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

RESOURCE MANAGEMENT PLAN

Myles Standish Planning Unit

Including Myles Standish State Forest

December 2011

Cover Photo
American Lady Butterfly on Asters by Bob Conway

"I will walk in the woods forever, gazing at its beauty and at all that it offers my eyes.
I will dwell upon the beauty of its plants, its animals, and see the radiance of abundant color.
I will share with all through my eyes so that you might see it as I do.
I ask that you protect it so future generations may enjoy the beauty and splendor as well."

Bob "Grumpy" Conway (1946-2010)

dcr
Massachusetts

Myles Standish Planning Unit

Including Myles Standish State Forest

RESOURCE MANAGEMENT PLAN

2011

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

Resource Management Plans (RMPs) provide guidelines for management of properties under the stewardship of the Department of Conservation and Recreation (DCR). RMPs are working documents to assist with setting priorities, enabling the Department to adapt to changing fiscal, social and environmental conditions. The planning process provides a forum for communication and cooperation with park visitors, partners and the surrounding communities to ensure transparency in the DCR's stewardship efforts.

The purpose of this RMP is to achieve a sustainable balance between the conservation of important natural and cultural resources and the provision of quality outdoor recreational opportunities. Myles Standish State Forest (MSSF) contains a significant portion of the third largest Pine Barrens in the world and numerous coastal plain ponds, harboring rare plants and wildlife.

MSSF is the largest publicly owned recreation area in southeastern Massachusetts. MSSF offers 429 camping sites and 138 private cottages, tucked into the forest or set along the edge of seven of the forest's 58 ponds. Day use areas at College and Fearing ponds offer picnicking, swimming, fishing and canoeing. Fifteen miles of paved bicycle trails, over 28 miles of equestrian trails and 79 miles of hiking trails and unpaved forest roads take visitors deep into the forest. The Massachusetts Division of Fisheries and Wildlife (DFW) manages Fearing Pond for fishing and pheasant and quail Wildlife Management Areas for hunting within MSSF.

This RMP represents both a connection to the historic past and a guide to the future of Myles Standish State Forest. This RMP advances the DCR's efforts to prepare RMPs for every state forest, park and reservation across the Commonwealth.

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 the DCR, our facilities and our programs, please visit us at www.mass.gov/dcr. Contact us at mass.parks@state.ma.us.

Contents Page

Contents Page

Contents Page

List of Tables

Contents Page

List of Figures

Appendices

EXECUTIVE SUMMARY

INTRODUCTION

Resource Management Plans (RMPs) are working documents that consider the past, present and future of a forest, park or reservation. They include an inventory and assessment of environmental, cultural and recreation resources; identify unique characteristics and values; and develop clear management goals and objectives. RMPs provide a guide to the short and long-term management of properties under the stewardship of the Department of Conservation and Recreation (DCR). They are intended to be working documents for setting priorities, capital and operational budgeting, resource allocation and enhancing communication and cooperation with park visitors and the surrounding communities.

The Department of Conservation and Recreation is directed 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." Although the mandate does not specify the format or content of these management plans, it does require the following:

> *"Said management plans shall include guidelines for the operation and land stewardship of the aforementioned reservations, parks, and forests, shall provide for the protection and stewardship of natural and cultural resources, and shall ensure consistency between recreation, resource protection, and sustainable forest management."*

The legislative mandate also establishes two other requirements. First, that the Commissioner of the Department of Conservation and Recreation "shall seek and consider public input in the development of management plans, and shall make draft plans available for a public review and comment period through notice in the Environmental Monitor." Second, management plans must be reviewed and adopted by the Stewardship Council. Within 30 days of adoption, the Commissioner "…shall file a copy of such management plans as adopted by the council" with the Secretary of State and the Joint Committee on the Environment, Natural Resources, and Agriculture. Resource Management Plans, and the process developed to prepare these plans, exceed all legislative mandates.

This plan covers the Myles Standish Planning Unit, which includes Myles Standish State Forest (MSSF), and conservation restrictions held by the DCR on Camp Cachalot and the Briggs Property, located in Plymouth. The two conservation restrictions are included in this plan because of their physical proximity to Myles Standish State Forest.

MANAGEMENT PRINCIPLE AND GOALS

Myles Standish State Forest (MSSF), the largest public recreation area located in the densely populated southeastern Massachusetts, offers a variety of affordable opportunities for outdoor recreation on 12,404 acres of public land. Each year over 600,000 visitors enjoy camping, swimming, fishing, biking, hiking, horseback riding, snowmobiling, skiing and hunting in the forest.

The State Forest Commission acquired approximately 5,700 acres in 1916 to establish MSSF. Only one state forest in the DCR system (Otter River State Forest) is older than MSSF. During the 1930s, much of the existing infrastructure was constructed by state-funded unemployed crews and the federally-funded Civilian Conservation Corps (CCC), including roads, trails and recreation areas. These crews also continued reforestation efforts in the forest.

The magnificent work of glaciers and coastal geologic processes in southeastern Massachusetts produced a landscape dotted with globally rare natural communities. MSSF contains a significant amount of these globally rare communities, including the third largest Pine Barrens in the world, and numerous coastal plain ponds harboring unique plants and wildlife. MSSF also protects portions of the Plymouth-Carver Sole Source Aquifer, one of the largest groundwater resources in the state.

The DCR is entrusted with the stewardship of MSSF. A thorough inventory and assessment of existing conditions and activities, in concert with substantive public input, is necessary to establish guidelines for future management of MSSF. The following management principle and associated

management goals are identified as a foundational structure for the Resource Management Plan, which will guide future management of this important facility.

Management Principle

Through the creative use of limited state management resources and partnerships, achieve a sustainable balance between the conservation of important natural and cultural resources and the provision of quality outdoor recreational opportunities.

Management Goals

Maintain and enhance habitats for rare species, native plants and wildlife. Implement a program of prescribed fire and mechanical fuel reduction to maintain and improve Pine Barrens habitat for rare Pine Barrens species, as well as to reduce the potential for wildfire. If the Pine Barrens remain undisturbed for long periods of time, the ecosystem will transition into shade-tolerant white pine and hardwood forests, displacing rare species that rely on open Pine Barrens habitat. Remove tree plantations consisting of non-native pine species to reduce fire danger and improve Pine Barrens habitat. Pursue the acquisition or protection of in-holdings and abutting properties containing significant Pine Barrens habitat.

Protect and enhance the quality of water resources within the forest. Manage water resources of the forest to ensure healthy and safe water-based recreation; conserve and improve the habitats of native aquatic plants and animals; and protect the Plymouth-Carver Sole Source Aquifer. Manage the coastal plain pond shores to enhance endangered species habitats and protect them from overuse and avoidable environmental damage.

Preserve the distinct scenic and cultural qualities of the forest. The forest's cultural resources represent a range of human endeavors from pre-contact Native American occupation to cranberry growing. Preservation of these cultural resources and landscapes connects us to our past. Implement practices to protect the intact archaeological record at MSSF. Preserve the CCC landscape and remaining structures.

Provide diverse opportunities for sustainable outdoor recreation. Maintain a sustainable network of walking, hiking, biking, horseback riding, snowmobile and skiing trails to provide connections among day use areas, campground areas and regional greenways. Renovate and maintain comfort stations to provide modern sanitary facilities for public use. Restore natural landscapes surrounding recreation facilities to eliminate recreational damage, improve landscape aesthetics and provide sustainable public access to pond shores. Improve forest roads for safety, aesthetics, fire protection and maintenance.

Expand interpretive and environmental education programs. Effective park management largely depends on the support of well-informed visitors. Provide interpretive programs and materials that educate visitors about the impact of their actions on the forest's important natural and cultural resources.

Involve partners in the achievement of the management goals. Maintain and develop partnerships with other state agencies, adjacent municipalities, non-profit organizations, local universities and businesses to provide quality outdoor recreational opportunities while conserving the important natural and cultural resources of MSSF. Establish and administer sustainable standard practices for users permitted within the forest.

PRIORITY RECOMMENDATIONS

This RMP identifies 86 management recommendations. These recommendations are specific actions to be taken to achieve the six management goals. The following 26 priority recommendations focus on short-term activities to provide healthy habitat for native and state-listed species, improve existing recreation facilities and stabilize existing infrastructure to reduce future maintenance costs.

Short Term Action	DCR Lead Unit
Maintain and enhance habitats for rare species, native plants and wildlife.	
Develop and implement a comprehensive fire management program to include a combination of mechanical fuel reduction and prescribed fire to improve and maintain habitat quality for rare Pine Barrens species, as well as to reduce the potential for an uncontrollable wildfire.	Forestry and Fire Control
Continue to exclude motorized off-highway vehicles (OHV) from MSSF and limit motorized vehicle traffic on unpaved forest service roads and utility corridors to minimal traffic for the purposes of maintenance, safety, habitat management and monitoring. Monitor and enforce OHV restriction using the Park Watch Program with law enforcement support.	Ranger Services
Develop and implement a plan to remove tree plantations consisting of non-native species in consultation with the Forest Reserves Science Advisory Committee to reduce fire danger and improve Pine Barrens habitat. Following cutting, controlled burning should be implemented to stimulate sprouting of native Pine Barrens shrubs.	Forestry
Conduct both natural and cultural resource surveys to identify sensitive resources in areas scheduled for fuel reduction, controlled burns or plantation removal operations.	Planning and Forestry
Maintain a variety of grasslands and early sucessional forests to provide habitat for uncommon grassland and shrubland bird species such as whip-poor-wills, prairie warblers, American kestrels and bluebirds.	Forestry and State Parks
Work with MassWildlife to prepare a new management plan and MOA for the pheasant and quail Wildlife Management Areas to control non-native species, promote native plants and reduce trail impacts in consultation with the NHESP.	Forestry and State Parks
Protect and enhance the quality of water resources within the forest.	
Post invasive species warning signs at the East Head Reservoir, Rocky, Curlew and Charge pond fisherman landings warning boat owners of the need to avoid transporting invasive species from pond to pond on their boats.	State Parks with Lakes and Ponds
Restore compacted and eroded areas at Charge, Fearing, Barrett, College and Curlew ponds.	State Parks
Preserve the distinct scenic and cultural qualities of the forest.	
Until an archaeological survey has been completed, new alterations of undisturbed, level and well-drained areas around ponds and wetlands should be avoided and monitored where activities are already occurring.	State Parks
Back fill the “Homestead” dump site to eliminate the OHV track and restore the original topography.	State Parks
Find a park use for the Perry House that minimizes alterations to the building (e.g. Environmental Police Headquarters, camp store or nature center). If a park use is not found, consider the property for inclusion in the Historic Curatorship Program.	State Parks with Cultural Resources

Short Term Action	DCR Lead Unit
Preserve the distinct scenic and cultural qualities of the forest. (Continued)	
Stabilize the CCC Fearing Pond bathhouse to avoid further deterioration.	Engineering
Provide diverse opportunities for sustainable outdoor recreation.	
Re-open the picnic area and beach at Fearing Pond to reduce over use of the College Pond day use area during peak summer weekends**.**	State Parks
Expand the College Pond day use area swimming beach.	State Parks
Increase the frequency of comfort station cleanings during peak summer weekends.	State Parks
Replace the central Curlew Pond comfort station to provide accessible facilities with showers and dish washing sinks.	Engineering
Complete minor comfort station exterior repairs, interior renovations and install dish washing sinks at the Charge, Fearing and Barrett pond camping areas.	State Parks
Prepare site plans for each cottage pond that protects sensitive wetland communities, corrects shore erosion, provides appropriate access for public recreation and preserves the cottage communities. The site plans should identify cottages that must be removed or relocated to protect sensitive wetland communities or provide appropriate public recreational access.	Planning with State Parks
For the remaining privately owned cottages, continue the current management policy of eventually eliminating the private cottage program through the gradual retirement of existing permits.	Legal
Work with partners to remove pine needles and prune vegetation along the paved bike path.	State Parks
Repair cracks and heaves along the paved bike trail. As needed, add trail signs at road crossings, winding and hilly areas.	State Parks
Resolve the right-of-way legal issues and repair the road over the East Head Reservoir dam to provide direct access from the West Entrance and Park Headquarters Complex to the College, Charge and Fearing pond use areas, MCI Plymouth, Camp Squanto and Camp Cachalot, reducing heavy truck damage to Lower College and Halfway Pond roads.	Legal and Engineering
Expand interpretive and environmental education programs.	
Provide new interpretive kiosks at the Charge Pond Road Parking Lot #5 and Fire Tower Parking Lot #6. The kiosks should include a map of the forest, forest rules, description of facilities available in the forest and a brochure holder for trail maps. Provide a Fire Danger Sign at the East Entrance.	State Parks

Short Term Action	DCR Lead Unit
Expand interpretive and environmental education programs. (Continued)	
Install interpretive panels and trail map holders on the existing kiosks at the East Entrance Parking Lot #4 and the Upper College Pond Road Parking Lot #2, including a map of the forest, forest rules and a description of facilities available in the forest.	State Parks
Involve partners in the achievement of the management goals.	
Provide assistance to the Friends of MSSF in identifying and controlling invasive plant species within sensitive natural communities.	Ecology
Work with the Friends of MSSF to establish a native plant garden and Pine Barrens interpretive programs to educate park visitors and area landowners in techniques for enhancing native plants and birds as well as pest control to prevent chemical poisoning of native wildlife.	Forestry and Fire Control

This page intentionally left blank.

