along the causeway, so when this occurs staff must request that cars be moved or alert law enforcement. A main gate is located at the beginning of the causeway allowing staff to control vehicular traffic during unsafe conditions or before and after recreation hours.

Parking lot reconfiguration, boat trailer parking, and a vehicle turnaround are anticipated when funding is available for Gooseberry Neck improvements. The lot will remain unpaved to allow for proper drainage and to reduce coastal storm damage because it is within a FEMA designated Velocity Zone.

The 2009 Order of Conditions for operational maintenance discusses permitted maintenance practices for this parking lot and boat ramp. (See Appendix E.)

Westport River Boat Ramp. Parking is provided for up to 60 vehicles with boat trailers. There is no charge for the use of this parking lot.

Rare Species and Paved Surfaces

Management practices have been altered when rare species temporarily use paved surfaces at HBCH. Piping plovers generally seek open sandy and sparsely vegetated habitat along a barrier beach (DFW 1993). HBCH has paved areas which are at times covered in layers of sand. When plovers select these hazardous areas as potential nesting grounds visitors and daily operations must be temporarily redirected from these zones (DFW 1993). Piping plovers have selected nesting locations on or near various paved surfaces, including the windswept dunes along the Central Plaza, close to the beach access road, into the back dune adjacent to the west parking lot (i.e. Lot 2), and physically on the east parking lot. These nesting locations on or near paved surfaces pose various threats to piping plovers, particularly because their nesting and brooding season overlaps with peak recreation months at HBCH.

The 2009 Order of Conditions for operational maintenance outlines permitted practices along John Reed Road and near other paved surfaces of HBCH because these areas are within wetlands resources and rare species habitat.

2.4. DEMAREST LLOYD MEMORIAL STATE PARK

2.4.1. Natural Resources

Physical Features

Topography

Topography ranges from sea level along the shore to approximately 59 feet above sea level at isolated knolls in the northwestern portion of the park. Most recreation infrastructure is located three or fewer feet above sea level.

Dune and Beach System

A single barrier beach extends eastward from George's Pond and Giles Creek to Buzzards Bay. Its northern limit is the canoe/kayak launch area and it extends off the park to the south. This barrier beach, which is geomorphically categorized as a barrier spit, contains dune, sand and cobble beach, salt marsh, and tidal flat habitat. The series of dunes cover nearly 15% of the total acreage of DEML and generally extend three to five feet above the height of the upper beach (DEM 1996). A coastal hazards assessment assigned a poor rating to this beach (Bourne Consulting Engineering 2009). This rating indicates signs of erosion from strong currents and advanced deterioration with a strong risk of damage during a major coastal storm.

The low lying dunes and associated vegetation, including mature native trees and shrubs, contribute to the system's stability. The secondary dune system at the main recreation area has been converted to a paved parking lot, inland of which are seasonally wet, vegetated areas maintained as picnic grounds, salt marsh creeks, and sandy maritime woods. The southern section contains pockets of wet vegetated secondary dunes mixed with dense maritime shrubland habitat, which gradually becomes maritime forest abutting the fringing marsh system of George's Pond.

Historic Shoreline Change

Due to a lack of shoreline change data for much of the shore of DEML, the amount and pattern of shoreline change cannot be identified.

Estuarine Marsh System

The salt marsh system contains several drainage ditches that are probable relics of mosquito control efforts of the 1930s (Flatebo 1982). The salt marsh estuarine system provides habitat for several rare species, therefore recreation amenities have not been developed for much of the salt marsh ecosystem (DEM 1996; Flatebo 1982).

Throughout the recreation season, uncontrolled access from picnic areas to the adjacent salt marsh creek occurs. No signs or fencing restrict access to the salt marsh. This exploration can lead to a greater appreciation of the resource, yet also contributes to its degradation. An abundance of trash, including harmful fishing line segments, can be found along the salt marsh edge despite efforts to both collect trash and provide trash receptacles.

George's Pond is a 12 acre brackish body of water fringed with salt marsh (Flatebo 1982). An extensive stand of 15 foot tall common reed blocks the scenic vista along the northwest side of George's Pond. The abundance of common reed in this area is believed to be decreasing following the cleaning of blocked culverts in 2009 (Burns 2010; Buzzards Bay NEP 2002; O'Reily 2008). (See Section 3.4.1 for additional information.) An access path from a nearby neighborhood enters the park along the George's Pond Trail. The access path has a blocked dike in need of a culvert to increase tidal flow to the area (Buzzards Bay NEP 2002) and is surrounded by invasive Japanese knotweed.

Water Resources

Ponds

There are two ponds. The first, George's Pond, is a tidal pond with a surface area of 11.7 acres. The second is a 0.8 acre unnamed pond located along the park's western boundary, just north of the park road.

Wetlands

Approximately one-third of the reservation (34.0%) is covered by wetlands. The most common wetland type, salt marsh, lines the shores of George's Pond and Giles Creek. Emergent marshes, both fresh and brackish, are present north of George's Pond, southwest of the parking lot, and both north and south of the canoe/kayak launch area.

Vernal Pools

There are one certified and two potential vernal pools. The certified vernal pool is located to the north of the canoe/kayak launch area and the

potential vernal pools are associated with the unnamed pond.

Streams

A single stream, Giles Creek, drains George's Pond and the salt marsh west of the parking area.

Groundwater

There are no known aquifers.

Flood Zones

The 100-year flood zone covers 176.3 acres (84.8%) of the reservation and includes all infrastructure east of Giles Creek. The administration building is located outside of this flood zone.

Hurricane Inundation

Demarest Lloyd is particularly susceptible to flooding caused by Category 3 or greater hurricanes. Models predict that a Category 1 hurricane will not result in any inundation. A Category 2 storm will result in the inundation of 63% of the park, including George's Pond, Giles Creek, salt marshes, beaches, and all other low-lying areas. Perhaps most significantly, the flooding of Giles Creek will in effect create an island on which the recreation facilities are isolated. A Category 3 hurricane is predicted to result in the inundation of all parking lots, the comfort station, lifeguard storage shed, maintenance shed, contact station, and all other infrastructure associated with the beach. Only the administration building, located farther west (i.e., away from the shore) on the park road is projected to avoid inundation. It is also projected to avoid inundation associated with Category 4 storms.

These predictions are based on worst case scenarios and assume the most damaging track and tide height when a hurricane makes landfall.

Rare Species

Ninety-one percent of DEML has been designated as Priority Habitat under MESA (321 CMR 10.00; Appendix H) and activities that may alter this habitat are subject to regulatory review to minimize adverse impacts to rare species. Eleven rare species are known to occur on DEML and two additional rare species forage in the adjacent waters (see Table 2.4.1). Several rare species occurring on this property require diligent seasonal management and also provide unique public educational opportunities. Five additional state-listed birds have been observed by birders during migration (Appendix J); these are not included in the NHESP database.

Nesting and feeding habitat for the state and federally listed piping plovers includes gently rolling dunes, sandy beach, tidal flats, and salt marsh. DEML averages two pairs of piping plover per season (Bogart et al. 2010; Appendix K). Currently, human disturbance and predators (primarily fox and raccoon) negatively impact the reproductive success of piping plovers and least terns at DEML (Bogart et al. 2010). The 2010 nesting season was the first successful piping plover fledgling season since 2005 (Bogart et al. 2010). It is speculated that the growth of the barrier beach spit combined with a large channel of water behind it at high tide may have reduced the number of predators accessing plover habitat, therefore increasing the fledgling rate in 2010 (Bogart et al. 2010).

Least terns share many of the habitats used by piping plovers, but also forage in adjacent near-shore waters. They have nested at DEML with little reproductive success; in 2010 a small colony with six nests was eliminated by predation in a single night (Bogart et al. 2010).

Diamond-backed terrapins, an estuarine turtle, are special visitors to DEML. The sandy areas of the park provide appropriate nesting grounds for this species. The picnic areas are attractive areas for them to nest, yet the high amount of recreation, combined with vehicles that are sometimes driven directly to picnic tables by visitors, are immediate threats to their reproductive success. Additional threats include nest predation and direct adult or juvenile mortality (Bogart et al. 2010).

Table 2.4.1. State-listed species that have been documented on Demarest Lloyd Memorial State Park.

Species	Type [a]	MESA [b]	Presence [c]
Arctic tern	B	SC	A
Bristly foxtail	P	SC	C
Chain dot geometer	I	SC	C
Common tern	B	SC	C
Data-sensitive rare plant[d]	P	E	C
Diamond-backed terrapin	R	T	C
Least tern	B	SC	C
Marbled salamander	A	T	C
Piping plover[e]	B	T	C
Rose of Plymouth (Sea pink)	P	E	C
Roseate tern[f]	B	E	A
Spartina borer moth	I	SC	C
Straight lined mallow moth	I	SC	C

a. Types of state-listed species includes: A = Amphibian; B = Bird; I = Insect; P= Plant; and R = Reptile.
b. Status of species listed under the Massachusetts Endangered Species Act: E = Endangered; T = Threatened; SC = Species of Special Concern.
c. Presence of state-listed species at DEML: A = Confirmed over waters adjacent to the reservation; and C = Confirmed on the reservation (French 2012).
d. Sensitive rare species are not identified in accordance with the NHESP's policy of not revealing in site-specific documents the name or location of rare species susceptible to collection.
e. This species is also listed as Threatened under the U.S. Endangered Species Act.
f. This species is also listed as Endangered under the U.S. Endangered Species Act.

A maximum of ten turtles were observed in 2005 and 2010 (Bogart and Kelly 2005; Bogart et al. 2010); most were reported by park visitors or found by Lloyd Center staff (Mello and Bogart 2010). The Lloyd Center retained a permit from the NHESP in 2009 that allowed them to collect eggs from nests and incubate them at the Lloyd Center. Immediately prior to hatching they were returned to the nest site and released into the Slocums River estuarine system. The turtles are given an identifying mark on their shell for recapturing data (Mello and Bogart 2010). Several have been recaptured (Bogart et al. 2010).

Sea pink, a state endangered plant, has not been detected since 1988 despite several recent searches; it is unknown why the population has diminished. Unless it is rediscovered soon, it will be considered a historic species (Garrett 2010). Little recreation and no management activities take place where it was previously documented; therefore these activities should not have influenced its disappearance.

Shellfish

As of June 2011, all shellfish beds in Dartmouth, except for a southern portion of Pandaram Harbor, are closed to shellfishing. This includes all waters adjacent to DEML.

Vegetation

The vegetation is poorly known, with fewer than 70 species identified (Appendix J).

Invasive Species

Invasive plants are non-native species that have spread into native or minimally managed plant systems (MIPAG 2005). Their spread poses a risk to the diversity of native plants and animals and can cause economic harm disrupting ecosystems (MIPAG 2005). In Massachusetts, these plants are categorized as "invasive," "likely invasive," or "potentially invasive" (MIPAG 2005).

Six species of invasive plants (MIPAG 2005) have been documented at DEML. No reservation or park-wide surveys have been conducted to determine the abundance and distribution of these invasive plants or the presence of additional invasive species.

Mapping and controlling common reed was identified as a management recommendation in the 1996 Barrier Beach Management Plan; at the time common reed was found in trace amounts (DEM 1996). Now common reed is scattered throughout DEML and appears to be the most abundant invasive plant on the property, threatening park aesthetics and native species diversity. It nearly surrounds the perimeter of George's Pond, portions of the fringing salt marsh ecosystem, and has encroached sections of the vegetated dune swales and back dune habitat.

Autumn olive and Japanese knotweed are encroaching on unique interdunal marsh swale habitat. The George's Pond Loop Trail is located in this section. If these expanding populations of invasive species are not properly managed, they could threaten both the common and rare species dependent upon this habitat (DFW 2006). Oriental bittersweet and multiflora rose may also be found on the property.

Natural Communities

Six natural communities are known to occur at DEML. These communities, and an indicator of their rarity in Massachusetts, are identified in Table 2.4.2. Full descriptions of these community types may be found in Swain and Kearsley (2001). Because comprehensive surveys have not been conducted, additional natural community types may be present.

Table 2.4.2. Natural communities of Demarest Lloyd Memorial State Park.

Community Type[a]	System[b]	Source[c]	State Rank[d]
Coastal forest/woodland	T	French	S3
Coastal interdunal marsh swale	P	French	S1
Coastal salt pond marsh	E	French	S2
Cultural grassland	T	RMP	N/A
Maritime dune	T	French	S2
Maritime oak-holly forest	T	French	S1
Maritime shrubland	T	French	S3

a. Classified according to Swain and Kearsley (2001).
b. E = Estuarine; T = Terrestrial.
c. Information was obtained from: French = French (2012); RMP = Resource Management Planner.
d. Communities are ranked from the most rare (S1) to the most common (S5).

The uncommon coastal interdunal marsh swale community contains areas of low, wet depressions along the inner dune. These wet depressions contain habitat for imperiled state-listed species. Interdunal swales generally have a high habitat value to birds and mammals and can even act as vernal pools. This natural community type contains pockets of common reed, autumn olive and Japanese knotweed; other threatening non-native species may be present. Several recreation trails (see Section 2.4.3) traverse this natural community and sections may require an approved wetland crossing feature (e.g. stepping stones or bog bridge) to help protect this fragile habitat (DFW 2009*b*). An organic refuse pile for the park has been deposited within this habitat for many years.

The maritime oak-holly forest appears to be in stable condition with few documented invasive species. However, trails crisscross this rare community (see Section 2.4.3) providing potential avenues for the introduction of invasive species.

Vernal Pools

When a vernal pool is certified by the NHESP, it is protected under Massachusetts' WPA (310 CMR 10.00; Appendix H). There is one certified vernal pool at DEML. Three potential vernal pools may exist at DEML; field surveys can help determine this. Rare species may exist in the potential vernal pools and certifying them, if they are qualified, will support their future protection. Vernal pools can occur within dune communities and serve as important feeding and breeding areas for a variety of reptiles, amphibians, invertebrates, and birds and mammals (Swain and Kearsley 2001).

2.4.2. Cultural Resources

Demarest Lloyd Memorial State Park contains cultural resources that predate the establishment of the park, as well as resources associated with development of its park facilities. Both time periods are critical to understanding the development of these facilities and landscapes. All known cultural resources are identified in Table 2.4.3. None of these resources are currently listed on either the State or National Register of Historic Places, nor have they been evaluated for their significance.

Archaeological Resources

Although there are no known pre-contact archaeological sites within the park, pre-contact Native American sites have been found in other areas along the Slocums River (PAL 2002).

Historic Resources

Several dry laid stone walls remain that reflect the agricultural history of the property, including a stone wall located along the park entrance road that defines DEML's northern boundary and the remains of an animal paddock in the salt marsh along the Slocums River. The stone walls at DEML will deteriorate further without regular maintenance and the stones are vulnerable to collection and resale. These resources offer an opportunity to interpret the agricultural heritage of the property.

A small Cape Cod style comfort station was constructed in 1961. It was renovated in 2005 to comply with the state sanitary code (105 CMR 410; Appendix H) and to provide ADA accessible facilities. The location of this comfort station is shown in Figure 2.4.1.

Table 2.4.3. Cultural resources and infrastructure of Demarest Lloyd Memorial State Park.