White-tailed Deer, Bob Conway

SECTION 1. INTRODUCTION

1.1. MISSION OF THE DEPARTMENT OF CONSERVATION AND RECREATION

The Department of Conservation and Recreation (DCR) is responsible for the stewardship of approximately 450,000 acres of Massachusetts' forests, parks, reservations, greenways, historic sites and landscapes, seashores, lakes, ponds, reservoirs and watersheds. It is one of the largest state park systems in the country. The mission of the DCR is:

> *"To protect, promote, and enhance our common wealth of natural, cultural, and recreational resources."*

In meeting today's responsibilities and planning for tomorrow, the DCR's focus is:

- Improving outdoor recreational opportunities and natural and cultural resource conservation.
- Restoring and improving DCR facilities.
- Expanding public involvement in carrying out the DCR's mission.
- Establishing first-rate management systems and practices.

The DCR was created pursuant to state legislation that in 2003 merged the former Metropolitan District Commission (MDC) and the former Department of Environmental Management (DEM). The DCR's Division of State Parks and Recreation manages nearly 300,000 acres of the state's forests, beaches, mountains, ponds, riverbanks, trails and parks outside the Greater Boston area. The Division of Urban Parks and Recreation manages over 17,000 acres of woodland, river and coastal reservations within the Greater Boston area and has broad management responsibilities for the preservation, maintenance and enhancement of the natural, scenic, historic and aesthetic qualities within this area.

The health and happiness of people across Massachusetts depend on the accessibility and quality of our green spaces – our natural and cultural resources, recreation facilities and great historic landscapes. The DCR continues to improve this vital connection between people and their environment.

1.2. INTRODUCTION TO RESOURCE MANAGEMENT PLANS

The Department of Conservation and Recreation is directed by a legislative mandate (M.G.L. Chapter 21, Section 2F) to prepare management plans for every DCR reservation, park and forest, to provide

management guidelines for the protection and stewardship of natural and cultural resources and ensure consistency between recreation, resource protection and sustainable forest management. The legislative mandate also requires the incorporation of public review and input into the development of management 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 and objectives are developed and short and long-term implementation action plans are identified for the management of properties under the stewardship of the DCR. RMPs 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. RMPs are intended to be working documents for setting priorities, budgeting and resource allocation and establishing guidelines for balancing sustainable recreation with the stewardship of natural and cultural resources. 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.

DCR staff undertook a statewide survey in 2008-2009 to assess the level of existing resource and planning data available and correlate that with operations and management considerations. This assessment was used to identify groupings of properties that should be included together in a single RMP, i.e. planning units. The statewide survey was also used to develop a strategic plan for the RMP Program, including the identification of a sequence for preparing RMPs. MSSF is ranked 4th out of the 80 planning units identified statewide.

1.3. THE PLANNING PROCESS

Resource Management Plans are developed by the DCR's Resource Management Planning Program through an iterative process of data gathering and analyses, public input, review and revision. Administrative, cultural (i.e., archaeological and historic), ecological, recreational, social and spatial (i.e., mapping) information is gathered. Sources of information include interviews with DCR staff, site visits, administrative files and reports, legal documents, map data and municipal and regional plans.

An initial meeting is convened to provide the public with an opportunity to express their thoughts about the properties included in the RMP and to provide input into the plan's contents. The public meeting is announced in the Environmental Monitor and advertised in local media outlets.

A draft RMP is then prepared according to a standard format. This draft is then distributed within the DCR for internal review. The draft RMP is repeatedly reviewed and revised to produce a revised draft RMP for public review and comment.

The revised draft RMP is made available to the public via the DCR web page and a second public meeting is convened. Once again, the public meeting is announced in the Environmental Monitor and advertised in local newspapers. An overview of the RMP's findings and recommendations is presented at the meeting and public comment solicited and recorded. These comments, and written comments received during the public comment period, are used to further develop the draft RMP.

Once revised, a final draft RMP is submitted to the Stewardship Council for review and adoption. The Stewardship Council is a 13-member citizen advisory board that works with the Department to provide a safe, accessible, well-maintained and well-managed system of open spaces and recreation facilities that are managed and maintained on behalf of the public for the purposes of natural and cultural resource protection, sustainable recreation and education.

Once adopted, the Commissioner of the Department of Conservation and Recreation files copies with the Secretary of State and the Joint Committee on Environment, Natural Resources and Agriculture of the Massachusetts General Court. The adopted RMP provides structure and guidance for the operation and management of properties included in the plan and ensures consistency between resource management, recreation and sustainable forest management.

1.4. Public Participation in Developing this RMP

Notice of a public meeting and of the DCR's intent to prepare a Resource Management Plan for the Myles Standish Planning Unit appeared in the October 6, 2010 issue of the *Environmental Monitor*. Additional announcements were posted on the DCR web page and press releases were provided to the local newspapers. Announcements were also directly distributed to individuals, regional and local stakeholder organizations and local officials. An initial public meeting occurred on October 28, 2010 at the Carver High School. Approximately 70 people attended this initial meeting. Public input was received at the meeting and through U.S. mail and e-mail received during a 30 day comment period after the meeting.

To promote greater citizen participation and help the DCR create a full resource inventory, the Friends of MSSF hosted a series of five public workshops on specific aspects of the RMP (see Table 1.4.1).

Table 1.4.1. Friends of MSSF RMP Workshops

Workshop Topic	Date	# of Participants
Pinelands, Plantations and Wildlife Management	11/10/2010	27
Vernal Pools and Pond Management	11/17/2010	29
Interpretive Services, Historical and Cultural Resources	12/2/2010	29
Recreational Resources	1/6/2011	25
Infrastructure and Operations	2/12/2011	34

Notice of the workshops was published in local newspapers, posted on both the DCR and Friends of MSSF web sites and were directly distributed to individuals, stakeholder organizations and local officials. Workshops were held in the conference building across from the MSSF headquarters in Carver. Meeting minutes for the workshops can be found in Appendix M.

A public meeting to present a preview of the draft RMP was held on May 25, 2011 at the Main Plymouth Public Library; 30 people attended. Notice of the preview was published in the May 9, 2011 *Environmental Monitor*, posted on the DCR web page, press releases were provided to local newspapers and notices were sent directly to local stakeholders.

A public meeting to present an overview of the draft RMP was held on July 14, 2011 at the CCC Amphitheater at Myles Standish State Forest and was attended by 35 people. Notice of the meeting was published in the July 6, 2011 *Environmental Monitor* and posted on the DCR web page. Press releases were provided to local newspapers and notices were sent directly to local stakeholders. The draft RMP was made available on the DCR web site, at the Plymouth and Carver public libraries and at the MSSF headquarters on July 15, 2011.

The public comment period on the draft RMP ran from July 15, 2011 to September 15, 2011; 62 sets (135 pages) of comments were received and incorporated into the final RMP (see Appendix O). This Resource Management Plan was submitted to the DCR's Stewardship Council on November 8, 2011 and was adopted by the Council on December 2, 2011.

1.5. Properties Included in This RMP

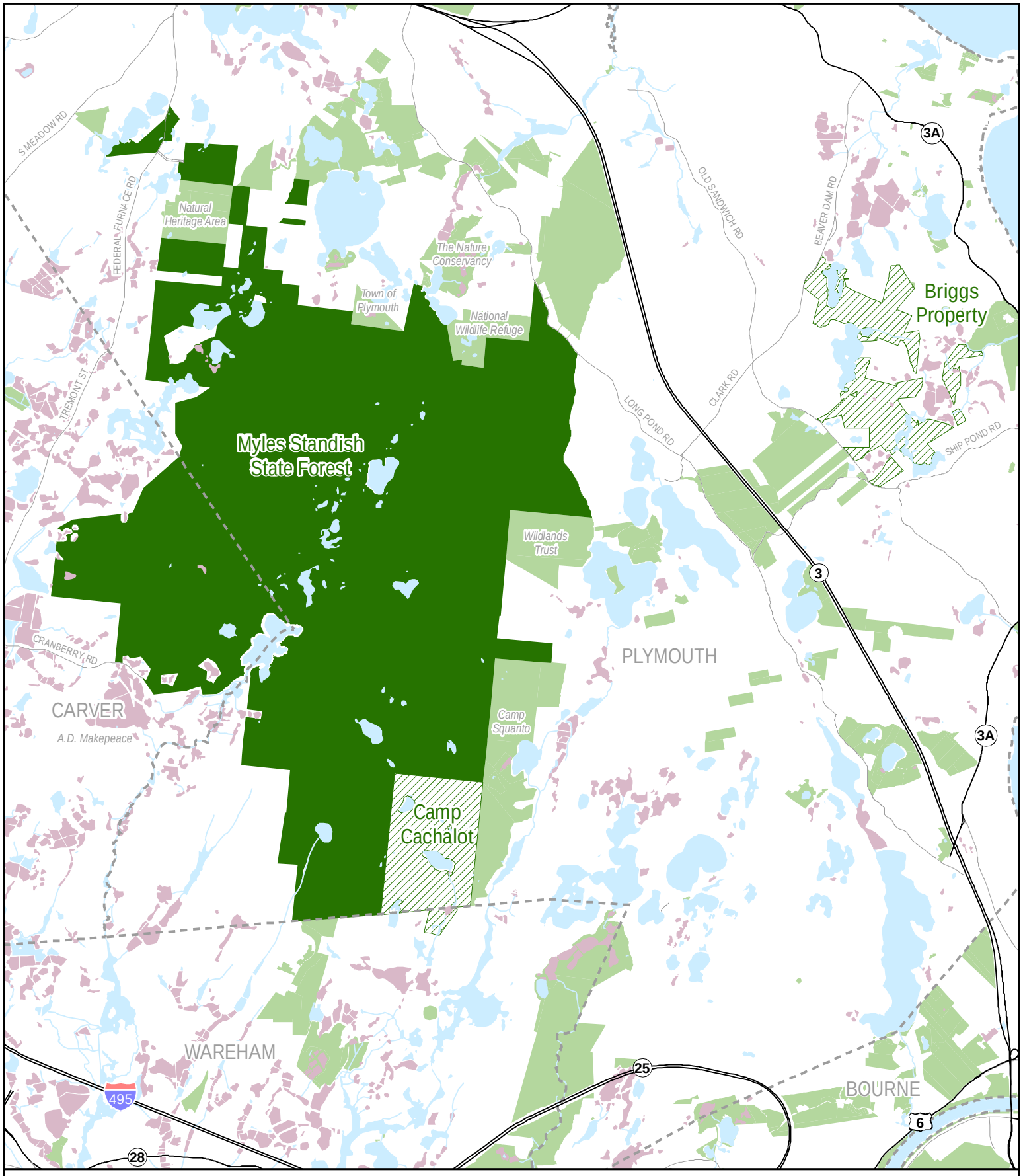
This plan covers the Myles Standish Planning Unit, which includes Myles Standish State Forest and conservation restrictions held by the DCR on Camp Cachalot and the former Briggs Property. A conservation restriction (CR) is a legal document that limits the uses of land in order to protect specific conservation values of that land. These conservation restrictions were acquired to protect the open space value of partially developed land, by prohibiting expanded development of these properties. The locations of these properties are indicated on the Myles Standish Planning Unit map. These CRs are included in this plan because of their physical proximity to MSSF.