Resource	*Type*[a]	*Condition*[b]	*Date*[c]	*MHC #*[d]
Demarest Lloyd Memorial State Park	LA	2	c. 1960	-
Stone Walls	ST	3	-	-
Stone Paddock	ST	3	-	-
Comfort Station	BU	1	1961	-
Lifeguard Storage Shed	BU	2	2006	-
Water Pump House	BU	2	-	-
Ranger Station	BU	3	-	-
Contact Station	BU	2	-	-
Maintenance Storage Shed	BU	2	-	-
Canoe/Kayak Launch	ST	3	-	-

a. Resource types include the following: BU = Building; ST = Structure; LA = Landscape; SI = Site, and OB = Object.
b. Windshield level Condition Assessment using the Building System and Equipment Condition Code as used in the Massachusetts Capital Asset Management Information System (CAMIS). The following codes are used: 1 = Excellent – Easily restorable to like new condition, minimal routine maintenance; 2 = Good – Routine maintenance required; 3 = Adequate – Some corrective and preventative maintenance required; 4 = Fair – Excessive corrective maintenance and repair required; 5 = Poor – Renovation needed; and 6 = Fail.
c. Date provided, when available.
d. Massachusetts Historical Commission inventory form number; this is included only for those resources where an inventory form currently exists. The existence of an inventory form does not convey any particular status regarding the significance of a resource, nor should it be interpreted that the lack of an inventory form means a resource is not historic.

2.4.3. Recreation Resources

Popular recreational activities at DEML include picnicking, swimming, sunbathing, non-motorized boating, walking, and jogging. Nature observation, kayaking, horseback riding, and geocaching are also enjoyed at the facility; currently there is one geocache location south of the George's Pond Loop Trail (http://www.geocaching.com, accessed January 27, 2012).

Demographics

The geographic origins of visitors to DEML were identified from visitor intercept surveys conducted in July and August, 2011; 227 valid ZIP Codes were recorded. (See Section 2.2.3 for additional information on these surveys.) Visitors came from 52 Massachusetts cities and towns, eight Rhode Island cities and towns, and seven states. Sixteen cities and towns were home to over one percent of visitors surveyed. (Table 2.4.4) These municipalities constitute the Demarest Lloyd Demographic Unit (DLDU). This demographic unit is smaller than the Horseneck Demographic Unit (HDU) in area, number of municipalities, population, and households.

Table 2.4.4. Municipalities in the Demarest Lloyd Demographic Unit and the percentages of visitors surveyed that originated from these municipalities.

Municipality[a]	% of visitors
New Bedford	20.7
Fall River	10.6
Dartmouth	8.8
Taunton	6.2
Westport	4.0
Freetown	3.5
Fairhaven	2.2
Providence, RI	2.2
Brockton	1.8
Acushnet	1.3
Attleboro	1.3
Easton	1.3
Mansfield	1.3
Norton	1.3
Somerset	1.3
Worcester	1.3
Total	69.1

a. All municipalities are in Massachusetts unless otherwise indicated.

U.S. Census Bureau data for the Demarest Lloyd Demographic Unit provides insight into visitors and likely visitors to DEML. The U.S. Census was last conducted in 2010 and not all data are currently available. Because of this, the demographic description of the DLDU includes information from both the 2000 and 2010 censuses. County subdivision-level data were used for all analyses.

The age structure of the DLDU is similar to that for all Massachusetts residents. (Table 2.4.5) The percentage of children is slightly lower, and seniors slightly higher, than the state average. Given the similarity of the DLDU and state age structures, it is unlikely that the observed variation reflects the need for unique facilities or management approaches at DEML.

Table 2.4.5. Age of population in the Demarest Lloyd Demographic Unit.[a]

Age	#	%	State Average (%)
Children	205,235	22.7	21.7
Adults	584,972	64.7	64.5
Seniors	114,188	12.6	13.8
Total	904,395	100.0	100.0

a. Data compiled, by municipality, from 2010 Demographic Profile SF (DP1) dataset (http://factfinder2.census.gov).

The DLDU differs from the Massachusetts average in the primary language spoken at home (see Table 2.4.6). Approximately 29% of households have primary languages other than English, as compared to approximately 19% of households across Massachusetts. Spanish and other Indo-European languages are more commonly spoken at home in the DLDU than in Massachusetts in its entirety. The incidence of Asian and "Other" languages spoken at homes in the DLDU are similar to the Massachusetts average.

Table 2.4.6. Primary language spoken in households in the Horseneck Demographic Unit.[a]

Language	#	%	State Average (%)
English	590,122	71.4	81.3
Spanish	85,287	10.3	6.2
Other Indo-European	121,965	14.7	8.9
Asian	21,980	2.7	2.9
Other	7,660	0.9	0.7
Total	827,014	100.0	100.0

a. Data compiled, by municipality, from 2000 SF4 Sample Data (DP-2) dataset (http://factfinder2.census.gov).

The DLDU also differs from the Massachusetts average in household income (see Table 2.4.7). There are more low income and fewer high income households in the demographic unit. There are also more low income and fewer high income households in this demographic unit than in the Horseneck Demographic Unit. The percentage of medium income households is consistent with the state average. This highlights the need for, and importance of, no cost and low cost recreational opportunities.

Table 2.4.7. Household income within the Horseneck Demographic Unit.[a]

Income Range	#	%	State Average (%)
Low (<$10k–$24,999)	120,155	35.8	24.5
Medium ($25k–$74,999)	154,232	45.9	45.0
High ($75k–>$200k)	61,381	18.3	30.5
Total	335,768	100.0	100.0

a. Data compiled, by municipality, from 2000 SF4 Sample Data (DP-3) dataset (http://factfinder2.census.gov).

In general, visitors to DEML are similar in age structure to the Massachusetts average, but are more linguistically diverse and have lower household incomes.

Recreation Areas

Three distinct recreation areas exist at DEML:

- ***Main Beach.*** A waterfront area providing 0.75 miles of sand and cobblestone beach, a portion of which is designated guarded waterfront, and a public boat ramp.
- ***Trails.*** A network of short trails traversing wooded uplands and coastal dune habitat providing sweeping vistas of the barrier beach ecosystem.
- ***Picnic Areas.*** A large picnic facility organized into 4 discrete picnic areas.

An inventory of recreation resources is presented in Table 2.4.8.

Table 2.4.8. Inventory of recreation resources at Demarest Lloyd Memorial State Park.

	Lifeguarded Beach, - Linear Feet (# of lifeguard chairs)	Unguarded Beach, - Linear Fee t	Bathhouse(s)	First Aid Building	Boat Ramp	Campground (# of Sites)	Trails/Paths (Miles)	Picnic Tables - Approximate #	Volleyball Court	Playground	Basketball Court
Main Beach	900 (3)	2,843	-	-	1	-	-	-	-	-	-
Property Grounds; including both the trails network and picnic areas	-	-	1	-	-	-	1.0	75	-	-	-

Main Beach

Visitors primarily use the boat ramp and seven at-grade sand dune crossings from the parking lots to access both the guarded and unguarded waterfront. DEML lacks elevated boardwalks and shade shelters. The current dune system has been degraded at each cross over and an excessive number of dune crossings exist in relation to the size of the facility (DEM 1996).

The guarded day use beach, located at the eastern edge of the central parking lot, is dominated by a cover of cobble extending from the dune to the high tide mark. This day use beach does offer a vast area of sandy tidal flats at low tide. The northern spit of the beach system, extending beyond the boat ramp, generally shows yearly accretion of sand and offers the public a soft, sandy resource. This is unguarded water, yet an attractive area to swim or sunbathe. This portion of sandy beach is also seasonally fenced for rare shorebird protection. (See Section 3.4.1.) It generally provides the most ideal nesting habitat for the rare birds.

The number of seasonal lifeguards has varied from a peak number of ten guards in the 1990s to around six over the past several years, largely due to staffing cuts. Lifeguards at the three stations along the main beach protect swimmers from the various elements. Sudden storms, shifting shorelines, and sudden changes in channel depths that can create powerful rip currents are not uncommon to DEML. Lifeguard certification standards and waterfront procedures are described in Section 3.2.3.

The tidal processes at the mouth of the Slocums River are not well understood and have historically created unsafe swimming conditions; several lives have been lost. Establishing the boundaries of the guarded waters is a challenge because the beach is quick to change shape and the expansive tidal flats can lure people far out to where they can access deep water. If necessary, lifeguards will paddle their rescue equipment or wade these long distances to rescue a swimmer. At times, these rescue missions are beyond guarded waters.

The guarded waterfront of DEML is occasionally closed to swimming when water quality tests do not meet minimum standards for recreational uses, pursuant to 105 CMR 445 (DCR 2007*c*). Unsatisfactory water quality test results are generally attributed to heavy rainfall events that can flood the Slocums River with contaminants.

Water quality at the guarded, day use beach is generally good, with infrequent closures. Of the 15 tested water samples in 2008, 7% exceeded state standards (Dorfman and Rosselot 2009). In 2009, none of the collected water samples (of 16) exceeded the state standards (Dorfman and Rosselot 2010).

Trails

The multiple walking trails are short in length and easy to walk due to minimal grade changes. Together, they total an average of one mile. They afford excellent vistas of the Slocums River, the barrier beach, Giles Creek, and George's Pond. There are some fantastic opportunities along these trails to interpret rare natural communities in Massachusetts as well as the rich cultural history of the property and surrounding area. The following trails are at DEML:

- ***George's Pond Loop Trail.*** A loop trail located on the southern end of the property around George's Pond.
- ***Slocums River Trail***. A trail in the northern portion of the property.
- ***Giles Creek Trail***. A wooded trail off of the Slocums River Trail that provides views of Giles Creek.

The trailhead for the George's Pond Loop Trail is accessed behind the comfort station and is identified by a wooden kiosk. This trail traverses a sensitive and rare dune community, a coastal interdunal marsh swale (DFW 2009*b*). It also provides access to unguarded beach at the southern end of the property. Benches along the loop trail offer scenic vistas of George's Pond and the salt marsh tributary. An illegal access trail from a nearby neighborhood connects to the southern portion of the loop trail and is infested with non-native Japanese knotweed. The loop trail also has a blocked dike in need of a culvert to increase tidal flow to the area (Buzzards Bay NEP 2002). Invasive autumn olive (MIPAG 2005) is slowly encroaching into the drier portions of this trail loop and requires immediate attention. Trail users have started to create an unnecessary and illegal cross trail towards the southern end of the loop that will eventually degrade this fragile habitat. This illegal trail also crosses wet habitat subject to degradation by trail users if left unattended. There are six wooden kiosks along this trail loop.

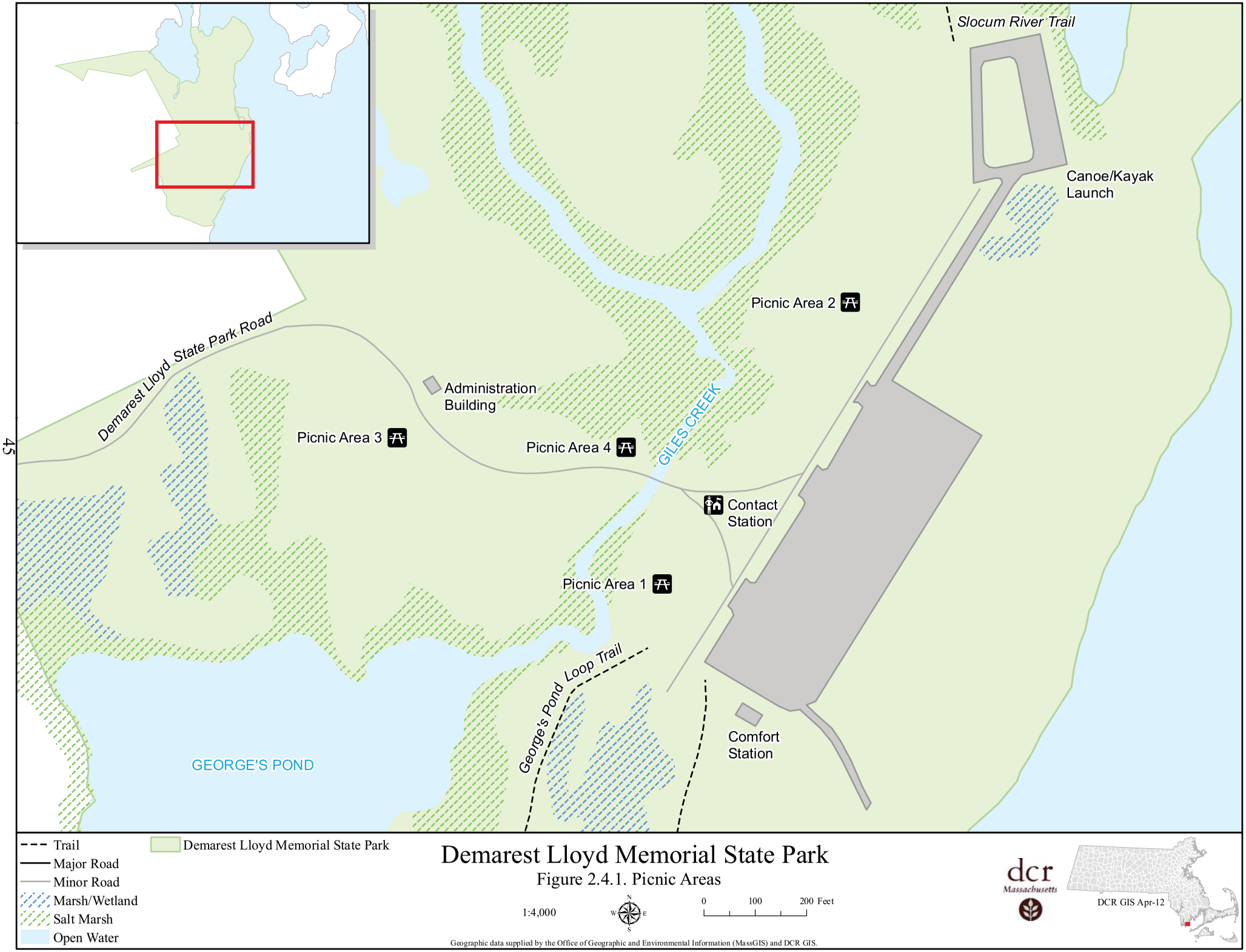
The Slocums River Trail is accessed near the northwestern edge of the northern parking lot. This trail traverses wet inner dune and marsh estuary habitat leading to upland coastal forest with a unique assortment of holly and oak. A certified vernal pool is close to this trail system. The trail lacks connectivity with three separate vista overlooks that one must back track the trail system to view; one of these vistas is the end point of the Giles Creek Trail. Portions of the Slocums River Trail allow the public to easily access sensitive habitat. This trail also traverses maritime oak-holly forest, a rare natural community subject to invasive species such as oriental bittersweet or Japanese honeysuckle (DFW 2009*a*). Invasive species have not been inventoried along this trail.

The Giles Creek Trail lacks a defined trailhead; it stems off from the Slocums River Trail and offers a beautiful vantage point of Giles Creek.

Picnic Areas

Picnicking is very popular in the summer months and competition for picnic tables between visitors occurs regularly. Staff often has to patrol these areas, particularly during the Fourth of July weekend, to make sure parties are not using more than two tables, which is the maximum number allowed per group. There are approximately 75 picnic tables scattered within four distinct areas (see Figure 2.4.1). Approximately one quarter of the tables are in poor condition. The four picnic areas are as follows:

- ***Area 1.*** A highly used site located near the trailhead for the George's Pond Loop Trail and the comfort station. This picnic area offers natural shade and access to the marsh creek.
- ***Area 2.*** The largest of the picnic areas, Area 2 is highly used. It extends north after passing the contact station and parallels both the parking lot and marsh creek. The northern portions of this picnic area extend into the coastal woodland offering natural shade and easy access to the Slocums River Trail.
- ***Area 3.*** This area is the most shaded, furthest from the ocean, and least used of any of the picnic areas. It is the second largest picnic area; located in upland wooded habitat across from the administration office.
- ***Area 4.*** The smallest, but still popular, picnic area. It is located adjacent to the bridge over Giles Creek. Only three tables and grills service this location.


Slocum River Trail
Canoe/Kayak Launch
Picnic Area 2
Demarest Lloyd State Park Road
Administration Building
Picnic Area 3
Picnic Area 4
GILES CREEK
Contact Station
Picnic Area 1
George's Pond Loop Trail
Comfort Station
GEORGE'S POND
45
Trail
Major Road
Minor Road
Marsh/Wetland
Salt Marsh
Open Water
Demarest Lloyd Memorial State Park
Demarest Lloyd Memorial State Park
Figure 2.4.1. Picnic Areas
1:4,000
N
W
E
S
0
100
200 Feet
dcr
Massachusetts
DCR GIS Apr-12
Geographic data supplied by the Office of Geographic and Environmental Information (MassGIS) and DCR GIS.

There are few long picnic tables available, because they are too heavy for one staff person to move back into place after they have been rearranged by visitors. People periodically steal the picnic tables, but bolting them in place has not been feasible. Fifty fire pits with grill features are located in these picnic areas. Four dumpsters service the picnic grounds; recycling containers are provided at the comfort station.

Vehicles illegally park at Areas 2 and 3. Despite staff's verbal requests to stop the activity and move cars to the parking lots, people continue this behavior; signs are not installed to further prohibit this activity.

Vehicle traffic is potentially hazardous in portions of Area 2 for both pedestrians and for rare diamond-backed terrapins that nest along these grounds. There is no guardrail along the road to prevent cars from parking or temporarily unloading next to picnic tables. Portions of this picnic area become seasonally wet and driving in these areas can damage the resources.

An old picnic area existed behind the administration office, but currently there are no tables or grills in this area. This grassy location requires frequent mowing, but is located in eastern box turtle habitat, which may trigger seasonal mowing restrictions for their protection (DFW 2009*a*). It is a possible location for a group picnic area, a feature these picnic grounds lack despite the high demand by park users.

Facility Use Estimates

Facility use estimates are largely based on paid access. In 2011, DEML collected day use fees from 5,247 vehicles. Staff also sold 69 ParksPasses, six second-car passes to in-state vehicles, and nine passes to out of state vehicles. Two bus passes were sold to non-profit organizations. No-cost senior passes were distributed to 112 people. Visitor use surveys conducted at DEML in the summer of 2011 identified an average of 2.74 persons per vehicle entering the park. Applying this to the number of vehicle passes sold or distributed produces a use estimate of 14,913 visitors.

This number underestimates true facility use for three reasons. First, additional vehicles use the park when the gates are open but the contact station is unstaffed and entrance fees are not collected; these visitors go uncounted. Second, visitors with annual and senior passes may enter the park on multiple occasions with only their first visit being factored into the use estimate. Finally, walk-ins and bicyclists may enter the park from multiple locations; they are not counted.

Accessibility

Universally accessible facilities and equipment have been made available in an effort to accommodate visitors of all abilities. However, additional accessible facilities and equipment would increase recreational opportunities.

The following text identifies accessibility issues associated with each of the park's three distinct recreation areas.

Main Beach. There are no accessible dune crossings and the park lacks independent access to the beach for individuals with disabilities. Although the grade from the parking lot, over the dune, to the main beach is relatively flat, currently there is no official ADA compliant access to the beach and mean high water. There is one beach wheelchair available for park users.

Trails. The walking trails are relatively flat, although they have natural surfaces that do not meet the firm and stable designation required by federal law for accessibility (42 U.S.C. 12101; Appendix H).

Picnic Areas. The comfort station was updated in 2005 and has ADA compliant restrooms and outdoor cold water rinse stations. There are no ADA compliant picnic tables.

Illegal Uses

Recreation in violation of park regulations occurs at DEML.

Off-leash dogs may be found throughout the reservation and dogs both on- and off-leash are present during the restricted bird nesting season.

Regulatory signs are installed throughout the park; they have not been inventoried.

Rafts and other forms of personal flotation devices as well as motorized craft are not allowed at DEML. People disregard the ban and enter unguarded waters with their floatation devices, which can create unsafe conditions if they are caught in a strong rip current.

Illegal OHV use is generally not a management problem.

2.4.4. Infrastructure

Roads and Parking

Visitors arrive almost exclusively by car and DEML maintains a large centralized parking lot for their vehicles see (Figure 2.4.1). Smaller numbers of visitors arrive by bike or on foot. The park is not served by public transportation.

Roads

DEML is accessed from Barney's Joy Road, a municipal road. Within the park, access is provided by Demarest Lloyd Memorial State Park Road, which is located entirely within park boundaries.

Four culverts cross under Demarest Lloyd Memorial State Park Road. Two connect drainage from primarily agricultural upland areas to George's Pond. In 1996, a drainage improvement project replaced twin corrugated metal pipes with twin 48-inch reinforced concrete culverts with flared end sections and a gravel base. These twin culverts connect the main salt marsh creek from the Slocums River to George's Pond. A 128-foot long wooden guardrail was replaced along the road at the creek crossing. Rip rap was imbedded along the slope to the creek to improve drainage. The road does not have a curb leading to this stream crossing, but prior to the 1996 drainage improvement project, a small curb existed. Debris falls into the marsh creek and culverts from the road, contributing to restricted tidal flow through the culverts and necessitating continuous maintenance by Bristol County Mosquito Control (Janik 2009). Human curiosity also leads to stone throwing into this section of the creek, further contributing to blocked culverts. In 2010, staff added large pieces of gravel to repair the crumbling edge of road above these culverts, yet this quick fix started to degrade within months.

Parking Lots

There are two parking lots, the beach parking lot and the boat launch parking lot. Both are located at the eastern end of Demarest Lloyd Memorial Park Road. A contact station, for collecting fees and recording pass holder information, is located at the common entrance to these lots. Collectively, these lots can accommodate up to 505 vehicles (see Table 2.4.9). These lots generally accommodate the volume parking associated with daily park users.

Table 2.4.9. Parking capacity at Demarest Lloyd Memorial State Park.

Name of Lot	# of spaces
Main Beach Parking	475
Boat Launch Parking	30

On some days, such as around the busy Fourth of July holiday weekend, the number of visitors arriving by vehicle exceeds the lot capacity. When the main parking lot is full or closed (or visitors meet others and carpool into the park), cars will occasionally line Barney's Joy Road. This practice is both a concern to nearby residents and illegal. At peak times, cars will also park illegally along Demarest Lloyd Memorial State Park Road, typically in front of Picnic Area 3, and visitors will walk into the park, avoiding parking fees and causing congestion for pedestrians and fee paying visitors. When this takes place, staff will ask for cars to be moved or request law enforcement support to provide parking citations. During the off-season, the main gate, which is currently in good operating condition, remains locked and people enter the property by foot or bike.

The installation of rain gardens within the main parking lot at DEML by the DCR's Lakes and Ponds Program in 2006 improved groundwater recharge, storm water runoff and park aesthetics. Prior to the rain garden installation, considerable ponding of water occurred after it rained. Although they function appropriately to correct resource issues, the design of the rain gardens contribute to maintenance problems because the numerous small structures trap litter.

There is one bike rack located at the main parking lot, which currently serves the demand for this park.

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Piping plover management at Horseneck Beach State Reservation.

SECTION 3. MANAGEMENT RESOURCES AND PRACTICES

3.1. INTRODUCTION

The management of Horseneck Beach State Reservation and Demarest Lloyd Memorial State Park provides an archetypal example of the balance between conservation and recreation. These shoreline properties are very popular destinations with many thousands of visitors each year. They also support a variety of important and sensitive natural and cultural resources. Achieving the balance between conservation and recreation is an ongoing challenge for DCR staff.

Operation and management requires coordination between multiple bureaus, offices, and programs of the DCR along with support from partners. Operation and management is also subject to fluctuating budgets and a variety of laws, regulations, policies, plans, and legal agreements. The following section describes current management and operations for the Horseneck Planning Unit.

3.2. HORSENECK PLANNING UNIT

3.2.1. Natural Resources

The Lloyd Center for the Environment, operating under a contract between Mass Audubon and the DCR, monitors and manages populations of piping plovers, least terns, and diamond-back terrapins at DEML as well as piping plovers and a data-sensitive rare insect at HBCH. Specific monitoring and management activities are identified in Table 3.1.1. Bird monitoring and management activities are performed in accordance with state standards (Blodget and Melvin 1996).

Table 3.1.1. Chronology of rare species monitoring and management activities performed by the Lloyd Center for the Environment.[a]

Activity	Species[b]	Month(s)
Identify territories	L	March–April
Install/maintain fencing	L, P	March–July
Locate nests	P	April–July
Install predator exclosures	P	May–July
Public education	L, P	May–July
Survey colonies	L	May–July
Human use surveys	-	May–July
Survey/protection	T	June–July
Count fledglings	P	July–August
Conduct surveys	D	July–August
Remove fencing and predator exclosures	L, P	August

a. Based on Bogart et al. (2010).
b. D = data sensitive rare insect; L = least tern; P = piping plover; and T = diamond-backed terrapin.

Vegetation. There are seven Continuous Forest Inventory (CFI) plots in the planning unit; five at HBCH and two at DEML. Vegetation in these plots is inventoried at least once every ten years to identify plant species composition and abundance, tree growth, plant disease, the presence of invasive species, and disturbance. This monitoring is performed by the Regional Forester or Assistant Regional Forester as part of an agency-wide program.

3.2.2. Cultural Resources

Historic structures are managed in accordance with agency guidelines and national standards (DCR 2007*d*; Weeks and Grimmer 1995). There are no cultural resource management practices unique to this planning unit.

3.2.3. Recreation Resources

Waterfront Program

A DCR *Waterfront Program Procedure Manual* has been established to unify how waterfront properties operate (DCR 2007*c*). This manual covers topics such as designated swimming areas, water quality standards, emergency response and preparedness, management of designated swimming areas and lifeguard recruitment, and testing guidelines. The DCR has approximately 600 lifeguards per year distributed across 64 facilities offering guarded swimming areas (Briere et al. 2011); all lifeguard staff receives the same annual trainings outlined in the *Waterfront Program Procedure Manual* (DCR 2007*c*). All lifeguards at coastal beaches must be certified in Lifeguard Training, Standard First Aid, Waterfront Module, and CPR for the Professional Rescuer (DCR 2007*c*). Supervisory lifeguards must also be certified in Lifeguards Management Training. In-service training is offered at some of the DCR's popular and potentially dangerous facilities, such as HBCH and DEML, in order to further develop lifeguard skills in topics such as storm rescue training and use of Automated External Defibrillator (AED) portable units.

Swimming restrictions are implemented for public safety, yet management challenges occur when people violate the closure policy by entering unsafe water areas. Lifeguards, Environmental Police Officers (EPO) and State Police will assist with patrolling the water's edge to promote public safety in unguarded areas when swimming restrictions are implemented.

One item not addressed in the *Waterfront Program Procedure Manual* is procedures related to a swimming restriction due to nearby shark sightings. With a recent increase of shark sightings in Massachusetts, including the elusive great white shark, management of recreation areas has forced swimming restrictions around the state. Although not uncommon to our Atlantic waters, the increase in Great White sightings off the coast of Cape Cod and other portions of Massachusetts has been attributed to our seal population (diet of great white shark, http://www.mass.gov/dfwele/dmf/spotlight/white_shark_2009.htm). In August 2010, swimming activity was restricted at HBCH due to shark sightings (Rourke 2010). A Massachusetts State Police helicopter patrolled the coastline to monitor if sharks posed any threats. Precautionary closures of swimming areas due to shark sightings could become a trend, particularly if their food source remains locally abundant.

Water Quality Monitoring

The DCR closely complies with specific water quality monitoring and closure posting requirements at bathing beaches (DCR 2007*c*; 105 CMR 445; Appendix H). When red flags are posted at guarded waterfront areas, the water quality within that specific area does not meet the minimum standards for recreational purposes. Public Health Advisory signs, established by the Department of Public Health (DPH), are used in conjunction with red flags (DCR 2007*c*). A blue flag is posted at guarded waterfront areas when regular water testing efforts have determined that the water quality meets the minimum standards for recreational uses, pursuant to DPH (105 CMR 445; DCR 2007*c*).

Beach Maintenance

The planning unit currently has neither design plans nor permits for beach nourishment projects, although cost estimates for the properties can be found in the *MA Coastal Infrastructure Inventory and Assessment Project* document by Bourne Consulting Engineering (2009).

HBCH and DEML are eligible, under strict guidelines, to receive FEMA funding for improvements related to storm damage (42 U.S.C. 4001; Appendix H). HBCH received over $100,000

in funding for the installation of new boardwalks, dune restoration, and interpretive signs in 1992 after Hurricane Bob (DEM 1995).

Fishing and Shellfishing

A Recreational Saltwater Fishing Permit is required of all "persons engaged in the recreational fishing…in or from the coastal waters of the Commonwealth," with the exception of disabled persons and persons under the age of 16 years (322 CMR 7.10).

The harvesting of lobster offshore is regulated through 322 CMR 6.00 and 322 CMR 7.00.

Officers from the Executive Office of Energy and Environmental Affairs' Office of Law Enforcement (i.e. Environmental Police Officers) enforce the fishing and lobster harvesting regulations.

The taking of shellfish is regulated by the Select Board in Dartmouth and by the Harbor and Wharfinger Department in Westport.

3.2.4. Infrastructure

Trails

Important information about trail maintenance, protection, and development, including potential permit requirements as well as volunteer guidelines for trail work, can be found in the *Trails Guidelines and Best Management Practices Manual* (DCR 2010*a*) and *Recreational Trail Maintenance and Biodiversity Conservation* (DFW 2009*b*). These documents serve as the primary guidance for trail creation, maintenance, and repair on DCR properties.

3.2.5. Interpretive Services

Interpretation plays an important role in the creation of meaningful connections between visitors and park resources. As beach facilities, interpretive services and programs within the Horseneck Planning Unit are historically seasonal. The level of interpretive services and programs also fluctuates among years, with the availability of seasonal interpretive staff. For example, there were no seasonal interpreters from 2002–2006, or in 2009 and 2010.

A Seasonal Interpreter was based at HBCH in 2011 and provided programming for the entire planning unit. They offered 88 programs, which were attended by 2,975 participants. Programs primarily took place at HBCH, with limited programming offered at DEML. At both properties, emphasis was placed on natural resources. Cultural resource-related programming was offered at the lifesaving station, in association with the WFA. Information on each property's programming is provided in Sections 3.3.5 and 3.4.5.

The Seasonal Interpreter and all interpretive programming in the planning unit are overseen by the Regional Interpretive Coordinator. The coordinator is available to supplement field staff efforts. They also conduct a variety of interpretive planning activities, such as the development of interpretive programming and materials.

Currently the planning unit lacks a Comprehensive Interpretive Plan to identify and prioritize educational opportunities, to explain the natural and cultural resources of the facilities, and key management objectives to preserve them.

3.2.6. Park Operations

Introduction

The operation and management of DCR properties is often complex and requires close coordination between multiple divisions of the DCR; it is also highly dependent upon fluctuating operating budgets. Each facility has its own management challenges that are generally influenced by many factors including seasonal or year-round visitor use numbers, staffing numbers, condition of recreation facilities, the equipment available for property management, and regulations that the agency must follow to protect both natural and cultural resources. Adaptive management of HBCH and DEML's operational procedures has occurred over the past 40 years as these parks have grown in popularity and use. The following section summarizes current operations and management of the planning unit.