In 1998, the DCR and the Massachusetts Division of Fisheries and Wildlife (DFW) jointly purchased a conservation restriction on Camp Cachalot, a 750-acre property owned by the Moby Dick Council of the Boy Scouts of America. Camp Cachalot encompasses several ponds, miles of trails, significant pitch pine-scrub oak habitat and occurrences of state listed rare species. The property abuts the southeast corner of MSSF. The CR ensures continued Boy Scout camp use, public pedestrian access to the property, hunting during shotgun deer season, use of Abner and Five Mile ponds for

fishing, public parking at the entrance to the camp and establishment of a trail in the northeast section of the property to Abner Pond. In consultation with the owner, the DCR and DFW can enter the property to carry out habitat management activities, including the establishment of fire breaks, removal of fire fuels and controlled burns.

In 2009, the DCR purchased a CR on 783 acres of the former Briggs Property from the Town of Plymouth. The property contains pitch pine-scrub oak forest, ponds, watercourses and wetlands.

This acquisition provides a unique opportunity to create a greenway from MSSF to Massachusetts Bay at Ellisville Harbor State Park. The property offers great opportunities for hiking and passive recreation, contains high priority rare species habitat and contains a significant archaeological site. Passive recreational activities such as hiking, horseback riding, snowshoeing, cross-country skiing, bird watching, nature study or research, fishing, swimming, hunting, trapping and non-motorized boating are allowed. Motorized boating is also allowed on Great Island Pond.



Myles Standish Planning Unit

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

1.6. DEFINING CHARACTERISTICS

Myles Standish State Forest, the largest public recreation area in southeastern Massachusetts, offers a variety of affordable opportunities for outdoor recreation on 12,404 acres of public land. Each year over 600,000 residents of densely populated eastern Massachusetts visit MSSF to enjoy camping, swimming, fishing, biking, hiking, horseback riding, snowmobiling, skiing and hunting in the forest. MSSF contains a significant portion of the third largest pitch pine-scrub oak Pine Barrens in the world and numerous coastal plain ponds harboring unique plants and wildlife.

Myles Standish State Forest is characterized by:

- Recreational opportunities offered by nine miles of hiking trails, 15 miles of paved bike trails, 28 miles of equestrian trails and 79 miles of hiking trails and unpaved forest roads.
- Four campgrounds providing 429 sites around four ponds.
- Two day use areas with swimming, boating, fishing, hiking and picnicking facilities.
- 143 private cottages located on state land around five ponds.
- 3,365 acres of native white pine and hardwood forests.
- 6,641 acres of globally rare Pine Barrens communities with 70 frost pockets.
- 58 kettle hole ponds, many containing high quality coastal plain pond shore habitat.
- 1,143 acres of pine plantations.
- These uncommon ecological communities support 41 state-listed rare or endangered species.
- Cultural resources associated with Native American occupation, early colonial settlement, cranberry growing and Civilian Conservation Corps achievements.

1.7. MANAGEMENT PRINCIPLE AND GOALS

The DCR is entrusted with the stewardship of Myles Standish State Forest. A thorough inventory and assessment of existing conditions and activities, in concert with substantive public input, is necessary to establish guidelines for future management of the forest. The resource management planning process has identified the following management principle and associated goals to guide future management of this important facility and provide a foundational structure for this plan.

Management Principle

Through the creative use of limited state management resources and partnerships, achieve a sustainable balance between the conservation of important natural and cultural resources and the provision of quality outdoor recreational opportunities.

Management Goals

Maintain and enhance habitats for rare species, native plants and wildlife. Implement a program of prescribed fire and mechanical fuel reduction to maintain and improve Pine Barrens habitat for rare Pine Barrens species, as well as to reduce the potential for wildfire. If the Pine Barrens remain undisturbed for long periods of time, the ecosystem will transition into shade-tolerant white pine and hardwood forests, displacing rare species that rely on open Pine Barrens habitat. Remove tree plantations consisting of non-native pine species to reduce fire danger and improve Pine Barrens habitat. Pursue the acquisition or protection of in-holdings and abutting properties containing significant Pine Barrens habitat.

Protect and enhance the quality of water resources. Manage water resources of the forest to ensure healthy and safe water-based recreation; conserve and improve the habitats of native aquatic plants and animals; and protect the Plymouth-Carver Sole Source Aquifer. Manage the coastal plain pond shores to enhance endangered species habitats and protect them from overuse and avoidable environmental damage.

Preserve the distinct scenic and cultural qualities of the forest. The forest's cultural resources represent a range of human endeavors from pre-contact Native American occupation to cranberry growing. Preservation of these cultural resources and landscapes connects us to our past. Implement practices to protect the intact archaeological record at MSSF. Preserve the CCC landscape and remaining structures.

Provide diverse opportunities for sustainable outdoor recreation. Maintain a sustainable network of walking, hiking, biking, horseback riding, snowmobile and skiing trails to provide connections among day use areas, campground areas and regional greenways. Renovate and maintain comfort stations to provide modern sanitary facilities for public use. Restore natural conditions surrounding recreation facilities to eliminate recreational damage and improve landscape aesthetics. Improve forest roads for safety, aesthetics, fire protection and maintenance.

Expand interpretive and environmental education programs. Effective park management largely depends on the support of well-informed visitors. Provide interpretive and environmental education programs and materials that educate visitors about the impact of their actions on the health of the forest's natural and cultural resources.

Work with partners to achieve management goals. Maintain and develop partnerships with other state agencies, adjacent municipalities, non-profit organizations and businesses to provide quality outdoor recreational opportunities while conserving the important natural and cultural resources of MSSF. Establish sustainable standard practices for permitted users within the forest.

1.8. REGIONAL CONTEXT

Myles Standish State Forest is located within the Towns of Carver, Plymouth and Wareham. Approximately 85% of the forest is in Plymouth and 15% in Carver. In the late 1970s and 80s, rising housing prices in and around Boston made Plymouth, Carver and Wareham, with their inexpensive land, low taxes and relative proximity to Boston, attractive as bedroom or retirement communities for people leaving more congested areas up north. The population of these three abutting towns has increased by 176.2% between 1970 and 2010 (see Table 1.8.1). The rate of population increase has slowed since 1980.

Table 1.8.1. Population of Towns Adjacent to Myles Standish State Forest, 1970-2010

Year	Plymouth	Carver	Wareham	3-Town Total (% Change)
1970	18,606	2,420	11,492	32,518
1980	35,913	6,988	18,457	61,358 (+88.7%)
1990	45,608	10,590	19,232	75,430 (+22.9%)
2000	51,701	11,163	20,335	83,199 (+10.3%)
2010	56,468	11,508	21,882	89,799 (+7.9%)

Source: 1970, 1980, 1990, 2000 and 2010 U. S. Census.

The increase in population has translated into changes in land use in the abutting towns. Data on land use from 1971 and 1991 show a significant increase in residential, commercial and industrial land use for each town and a corresponding decrease in forested land. As a result, unprotected privately-owned open space is being converted into residential land and these new residents are creating an additional demand for recreational opportunities at MSSF. During the past three decades, the Town of Plymouth, DCR, MassWildlife and several non-profit conservation organizations have been working together to identify and protect significant open spaces in the area.

The management of MSSF must take into account land uses and activities that occur on surrounding lands. The natural habitats and species found in MSSF do not recognize the ownership boundaries established by the state. In addition, land use decisions that occur outside the forest have an impact on the environment and activities that occur within the forest.

Southeastern Massachusetts contains one of the largest contiguous areas of Pine Barrens in the world. A significant portion of this forest type lies in MSSF. MSSF is home to a significant resident animal population and serves as a migration route for animals that breed elsewhere in the region. In addition to the DCR, several other government and conservation organizations maintain conservation areas near the forest (see Myles Standish Planning Unit map). The U.S. Fish and Wildlife Service and The Nature Conservancy own preserves for the endangered northern red-bellied cooter north of the forest. The Town of Plymouth and the Wildlands

Trust of Southeastern Massachusetts own several conservation areas north and east of the forest.

The largest abutting land use west and south of MSSF is cranberry cultivation. A.D. Makepeace Company, Massachusetts' largest cranberry grower, owns 10,000 acres of land used primarily for cranberry production, including land abutting the southwestern part of the forest. Two smaller cranberry companies, the Crane Brook Company and the Federal Furnace Cranberry Company, own land to the west (around Federal Pond) and north (south of Great South Pond) of the forest.

Another primary land use abutting the forest is private recreation and outdoor facilities. Two of these are camps operated by the Boy Scouts of America. The 635-acre Camp Squanto and 750-acre Camp Cachalot are located southeast of the forest. A Girl Scout Camp, Wind-In-The-Pines, also abuts the forest along Mast Road in Plymouth. Smaller private campgrounds are also closely associated with the forest. Shady Acres Campground abuts the western edge of the forest, Ellis Haven Campground abuts the northern edge of the forest and Blueberry Hill Campground is an in-holding located on Curlew Pond.

An increasing amount of residential housing is found close to the forest. Several residential subdivisions have been developed near the northeastern boundary of the forest and more are planned. A. D. Makepeace has received MEPA approval to construct 1,175 units of housing and 60,000 square feet of commercial space southeast of the forest while preserving 1,200 acres for open space. The company has also initiated the MEPA review process for development of new cranberry bogs, 1,790 units of housing and one and a half million square feet of commercial and industrial space southwest of the forest.

Table 1.8.2. Physical, Ecological and Political Settings

Myles Standish Planning Unit

Location: Towns of Plymouth, Carver and Wareham

DCR Management Structure:
Unit: Myles Standish State Forest
District: Cape Cod District
Region: Southeast Region
Division: State Parks and Recreation

Size: 12,404 acres with a perimeter of 46 miles[a]
Plymouth: 10,537 acres
Carver: 1,862 acres
Wareham: 5 acres

Ecoregion: Cape Cod and Islands

Watersheds: Buzzards Bay and South Coastal

Legislative Districts:
Senate Districts: Plymouth and Barnstable, Senator Therese Murray
First Plymouth and Bristol, Senator Mark R. Pacheco
House Districts: First Plymouth, Representative Viriato Manuel deMacedo
Second Plymouth, Representative Susan Williams Gifford

Conservation Restrictions:
Camp Cachalot: 750 acres
Briggs Property: 783 acres

Designations:
Priority Habitat – Natural Heritage Endangered Species Program
Certified Vernal Pools – Natural Heritage Endangered Species Program
Sole Source Aquifer – Environmental Protection Agency
Important Bird Area – Massachusetts Audubon Society
Representative Natural Area – Massachusetts Wildlands Program

[a] These values were determined through the use of a Geographic Information System.

1.9. HISTORY OF THE PROPERTY

Prior to European settlement, the land that now comprises MSSF was occupied seasonally by members of the Wampanoag Federation. Their territory included all of southeastern Massachusetts from Narragansett Bay north to Quincy Bay and east to Provincetown. From March to June, the Wampanoags typically began their annual subsistence cycle by moving to farming sites to sow crops of maize, squash and legumes. Summer camps located near the ocean along fresh water tributaries were used as a base for hunting and fishing. As summer ended, food gathering activities reached a climax as crops were harvested and wild nuts, berries, red meat and fish were collected. By fall, villages disbanded to form small hunting units in the interior forests to capture large mammals such as bear and deer. In December, the original villages reassembled and existed on small amounts of stored meat, grains and whatever fresh fish or meat could be obtained (MHC, 1982).

This life cycle was dramatically altered in the beginning of the 17th century when European fishing parties first visited the New England coast. Its first effect was the Plague of 1616-19, which reduced the local Wampanoag population to approximately one-tenth of its original size. In 1620, English puritans settled at Patuxet, a former Wampanoag village abandoned after the Plague. Squanto, the last survivor of Patuxet, passed his rights to the village of Patuxet to the Pilgrims, who renamed it as Plymouth (MHC, 1981).

Unfortunately, the Wampanoag's conception of land ownership differed dramatically from that of the Pilgrims. Native Americans believed that transfer of title included the continued right of access, fishing and hunting. English colonists on the other hand, gave exclusive rights to individual owners. Recognition of this irreconcilable difference resulted in the King Philip War of 1675-76, which resulted in the virtual elimination of the Wampanoag population from the Plymouth area (DNR, 1971).

Early English settlers relied heavily on local timber for fuel and building materials. Select white pine and oak were sent to England to provide construction materials and ship masts. Masts for ship building were taken from the forest during the colonial period. Mast Island in Halfway Pond and Mast Road are names which came from this activity. In 1709, the Plymouth Town Committee voted that the remaining common lands be laid out in 10 Great Lots (30,000 acres total). Each Great Lot was divided into 20 shares. The Great Lots located in MSSF were used primarily for wood lots (MHC, 1981).

With the discovery of bog iron deposits in area peat bogs, bog iron production began at the nearby Federal Furnace of Carver. The Federal Furnace operated between 1793 and 1841, producing hollow ware (e.g., pots, kettles, bake pans, irons and stoves). Federal Furnace also produced cannon balls for the U.S.S. Constitution during the War of 1812. Federal Pond and Federal Road are names that remain from this period. Huge quantities of wood were used to make charcoal to smelt the iron. During this period, as many as nine furnaces were operating in the surrounding towns. One foundry might use as much as 90,000 cords of wood for charcoal a year. By 1830, MSSF was a cut and burned over forest. Heavy clear cutting plus repeated fires reduced the forest cover to pitch pine and scrub oak (DNR, 1971).

Cranberry production began in the area in 1856. Many of the areas mined for bog iron were reused for cranberry bogs. East Head Pond was dammed in 1868 to provide a water source for cranberry production and remains in this use today. By 1890, extensive wetlands located southwest of the forest were developed for cranberry production (DNR, 1971).

Timber harvesting, bog iron mining and cranberry production were the most prominent uses within the forest. Agricultural activity was limited due to the destruction of topsoil by wildfires and the sandy nature of the soil. In 1880, Job Turner established a farm for horses, cattle and poultry between East Head Reservoir and Barrett Pond. This is the only homestead documented within the forest. After his death in 1894, the farm was abandoned and a few years later the buildings were destroyed by forest fires (Griffith, 1913).

In 1908, the Massachusetts Game Sanctuary Association acquired the Turner estate to create a game sanctuary for the breeding and protection of game. Unregulated hunting had drastically reduced the number of native game birds (Nelson, 2011). The Easthead Game Farm, which was located on the site

of the forest headquarters, bred pheasants, ducks, grouse, quail, geese and wild turkeys to be released locally. The Association also planted 30,000 white pines on the property (Rothman, 1996).

In 1914, the State Forest Commission was formed to acquire and restore unproductive waste lands to commercial forests, to protect the soil and regulate water flow. In 1916, the newly formed State Forest Commission purchased the 5,700-acre Game Sanctuary Association property for $17,000, creating MSSF, the second state forest. A program of reforestation began immediately and continued for the next 40 years. To secure the forest and provide a source of revenue, the Commission issued permits for individuals to construct private cottages along the shores of Charge, Fearing, College, Curlew, Rocky and Widgeon ponds. The early campers signed five-year permits, which required that they clear a lot, build a cabin and become seasonal residents of the forest (Nelson, 2005).

In 1920, the Department of Conservation was formed to reclaim land for timber production and protection of the water supply. The Department of Conservation continued to plant white, red and Scots pines. The YMCA of Boston was permitted to construct a camp at Barrett Pond. By the end of the 1920s, the state had purchased the majority of the land we now know as MSSF.

In 1930, the legislature provided the Department of Conservation with additional funds to put unemployed men to work in state forests. These crews completed numerous forest improvement projects at MSSF, including extensive pest control, tree stand improvements and pine plantings. The unemployed crews constructed new public campsites at Charge and New Long ponds, planted 575,000 pine trees and constructed 30 miles of roads and fire lines.

In 1933, the federal government created the Civilian Conservation Corps (CCC). CCC Camp S-56 constructed over 70 miles of roads, 17 miles of hiking trails, planted 730,000 pine trees and built recreation areas at Charge, Fearing, New Long and Fearing ponds.

Gas rationing during World War II caused a drastic drop in attendance at MSSF. At the same time, a lack of personnel and material resulted in the deterioration of facilities in the forest. This resulted in the closing of the Charge and College pond recreation areas, with only Fearing Pond remaining open.

Immediately after the war, the demand for outdoor recreation increased and existing facilities suddenly became inadequate. Each successive year's attendance doubled and by 1947, visitors had to be turned away from MSSF. The renting of park property to individuals to construct new private cottages was completed at this time. By 1950, new comfort stations were built, roads were repaired and camping areas were expanded to include Curlew Pond. For many years, the Brockton Girl Scouts used Camp Rockne on New Long Pond Road. By 1950, aerial spraying of DDT virtually eliminated gypsy moth damage in the forest and 20 million board feet of mature white pine was cut and sold.

In 1951, the Massachusetts Department of Corrections established a forestry camp in the forest on Bumps Pond. The original 50 bed facility has been expanded to 200 beds today. Since that time, inmates have assisted MSSF staff with recreational development, maintenance and forestry activities. The forestry camp assisted with numerous fire prevention, forestry, road improvement, landscape and building projects within the forest. The camp also produced picnic tables, fireplaces and carved wood signs for statewide use.

In 1953, the Department of Conservation (1919-1953) was reorganized as the Department of Natural Resources (1953-1975). Between 1956 and 1959, the Division of Fisheries and Game cleared and planted 23 woodland areas in the center of the forest, creating a 1,150-acre pheasant Wildlife Management Area. In 1966, 75 acres were cleared and planted with rye, millet and buckwheat to create an 870-acre quail management area on the eastern edge of the forest.

On May 7, 1957, a fire set on the west side of the forest did not stop until it reached the ocean. The fire burned 12,500 acres, including 3,000 acres within the forest. In 1964, a fire burned 4,000 acres in Plymouth and Wareham including 1,500 acres in the forest. The fire destroyed recreation facilities and private cottages at Charge Pond. In 1972, construction was completed for eight comfort stations, 250 campsites, two swimming beaches, roads and utilities at Charge Pond, creating the largest camping area in MSSF.

In 1975, the Department of Natural Resources (1953-1975) was divided into the Department of Environmental Management (1975-2003) and the Department of Fisheries and Wildlife. In 2003, the Department of Environmental Management was merged with the Metropolitan District Commission (1919-2003) forming a new park agency called the Department of Conservation and Recreation. The merger also created the Division of State Parks and Recreation, representing the DEM Division of Forests and Parks dating from 1898.

Table 1.9.1. Significant Myles Standish State Forest Events

Year	Event
1500-1620	Area inhabited by Wampanoag Federation ("People of the First Light").
1616-1619	Plague reduced Wampanoag population to approximately 10% of its original size.
1620	English Puritans settle in Plymouth Harbor.
1675-1676	King Phillip's War devastated the remaining local Wampanoag population.
1710-1715	Ten Great Lots, including MSSF, granted by the Town of Plymouth to individuals, primarily for wood lots.
1770s	Local fishing, whaling and shipbuilding industries required vast quantities of timber.
1793-1841	Federal Furnace of Carver used local fuel and bog iron to manufacture iron products.
1830	Original forest completely cut over.
1868	East Head Reservoir dammed to provide water source for cranberry production.
1880-1894	Job Turner operated farm for horses, cattle and poultry east of Barrett Pond.
1908	Massachusetts Game Sanctuary Association purchased 5,700 acres at MSSF.
1916	State Forest Commission acquires 5,700 acres in Carver and Plymouth creating Myles Standish State Forest.
1918	To raise revenue and secure the forest, the Forest Commission advertized the availability of 250 campsites for use around five ponds in the forest.
1930-1932	Department of Conservation hired unemployed men to construct new public campsites at Charge and Long ponds, plant 575,000 pine trees and construct 30 miles of roads.
1933-1937	CCC Camp S-56 constructed over 70 miles of roads, 17 miles of hiking trails, three cedar log bathhouses, several day use and camping areas and planted 730,000 pine trees.
1941-1945	War transportation restrictions and shortages reduced maintenance and attendance.
1951	New prison camp provides labor for park, road and timber management.
1957	Fire burns 12,500 acres, including 3,000 acres in the forest.
1964	Fire burns 1,500 acres in the forest, including recreation facilities at Charge Pond.
1970-1972	250 campsites, eight comfort stations, roads and utilities constructed at Charge Pond.

This page intentionally left blank.

Heathland with Flowering Broom Crowberry, Bob Conway

SECTION 2. EXISTING CONDITIONS

Since its creation in 1916, Myles Standish State Forest has been the largest public open space in southeastern Massachusetts. For 95 years, the forest has provided the people of southeastern Massachusetts with access to nature and nature-based recreation. This chapter describes the present state of the natural, cultural and recreation resources of the forest. It also describes the current interpretive services, operation and management of the forest.

2.1. NATURAL RESOURCES

The natural resources of Myles Standish State Forest (MSSF) have been shaped over time by the forces of glaciers, climate, fire and human disturbance. The result of this volatile history is a landscape that provides a unique variety of natural communities and resources.

This section provides an overview of the varied natural resources of the forest. It constitutes an updated natural resource inventory of the forest, based on existing information. No specific field studies were conducted as part of this RMP. Much of this information was originally compiled for the Myles Standish State Forest Guidelines for Operations and Land Stewardship (GOALS) Plan (DEM, 1987). This information was updated by Epsilon Associates in 2001, during the preparation of a Trails and Resource Management Plan for MSSF; by the Natural Heritage and Endangered Species Program (NHESP) during preparation of a Biodiversity Report for MSSF (NHESP, 2007); and by Irina Kadis, a botanist who prepared a plant inventory for MSSF (Kadis, 2010). This information is used to evaluate current land management practices and to present recommendations for future resource management and the provision of recreational opportunities in MSSF.

Climate

The climate of MSSF is more moderate than inland areas because of its proximity to Cape Cod Bay and Buzzards Bay. Spring and summer temperatures are somewhat cooler than inland areas, favoring outdoor recreation. Winter temperatures are slightly warmer with less snow accumulation as the ocean slowly cools in autumn. Average monthly temperatures range from approximately 32.0°F in January to 68.9°F in July (Aizen and Patterson, 1995). In general, annual precipitation ranges from 42 to 50 inches, with peaks typically in early spring and mid to late fall. Variations in precipitation from year to year can cause drought or flooding with as much as a

five-foot variation in the water table level. The growing season ranges from 146 to 174 days, but within topographic depressions (i.e., frost pockets) frost can occur throughout the year (Epsilon, 2001).

Geology and Soils

Geology

Southeastern Massachusetts was covered by ice from the Wisconsin glacier until about 12,000 years ago. The advance of glacial ice created a dense, poorly sorted and often highly compacted sediment deposit beneath the glacier, known as glacial till. Till deposits are generally composed of non-stratified, unsorted sediments over the bedrock, ranging in size from fine clay to large boulders (Skehan, 2001).

When the glacier retreated from the MSSF area approximately 12,000 years ago, it did so haltingly. Moraines were formed when advancing ice sheets pushed forward massive quantities of debris, which were then deposited as the glacier melted. The Ellisville Moraine located on the northeastern border of the forest and the Hog Rock Moraine located on the northwestern border of the forest are recessional moraines (Skehan, 2001), formed by the Wisconsin glacier during a pause in its final retreat (see Figure 1).

Meltwater from the glacier deposited large quantities of sand and gravel south of the moraines. Most of the forest is composed of a gently sloping glacial outwash plain, created when the melting glacial ice sheet deposited sandy, highly permeable soil in lowland areas along the glacier's edge. These water lain deposits are often referred to as "glacial outwash" because they are stratified or sorted by grain size and less dense than glacial tills (Skehan, 2001).

Large blocks of ice occasionally lodged in both the moraine and outwash deposits. When the blocks melted, they formed kettle-like depressions that filled with water and became small ponds or depressions. The landscape of the forest is composed of a combination of elevated upland moraines and gently sloping outwash plains, dotted with small kettle hole ponds and depressions. Elevations in MSSF range from 220 feet above sea level in the north central portion of the forest to 770 feet in the southwestern corner of the forest.