Regulations

Daily operations and planning efforts associated with this planning unit are influenced by several key laws, including the Wetlands Protection Act (M.G.L. c 131 § 40) and its associated regulations (310 CMR 10.00); the Massachusetts Endangered Species Act (MESA; M.G.L. c 131A) and its associated regulations (321 CMR 10.00); the Massachusetts Acts and Resolves of 1983 (M.G.L. c.589 § 17) and its associated regulations (310 CMR 9.00); and the

State Building Code (M.G.L. c.143 § 93-100) and its associated regulations (780 CMR). An overview of Massachusetts' regulations applicable to this planning unit may be found in Appendix H.

Administrative Structure

Region. The Department of Conservation and Recreation manages its parks, forests, and reservations under two separate divisions; the Division of State Parks and Recreation (DSPR) and the Division of Urban Parks and Recreation (DUPR). HBCH and DEML are within the DSPR. Specifically, the Horseneck Planning Unit is part of a group of DCR facilities within the Southeast Region, under management of the Southeast Regional Manager. The Southeast Region Beach Manager provides support for various aspects of waterfront management throughout the region, including, but not limited to, lifeguard staffing and resource protection. A Regional Mechanic provides vehicular maintenance support. A Regional Heavy Equipment Operator is scheduled for specific projects when the Seasonal Heavy Equipment Operator is not present. A Regional Ranger provides support for Code of Massachusetts Regulations (CMR) education and enforcement and coverage for special events.

District. This region is further divided into two smaller management districts: the Cape Cod District and the South Coast District. The Horseneck Planning Unit is within the South Coast District, under management of the South Coast District Manager.

DCR Staffing

The number and job titles of full-time and seasonal personnel that work at HBCH and DEML and report to the South Coast District Manager are presented in Table 3.2.1. There are two full-time, year-round employees in the planning unit. The first is a Recreation Facility Repairer based year-round at HBCH. The second, a Forest & Parks Supervisor II, manages DEML on a seasonal basis and works the remainder of the year at HBCH. During the peak season, operation of HBCH is supervised by a Recreation Facility Supervisor IV. All supervisors are trained annually on revenue reporting procedures, the camp reservation system, and other useful tools of the trade.

Table 3.2.1. FY10 Horseneck Planning Unit personnel.

Job Title	#
Year-round Personnel	
Forest & Parks Supervisor II	1
Recreation Facility Repairer	1
Seasonal Personnel	
Recreation Facility Supervisor II [a]	1
Long-term seasonal [b] (HBCH)	5
Short-term seasonal [c] (HBCH)	27
Lifeguard [d] (HBCH)	37
Short-term seasonal (DEML)	3
Lifeguard (DEML)	5

a. This is a full-time, year-round employee who works seasonally at HBCH and the remainder of the year at Freetown-Fall River State Forest.
b. Long-term seasonal staff includes park supervisors, heavy equipment operators, and laborers.
c. Short-tem seasonal staff includes laborers, summer workers, clerks and a park ranger.
d. Lifeguard staff numbers include a head lifeguard an assistant supervisor and two Emergency Medical Technicians.

The number of work shifts per day varies among job titles. Year-round personnel and the Recreation Facility Supervisor IV have one shift per day. Beach staff and lifeguards have two shifts (a.m. and p.m.). The campground staff at HBCH has three.

A District Ranger and Seasonal Ranger also provide support for education and enforcement of CMR's or coverage during special events in the planning unit.

There has been discussion of a possible transition to seasonal staffing only. As fiscal challenges require the agency to make some tough staffing decisions, coastal facilities such as the Horseneck Planning Unit that have a very quiet winter season may be candidates for such a transition. In addition, if staffed year-round, the new Beach Services Building has to be in active use to justify keeping it open during the winter months, otherwise the pipes will freeze. Staff currently shut this building down completely for the winter and relocate their administrative functions to the maintenance building on John Reed Road.

Operations

Personnel perform a variety of activities related to the operation and maintenance of the planning unit's recreation facilities and natural resources. No busy day is the same at HBCH or DEML, but general routines are followed to maintain operation of the properties for visitor use and safety as well as natural and cultural resource protection. The

following section provides an overview of planning unit management tasks that generally maximize the use of staff and volunteers. These summaries do not include work performed by outside contractors (e.g. coastal rare species protection or waterless composting toilet maintenance).

Buildings and grounds related activities include: cleaning, painting, minor carpentry, electrical and plumbing tasks, mowing grass, removing leaves, picking up litter, beach raking (at HBCH), sand removal from portions of paved surfaces, emptying trash barrels, graffiti removal, and the operation and maintenance of hand and power tools (see Table 3.2.2). For cleaning activities, staff are assigned depending upon availability.

Visitor services related activities include: parking fee collection and ParksPass sales and processing, routine patrols, and promoting awareness and enforcement of regulations (see Table 3.2.2).

Administrative activities include: employee scheduling and supervision, report preparation, revenue processing, coordinating volunteer activities, coordinating special events, and budget preparation.

Table 3.2.2. Current management activities in the Horseneck Planning Unit.

Activity	Location[a]	Summer	Fall	Winter/ Spring
Administration: camping	HBCH	Daily	-	-
Beach raking (mechanical)	HBCH	5+ times/week	-	-
Carpentry, electrical, and plumbing repair (minor)	PU	As needed	As needed	As needed
Cleaning comfort station	PU	2 times/day	-	-
Collection of daily use fees	PU	Daily	-	-
Composting toilets, service	HBCH	2 times/day	As needed	As needed
Composting toilets, adding wood shavings	HBCH	3+ times/week	1+ times/week	As needed
Composting toilets, check tank level	HBCH	1 time/week	As needed	As needed
Litter and trash pick-up	PU	As needed	As needed	As needed
Maintenance, heavy equipment	PU	As needed	As needed	As needed (Spring)
Maintenance, parking lot	PU	As needed	-	As needed
Maintenance, trail system	DEML	As needed	As needed	-
Maintenance, trail system (Gooseberry Neck)	HBCH	Once	-	-
Mowing and trimming, picnic area	DEML	As needed	-	-
Patrols (routine)	PU	Daily	Daily	Daily
Sand fence installation (dune protection)	PU	As needed	As needed	As needed
Sand fence installation and removal (winter)	HBCH	-	Once	Once
Septic tank, check tank level	HBCH	1 time/week	As needed	As needed
Visitor guidance/information	PU	Daily	-	-
Water safety monitoring	PU	Daily	-	-

a. Location of management activity within the planning unit: DEML = Demarest Lloyd Memorial State Park; HBCH = Horseneck Beach State Reservation; and PU = Planning unit-wide.
b. Parking lots at DEML and HBCH were formerly kept cleared of snow all winter; they currently lack the necessary equipment.

Supplemental Staffing

Partnerships and Volunteers. There are a number of existing beneficial partnerships that help to support the DCR's resource protection efforts in the planning unit. Although there have been expressions of interest in forming a friends group for HBCH, there are currently no friends groups in the planning unit.

A Horseneck Beach Advisory Committee was created in the early 1990s to assist the DEM in reviewing existing management and future improvements to the property. The Advisory Committee consisted of 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 WRWA. This Advisory Committee is no longer active, but the group contributed valuable information to the DEM.

Volunteers contribute to the operation, maintenance, and resource stewardship of HBCH and DEML. Volunteer efforts at HBCH tend to be single day events involving a large number of participants. This approach minimizes the amount of staff time required to organize and oversee these events. Although this approach is appropriate for basic tasks (e.g. clean-up) it is not appropriate for ongoing activities or activities that require specialized training. Although HBCH has benefited from volunteer labor, opportunities exist to expand the variety and complexity of these activities. Associated with this is the challenge of securing adequate staff time to develop and oversee a volunteer program. Any volunteer program development shall follow the DCR Volunteer Policy, which is currently being finalized.

The following include both partnerships and volunteer activity at HBCH and DEML:

- Numerous non-profit organizations, a state agency, and the federal government have partnered with the DCR in land conservation efforts or have protected land in close proximity to this planning unit including: Mass Audubon, DNRT, The Trustees of Reservations, Westport Land Conservation Trust, Buzzards Bay Coalition, Rhode Island Field Office of The Nature Conservancy, DAR, and the USFWS.
- The Massachusetts Beach Buggy Association traditionally assists staff with seasonal installation of thousands of feet of sand fencing at HBCH. (See Section 3.3.3 for additional information and Figure 2.3.1 for locations of winter sand fencing in 2011-2012.)
- Bristol County Mosquito Control provides targeted channel maintenance within HBCH and DEML and culvert clearing, resulting in enhanced mosquito control, tidal flushing, and common reed control.
- The Lloyd Center assists with monitoring and stewardship of rare species habitat as well as public education; a small pool of volunteers assist the Lloyd Center with rare species monitoring at HBCH and DEML.
- The Lloyd Center and their dedicated suite of volunteers walk the beaches of HBCH and DEML to track bird mortality. Their results are submitted to the Seabird Ecological Assessment Network (SEANET) program to help track causes of seabird mortality on the east coast of the U.S.
- The Division of Marine Fisheries undertakes species surveys and population monitoring.
- The NHESP and volunteers with the New England Wildflower Society routinely perform rare plant monitoring at DEML.
- A dedicated turtle conservationist has volunteered to assist with diamond-backed terrapin nest protection at DEML.
- The WRWA assists in the monitoring and management of osprey nesting platforms and horseshoe crab monitoring along the Westport River. They are also an important partner in the conservation and protection of the river, marsh, mud flats, and woodland strips at the northern end of HBCH.
- Mass Audubon's Allens Pond Wildlife Sanctuary and dedicated volunteers provide ongoing monitoring of osprey nesting activity as well as monitoring and repairing the artificial nesting platforms in the area.
- The planning unit has welcomed Coastsweep organized events. The WRWA has organized events consistently at Gooseberry Neck and the town portion of Horseneck Beach. Coastsweep has been in existence for 23 years; it is a statewide beach clean-up that includes collecting

data on the volume and type of trash collected, which is submitted to a worldwide database to help reduce marine debris. Coastsweep is sponsored by the Office of Coastal Zone Management (CZM) and coordinated by the Urban Harbors Institute of the University of Massachusetts, Boston (http://www.coastsweep.umb.edu/index.html).

- The WFA currently maintains a visitor's center and operates interpretive programs out of the lifesaving station, supporting the DCR's cultural resource protection efforts not only through programming, but also as a curator through the agency's Historic Curatorship Program.
- The FBA oversees the Westport River Boat Ramp on DCR land and manages the construction, repair, and operation of state boat ramps, parking areas, and approach roads (http://www.mass.gov/dfwele/pab/pabbrch.htm). The FBA has no regional staff to oversee the daily operations of their facilities. There is an agreement between the town and the FBA for daily management of the Westport River Boat Ramp; the DCR has no management responsibilities.

Host Campers. It is a DCR policy to welcome host campers in DCR campgrounds to assist staff in the maintenance of camping facilities and service to campers. Host campers are not intended to be a substitute for paid staff, but provide a unique opportunity for campers to contribute to the facilities they love. Each camping facility may assign one host camper per 25 campsites. Host campers must first apply and then sign an agreement with the DCR (http://www.mass.gov/dcr/recreate/campInfo/camphost.htm). Host campers must be available for a minimum of two weeks and a maximum of 90 days at the campground; opportunities exist for extended host camper services beyond 90 days with permission. They provide no less than 20 hours per week of support services that range from welcoming visitors, distributing park information, performing light maintenance work around campgrounds, cleaning the campground comfort station, and reporting concerns or hazardous situations to park staff. A sign is posted at the host camp site. All camping fees are waived during the host camper's service. Host campers do not enforce state park rules, collect fees, operate or travel in state vehicles.

At the HBCH campground, staff routinely get host campers (three per year, on average) and some will come back regularly. HBCH will often get host campers who have maxed out their stay at another DCR facility.

Public Safety

Public safety, waterfront safety and emergency response services are provided by park staff with the support of state and local law enforcement departments. The Massachusetts Office of Law Enforcement has primary law enforcement authority on state-owned lands and can accept or deny work details solicited from the DCR. If the work detail is declined by the Office of Law Enforcement, the Massachusetts State Police or the local police can accept the detail.

Additional law enforcement is currently provided, for a fee, on holidays and weekends by the EPOs. Local police, both Westport and Dartmouth, provide additional law enforcement on the properties and associated roadways within their respective jurisdictions. Fire control and emergency medical response are also provided by the municipalities in which the properties are located, with support from DCR Fire Control staff.

Lifeguards use kayaks and rescue boards to patrol the water or perform rescue missions. Waterfront safety equipment requires ongoing maintenance and care by staff or a contractor. Maintaining this essential equipment is a challenge to many DCR properties, including those in this planning unit.

Budgetary Information

A variety of funds support the operation and maintenance of DCR forests, parks, and reservations.

Operational Funds. Funding for the operation and maintenance of HBCH and DEML comes from the South Coast District's operational budget; there are no dedicated operational budgets for the individual properties. The Southeast Region and South Coast District staff, including Rangers, Interpreters, Fire Control personnel, the Heavy Equipment Operator, and the Regional Beach Manager, provides services to facilities throughout the District on an as needed basis. The Southeast Region operational budget is used for utilities such as telephone, electric, and heating needs, while the South Coast District

operational budget is used for ongoing management and maintenance needs such as vehicle repair, lock replacement, and ongoing sand fence replacement. Support for storm water management is provided by the Bureau of Engineering on an as needed basis.

Capital Funds. The capital budget supports projects (e.g. construction, repair) and items (e.g. equipment) with an expected lifespan of at least seven years. Capital projects and programs are identified and funded through a five-year capital plan. These plans identify proposed capital projects, their costs, and the year in which they are to be funded. Projects for DEML and HBCH identified on the current five-year capital plan are listed in Appendix F.

Conservation Trust Funds. Donations made at, or for the benefit of, a particular property directly fund conservation and education projects at that property. Iron rangers (i.e. secure metal donation boxes) are installed at 169 DCR properties to encourage donations to conservation trusts. Within the Horseneck Planning Unit there are two iron rangers, one at the HBCH campground and the other at DEML. At the end of FY11, there was approximately $5,500 in the HBCH Conservation Trust and no funds in the DEML Conservation Trust.

Retained Revenues. Revenues from day use parking fees at DEML and HBCH and camping reservation funds from HBCH are deposited in the state's general fund. The state operating budget specifies the maximum amount of revenue that the DCR may retain in a given fiscal year. This amount changes yearly. In fiscal year 2011, retained revenues were capped at $8,489, 419. Such retained revenues may be used by the agency for operating expenses and facility improvement; they may not be used to support full-time personnel.

During FY11, $501,770 in park revenue was collected at HBCH. This included $488,914 in parking and fees, $12,781 in camping fees, $50 in merchandise sales, and $25 in permits. During the same fiscal year, DEML collected $42,617 in parking fees and an additional $50 in miscellaneous revenues.

Management Challenges

Management challenges for both parks include having enough small bills on hand for parking fee collection tasks and outdated internet connections, reducing the planning unit's online efficiency and communication. Making change for a $7 parking fee is particularly difficult during busy three-day holiday weekends, when the banks are closed.

An additional challenge faced by both parks is visitors feeding gulls, which leads to an aggressive gull population that raids trash receptacles, threatens the health and safety of the birds, risks the spread of disease, endangers drinking water supplies, and may adversely affect piping plover productivity (Bogart et al. 2010; CZM 1994; DCR 2010*b*; DCR 2010*c*). In 2010 and 2011 the DCR asked the public to stop feeding gulls around the state after the DCR's Division of Water Supply and Protection analyzed gull tagging and tracking data that identified feeding gulls as a threat to their well-being and public drinking water supplies (DCR 2010*b*; DCR 2010*c*).