Soils

Most of the soils of MSSF are sandy and excessively well-drained with little organic matter. Rain percolates too rapidly through the sandy soils to be fully available to plants. MSSF is primarily comprised of Carver coarse sandy soils that are well-drained (DEM, 1987). The glacial deposit for Carver soil series is from 40 to 160 feet thick with a seasonal high water table no closer than five feet from the surface (USDA, 1969). The thin layer of organic topsoil in the Carver soil series is a limitation to the number and type of plant species that will grow in this area. However, there are specialized plants well adapted to this dry, sandy substrate.

Carver loamy coarse sand soil is usually underlain with a deep deposit of pebbly sand and is found in small isolated areas near the southwestern and southeastern boundaries of MSSF.

Carver-Gloucester soils are composed of two-thirds sandy Carver soil and one-third stony Gloucester soil derived from the glacial till deposits of the moraines located in the northwestern portion of MSSF. There is more organic matter in the Carver-Gloucester soil type, which supports native white pine forests.

The Carver and Carver-Gloucester sandy soils are easily graded for roads or trails, but the lack of organic top soil makes it very difficult to establish vegetation. The sands of both soil types are highly permeable and allow for very rapid percolation. As a result, the potential for groundwater contamination is great, as harmful chemicals do not have adequate time to leach out before reaching the groundwater.

Peat, muck and sanded muck also occur in isolated wetland areas. Sanded muck represents poorly drained soils that have been developed for cranberry production by covering the organic matter with a foot of coarse sand and developing a system of ditches to control the water level (DEM, 1987).

Natural History

Deposits left by the retreating glacier were first colonized by tundra plants capable of surviving in cold climates and nutrient-poor soils. Grasses, sedges, alders and willows formed low, shrubby vegetation that stabilized the soil. As the climate warmed about 12,000 years ago, birch and pine

forests replaced the tundra. Between 6,000 and 9,000 years ago, oak, pitch pine and beech began to grow in the area (Patterson and Backman, 1988).

In 1984, the UMass Department of Forestry and Wildlife Management studied the fire and vegetation history of MSSF. Sediment cores from the deepest part of two ponds were analyzed to identify fossil pollen and charcoal in the sediment. The sediment cores were taken from Charge and Widgeon ponds in order to compare and contrast the natural history of ponds located in the glacial outwash plain in the southern part of MSSF and the moraine topography of northwestern MSSF, respectively. The sediment samples contained pollen and charcoal that had been gradually deposited over centuries in the sediment at the bottom of the ponds. The pollen that is incorporated in the mud at the bottom of the pond reflects the vegetation that existed around the pond and the charcoal provides a record of the number and intensity of forest fires.

An analysis of the pollen preserved in the sediments of the two ponds indicated that jack pine and spruce were present in the area about 10,000 years ago. When the Pilgrims arrived in 1620, pollen samples indicated that the forest consisted mostly of white pine and oak species around both ponds. Hemlock and beech also occurred near Widgeon Pond. Hickory, chestnut and pitch pine pollen was also found in the sandier soils near Charge Pond (Patterson and Backman, 1988). The vegetation on Halfway Pond Island, which was protected from the heavy cutting and wildfires that occurred throughout the mainland, is a relic of the pre-colonial forest. The Nature Conservancy has preserved the island's diverse climax forest of beech, red maple, eastern hemlock, white pine and yellow birch.

Local land use records and increases in pollen from agricultural weeds placed the first land clearing activities in the early 1700s for Widgeon Pond and shortly after 1850 for Charge Pond. At Charge Pond, pollen values for oak, white pine, hickory and beech all decline after 1850 and pitch pine pollen increases dramatically. At Widgeon Pond, oak, beech and hemlock pollen decrease following local settlement and pitch pine increases (Patterson and Backman, 1988).

The amount of charcoal in the sediment from Charge Pond indicates that the occurrence of fire increased dramatically during the late 1800s. This is not surprising, because the forests were being cut to provide fuel for bog iron furnaces and other wood product industries during this period. This harvesting left abundant slash and there was a lack of fire suppression capabilities. Extensive wood harvesting and associated wildfires allowed the fire adapted pitch pine component of the pre-colonial forest to thrive and expand, leading to the Pine Barrens ecosystem that exists in a significant portion of MSSF today. These fires also destroyed organic matter in the soils, reducing soil fertility and its moisture holding capacity.

During this era, forests across Massachusetts were cleared for agriculture and wood products. The public's concern about this provided the impetus for the creation of the State Forest Commission in 1914. In 1916, the newly formed State Forest Commission acquired MSSF for reforestation purposes. The planting of hundreds of thousands of conifer seedlings by the Civilian Conservation Corps from 1934 to 1937 restored hundreds of acres of forest land. Scots pine and red pine, two species planted during this effort, are not specifically adapted to the conditions of MSSF. However, the many white pines that were planted on the burned over landscape during the early 1900s are thriving and can provide pleasant scenery and moderate the effects of wildfire. This early reforestation program was the Commonwealth's first attempt at "ecological restoration."

After the 1957 fire, several stands of red pine, white pine and Norway spruce were planted in the western portion of MSSF. Several timber sales thinned out the white pine stands around East Head Pond and Upper College Pond Road, where the trees were large enough for a commercial harvest. Approximately 400 million board feet of white pine were harvested from MSSF after 1976 (see Figure 5).

Wildfire History

Fire has played a significant role in shaping the natural and physical features of MSSF. An immense blaze known as The Great Fire of 1900 burned approximately 50 square miles of Plymouth, from MSSF to Cape Cod Bay. The first recorded fire following the creation of MSSF occurred in 1921 around Curlew, Rocky and Widgeon ponds. After the fire, the Commonwealth purchased a fire truck and began fire suppression activities in the forest.

The first fire observation tower was constructed on Lower College Pond Road, near the forest headquarters in 1938, just prior to a blaze that burned 714 acres from Little Long Pond to Alden Road (see Figure 4).

In May of 1957, high winds helped to join three separate fires along the southwestern boundary into one conflagration (see Figure 4). This fire was the largest recorded crown fire in MSSF, besides the Great Fire of 1900; it burned 15,000 acres from the southwest corner of MSSF to Plymouth Bay. During the 1960s, at least five fires occurred in MSSF, with the largest burning approximately 1,500 acres and 26 structures near Charge Pond in 1964. The forest experienced 15 fires during the 1970s. With increased levels of pre-suppression and fire-spotting, MSSF only experienced one notable fire on Snake Hill Road in 1985.

In 2000, a controlled burn program was initiated at MSSF to reduce vegetation that can fuel an uncontrollable wildfire and to help maintain Pine Barrens habitat. In March 2000, the DEM, in cooperation with the Town of Plymouth and The Nature Conservancy, conducted a controlled burn of seven acres on the eastern boundary of the forest. In 2009 and 2010, controlled burns were conducted on 150 acres in the eastern part of the forest. Controlled burning is one way of removing forest fuels to reduce the risk of wildfires. Other ways of reducing fire risk include mowing, grinding brush and pruning trees. (For more information see http://www.mass.gov/dfwele/dfw/nhesp/natural_communities/pdf/prescribedburning.pdf.)

For thousands of years, a diverse community of plants and animals adjusted to wildfires in the Pine Barrens. Pitch pines have thick bark that is resistant to fire. In areas with a long history of wildfire, pine cones of this tree need heat to open and sprout. Pitch pine needles and scrub oaks sprout back after a fire (NHESP, 2007). Species diversity of native plants in Pine Barrens is greater following a fire. Studies of bird diversity have shown that the greatest number of different bird species occurs in Pine Barrens several years after a burn and decreases as the forest matures (Lloyd-Evans, 1974, 1975).

Water Resources

The water resources of MSSF are dominated by groundwater-related features such as kettle hole ponds and vegetated wetlands. Rainfall is rapidly absorbed into the sandy soil, contributing to the underlying aquifer, and relatively little water results in surface runoff.

Groundwater

MSSF is located over the Plymouth-Carver Sole Source Aquifer (PCA), the second largest aquifer in Massachusetts (Urban Harbors Institute, 2008). Sole source aquifers are designated by the U.S. Environmental Protection Agency (EPA) under the Safe Drinking Water Act (P. L. 93-523). In its designation, the EPA found that the PCA was the only source of drinking water for many residents and businesses located in the area; that there are no alternative sources of water in the area that could meet the demand; and that contamination would create a public health hazard and financial burden (EPA, 1990). The PCA covers over 140 square miles and is estimated to store approximately 500 billion gallons of water. The aquifer is located in sand and gravel glacial outwash deposits, which vary from 40 to 160 feet thick. Public supply wells in these sand and gravel outwash deposits have an average yield of 325 gallons per minute. The average recharge to the aquifer is almost entirely from precipitation and averages about 160 million gallons per day (Fuss & O'Neil Technologies, 2007). The groundwater table can be seen in the various kettle hole ponds that intersect the aquifer within the forest.

Precipitation entering the PCA through shallow soils can flush chemicals into the water supply. Releases of oil or hazardous materials and the application of fertilizers or chemicals to surface soil increase the risk of these chemicals migrating into the aquifer. The sandy soils and glacial outwash deposits that comprise the PCA are susceptible to the infiltration and migration of contaminants. Area cranberry growers introduce the risk of contamination from nitrates and pesticides. The UMass Cranberry Station provides state of the art technical advice to advance the industry, while protecting natural resources. Under the management of the UMass Cranberry Station, Rocky Pond Bog serves as a location within the forest for conducting research on sustainable management practices for cranberry production.

In 1998, the DEM retained Gannett Fleming, Inc. to conduct an environmental audit of facilities located within the forest. The fueling station, maintenance

yard, hazardous waste storage facility, 28 park buildings, eight fuel storage tanks, two inactive landfills, 25 septic systems and 15 on-site wells were inspected for compliance with state and federal environmental regulations. Nineteen corrective actions were identified in the audit (Gannett Fleming, 1999). The corrective actions were then funded and completed under the Clean State Program.

Ponds

Fifty-eight kettle hole ponds ranging in size from approximately one to 86 acres are located within MSSF. Twenty-one of these ponds are named and identified in the following table. The remaining 37 ponds are unnamed and relatively small in size (typically less than three acres). The ponds of MSSF are generally distributed in two clusters, one in the center of the forest and a second in the northwest corner of the forest (see Figure 6). There are also a few significant ponds in the southern part of the forest, but relatively few ponds in the western and northeastern parts of the forest. Two day use areas, 429 public campsites, MCI Plymouth and 142 private cottages are concentrated around eight of the largest ponds, leaving the remaining 50 smaller ponds relatively undeveloped.

Table 2.1.1. Named Ponds and Their Recreational Uses

Pond Name	Size (acres)	Maximum Depth (feet)	Location in MSSF	Recreational Uses		
				Swimming	Fishing	Boating
Barrett	16	17	Southwest	✓**	✓	✓
Bumps	20	4	East	No Access	No Access	No Access
Charge	23	17	South	✓	✓	✓
Cherry	2	-	North-central	LA	LA	LA
College	53	24	Central	✓**	✓	✓
Curlew	43	31	Northwest	✓**	✓	✓
Doctors	2	3	Southeast	NFA	NFA	NFA
East Head Reservoir*	86	10	Southwest	NP	Boat Only	✓
Fearing	24	20	South-central	✓**	✓	✓
Grassy	3	-	Southeast	NP	NP	NP
Hooper	3	-	North-central	NP	NP	NP
Little College	3	-	North-central	NFA	NFA	NFA
Little Widgeon	7	5	Northwest	LA	LA	LA
Manters Hole	2	-	Northwest	NP	NP	NP
New Grassy	6	4	Southeast	LA	✓	LA
New Long	23	6	Central	NFA	✓	✓
Rocky	20	19	Northwest	NFA	✓	✓
Round	10	12	Central	LA	LA	LA
Three Cornered	14	4	Central	LA	LA	LA
Torrey	3	4	Central	NP	NP	NP
Widgeon	24	12	Northwest	NFA	✓	✓

***** East Head Reservoir is owned by the Davison Partners. The property line is located six rods (99 feet) from the high water mark around the Reservoir.

****** Public swimming area was posted for elevated bacteria levels during the 2010 swimming season.

✓ = FORMAL ACCESS is available for recreational activity.

NFA = Recreational activity is permitted, but NO FORMAL ACCESS is available.

LA = LIMITED ACCESS for low impact recreational use is permitted, sensitive pond shore habitat.

NP = Recreational access NOT PERMITTED, habitat protection area.

East Head Reservoir is an important in-holding within MSSF. This large, impounded water body is privately owned by Davison Partners, a local cranberry grower. According to historical records, East Head Reservoir was a trout farm in the late 1800s (DNR, 1971). Today the reservoir provides water to irrigate cranberry bogs owned by A.D. Makepeace and Davison Partners.

The kettle hole ponds within MSSF are filled with groundwater and have no inlet or outlet. The water levels within the ponds are influenced by seasonal and year to year fluctuations in the groundwater table. The fluctuating water levels of the ponds have led to the development of a globally rare type of plant and animal community known as the Coastal Plain Pondshore. (For more information see http://www.mass.gov/dfwele/dfw/nhesp/natural_communities/pdf/coastal_plain_pondshore_commun.pdf.) The plants and animals of this community type have adapted to the changing water levels of the ponds. The network of kettle hole ponds at MSSF support 20 rare plant and animal species that are components of the Coastal Plain Pondshore community (Wildlands Trust, 1998).

The ease with which water moves through the sandy glacial till substrates of the coastal plain ponds causes the water levels of the ponds to fluctuate directly with the water table, partially or completely exposing the pond shorelines during the late summer and early fall. These fluctuating water levels create a habitat along the pond shorelines for the state and federally endangered northern red-bellied cooter, seven species of state-listed insects and 12 species of state-listed plants (NHESP, 2007).

The coastal pond shore communities consist largely of plant species adapted to the special shoreline environment. These species are able to thrive in the nutrient-poor, acidic conditions and out-compete more common plant species in the area. The life cycles of coastal pond shore plant species increases the ability of these plants to out-compete other species (Swain and Kearsely, 2001). Some species' seeds germinate early in the growing season when the shore is still covered with water and other seeds germinate as water levels drop and the shores dry. The periodic inundation of the shores prevents upland species and shrub establishment, while decreases in water levels inhibit aquatic plant establishment along the shores.

The greatest threat to the Coastal Plain Pondshore communities is excessive water withdrawal, which lowers pond levels, changes natural hydrologic fluctuations and allows woody species to colonize the shores. Off-highway vehicle use on pond shores destroys herbaceous vegetation, dragonfly and damselfly habitat and turtle nesting habitat (NHESP, 2007). Nutrient input into naturally low-nutrient coastal plain ponds allows more weedy plant species to grow, changing the habitat for plants and animals alike. Increased nutrient input comes from improperly maintained septic systems, large numbers of swimmers, overwintering populations of Canada Geese, use of fertilizers in the watershed and soil erosion. Heavy recreational use of coastal pond shores removes plants and deters animals from using the habitat. Concentration of recreation at particular ponds effectively protects the other ponds (NHESP, 2007).

In 1989, the Massachusetts Wildlands Program designated a 45-acre area around Three Cornered and Round ponds in MSSF as a Representative Natural Area (RNA) because it harbored an exemplary Coastal Plain Pondshore community. Vegetation within the RNA had adapted to extreme changes in water levels. As a result, 12 rare plant species, including several that are globally rare, and several state-listed animal species were found within the designated area (DEM, 1989).

Public swimming beaches are located at five of the forest's ponds: Charge, Fearing, Barrett, College and Curlew (see Table 2.1.1). Bacteria monitoring is conducted at these ponds in accordance with the minimum standards for bathing beaches contained in the State Sanitary Code (105 CMR 445.0). This code requires that water samples be obtained and analyzed at least once per week throughout the swimming season. During the swimming season, the DCR monitors Enteroccoci bacteria at the forest's public beaches. When counts of these organisms exceed state standards, the swimming area is posted for elevated bacteria and swimming is discouraged. The area is still open for public use for sunbathing and picnicking.

Historically, bacteria levels at MSSF have been low. However, in 2009 one sample exceeded state standards at Barrett Pond. During the 2010 swimming season, six samples at Fearing, three at Curlew and one each at College and Barrett ponds

exceeded state standards. Most of the failures occurred after rain events associated with significant storm water runoff into the ponds. In 2010, there were long spans in between rain events, so there was a build-up of bacteria on the roadways and in the camping and day use areas that drain towards the ponds, which resulted in higher counts.

Eroded areas along pond shores, especially at College, Barrett and Fearing ponds, can serve as pathways for sediments to enter the ponds. Phosphorus enrichment from these soil sediments can accelerate aquatic plant growth and degrade water quality. In 2009, the DCR Lakes and Ponds Program completed a bank stabilization and access project adjacent to Camping Area H at Fearing Pond to reduce soil erosion and surface runoff into the pond. Stairs were added to channelize pedestrian access to the beach without damaging the bank. The remaining pond shore was replanted and roped off to discourage access to the restored areas.

In 2004, the DCR Lakes and Ponds Program surveyed water quality at Charge, Fearing and College ponds. As indicated in the table below, nutrient levels were low in all three ponds, with Charge Pond having the lowest phosphorus and nitrogen levels. Low nutrient levels indicate healthy ponds that are not likely to support prolific aquatic plant or algae growth. High dissolved oxygen levels support native fish populations, invertebrates and microorganisms that are dependent on high oxygen levels. The UMass Acid Rain Monitoring Project has monitored the pH, alkalinity and other water quality indicators at College Pond from 1983 through 2010 (www.umass.edu/tei/wrrc/arm). Over the past decade, the pH of College Pond has risen from 5.25 to 6.47 (reflecting decreased acidity), while alkalinity has increased from 1.1 to 2.6 mg/L of $CaCO_3$, which increases the acid neutralizing capacity of the pond.

A 2008 DCR invasive aquatic plant survey found fanwort in Barrett Pond and fanwort and variable milfoil in East Head Reservoir. The 2008 survey did not identify any invasive plants in New Long, Curlew, College, Fearing, Charge, Rocky, Widgeon, Three Cornered or Bumps ponds. In August 2010, Carolina fanwort was observed flowering all across East Head Reservoir. The boat launch area is the most infested area (Kadis, 2010).

Table 2.1.2. 2004 Water Quality Survey Results

	Charge	Fearing	College	Management Target
Total Phosphorous (mg/L)	0.006	0.014*	0.011*	<0.02
Ammonia Nitrogen (mg/L)	BDL	0.11*	0.17*	<0.3
Nitrate Nitrogen (mg/L)	BDL	BDL	BDL	<0.3
Nitrite Nitrogen (mg/L)	BDL	BDL	BDL	<0.3
% Dissolved Oxygen	95.7*	87.2*	82.4*	>70
pH	6.11*	6.54*	6.08*	>6.0
Secchi Disc (m)	3.5	5.0	4.75	>4.0

Source: DCR Lakes and Ponds Program
BDL = Below Detection Limits
* Average of multiple samples taken at different depths.

Vernal Pools

Vernal pools are shallow depressions that temporarily fill with water during the spring and/or fall and typically dry out during the late summer. Vernal pool habitat is essential to the life cycles of certain frog, salamander, fairy shrimp, snail and isopod species. These species have evolved breeding strategies that take advantage of the fishless, aquatic environment provided by vernal pools. Vernal pools often have little or no vegetation in them, but they are surrounded by trees, shrubs and herbaceous vegetation (Swain and Kearsley, 2001).

There are 10 NHESP certified vernal pools located within MSSF (see Figure 2). The NHESP conducted a survey of potential vernal pools in southeastern Massachusetts using color infrared aerial photography. This survey identified approximately 93 potential vernal pools within MSSF. Field surveys can confirm the certified status of these potential vernal pools.

The locations of the vernal pools are generally clustered and appear to be positively associated with the ponds in the forest. The fluctuating water table is important in the seasonal hydrology of the vernal pools. None of the state-listed species documented in MSSF use vernal pools to any great extent, although species such as the eastern box turtle could utilize vernal pools located in the forest. Vernal pools

usually do not require ongoing management, unless they are threatened by non-native plant species or contaminated by storm water runoff or septic system leachate. Vernal pools do require buffering from forestry practices, building projects and trail construction.

Vegetated Wetlands

Using aerial photography, the Massachusetts Department of Environmental Protection's Wetland Conservancy Program identified vegetated wetlands and bogs within MSSF (see Figure 2). There are approximately 42 acres of vegetated wetlands and 62 acres of cranberry bogs within MSSF (Epsilon Associates, 2001). The vegetated wetlands are associated with many of the smaller kettle hole ponds located within the forest that have a higher cover of vegetation and less open water.

Streams

The highly permeable sandy soils of MSSF produce groundwater dominated hydrology rather than one influenced by surface water. As a result, there are very few perennial or intermittent flowing waterbodies. Charge Pond, at the southern extent of the forest, outlets to a swale that flows south partially through the forest, then outside the property to supply cranberry bogs located in Wareham. East Head Reservoir forms the headwaters of the Wankinco River. However, the outlet to East Head Reservoir is outside the forest and as a result, no portion of the river is located within MSSF; associated riverfront area is located in the forest. Since all other waterbodies in MSSF are groundwater fed, streams and rivers are not present anywhere else in the forest.

Vegetation

The pre-colonial forest consisted of a mix of white pine and hardwoods (Patterson and Backman, 1988). The pitch pine-scrub oak dominated Pine Barrens community that has formed in MSSF and the surrounding towns resulted from human disturbances and wildfires that occurred from colonial times to the present. Land use activities and associated wildfires allowed the Pine Barrens to substantially expand during the 1800s, while wildfires during the 1900s maintained the habitat.

Many Pine Barrens located in the forest are currently succeeding to stands of mixed white pine and shade-tolerant hardwoods (Epsilon, 2001). In contrast, other areas, such as frost pockets, appear to remain in a self-perpetuating cover of scrub oak and heath because of the harsh growing conditions in these topographic depressions. A digital vegetation map illustrating the vegetative cover types of MSSF (see Figure 2) was created using information developed by the UMass Amherst Department of Natural Resource Conservation in the 1990s. DCR Management Foresters verified the vegetative cover information within the forest (Epsilon, 2001).

White Pine and Hardwood Forests

Native white pine and hardwood forests occur primarily in the western and northern portions of the forest where soils are derived from glacial moraine deposits. Many of these areas have not burned in the recent past.

Table 2.1.3. White Pine and Hardwood Forests within MSSF

Forest Type	Approximate Area (acres)
White pine forest	3,090
White pine-oak forest	59
Mixed oak forest	216
Total	**3,365**

White Pine Forest. This forest type is dominated by white pines, although scattered white and black oaks are typically encountered. Along the western portion of the forest, north of Halfway Pond Road are some outstanding natural stands of white pine. Many of these trees have reached substantial size. These stands are interspersed with areas of mixed white pine and pitch pine. A dense stand of native white pine also exists around Curlew and Widgeon ponds, where the soil is less sandy (see Figure 2). These white pine forests are similar to the climax forest that existed before European settlement of the area.

White Pine-Oak Forest. White pine-oak forest is a forest dominated by a mix of white pine and oak species, typically located on glacial moraine soils. These forests are often a transitional stage between successional white pine forests and other communities such as mixed oak forests. White pine and oak species dominate the canopy, with lower numbers of pitch pine and red maple. The shrub layer is typically composed of low bush blueberries, huckleberry and sheep laurel. The herbaceous layer is usually sparse with species such as Canada

mayflower, wintergreen and pink lady's slipper present.

Mixed Oak Forest. In the northeast corner of the forest, woodland of mixed oak species composed of white, black and scarlet oak exists in association with white and pitch pine. This is an oak dominated community located over the Ellisville Moraine. The oak species dominate the canopy. The understory contains a mix of saplings from the canopy species. Shrubs in the understory include blueberries, huckleberry, sweet fern and scrub oak. The herbaceous layer is usually scattered and composed of poverty grass.

Pine Barrens

The Pine Barrens are globally rare communities that were once widespread and are now confined primarily to four areas of the United States: New Jersey, Long Island, Albany and Plymouth. These fire-adapted communities are home to a host of rare species found almost nowhere else in the world. The Pine Barrens are characterized by an open canopy of scattered pitch pine with an understory of scrub oak or shrubs in the heath family. Small mammals, rare beetles, moths, butterflies and birds use the Pine Barrens for food and shelter. The plants and animals that inhabit the Pine Barrens have evolved in response to both the droughty outwash soils and the history of wildfires. At MSSF, the Pine Barrens range in character from areas dominated by scrub oak shrubs to those of large pitch pines. The understory vegetation also varies depending on the amount of organic material in the soil and the fire history of the area (DEM, 1987).