3.3. HORSENECK BEACH STATE RESERVATION

3.3.1. Natural Resources

Rare Species. The Lloyd Center installs seasonal symbolic fencing (simple post and string fencing with educational signs) from April 1–August 31 at HBCH to protect nesting habitat for rare shorebirds in accordance with state and federal guidelines (DFW 1993; Atlantic Coast Piping Plover Recovery Team 1996). Symbolic fencing protects the area of beach from the low tide mark to the back dune area, described as maritime beach strand habitat. The USFWS considers beach strand habitat and their dependent species a priority resource concern along the Atlantic coast due to a variety of significant human pressures (Defeo et al. 2009; USFWS 2000).

Wildlife. The Lloyd Center has conducted butterfly research on Gooseberry Neck. Monarch butterflies tagged at that site have been relocated in Mexico and Texas (Mello and Bogart 2010). See Section 3.3.5. Interpretive Services, for additional information.

The harvest of horseshoe crabs for use as bait is regulated by 322 CMR 6.34. These regulations were recently updated in response to ongoing volunteer efforts to survey for spawning horseshoe crabs across the state since 2008 (http://www.mass.gov/dfwele/dmf/programsandprojects/horseshoe_crab.htm, accessed May 26, 2011). The WRWA has lead volunteer horseshoe crab spawning surveys along the mouth of the Westport River extending to the public boat ramp at HBCH.

Vegetation. There are seven CFI plots at HBCH. Two are south of John Reed Road; one near the main beach and another near the campground. The three plots located north of John Reed Road are all located in salt marsh. All seven plots were inventoried in 2011.

In 2008, the destructive non-native Asian longhorned beetle was detected in Worcester, MA; it has since been found in Boston. The spread of this beetle, which can occur by relocating contaminated wood, could cause serious negative impacts to the sugar maple, nursery, tourism and forest product industries of the Northeast (http://www.mass.gov/agr/alb.htm, accessed May 10, 2011).

To help protect our forests, transported firewood is prohibited at all state park campgrounds. Pest and disease-free firewood is available at all DCR campgrounds with a $5 donation requested per bundle or $10 for three bundles. This money is deposited into the park's Conservation Trust. At HBCH, the firewood is made available at the camp office. Firewood is stored in the lockable shed near the camp office as well as at the maintenance garage on John Reed Road, which requires routine transport from the maintenance garage to the shed and office as well as available staff to complete the task.

Prescribed Burning. A prescribed burn plan was created (c. 2006) for Gooseberry Neck. It was not implemented due to unfavorable weather conditions for burning. There are currently no prescribed burning activities planned for this site.

3.3.2. Cultural Resources

There are no cultural resource management activities unique to this property.

3.3.3. Recreation Resources

Central Plaza/Main Beach

Waterfront Area. HBCH personnel perform a variety of activities related to the operation and maintenance of both recreation areas (the guarded waterfront day use beach and the campground). The beach is typically guarded from Memorial Day through Labor Day, but the length of the season could be impacted by funding constraints. The campground is generally open from May through October.

The Head Lifeguard at HBCH must balance the daily needs of the facility when organizing the number of guards working the beach, where they are assigned, and the current public safety conditions that can change dramatically over the course of a day. Public safety can be a challenge when thousands of people use the beach at the same time (Briere et al. 2011). The Head Lifeguard periodically assigns a full reservation patrol of traditionally unguarded waters extending to Gooseberry Neck without compromising public safety at the guarded beach. This involves a safety check by lifeguards on a stand-up personal watercraft, rescue board, or OHV.

Beach Maintenance. The wrack line (daily seaweed and marine litter accumulation) along the main beach of HBCH is subject to beach raking activity five times per week during the recreation season for both patron safety and aesthetics. The wrack line washes up on incoming tides and is full of edible delicacies for wildlife, including rare shorebirds, yet it is also riddled with litter. Beach raking is performed early in the morning, primarily between 6:00 a.m. and 9:00 a.m., before it gets too busy, by the Heavy Equipment Operator. Beach raking can produce negative consequences, including: loss of fine sands, accelerated beach erosion, significant changes in beach food webs, lower abundance of native plants, and repression of coastal dune forming processes (CZM 1994; Defeo et al. 2009; http://water.epa.gov/type/oceb/assessmonitor/debris/moreinfo.cfm) Beach raking also requires a storage area for the collected material; when available, staff separates the trash from the organic waste. Trash that is appropriate for recycling is not currently recycled, as staff members are not available to undertake sorting by hand during the peak recreation season, although staff has reused some of the larger rocks that are collected from time to time. Generally only old, dried wrack is removed, leaving the freshest wrack at the shoreline for coastal species and beach processes.

In order to provide layers of desirable sand at the HBCH day use beach, thousands of feet of sand fencing is installed every fall to collect windblown sand. By spring, fencing is taken off the beach and the collected sand is redistributed above the high tide mark. This process is time consuming and challenging to coordinate, given the time of year restrictions that apply (work must be completed by

April 1) due to early nesting rare shorebirds. Regional Heavy Equipment Operators are in high demand in the spring, especially if there have been damaging storms to the region, and are used at HBCH to help perform this task. This work is also performed by year-round staff, seasonal campground staff, and volunteers. During the process, DCR vehicles are used to drop off or pick up fencing, depending on the season, and heavy equipment is used to remove fence posts.

In October, volunteers from the Massachusetts Beach Buggy Association install sand fencing under the supervision of DCR staff. These volunteers stay overnight at the HBCH campground and install fencing during the day. This is a Massachusetts Beach Buggy Association conservation project and personal vehicles on the beach are limited to only those necessary to transport personnel, tools, or supplies.

When funding is reserved from the South Coast District operational budget, sand fencing is purchased to maintain deteriorating fencing and install new dune fencing along various portions of HBCH.

The ADA Healthy Heart Trail is located within a shifting dune and sand often covers portions of the paved access road. Constant maintenance, mostly by the seasonal Heavy Equipment Operator, is required to keep this road safe for ADA and emergency use, yet staff availability can limit this maintenance activity.

In 2009, the Westport Conservation Commission issued an Order of Conditions (OOC) for two Operational Maintenance Plans (Department of Environmental Protection File No. SE 80-1791). The first was for HBCH and the second was for Gooseberry Neck and DCR properties on East Beach Road. This OOC is in effect from June 5, 2009 through June 4, 2012. This order is presented in Appendix E.

Associated with the OOC, was a letter from the Massachusetts Division of Fisheries and Wildlife that identified several conditions necessary for the DCR to comply with the rare wildlife species section of the Massachusetts Wetlands Protection Act (French 2009). These conditions included:

- No removal of winter snow fence or the placement or bulldozing of sand on the beach between April 1 and August 31 unless explicitly approved by the NHESP.
- Any areas proposed for mechanical beach cleaning/raking after May 20 shall be surveyed by a qualified shorebird monitor, as determined by the NHESP, to determine if 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 of each year, all areas of suitable piping plover habitat…shall be delineated with symbolic fencing and warning signs. All vehicular access…shall be prohibited inside fenced areas.
- All other areas of the beach front shall be monitored at least three times per week, beginning April 1 each year, by a qualified shorebird monitor, as determined by NHESP. If piping plovers are found to be nesting or "scraping"…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 conditions currently guide beach operations at HBCH. The Division's letter further indicated that operational maintenance activities at HBCH are located within Priority Habitat and that the DCR is additionally required "to file directly with the NHESP pursuant to the MESA" (French 2009). These operational maintenance activities have not yet been submitted for MESA review.

Campground

As with all DCR campgrounds, campers register for campsites in advance, by phone or Internet, with Reserve America. Reservations may be made as early as six months, or as late as one day, prior to arrival. Reservations are limited to 14 cumulative days in any one park between Memorial Day and Labor Day. There is a two day minimum stay.

Gooseberry Neck

Gooseberry Neck is periodically monitored by campground staff and beach staff to assess parking lot and beach conditions and user activity. The main trail leading to the observation towers on Gooseberry Neck is maintained annually, usually in July, by either the Town of Westport or the regional Heavy Equipment Operator, by cutting vegetation back with a brush hog. Rare species dependent upon various shrubland plants are listed for Gooseberry Neck; therefore the NHESP should approve any vegetation management along the main trail (Appendix H).

3.3.4. Infrastructure

Composting Toilet Facility Maintenance. The DCR is evaluating if maintenance of the waterless composting toilet system in each comfort station as well as the visitor restrooms in the Beach Services Building can be fully serviced by DCR staff as a means of cost savings. Currently, a majority of maintenance is performed by DCR staff, with company representatives periodically servicing the units.

During the recreation season, the waterless composting toilets are serviced in the morning and evening and their surfaces are cleaned daily. At least three times a week wood shavings, collected from the DCR carpentry shop, are added to the composting area; this frequency may be increased during peak use times to further assist with decomposition. Each composting toilet facility has four tanks and their levels must be checked once per week so they may be emptied before reaching capacity (600 gallons per tank). Confusion exists as to the proper maintenance technique for these units, particularly the amount of wood shavings to add, if specific wood shavings are required, and if raking of compost needs to be performed. Confirmation from a company representative will help the DCR perfect the maintenance of this system. A fan system must function at all times of the year to assist with the operation of the unit; during the first winter, the fan system shut down creating concerns for the system.

Septic Systems. The campground septic system was installed to work automatically by a float system that triggers removal of liquids from the holding tank. In the past, a stuck float has caused grey water to overflow and overload an electrical box. It is now in proper working order and is checked regularly.

Roads. John Reed Road is owned by the Town of Westport, maintained by the DCR, and plowed by the Massachusetts Department of Transportation (MassDOT). West Beach Road is owned and maintained by the DCR.

3.3.5. Interpretive Services

Programming

DCR Programming. Interpretive services and programs are historically seasonal. The level of services and programs has fluctuated, among years, with the availability of seasonal interpretive staff. Due to funding limitations, these positions have not been filled since the summer 2008 season (see Table 3.3.1). In previous years when funding was available, services included a mix of educational programs and activities geared primarily towards children, catering both to campers and day use visitors (Table 3.3.1).

Table 3.3.1. Number of interpretive programs and program participants at Horseneck Beach State Reservation, 2000–2011.

Year	# of Programs	# of Participants
2000 (June & July)	29	484
2001 (June–August)	76	513
2002–2006 [a]	0	0
2007 (June)	6	80
2008 (July & August)	45	640
2009[a]	0	0
2010[a]	0	0
2011 (June–August)	82	2,786

a. Interpretive staff was not available this year.

HBCH does not maintain an interpretive center, so interpreters work informally and efforts are focused on a variety of field based (rather than classroom based) programs. Interpretive programming is largely based out of a former utility space in the campground bathhouse. This bathhouse served as a meeting location for tours and programs. Additional programming was offered at the historic lifesaving station.

Interpretive programming tends to focus on natural resources and processes at Horseneck Beach.

Programs offered in 2011 included:

- Beach night hike
- Beach ramble
- Between the tides
- Crab hunt
- Creature feature
- Family sand sculpture festival
- Gooseberry Island hike
- Junior Ranger program
- Plover walk
- Salt marsh walk
- Swamp walk

Lloyd Center Programming. Since 1997, the Lloyd Center has been tagging monarch butterflies at Gooseberry Neck as part of an international monarch tagging program. From 2006 through 2011, 859 elementary school students, primarily from Fall River, Dartmouth, and Westport, have participated in this autumn program (Mello 2011). Classes have tagged over 1,000 monarchs, some of which have been recovered in Mexico, Florida, Texas, Rhode Island, and New Jersey.

The Lloyd Center also offers occasional programming at HBCH to help educate visitors about natural resources in this region. Since 1991 they have offered a traditional New Year's Day beach walk on Gooseberry Neck. This walk, which is free and open to all, focuses on coastal ecology and bird identification. Informal education is also provided by the Lloyd Center's research assistant and seasonal interns while monitoring piping plover and least tern activity at HBCH.

WFA Programming. The WFA currently operates the Westport Beach Lifesaving Station under a 25-year lease through the DCR's Historic Curatorship Program. As part of their renovation of the building, the WFA installed a display (primarily historic photographs) at the former lifesaving station, helping to interpret the history of the U.S. Lifesaving Service and its activities at HBCH. They also offer interpretive programs on the U.S. Lifesaving Service. In 2011, this programming was supplemented by DCR's Seasonal Interpreter.

Interpretive Displays

HBCH is equipped with bulletin boards at each of the new comfort stations to help publicize interpretive programs, when available. The only interpretive panel at HBCH is on piping plovers; it is currently in very poor condition and positioned too far from actual plover nesting zones to be informative. Most interpretive kiosks and the interpretive panel meet the DCR graphics standards (DCR n.d.) and interpretive guidance manual (DCR 2006).

3.3.6. Park Operations

Summary of a Busy Summer Day

Managing a park, especially during the busy summer season, is a complex task. A variety of personnel, with a variety of skills, are required to ensure safe recreation and resource protection. The following provides a snap-shot of daily management tasks at HBCH, which generally maximize the use of staff and volunteers. These summaries do not include work performed by outside contractors (e.g. coastal rare species protection).

<u>6:00 a.m.–2:30 p.m. Heavy Equipment Operator</u>

- Beach cleaner and tractor on beach for morning raking (6:00 a.m.–9:00 a.m.)
- Payloader in operation for variety of tasks
- Maintenance of vehicles and equipment
- Maintain beach access road

<u>7:30 a.m.–8:00 a.m. Supervisors, Clerk, Laborers, Summer Workers</u>

- Check reservations
- Paperwork for day use parking fee collection
- Prepare contact station for revenue collection
- Open and clean comfort stations
- Trash pick-up and emptying of trash barrels

<u>8:00 a.m.–6:30 p.m. Supervisors, Clerk, Seasonal Park Ranger, Laborers, Summer Workers</u>

- Day use parking fee collection and periodic revenue collection from contact station
- Distribution of radios
- Check composting toilet tanks
- Add wood shavings to composting systems three or more times per week during peak use
- Continued comfort station cleaning

- Report writing, staff scheduling, and other office work
- Public relations
- Sand shoveling near gates, guardrail, and on boardwalks
- Painting and staining as needed
- Grass cutting at campground and at traffic islands on John Reed Road
- Trash collection in parking lots
- Collection of radios
- Close of business revenue count and bank deposit

9:00 a.m.–6:00 p.m. Lifeguards, Seasonal Park Ranger

- Morning workouts
- Litter and debris pick-up on beach
- Rescue and first aid training
- Public safety oversight, including lifeguard duties and provision of first aid as needed
- Rules, regulations, and shorebird protection oversight
- End of the day equipment storage
- Collection of radios
- Report writing and staff scheduling

8:00 p.m.–early a.m. Seasonal Supervisor and Summer Workers

- Beach closes for the day
- Campground staff closes comfort stations and gates at the beach and Gooseberry Neck
- Campground oversight

Entrance Fees

Entrance fees are collected for each vehicle or walk-in entering the park. These fees are in accordance with 304 CMR 12 (Appendix H). They are collected at the contact station at the entrance to Lots 1 and 2. On busy summer days, the entrance fees collected can lead to an excessive amount of cash on the reservation. Currently, staff uses a drop safe to temporarily store money. This money is then transferred to a safe to await revenue accounting paperwork and a bank deposit.

Camping Fees

Camping fees differ between Massachusetts residents and non-residents. Residents pay $15 per night; non-residents pay $17 per night.

Special Use Permits

Beach Volleyball. In 2009 and 2010 Special Use Permits were issued for frequent volleyball tournaments organized by a local volleyball camp for high school girls and for an Army National Guard promotional effort (with nearly 100 spectators) at the day use beach, where currently no volleyball court exists. Staff directed the permit holders to an appropriate court location. Rare species may directly be impacted if the volleyball tournaments are not properly sited.