Table 2.1.4. Pine Barrens Communities within MSSF

Plant Community	Approximate Area (acres)
Pitch pine forest	4,379
Pitch pine-scrub oak forest	933
Pitch pine-oak forest	588
Scrub oak shrubland	313
Sandplain heathland	428
Total	**6,641**

Pine Barrens represent a significant ecological adaptation to sandy soils, the ability to regenerate immediately following fire and dependence on fire for the maintenance of the vegetative community. In the absence of fire, the Pine Barrens disappear as the result of plant succession. Given its significance, The Nature Conservancy has identified MSSF and the surrounding Pine Barrens as one of The Nature Conservancy's priority action sites (Beers et. al., 1999).

If the Pine Barrens remain undisturbed for long periods of time, the ecosystem will transition into shade-tolerant white pine and hardwoods, displacing rare species that rely on open Pine Barrens habitat. Prescribed burns and mechanical treatments that remove low dense shrubs, woody herbaceous vegetation, accumulated dead needles and leaves on a regular basis can be used to reduce the danger from wildfires and help rejuvenate fire-dependent Pine Barrens plant species. Studies by the Manomet Bird Observatory (now the Manomet Center for Conservation Sciences) have shown that the diversity of native bird species is greatest in Pine Barrens regenerated after a fire and decreases as the vegetation matures (Lloyd-Evans, 1974).

Pitch Pine Forest. The pitch pine plant community is dominated by dense stands of these native pines. Pitch pine can grow up to 80 feet high with a trunk three feet in diameter. Pitch pines have a thick bark that protects dormant buds, which only grow after the crown is killed. This enables the trees to re-sprout after fire has killed the crown. The thick bark also protects the trunk from damage unless the fire is very severe. In the past, pitch pines were a major source of pitch and timber for ship building because the wood's high resin content preserves it from decay. Pitch pine grows in shallow, less fertile sandy soils (TNC, 2010).

Pitch pine also serves as a food source for wildlife. Seeds shed in mid-winter are an important source of food for squirrels, quail and small birds such as the pine warbler, pine grosbeak and black-capped chickadee. White-tailed deer and rabbits also browse on young sprouts and seedlings (Collingwood and Brush, 1978).

Pitch Pine-Scrub Oak Forest. The pitch pine-scrub oak community in MSSF is composed of an open canopy of pitch pine of varied density with a shrub layer of scrub oak. Scrub oak is a scrub that can grow up to 20 feet high with a six inch diameter trunk, but usually does not have a single central trunk and is smaller. Scrub oak acorns are an important food source and the shrubs provide shelter for many animals. Openings in the scrub oak support a low shrub layer made up of various species such as

early sweet blueberry, low sweet blueberry and bearberry. Heathland or grassland plants and lichen often occupy frost pockets located within this community (Swain and Kearsley, 2000). The association between pitch pine and scrub oak varies within MSSF, ranging from areas dominated by scrub oak to areas of dense pitch pine. The composition of species within the understory of the pitch pine-scrub oak community varies with the level of organic material in the soil and the fire history of the area.

The pitch pine-scrub oak community is fire dependent. When fires occur in this community type on a frequent basis, they are generally of a low temperature. These low temperature fires help maintain the plant community structure. If fires are not sufficiently frequent, the flammable material ("fuel load") in a pitch pine-scrub oak community can accumulate. If the fuel load accumulates to significant levels and a fire ignites, the fire can burn much hotter than those with an average fuel load. In this situation a "hot" fire can kill trees in this community, potentially resulting in a change to other community types. Also, under certain wind conditions, these fires could potentially expand into surrounding communities.

In the absence of fire, there can be a build-up of organic material in the soil and a denser forest canopy. This supports the establishment of taller oak species such as scarlet, black and white oak and white pine. This is a shift to a pitch pine-oak forest. These species eventually grow to densities that result in a closed forest canopy. Because many of the shrub and herbaceous species of the pitch pine-scrub oak association are adapted for dry and exposed conditions, they are unable to compete with species more suited to the closed canopy (Epsilon, 2001).

Development and fire suppression throughout the northeastern United States has eliminated much of this habitat. However, in southeastern Massachusetts there is actually more pitch pine-scrub oak habitat now than there was in pre-colonial times due to human caused disturbance and interference. (For more information see http://www.mass.gov/dfwele/dfw/nhesp/natural_communities/pdf/pitch_pine_scrub_oak_commun.pdf.)

Pitch Pine-Oak Forest. Pitch pine-oak forests are dry woodlands that occupy sites with soils derived from glacial moraines. The ratio of pitch pine to tree oaks in this community varies greatly from site to site, with some areas having a dominance of pitch pine, while others a dominance of tree oaks. This is a fire dependent plant community that tends to contain increased numbers of white pine and red maple as the time period in between fires or other disturbances increases (Swain and Kearsley, 2000).

The canopy of the pitch pine-oak forest is typically comprised of pitch pine and black, scarlet and white oak. The understory is generally comprised of a continuous low shrub layer dominated by blueberries, black huckleberry and other plants dependent on acid soils. The herbaceous layer is generally sparse with bracken fern and wintergreen. Pitch pine-oak forests are typically found in a matrix with coastal plain ponds and pitch pine-scrub oak communities (Epsilon, 2001).

Scrub Oak Shrubland. Scrub oak shrubland is a shrubland dominated by scrub oak with little to no pitch pine. These communities form a mosaic with other plant assemblages such as heathland openings, pitch pine-scrub oak communities and pine-oak forests. Scrub oak and dwarf chestnut oak are the dominant woody species in this community. Grasses and lichens also make up a significant component of this plant community (Epsilon, 2001).

Sandplain Heathland. Sandplain heathlands are shrub dominated communities found on acidic, nutrient-poor, droughty soils. Woody shrubs such as scrub oak, black huckleberry, bearberry and low bush blueberry dominate this heath community. The vegetation cover in heathlands is often distributed in sparse clumps intermixed with patches of lichens. Members of the heath plant family possess resinous, waxy substances in their leaves known as cutins, which help reduce transpirational water loss. However, cutins are also highly flammable and ignite easily during dry periods. Plants of the heathlands actually benefit from the effects of relatively frequent, low temperature fires (Epsilon, 2001).

Frost Pockets. The unique local climate found in frost pockets creates environmental conditions that perpetuate scrub oak shrub vegetation. Several community types such as heathlands, sandplain grasslands and scrub oak shrublands can occur within frost pockets. Approximately 70 frost pockets have been tentatively identified in MSSF through the interpretation of color infrared photography

(Epsilon, 2001). Frost pockets support fragile communities that take decades to recover after the surface soil is disturbed.

Frost pocket depressions experience greater radiational cooling on clear nights than surrounding areas. Colder, denser air flows into and accumulates in these depressions due to gravity. As a result of this down drainage of cool air, temperatures at the bottom of the frost pockets average approximately 6°C lower than temperatures at the upper rim. With these lowered temperatures, frost events can occur in any season (Aizen & Patterson, 1995). On the other extreme, the maximum temperature in frost pockets can exceed the maximum temperatures of surrounding areas. Frost pockets are subject to intense solar heat gain because their conditions do not support a vegetative community with a shading canopy.

Frost pockets are maintained by late spring and early fall frosts that damage competing tree species (Swain and Kearsley, 2000). Plants in frost pockets leaf out much later in the season due to the lower temperatures in the depressions (Aizen and Patterson, 1995). This delayed leaf out provides insects with desirable, tender emerging growth when vegetation in the surrounding vicinity is already mature.

Lichens are fungi composed of two different groups of organisms, microscopic green or blue-green algae and colorless fungal threads called hyphae. These two components of the lichen grow together in close association or symbiosis. Lichen symbiosis is unique in that, from this symbiosis, a new plant body or thallus is formed, which bears no resemblance to either the associated algae or fungus (Hale, 1979).

Lichen studies conducted in and around frost pockets at MSSF found a zonal diversity of lichen species in frost pockets. Professor Samuel Hammer of Boston University found that some species preferred substrates enriched with organic matter, some seemed to be associated with blueberry and cranberry bushes in wet conditions, while other species grew best on the edge or lip of frost pockets (Epsilon, 2001).

Sandplain Grassland Community. This is an open grassland community dominated by grasses and herbaceous vegetation. Sandplain grasslands occur on flat outwash plains with droughty, low-nutrient soils. This community can be maintained by periodic fires and/or mowing. It often occurs as small openings within pitch pine-scrub oak communities.

Sandplain grasslands are dominated by little blue stem grass, Pennsylvania sedge and poverty grass. Shrubs found in this community include scrub oak, low bush blueberry and black huckleberry. Although there is overlap with the sandplain heathland community, sandplain grasslands exhibit a much greater diversity of vascular plants.

Conifer Plantations

As a result of colonial wood utilization and wild fires, most of the original forest was cleared and burnt over by the mid-1800s. The Massachusetts Game Sanctuary Association initiated reforestation efforts in 1912 by planting 30,000 white pines around Barrett Pond and East Head Reservoir (Rothman, 1996). White pines were selected to reforest given their pest resistance, suitability to local natural conditions, rapid maturation and ease of planting.

In 1916, the State Forest Commission purchased the Game Sanctuary and continued the reforestation program over the next 40 years. With the help of state unemployed crews and Civilian Conservation Corps crews in the 1930s, approximately 1.9 million white, red, Austrian, jack and Scots pines, spruce and other species were planted in the forest between 1916 and 1937. After the 1957 fire, several stands of red pine, white pine and Norway spruce were planted in the western portion of MSSF in an effort to reforest the area. The pine plantations are located on sites scattered throughout the center of the forest (see Figure 2).

Table 2.1.5. Conifer Plantations within MSSF

Plant Community	Approximate Area (acres)
White pine plantation	211
Red pine plantation	784
Scots pine plantation	148
Total	**1,143**

With the exception of white pine, the plantation trees at MSSF have very little potential to colonize or spread to other areas of the forest. Some incidences of Scots pine and red pine regeneration have occurred, but not to a great extent. Scots pine and red pine are not well adapted to the growing conditions at MSSF. The Scots pine plantations are dying. The red pine plantations have not been

maintained. White pine is native to the MSSF area and grows well in the forest (Epsilon, 2001).

A Continuous Forest Inventory (CFI) system was initiated in 1957 to document change in state forests through time. CFI makes use of permanent one-fifth acre plots. These plots are physically marked in the field and are based on a half-mile grid that is overlaid on all DCR forests and parks. Within MSSF, there are 79 CFI plots. Although the analysis of this data is not complete, it is apparent that there have been significant changes in the forest's vegetation over the 50 years that CFI data have been collected. Most of these changes reflect the fact that MSSF is recovering from two centuries of intensive use and associated disturbance that preceded its establishment (Epsilon, 2001).

Rare Plant Species

The Massachusetts Endangered Species Act (MESA) protects rare plant and animal species listed as Endangered, Threatened or of Special Concern in the Massachusetts Natural Heritage and Endangered Species Program (NHESP) database. The NHESP has documented the presence of 15 state-listed rare plant species within MSSF (see Table 2.1.6). There have been no reports of federally-protected plant species in MSSF.

The NHESP compiles and manages data relevant to rare species locations. Information on file with the NHESP is protected under the Public Records Law (M.G.L. c.66, s.17D) and site specific data is provided on a need-to-know basis only. The DCR collaborates with the NHESP to ensure that management protocols provide protection to known locations of state-listed plant species. Details concerning the species and their locations are not provided in this document to prevent unintentional dissemination of information, which may threaten such species as a result of collection or other use.