Events. Additional Special Use Permits issued for HBCH during the 2008, 2009, and 2010 season were for weddings, bike and road races, a motor home rally, a car show, a Westport Police fundraiser, an Animal Planet filming, and product promotional events.

Public Safety

At HBCH, staff spends a good deal of time trying to control visitor conduct, at the expense of other necessary tasks. State Police currently assist, but their presence does not span the duration of high visitation hours or when problems typically occur. Instead, they are there during the week, typically from 9 a.m–3 p.m. Reservation staff would like to see the shift be switched so that State Police are available during more hectic times, such as between 11 a.m. and 7 p.m.

A State Police horse barn was constructed next to the HBCH maintenance building along John Reed Road in 1997, allowing for more frequent mounted patrols of HBCH. Prior to 1997, the mounted horse unit was located further away at the Yacubian property. The mounted unit was not present in 2010 or 2011. This was a free service provided to HBCH that improved visitor conduct and safety.

Three video surveillance cameras were recently installed at HBCH, providing images of portions of the main parking lots, a comfort station, and the Beach Services Building. This video system allows in-house monitoring for public safety and property management or vandalism.

Administering first aid to visitors is performed at the first aid station in the new Beach Services Building, at the first aid shed on the beach, or via a utility vehicle equipped with an on-site first aid response station. HBCH has a portable AED unit for

responding to cardiac emergencies. Two stand-up personal watercrafts are used by HBCH lifeguards to perform water patrols or rescue missions when equipped with an attached rescue sled. A special beach trailer pulled by an OHV is used to provide convenient water access to the stand-up personal watercraft; access is generally beyond the designated swimming beach, although during high risk conditions a designated area is created along the guarded beach.

Park staff and emergency responders are allowed to use OHVs while performing their duties.

Management Challenges

Management challenges include public safety concerns related to the powerful rip current at Horseneck Beach, the need to balance a high level of visitation with the protection of rare nesting piping plovers, and control of illegal activities.

Use of motorized vehicles on HBCH (i.e. lifeguard OHVs and beach rake equipment) is a threat to piping plovers and their habitats. Vehicles can crush eggs, adults, and chicks. Chick behavior, including foraging from the dune line to the shoreline or crouching motionless to avoid human induced or predatory threats, increases their vulnerability to vehicles. Piping plovers have selected nesting locations on HBCH that range from the windswept dunes along the Central Plaza, to physically on the east parking lot or into the back dune adjacent to the west parking lot. Each of these nesting locations pose various threats to plovers and their young, including vehicular and pedestrian traffic. Area restrictions do occur when nesting attempts are located in these busy locations, including temporary parking lot closures. OHVs or emergency vehicles need to avoid driving along the wrack line where rare species could be feeding and should drive along the upper portion of the beach or along the beach access road, except in emergency situations. Guidelines are available for driving rules for essential vehicles on piping plover beaches (DCR 2007*a*; DFW 1993).

An additional challenge is radio communication, as there are some areas within the reservation where radio signals are easily lost. Staff members occasionally resort to using their personal cell phones as a result. In 2010, staff used two radio frequencies on a few radios to communicate and monitor both park and lifeguard operations. This was a useful method for supervisors although reception was still inconsistent and permission was granted from the DCR Fire Control to use their frequency signal for this purpose.

Finally, accounting and revenue processing is time consuming, as large amounts of cash may be collected on a daily basis due to high visitation rates. A cash counting device was recently purchased to assist with accounting tasks, but processing gate fees remains a challenge.

3.4. DEMAREST LLOYD MEMORIAL STATE PARK

3.4.1. Natural Resources

Water Resources. The Bristol County Mosquito Control Project (BCMCP) conducts maintenance activities in the park's marshes. In 2009, they excavated blocked culverts leading under Demarest Lloyd Memorial State Park Road to allow for greater tidal flushing of the upper marsh area and to help thin the common reed population (Buzzards Bay NEP 2002; O'Reily 2008). This is believed to have resulted in a decrease in the density of common reed one year after culvert maintenance was conducted (Burns 2010). The BCMCP also periodically maintains a ditch in the deep emergent marsh along the south side of John Reed Road (Burns 2010). This is done to reduce standing water that serves as mosquito breeding habitat.

Rare Species. The Lloyd Center installs seasonal symbolic fencing (simple post and string fencing with educational signs) from April 1–August 31 at DEML to protect nesting habitat for rare shorebirds in accordance with federal and state guidelines (DFW 1993; Atlantic Coast Piping Plover Recovery Team 1996). Symbolic fencing protects the area of beach from the low tide mark to the back dune area, described as maritime beach strand habitat. The USFWS considers beach strand habitat and their dependent species a priority resource concern along the Atlantic coast due to a variety of significant human pressures (Defeo et al. 2009; USFWS 2000).

Use of motorized vehicles (e.g. lifeguard OHVs) is a potential threat to piping plovers and their habitats. Vehicles can crush eggs, adults, and chicks. Chick behavior, including foraging from the dune line to the shoreline or crouching motionless to avoid human induced or predatory threats, increases their

vulnerability to vehicles. Guidelines are available for driving rules for essential vehicles on piping plover beaches (DFW 1993).

Local dedicated volunteers and the Lloyd Center have traditionally documented diamond-backed terrapin nests. When discovered, nests are provided protection measures (e.g. predator exclosures and monitoring). Predator exclosures can be used to protect nests and should be closely monitored and removed prior to the hatching date. When hatchlings are observed and in danger from recreational activity, they are escorted to the Slocums estuary or Giles Creek (Bogart et al. 2010). Unless permitted by the NHESP, no diamond-backed terrapin nests shall be removed from the property.

Park staff, NHESP personnel, or volunteers with the New England Wildflower Society conduct annual plant surveys for the park's two legacy species and other rare plants.

Invasive Species. In 2006, the DCR's Lakes and Ponds Program initiated a common reed control project on six DCR properties including DEML (Aquatic Control Technology, Inc. 2006). Licensed pesticide applicators controlled ten distinct populations totaling 1.62 acres. Nine populations were controlled through the use of a Glyphosate based herbicide applied with a backpack sprayer. The tenth population was controlled by cutting plants and applying herbicide to the cut stems; this was done in order to avoid impacts to rare species. Follow-up treatment and monitoring has not occurred, although long-term management recommendations were provided (Aquatic Control Technology, Inc. 2006).

Forest Inventory. There are two CFI plots. The first is located northwest of George's Pond and the second is adjacent to Barney's Joy Road. Both plots were inventoried in 2011.

The DCR's Forest Health Program conducts ongoing monitoring of gypsy moth populations and damage at one study plot on this property.

3.4.2. Cultural Resources

There are no cultural resource management activities unique to this property.

3.4.3. Recreation Resources

Beach

Waterfront Area. Personnel perform a variety of activities related to the operation and maintenance of both the guarded waterfront day use beach and the large picnic facility. The beach is typically guarded from Memorial Day through Labor Day, but the length of the season could be impacted by funding constraints.

Safety challenges include unique currents, changing shorelines, and ease of visitor access to remote, unguarded tidal flats. With limited staff numbers, the guards must watch over a heavily used beach area with boundaries that are difficult to delineate.

Beach Management. Overall, there is less management of the beach at DEML than at HBCH. Beach raking seldom occurs. Seasonal sand fencing is not erected to capture blowing sand; more permanent sand fencing is seldom installed, although areas of the fragile dune system could afford such protection measures. Sand fencing may adversely affect rare nesting shorebirds; placement of fencing in new locations should receive Lloyd Center guidance and NHESP approval.

3.4.4. Infrastructure

Roads. Demarest Lloyd Memorial State Park Road is owned and maintained by the DCR.

Trails. The DCR Bureau of Forestry coordinated an inventory and condition assessment of trails and roads for many DCR properties, including DEML (not HBCH). Although this RMP indicates there are three trails at DEML, only two highly defined trails (Slocums River and George's Pond) were recorded during the trail and road inventory project.

3.4.5. Interpretive Services

Programming

DCR Programming. In 2011, interpretive programming was provided by the Seasonal Interpreter based at HBCH. They offered six programs that were attended by 189 park visitors.

Programs offered in 2011 included: At Home between the Land and Sea, Beach Ramble, and Creature Feature.

Lloyd Center Programming. The Lloyd Center provides informal education on the biology and protection needs of rare beach-nesting species on the property.

Interpretive Displays

DEML is equipped with a bulletin board for visitors to obtain programming information. A panel conveying the history of DEML is located in front of the comfort station, adjacent to an unpainted iron ranger. An interpretive panel conveying information about piping plovers was formerly located here; it was vandalized and has since been removed.

A series of interpretive panel stands, currently without text, are located at several wildlife viewing spots on the Slocums River Trail. The George's Pond Loop Trail includes four interpretive panels conveying natural resource information and a fifth one conveying trail guideline information. These panels are simple, unadorned wood frames with Plexiglas covers protecting 8.5" x 11" sheets of paper. Information is generally posted by the facilities supervisor by means of printed text on 8.5" x 11" sheets of paper and refreshed on an annual basis. These interpretive panels do not comply with the DCR's graphic standards (DCR n.d.) or interpretive guidance manual (DCR 2006).

3.4.6. Park Operations

Summary of a Busy Summer Day

Because DEML is smaller and less complex than HBCH, its operations are less complex. The following provides a snap-shot of daily management that generally maximize the use of staff and volunteers. These summaries do not include work performed by outside contractors (e.g. coastal rare species protection).

7:30 a.m.–8:00 a.m. Supervisor, Seasonal Supervisor

- Check of buildings and grounds
- Paperwork for day use parking fee collection
- Tickets and start-up money taken to contact station

8:00 a.m.–6:30 p.m. Supervisor, Seasonal Supervisor, Summer Workers

- Park gates opened
- Comfort station opened and cleaned
- Day use parking fee collection
- Litter patrol
- Grounds maintenance
- Reports, staff scheduling, and other office work
- Painting, staining, and other maintenance for buildings and picnic tables
- Cleaning of fire pits and pedestal grills
- Trails maintenance
- Public relations and rules and regulations oversight
- Revenue counted and deposited
- Park closing duties

10:00 a.m.–6:30 p.m. Lifeguards

- Litter and debris pick-up on the beach
- Rake the beach
- Public safety oversight, including lifeguard duties and provision of first aid as needed
- Communicate park closing schedule to visitors
- Empty beach trash barrels
- Return equipment to lifeguard shack
- Close comfort station
- Return radios to HQ for charging

Entrance Fees

Entrance fees are collected for each vehicle or walk-in entering the park. These fees are in accordance with 304 CMR 12 (Appendix H). Cash is collected in a metal cash box and locked in a safe at the end of each day. This method poses an unnecessary safety risk for staff and the facility.

Limited staff are available for the required collection of park fees during peak operating periods. This restricts routine maintenance practices and results in unattended tasks.

Special Use Permits

Events. Permits were secured in 2009 and 2010 for a clambake (25th annual at DEML) and a triathlon.

Public Safety

The need for law enforcement is not extensive. The park gets one local police detail from both Dartmouth and Westport for the busy Fourth of July holiday.

First aid is administered from an on-site first aid response station or at a lifeguard station.

Management Challenges

Management challenges include the public safety concerns related to operating a public waterfront recreation area; the condition of structures and equipment; the accommodation of a large number of visitors to the picnic areas; and the protection of natural resources, including rare nesting piping plovers, least terns, and diamond-back terrapins.

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Historic military observation towers among coastal shrubland at Gooseberry Neck.

SECTION 4. RECOMMENDATIONS

4.1. INTRODUCTION

This Resource Management Plan provides a framework for achieving a sustainable balance between the provision of quality outdoor recreational opportunities and the conservation of important natural and cultural resources. This requires knowledge of a property's natural and cultural resources and the identification of compatible recreational activities.

Previous sections have described the natural, cultural, and recreation resources of HBCH and DEML and their management (Sections 2 and 3, respectively). This section considers the future of these properties and provides recommendations that, when implemented, will conserve and enhance natural and cultural resources while offering sustainable nature based recreation.

This section includes two types of recommendations, Land Stewardship Zoning and specific recommendations. Land Stewardship Zoning provides general guidance on compatible land uses throughout the planning unit. Specific recommendations address existing and developing issues, challenges, and opportunities within the Horseneck Planning Unit. Collectively, these recommendations are the means by which this plan's goals and management principle are realized.

4.2. LAND STEWARDSHIP ZONING

Resource Management Plans must protect natural and cultural resources and ensure consistency between recreation, resource protection, and sustainable forest management (M.G.L. Chapter 21: Section 2F). The zoning of properties through Land Stewardship Zoning at the planning unit level is the mechanism through which consistency and compatibility is ensured.

4.2.1. Landscape-level Zoning

DCR Landscape Designations

As an overarching template for organizing its land management activities, the DCR is adopting a management structure that sub-divides its state and urban properties into three landscape designations: (1) reserves, (2) parklands, and (3) woodlands. The three landscape designations are intended to recognize and enhance the provision of ecosystem services by segregating incompatible activities and allowing for prioritization of goals.

Reserves. Areas designated as reserves are representative of the Commonwealth's least fragmented, diverse forest settings, where the dominant ecosystem service objectives are biodiversity maintenance and the underlying supporting services of nutrient cycling and soil formation, watershed protection, and long-term carbon sequestration; important secondary services include the provision of wilderness values and recreation.

Parklands. In parklands, the primary ecosystem service objectives are the provision of public recreational opportunities that depend on natural areas, preservation of ecologically significant areas and special places, and promotion of cultural values (aesthetic, historical, educational, and tribal).

Woodlands. Woodlands emphasize the provision of ecosystem services that require management prescriptions with intensities that are less compatible with the activities in the parklands or reserves. One role for woodlands would be demonstrating, to private and municipal landowners and the general public, the practice of sustainable forestry through active forest management.

Landscape Designation Application to the Horseneck Planning Unit

The proposed landscape designation for HBCH and DEML is parklands. The DCR sponsored a public meeting on June 7, 2011 in Dighton to describe the proposed landscape designations for state forests, parks, and reservations in southeastern Massachusetts and to receive public comments on the proposed designations.

4.2.2. Planning Unit-level Zoning

The development and application of Land Stewardship Zoning at the planning unit level is the result of a step-by-step analysis of the unit's natural and cultural resources, compatible public access, and recreational uses. It allows for the management of properties at a finer scale, and with greater specificity, than is possible through the landscape-level designations. Land Stewardship Zoning provides the agency with the ability to apply site specific management treatments, as appropriate within the construct of the larger landscape designation, such as the inclusion of Zone 1 for resource protection measures within a parkland.

Land Stewardship Zoning Guidelines

Land Stewardship Zoning Guidelines provide a framework that guides the long-term management of parks, reservations, and forests. These guidelines define three standard zones, which are identified for all properties in an RMP. They also define significant feature overlays that are applied on a supplemental basis. The development and application of these guidelines is the result of a systematic analysis of the natural and cultural resources of the reservation, compatible public access, and recreational uses.

Zone 1. Highly sensitive natural and cultural resources that require special management approaches to protect and preserve their features and values. Examples include rare species habitat identified as being highly sensitive to human activities, archaeological or cultural sites, and rare or exemplary natural communities.

Zone 2. Areas containing commonly encountered yet important natural and cultural resources on which standard forestry practices and dispersed recreational activities occur at sustainable levels, without damaging the potential for improved ecological health, productivity, or protection through active management. Examples include ecosystems characterized by a diversity of wildlife and plant habitats, rare species habitat that is compatible with sustainable forestry and dispersed recreation, agricultural resources, and resilient cultural sites and landscapes.

Zone 3. Developed administrative, maintenance, and recreation sites, structures, and landscapes that accommodate concentrated use by staff and visitors and require intensive maintenance. Examples include park headquarters and maintenance areas, parking lots, swimming pools and skating rinks, paved bikeways, swimming beaches, campgrounds, playgrounds and athletic fields, parkways, golf courses, picnic areas and pavilions, and concessions.

Significant Feature Overlays. The three land stewardship zones may be supplemented with significant feature overlays that identify specific, formally designated or otherwise recognized resources. These overlays recognize, maintain, protect, or preserve unique and significant values, regardless of the zone in which they occur, and provide more precise management guidance.

Examples of significant feature overlays include areas subject to public drinking water regulations or areas subject to historic preservation restrictions. Specific management guidelines are provided by resource specialists or by the government agency that has recognized and listed the resource or site.

A more detailed description of the Land Stewardship Zoning Guidelines is available at: http://www.mass.gov/dcr/stewardship/rmp/lszguidelines.htm.

4.2.3. Applied Land Stewardship Zoning for the Horseneck Planning Unit

Application of the land stewardship zones is the result of an analysis of natural and cultural resources, in the context of compatible public recreation and park management activities.

Recommended Land Stewardship Zoning
Horseneck Beach State Reservation
(Figure 4.2.1)

Zone 1

- The entire barrier beach dune system, comprising a strip of varying width located landward of the beach. Protecting the integrity of the dune system is a priority for long-term stewardship of the entire barrier beach system.
- The Westport River estuarine marsh system, including sensitive coastal wetlands and habitat for osprey.
- All of Gooseberry Neck, encompassing everything south of the parking area. This includes a maritime shrubland community with rare species habitat, rare shorebird and tern breeding habitat along the beach, and the World War II era military observation site.

Zone 2

- The maritime forest community located landward of the barrier beach dune system.
- The Gooseberry Neck parking area, which is intended to support public access for low impact uses of the island.

Zone 3

- Portions of the reservation that support the most intensive levels of use, including the beach parking and administrative areas, the campground area located landward of the primary dune, and the beach itself.

Significant Feature Overlay

- Rare shorebird significance overlay for the beach, with NHESP management guidelines. This overlay covers piping plover nesting and foraging habitat and least tern nesting habitat.
- Rare animal significance overlay. This overlay includes Priority Habitat for this species, as identified by the NHESP in 2012. However, most of the area represented by this overlay contains neither animal observations nor Priority Habitat. It is anticipated that the area of this overlay will decrease following the recommended "rare animal" surveys.

Recommended Land Stewardship Zoning
Demarest Lloyd Memorial State Park
(Figure 4.2.2)

Zone 1

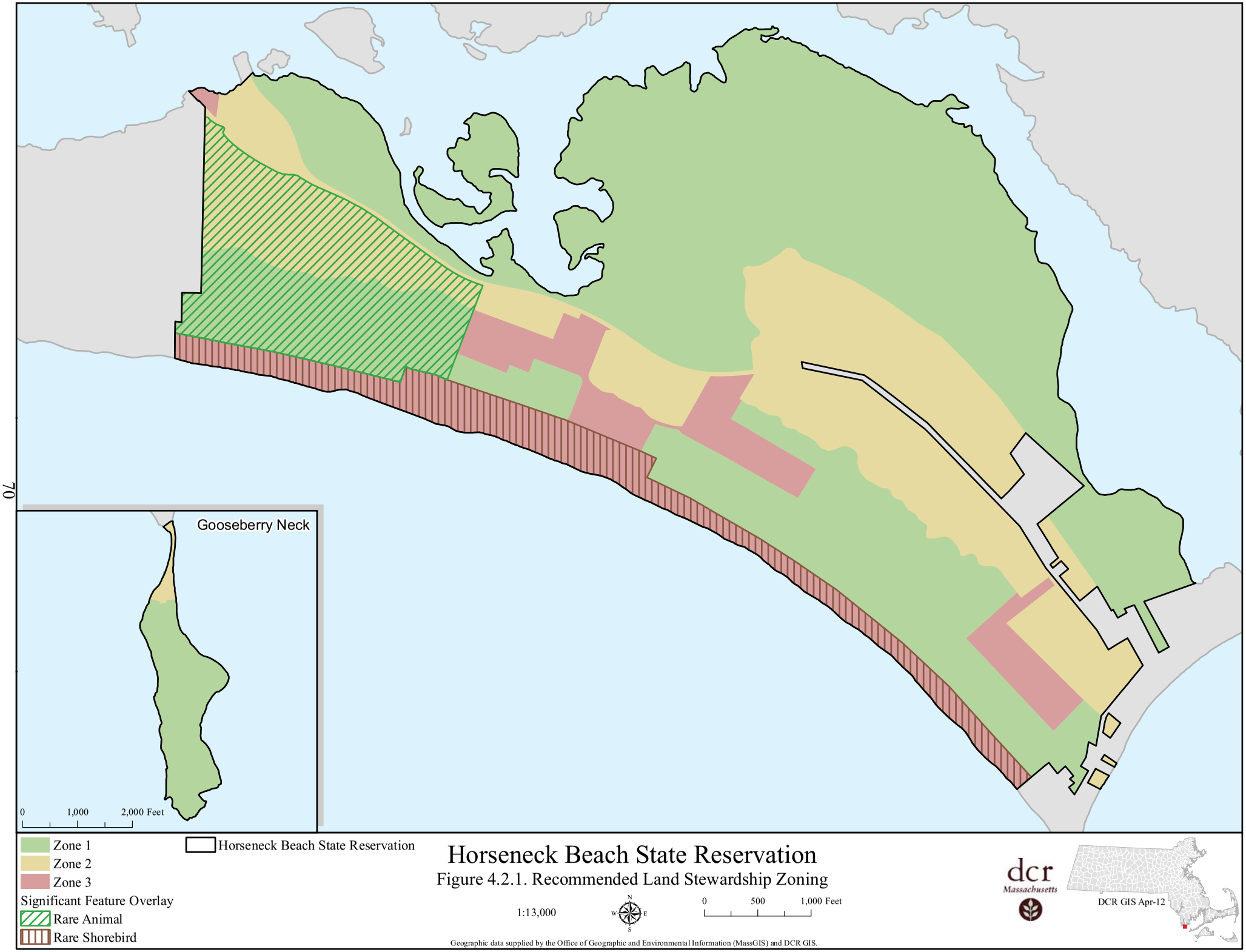
- The primary dunes, an area that is critical for the long-term protection of this coastal barrier ecosystem.
- The coastal marsh area located at the mouth of the Slocums River, which includes rare plant habitat.

Zone 2

- The maritime forest community and associated salt pond wetlands system.

Zone 3

- The beach and picnic areas


Gooseberry Neck
0
1,000
2,000 Feet
Zone 1
Zone 2
Zone 3
Significant Feature Overlay
Rare Animal
Rare Shorebird
Horseneck Beach State Reservation
Horseneck Beach State Reservation
Figure 4.2.1. Recommended Land Stewardship Zoning
1:13,000
N
W
E
S
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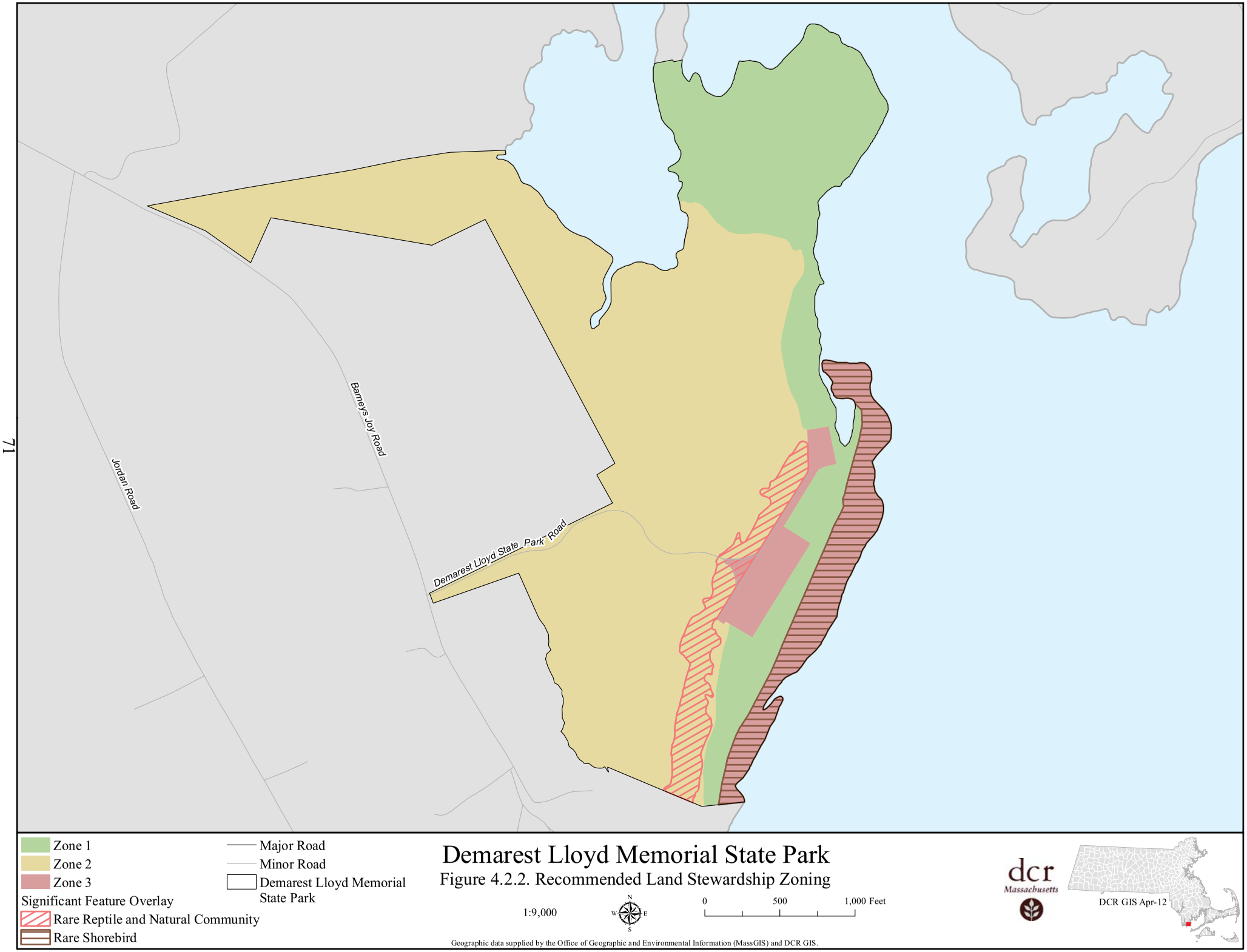
500
1,000 Feet
dcr
Massachusetts
DCR GIS Apr-12
Geographic data supplied by the Office of Geographic and Environmental Information (MassGIS) and DCR GIS.



Demarest Lloyd Memorial State Park

Figure 4.2.2. Recommended Land Stewardship Zoning

Geographic data supplied by the Office of Geographic and Environmental Information (MassGIS) and DCR GIS.

Significant Feature Overlays

- Rare shorebird significance overlay, with NHESP management guidelines. This overlay covers piping plover nesting and foraging habitat and least tern and common tern nesting habitat.
- Rare reptile and natural community significance overlay, with respective NHESP management guidelines. This overlay includes diamond-backed terrapin nesting habitat in the picnic areas and examples of the coastal interdunal marsh swale community type adjacent to George's Pond.

4.3. MANAGEMENT RECOMMENDATIONS

Management Principle

The resource management planning process for HBCH and DEML has established a management principle: *Achieve a sustainable balance between the conservation of important coastal resources in a dynamic ecosystem, with the provision of recreational opportunities for all.*

Management Goals

The following four management goals have been identified to achieve the management principle. These goals are of equal importance and are not placed in priority order.

Goal 1. Protect and enhance the functions of the dynamic barrier beach geology and ecosystem to make them more resilient in the face of climate change.

Goal 2. Maintain and enhance sustainable recreational opportunities through thoughtful use of limited operational resources and by facility design and improvements appropriate to a barrier beach ecosystem.

Goal 3. Increase our understanding of significant natural and cultural resources and protect and enhance these resources through appropriate stewardship strategies.

Goal 4. Promote public awareness and understanding of natural and cultural resources to increase support of the Department of Conservation and Recreation's stewardship strategies.

Recommendations

These management recommendations have been organized first by the planning unit as a whole, for those that apply to both HBCH and DEML, and then by individual facility. The set of recommendations that apply to each are presented by the four management goals identified for the Horseneck Planning Unit.

Horseneck Planning Unit

Management recommendations applicable to the entire planning unit are presented in Table 4.3.1.

Horseneck Beach State Reservation

Management recommendations for Horseneck Beach are presented in Table 4.3.2.

Demarest Lloyd Memorial State Park

Management recommendations for Demarest Lloyd are presented in Table 4.3.3.

Table 4.3.1. Recommendations for the entire Horseneck Planning Unit.

Recommendation	Priority[a]	Resources[b]	Implementation[c]
Goal 1. Protect and enhance the functions of the dynamic barrier beach geology and ecosystem to make them more resilient in the face of climate change.			
Explore grant opportunities to purchase sand fencing and other dune protection materials for the long-term management of the barrier beach systems.	H	2	P, X
Incorporate estimates of projected sea level change in future master plans and other plans involving the construction or reconstruction of infrastructure.	M	2	C, P
Goal 2. Maintain and enhance sustainable recreational opportunities through thoughtful use of limited operational resources and by facility design and improvements appropriate to a barrier beach ecosystem.			
Provide staff training in the use of portable AED units.	H	1	B, R
Obtain visitorship data to determine visitor demographics and assess additional operational needs.	H	1	P, R
Provide for greater ADA accessibility to the water.	H	2	O, P, R
Explore opportunities to improve the speed of internet service for park operations.	M	1	O
Organize Coastsweep events for each fall.	M	2	R, X
Secure a snowplow for the planning unit for snow removal duties, to maintain public access and safety during the winter months.	M	2	R
Facilitate the increased off-site sale of ParksPasses to the public through the development of an online sales capacity and notifying buyers from prior years when they become available to ensure early purchases.	M	2	O, X
Streamline the ParksPass processing routine to eliminate hand recording of license plate numbers, possibly through an automated vehicular pass line, so that staff time is used more effectively and idling of vehicles is decreased.	M	3	O, R
Conduct customer profile surveys to collect useful data on user interests for future planning and engineering projects related to development of sustainable recreation resources.	M	3	P, X

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Table 4.3.1. Recommendations for the entire Horseneck Planning Unit. (Continued)

Recommendation	Priority[a]	Resources[b]	Implementation[c]
Goal 3. Increase our understanding of significant natural and cultural resources and protect and enhance these resources through the implementation of appropriate stewardship strategies.			
Offer annual Rare Species Management and Beach Operations training for seasonal and lifeguard staff, heavy equipment operators, and volunteer shorebird monitors.	H	1	P
Request yearly operational funding for rare shorebird and endangered species protection.	H	1	P, R
Precede any ground disturbance activities by an archaeological survey to identify sensitive resources. Consult the Office of Cultural Resources.	H	1	P
Pursue mitigation funds from the 2003 *Bouchard No. 120* oil spill for predator control activities for the purpose of rare species protection.	H	1	L, P
Install fishing line receptacles in prime fishing locations to reduce wildlife hazards.	M	1	R, V
Familiarize staff with strategic oil response locations located in the Massachusetts Marine Oil Spill Prevention and Response Program and the Buzzards Bay Geographic Response Plan.	M	1	P, R
Evaluate potential vernal pools for certification and submit certification paperwork to the NHESP.	M	2	P, V
Conduct a renewable energy feasibility study to determine the economic and technical feasibility of providing clean electrical power, while minimizing visual and wildlife impacts.	M	3	C, E, P
Promote ways to inventory plants and animals to document species using the land. Focus land management and habitat protection for species identified in the *Massachusetts Comprehensive Wildlife Conservation Strategy*.	M	3	P, R, X
Consult osprey specialists on the placement of new osprey breeding platforms. Collaborate with volunteers and local organizations to install and monitor these platforms.	L	3	P, R, V

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Table 4.3.1. Recommendations for the entire Horseneck Planning Unit. (Continued)

Recommendation	Priority[a]	Resources[b]	Implementation[c]
Goal 4. Promote public awareness and understanding of natural and cultural resources to increase support of the Department of Conservation and Recreation's stewardship strategies.			
Post animal regulations on durable and visible signs and increase enforcement of all DCR regulations.	H	1	B
Establish a volunteer program to educate park visitors about shorebird ecology and management; provide yearly trainings and oversight of volunteers.	H	2	P, R, V
Install creative Carry In-Carry Out trash signs to encourage visitor stewardship of the resources.	M	1	R
Routinely update visitor information at existing bulletin boards and kiosks. Consult the Regional Interpretive Coordinator and the DCR graphic standards and interpretive guidance documents for the creation and placement of these boards and kiosks.	M	1	R, X
Supply DCR "gull study" brochures (available online) to visitors in order to educate the public about not feeding gulls. Install signs to deter gull feeding activity.	M	1	R
Train regional and planning staff on the material within the draft 2012 CCMP for integration of applicable information into planning unit projects.	M	1	R, P
Actively foster further development of friends groups and work with them to develop formalized volunteer programs to assist with a number of tasks that can support park staff.	M	2	R, X, V
Install fencing that conceals dumpsters without impeding access and install gull proof features.	M	2	R, E
Expand or establish partnerships to provide increased interpretive/educational events and programming.	M	2	R, V
Create new kiosks and wayside panels with the same consultation guidance as above.	M	3	B, P, R, X
Develop a Comprehensive Interpretive Plan in cooperation with the Lloyd Center, the Westport River Watershed Alliance, and the Westport Fishermen's Association.	M	3	B, R, V

a. Priorities are: High (H), Medium (M), or Low (L).

b. Availability of resource for implementing recommendations: 1 = funding is currently available; 2 = funding is currently unavailable, but may become so in the near future; and 3 = funding is currently unavailable, but may become so in more than five years.

c. The following codes identify the party responsible for implementing the recommendation: B – Bureau of Ranger Services; C = contractor or consultant; E = Bureau of Engineering; L = Legal Services; O = Other; P = Bureau of Planning and Resource Protection; R = regional or district staff; S = Department of Special Events; V = volunteer or partner; X = Office of External Affairs and Partnerships.

Table 4.3.2. Recommendations for Horseneck Beach State Reservation.

Recommendation	Priority[a]	Resources[b]	Implementation[c]
Goal 1. Protect and enhance the functions of the dynamic barrier beach geology and ecosystem to make them more resilient in the face of climate change.			
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.	H	1	C, P, R
Continue partnership efforts with the Massachusetts Beach Buggy Association to assist DCR staff with winter sand fence installation in accordance with approved maintenance plans.	H	2	R, V
Review conceptual plans and finalize the design for the Central Plaza enhancement and dune restoration. Consult the 2008 draft Request for Design Services proposal.	H	2	P, R, V
Eliminate unofficial trails within the primary and secondary dune system, including the forested dunes. Consult with the NHESP, Lloyd Center, CZM and DCR Ecology Program when closing footpaths.	M	1	P, R, V
Maintain current, and install additional, dune protection signs.	M	1	R
Restrict law enforcement and trash removal vehicles to the upper beach paved access road, except in emergency situations, in order to decrease adverse impacts to sensitive rare species on the beach.	M	1	R
Consult with the Buzzards Bay National Estuary Program to seek opportunities to improve the two tidally restricted culverts under John Reed Road.	M	1	P
Secure illegal entry points along the property fence at the western end of Horseneck Beach State Reservation (Bridge Street) to minimize uncontrolled foot traffic and illegal dumping in a sensitive resource area.	M	1	E, R
Monitor structural stability of the Thomas Edward Pettey Causeway and repair when necessary to preserve access.	M	2	E, R
Update the coastal processes study with the goal of providing recommendations for protecting portions of East Beach Road near the lifesaving station.	M	3	C, P
Redesign the campground to enhance both the visitor experience and the function of the barrier beach system.	M	3	E, P
Evaluate the beneficial reuse of compatible sand to rebuild and stabilize the dune system at the campground.	M	3	C,P
Complete the removal of six acres of impervious surface in the Central Plaza.[d]	M	3	C, E
Construct two additional ADA compliant dune crossings.[d]	L	2	C, E

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Table 4.3.2. Recommendations for Horseneck Beach State Reservation. (Continued)

Recommendation	Priority[a]	Resources[b]	Implementation[c]
Goal 2. Maintain and enhance sustainable recreational opportunities through thoughtful use of limited operational resources and by facility design and improvements appropriate to a barrier beach ecosystem.			
Return to the previous method of communicating park status and traffic conditions (i.e. notifying the State Police who then notify MassDOT) to travelers along Route I-195; request that MassDOT install a sign to inform east-bound travelers.	H	1	R, O
Install new gates and replace the deteriorating gates at the east parking lot and offer a one-way traffic lane along the access road behind the Beach Services Building and an exit only lane from the east parking lot.	H	2	R
Adjust the radio frequency for improved radio communication. Provide eight radios, for essential staff, that will be equipped to work on two channels simultaneously at HBCH.	H	2	R
Install security cameras at Lots 2 and 3.	H	2	C, R
Finalize and implement the 2009 Stormwater Runoff Improvement Project's design plans for traffic circulation and parking lot improvements; include the allocation of centralized parking for critical staff and additional accessible parking.	H	3	O, P, R
Prepare a Transportation Demand Management Plan.	H	3	C, P
Review the current schedule of State Police details, and collaborate with the police to determine if changes in shift hours or days are options.	M	1	B, R
Temporarily deliver beach wheelchairs to the contact station each morning to advertise the equipment and ease visitor pickup until the Central Plaza is redesigned. Alternatively, store them seasonally and securely under an elevated comfort station that is accessible to staff.	M	1	R
Install Mobi-Mat® RecPath, or comparable product, to provide ADA access from Central Plaza area to the beach.	M	2	R
Install additional bike racks at the new comfort stations and at the Beach Services Building.	M	2	P, R
Improve the cash control system in the contact station while outlining a protocol for parking fee collection and monitoring.	M	2	L, R
Study closing Pettey Causeway to automobiles to reduce operational concerns and vandalism to resources.	M	2	P, R
Install a new gate at the entrance of the reservation at the western end of East Beach Road to decrease illegal vehicle access.	M	2	R
In association with a new public process, develop, permit, and implement a plan for redesigning the campground.	M	3	C, E, P
Assess current use levels and future needs for existing recreation facilities such as the basketball court, volleyball court, and playground.	M	3	P, R
Improve the port-a-john area at Gooseberry Neck to create a facade that conceals these structures, allows for their maintenance, and minimizes vandalism. Incorporate ADA compliant port-a-johns into the design.	M	3	P, R
Explore options to create low impact sustainable trails.	L	2	B, P
Construct a sand volleyball court and a new paved basketball court in the campground.[d]	L	3	C, E, R

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Table 4.3.2. Recommendations for Horseneck Beach State Reservation. (Continued)

Recommendation	Priority[a]	Resources[b]	Implementation[c]
Goal 3. Increase our understanding of significant natural and cultural resources and protect and enhance these resources through the implementation of appropriate stewardship strategies.			
Upon hiring, have Coastal Ecologist meet with NHESP staff to discuss rare species management, including unresolved regulatory issues.	H	1	P
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.	H	1	P
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.	H	1	P
Maintain the symbolic shorebird fencing through the fall migration season (August–October) to protect important feeding and resting zones of imperiled bird species. Replace restricted area signs with critical migration habitat signs.	H	1	P, V
Secure the observation towers on Gooseberry Neck to prevent public entry and injury and establish routine monitoring of towers by park staff to ensure that the measures taken are not removed by vandals.	H	1	P, R
Create a Habitat Management Plan for mowing practices in rare species habitat on Gooseberry Neck and for the removal of Japanese knotweed at HBCH and along the trails of Gooseberry Neck. Obtain NHESP and conservation commission approval.	H	2	P
Conduct diamond-backed terrapin surveys in the marsh system and associated dune system. Once permitted by the NHESP, volunteers can help monitor or protect nests.	M	1	P, V
Conduct "rare animal" surveys to determine if this species is present on the reservation.	M	2	P, R, V
Update and implement the permitted prescribed burn project for Gooseberry Neck. Arrange for post-fire monitoring by skilled volunteers with assistance from the DCR Ecology Program.	M	2	O, P, V
Prepare an eradication plan to address the common reed infiltration into the three salt ponds on Gooseberry Neck in coordination with the NHESP, DEP, and Westport Conservation Commission. Post-control, work with the NHESP to conduct a yearly rare plant survey to monitor new recruitment of rare species.	M	2	P, V
Conduct a structural engineering and feasibility analysis to identify current stabilization needs for the towers on Gooseberry Neck; outline proactive protection and security measures and evaluate potential long term reuse options.	M	2	E, P
Install an iron ranger at the Central Plaza to maximize visibility and encourage donations.	M	2	R, X
Conduct a brackish salt marsh survey to determine if this unique natural community is present.	L	3	P

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Table 4.3.2. Recommendations for Horseneck Beach State Reservation. (Continued)

Recommendation	Priority[a]	Resources[b]	Implementation[c]
Goal 4. Promote public awareness and understanding of natural and cultural resources to increase support of the Department of Conservation and Recreation's stewardship strategies.			
Install appropriate regulatory warning signs along the length of the emergency access road and other significant paved areas to reduce potential adverse impacts to rare species.	M	1	P, R, V
In association with the NHESP and the Lloyd Center, develop and approve an action plan to protect piping plover nests established on paved areas.	M	2	P, V
Relocate the interpretive wayside sign on piping plover closer to piping plover nesting habitat to enhance visitor education.	M	2	P, R
Develop a seasonal interpreter center by installing a seasonal shed on the beach or by providing space in the current buildings.	M	3	P, E, R

a. Priorities are: High (H), Medium (M), or Low (L).
b. Availability of resource for implementing recommendations: 1 = funding is currently available; 2 = funding is currently unavailable, but may become so in the near future; and 3 = funding is currently unavailable, but may become so in more than five years.
c. The following codes identify the party responsible for implementing the recommendation: B – Bureau of Ranger Services; C = contractor or consultant; E = Bureau of Engineering; L = Legal Services; O = Other; P = Bureau of Planning and Resource Protection; R = regional or district staff; S = Department of Special Events; V = volunteer or partner; X = Office of External Affairs and Partnerships.
d. This recommendation was identified in the Draft Environmental Impacts Report (i.e. "Alternative Sustainable Recreation Master Plan"; I. T. Almy Associates and Caputo and Wick, Ltd. 1999) but not implemented.

Table 4.3.3. Recommendations for Demarest Lloyd Memorial State Park.

Recommendation	Priority[a]	Resources[b]	Implementation[c]
Goal 1. Protect and enhance the functions of the dynamic barrier beach geology and ecosystem to make them more resilient in the face of climate change.			
Prepare a Barrier Beach Management Plan; obtain state and municipal agency approval.	H	1	P, R, V
Close beach access from the most northeastern dune crossing due to sensitive resources and conflicts with poison ivy and common reed invading the pathway.	M	1	R
Study the sediment transport system near the mouth of the Slocums River to determine the feasibility of dredging the river and nourishing the recreation beach and address the "poor" condition rating given in the MA Coastal Infrastructure Inventory and Assessment Project.	M	3	C, P, E, R
Goal 2. Maintain and enhance sustainable recreational opportunities through thoughtful use of limited operational resources and by facility design and improvements appropriate to a barrier beach ecosystem.			
Evaluate the potential to restrict public access to the northern spit of beach (beyond public boat ramp) to promote shorebird breeding success and to enhance public safety by addressing unsafe swimming conditions in this area.	H	1	P, R,
Install universally accessible picnic tables.	H	2	O, R
Install visible trailhead signs and create either informative brochures detailing the trail system or a self-guided tour.	M	3	P, R, X
Restore the large group picnic area behind the administration building.	L	3	R

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Table 4.3.3. Recommendations for Demarest Lloyd Memorial State Park. (Continued)

Recommendation	Priority[a]	Resources[b]	Implementation[c]
Goal 3. Increase our understanding of significant natural and cultural resources and protect and enhance these resources through the implementation of appropriate stewardship strategies.			
Relocate picnic tables when diamond-backed terrapins nest nearby and predator exclosures are not an option.	H	1	R
Coordinate implementation of the BCMCP plan to restore drainage ditches leading to George's Pond for greater tidal flushing and a reduction in common reed populations.	H	2	P, R, V
Evaluate the potential impacts of BCMCP removing several large rocks that restrict tidal flow within the marsh creek. Consultation with the DEP, CZM, NHESP, Dartmouth Conservation Commission, and the DCR's Office of Cultural Resources and Ecology Program is required.	H	2	P, R
Continue state-listed rare plant surveys with the NHESP, New England Wildflower Society, and Lloyd Center.	H	3	P, V
Consult the NHESP's conservation plant biologist for habitat management recommendations to improve rare plant habitat.	M	1	R, V, P
Perform yearly diamond-backed terrapin management with guidance from the NHESP Turtle Conservation Biologist.	M	1	P, V
Conduct annual inspections of stone walls; replace fallen stones and remove saplings within five-feet of the feature.	M	2	R, V
Submit a request through the regional office and the Conservation Trust Program to participate in the Iron Ranger Painting Program to increase donations to the parks.	M	2	R, V, X
Install a guardrail along the parking lots parallel to the picnic areas to prevent vehicles from driving and parking at picnic table locations. Determine if an appropriate drop-off location could be established to improve accessibility for picnic area users.	M	3	E, P, R
Install a curb along the entrance road leading to the salt marsh overpass to reduce the amount of debris entering the creek.	M	3	E, P, R
Evaluate, with consultation from the NHESP, the placement of the park organic refuse pile to avoid adverse impacts to rare species habitat or the rare interdunal marsh swale natural community.	L	2	P, R
Goal 4. Promote public awareness and understanding of natural and cultural resources to increase support of the Department of Conservation and Recreation's stewardship strategies.			
Post signs directing park users to report diamond-backed terrapin nesting locations to park staff or the Lloyd Center.	M	2	R, X
Update interpretive panels along the Slocums River Trail to interpret historic agricultural use of the park, Native American activities along the Slocums River, and natural resources of the area.	M	2	B, P, X
Provide staff training on the history and preservation of the stone walls.	M	2	P
Upgrade the trail system in accordance with the NHESP's guidance for trail improvements and the DCR's *Trails Guidelines and Best Practices Manual*.	M	2	P, R
Photograph and document locations of the stone walls using GPS.	L	2	P

a. Priorities are: High (H), Medium (M), or Low (L).
b. Availability of resource for implementing recommendations: 1 = funding is currently available; 2 = funding is currently unavailable, but may become so in the near future; and 3 = funding is currently unavailable, but may become so in more than five years.
c. The following codes identify the party responsible for implementing the recommendation: B – Bureau of Ranger Services; C = contractor or consultant; E = Bureau of Engineering; L = Legal Services; O = Other; P = Bureau of Planning and Resource Protection; R = regional or district staff; S = Department of Special Events; V = volunteer or partner; X = Office of External Affairs and Partnerships.

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