Table 2.1.6. State-listed Rare Plant Species Documented in MSSF

Common Name *Scientific Name*	**NHESP Status**[a]	**Habitat**[b]
Acadian Quillwort *Isoetes acadensis*	E	CPP
Broom Crowberry *Corema conradii*[c]	SC	PBS
Inundated Horned-Sedge *Rhynchospora inundata*	T	CPP
Long-Beaked Bald-Sedge *Rhynchospora scirpoides*	SC	CPP
New England Boneset *Eupatroium leucolepis var. novae-angliae*	E	CPP
Plymouth Gentian *Sabatia kennedyana*	SC	CPP
Pondshore Knotweed *Polygonum puritanorum*	SC	CPP
New England Blazing Star *Liatris scariosa var. novae-angliae*	SC	PBG
Reed Bentgrass *Calamagrostis pickeringii*	E	KHW
Resupinate Bladderwort *Utricularia resupinata*	T	CPP
Short-Beaked Bald-Sedge *Rhynchospora nitens*	T	CPP
Subulate Bladderwort *Ultricularia subulata*	SC	CPP
Terete Arrowhead *Sagittaria teres*	SC	CPP
Torrey's Beak Sedge *Rhynchospora torreyana*	E	CPP
Wright's Panic-Grass *Dichanthelium wrightianum*	SC	CPP

a. E = Endangered; T = Threatened; SC = Special Concern Species.
b. CPP = Coastal Plain Pondshore; PBS = Pine Barrens (Shrubland); PBG = Pine Barrens (Grassland); KHW = Kettle Hole Wetlands.
c. It has been proposed that this species be removed from the state list, but remain on the Plant Watch List as a species of conservation concern.

Plant Pests and Disease

MSSF has experienced several outbreaks of insect and disease pests. The pine looper has had a significant effect on pitch pine populations and a minimal effect on other MSSF pines, killing a large portion of the pitch pines in the early 1970s and then again in the early 1980s. The black turpentine beetle has also been known to infest and damage live trees in MSSF, particularly infesting those with reduced vigor (Epsilon, 2001). The pine needle miner caused

browning of pitch pine needles in the mid 1990s, but did not prove lethal. Young white pine and Norway spruce growing in open areas are often damaged by the white pine weevil. Outbreaks of gypsy moth have completely defoliated areas of scrub oak in past summers, but the scrub oak recovered quickly and refoliated by summer's end. Scots pines at MSSF are presently affected by diplodia tip blight, which has severely damaged the plantations.

Invasive Plant Species

Plants introduced into a new area often leave behind their natural control agents. This may give them a distinct advantage over native species in their new habitat. Most introduced species from gardens, meadows and agriculture are not harmful to native communities (Weatherbee et al., 1998). However, a few species have become serious threats to native plant communities. The dry, acidic, nutrient-poor soil conditions of MSSF serve to buffer this area from many invasive plant species. Most invasive plants are generalists that select soils with a more neutral pH and higher moisture levels than the soils found at MSSF. As a result, Pine Barrens plant communities have much lower levels of invasion compared to other vegetative communities in the region (Epsilon, 2001).

Autumn olive is well established at Barrett Pond, the Wildlife Management Area fields and abutting properties. Norway spruce has the potential to destroy frost pocket habitats (Kadis, 2010). Recent invaders include bittersweet, Norway maple, glossy buckthorn and garlic mustard (Kadis, 2010). Early detection and control before invasive species become well established is essential to controlling invasive plant species. Irina Kadis, a local botanist, has created an Invasive Plant Data Collector on the Friends of MSSF web site, where volunteers can log invasive plant sightings in MSSF using GPS coordinates.

There are preferred methods of removal for each species that depend on their particular biology. If an invasive species issue arises in MSSF, the problem should be evaluated by a DCR ecologist in consultation with the NHESP to determine the best method of removal. Removal of the target species by hand (i.e., pulling or cutting) is usually the least destructive method to the surrounding habitat. This method can be employed if the invasion is confined to a relatively small area. However, large-scale invasive species epidemics can overwhelm an area eliminating the hand removal option. In these cases, either employing machinery or herbicides may be effective. However, early detection and hand removal is preferable.

Wildlife

MSSF contains large blocks of undeveloped land with a variety of wildlife habitats and species. The following section provides a summary of the types of wildlife found in MSSF. The northern red-bellied cooter, New England cottontail, vesper sparrow, eastern bluebird, eastern box turtle and eastern whip-poor-wills are the species of greatest conservation concern at MSSF.

Mammals

Approximately 84% of MSSF is covered by conifer trees that provide both food and cover for a variety of mammals (see Appendix D). Conifers provide an abundant food source through their seeds, as well as critical winter cover. Scrub oak is also common through much of the forest. Acorns are an important food source for numerous species including gray squirrel, southern flying squirrel, white-footed mouse, eastern chipmunk and white-tailed deer.

Although there are no species that depend solely on Pine Barrens for their existence, a variety of mammals occur in these areas. New England cottontails are a declining species that benefits from shrubby Pine Barrens habitat. In comparison to other forest types, mammal population densities tend to be relatively low in Pine Barrens communities.

Since many mammals tend to be nocturnal (mostly active at night) or crepuscular (mostly active at dawn and dusk), they are not readily visible to the casual observer. Mammal species that are most regularly observed in MSSF include red squirrel, gray squirrel, woodchuck, eastern chipmunk and eastern cottontail (Epsilon, 2001). These mammals are often observed because they are diurnal (active during the day). However, species such as mink, gray fox and red fox are more secretive and less likely to be encountered. A number of coyote packs have also been observed in the forest.

A decrease in hunting (U.S. Fish and Wildlife Service, 2006) has resulted in an increase in the white-tailed deer populations in some parts of Massachusetts. In 2000, MassWildlife completed a

study of white-tailed deer survivorship in MSSF. Deer were radio-collared and tracked for three years to calculate estimates of survivorship. According to MassWildlife, the survivorship estimates from the project were much higher than anticipated. MassWildlife estimated the deer population size in MSSF to be 15-20 deer per square mile (Epsilon, 2001).

Birds

Over 120 species of birds are found at MSSF including raptors, game birds, waterfowl and songbirds (see Appendix E). Many birds use MSSF as breeding habitat or a migratory stopover to rest and refuel. Vesper sparrows are the only state-listed rare birds documented in MSSF.

The breeding bird species found throughout MSSF are those typical of white pine-oak forests and Pine Barrens. From past studies, the most abundant species noted in the forest include passerine (perching songbird) species such as eastern towhee, pine warbler and common yellow-throated warbler. In addition, two species of the Nightjar family, eastern whip-poor-will and common nighthawk, are known to nest within the open areas of the forest. The larger pine stands throughout the forest satisfy the nesting requirements of hawks and owls, such as the red-tailed hawk, great horned owl and screech owl.

Bird species abundance and diversity are influenced by habitat structure. Areas cleared for wildlife management purposes, although not naturally created, increase the species diversity in MSSF by adding open field habitat. If these areas were not actively managed, the fields would likely revert to pine forests over time. Species such as eastern bluebird, vesper sparrow and clay-colored sparrow have been documented in the fields of the Wildlife Management Areas. Eastern bluebirds were among the species devastated by the loss of grassland habitat, competition with non-native birds and use of DDT before it was banned (Epsilon, 2001). Twenty-eight bluebird nesting boxes have been erected by volunteers in cleared areas in the quail Wildlife Management Area to serve as surrogates for dead, hollow trees. Volunteers monitor these boxes weekly to identify nests, count eggs and control insects and invasive birds (Guimont, 2010).

Eastern whip-poor-wills are ground nesting birds that need dry open woodlands. Because they are nocturnal and rarely seen, they are most frequently identified by the call of "whip-poor-will." They forage by perching on the ground and flying up to catch passing insects. Whip-poor-will populations decline when an absence of disturbance results in a maturing forest with a dense canopy. Given its decline statewide, it is anticipated that whip-poor-wills will soon be added to the NHESP list of rare and endangered species as a species of Special Concern. MSSF has one of the two largest remaining whip-poor-will populations in Massachusetts, providing a prime opportunity for conservation of this declining species (d'Entremont, 2000). Ongoing active management of open woodland habitat is needed to support a breeding population of whip-poor-wills in the forest.

The varied habitats in MSSF are an important migratory stopover for passerines, waterfowl and shorebirds. The ponds in the forest provide resting spots for a variety of ducks and geese flying from their wintering grounds to breeding locales in Canada.

Forest succession has greatly impacted both species diversity and abundance particularly in the Pine Barrens communities. Suppression of wildfires at MSSF has resulted in the loss of breeding habitat such that nighthawks have not been recorded breeding in the forest in recent years. Common nighthawks were known to nest on the ground in recently burned areas. Their eggs, which are dark gray with black and white mottles, blend in well with the blackened earth. MSSF was the only known location in the state where nighthawks nested in their natural habitat. They now search for flat, black, graveled rooftops as a best match to their desired breeding habitat (d'Entremont, 2000).

Plant succession through fire suppression has also had a negative impact on species abundance. Research by the Manomet Center for Conservation Services in the mid-1970s analyzed three pitch pine-scrub oak stands in different stages of succession following fire: two years (burned), 10 years (regenerating) and 30 years (mature). The highest abundance and diversity was observed in the 10 year regenerating forest stand. Forests in the first few years following a burn are recovering from the fire disturbance and wildlife species have not recovered

from the disturbance. After 10 years, both plant life and birds are flourishing. After 30 years, growth is stagnant and little new food is provided by the mature forest. The researchers concluded that regular fire disturbance enriched bird life as long as the damage was not too devastating.

Dr. David Morimoto substantiated this conclusion in research he conducted in the late 1980s in MSSF (Morimoto, 1992). Looking primarily at the most abundant bird species in the Pine Barrens communities (prairie warbler, eastern towhee and common yellow-throated warbler), he noted higher abundance and greater species diversity in plots that were more recently burned. He concluded that regular forest disturbance, particularly that provided by fire, creates diverse habitats (both disturbed and mature forests) and a patchy mosaic of habitat type, which increases species density and richness.

Stocked game birds in MSSF include northern bobwhite quail and ring-necked pheasant. Bobwhite quail is native to southeastern Massachusetts. Ring-necked pheasant is an introduced Asian species that is widespread in Massachusetts, but less abundant in southeastern Massachusetts. Both species are common in MSSF for short periods during the fall when approximately 1,500 pheasants and 1,500 quail are stocked in the Wildlife Management Areas during the bird hunting season (mid-October through the last Saturday in November).

Ruffed grouse breed in a variety of woodland habitats including pitch pine-scrub oak. Ruffed grouse appear to be relatively common in MSSF and the hunting pressure is sufficiently low to sustain a healthy population. By the mid-1980s, few wild turkeys were observed in MSSF. However, a successful stocking program instituted in Massachusetts has resulted in the expansion of wild turkey populations into MSSF. Wild turkeys are now a regular inhabitant of MSSF and surrounding forests (Epsilon, 2001).

Reptiles and Amphibians

MSSF provides habitat for a number of turtle species including the northern red-bellied cooter, common snapping turtle, stinkpot, eastern painted turtle, eastern box turtle and, possibly, spotted turtle (see Appendix F). With the exception of spotted turtles that frequent shallow temporary waterbodies and eastern box turtles that live in brushy fields and woodlands, all of these turtles prefer permanent pond habitats (DeGraaf and Rudis, 1983).

Northern Red-bellied Cooter. The ponds in MSSF provide essential habitat for the state and federal endangered northern red-bellied cooter. These red-bellied turtles are large (10-12 inches), freshwater basking turtles that spend most of their time in coastal plain ponds with occasional journeys onto dry land (USFWS, 1994). The northern red-bellied cooter primarily inhabits freshwater ponds with abundant aquatic vegetation. Sandy soil on land surrounding the pond is required for nesting. The turtles are usually active from late March through October. In the late spring and early summer, females select nesting sites in sandy soil, usually within 100 yards of the pond (USFWS, 1994). Hatchlings may emerge from nests to enter ponds in the late summer or overwinter in the nest chamber and emerge the following spring. During the winter months, red-bellied cooters rest on the bottom of ponds, under the ice, in a state of relative inactivity or hibernation. Sexual maturity in red-bellied cooters is probably reached in 15-20 years in females and perhaps less in males. Aquatic vegetation is the primary diet for all age classes, although crayfish are also eaten (Epsilon, 2001).

MSSF is located within the geographic center of the native red-bellied cooter distribution in Massachusetts. Threats to this species include the loss of nesting habitat to pond shore development, nest predation by domestic pets, increased population densities of natural predators in suburbanizing areas, road mortality and collection for pets (NHESP, 2007). In the 1970s, the local red-bellied turtle population consisted of 200-250 adult turtles living in up to nine core ponds (Crane, 2010).

A number of conservation measures have been implemented over the past 30 years to protect and increase the existing population of red-bellied cooters. One measure is to place a cage over the nest to protect the eggs from predators. In 1980, a "headstart" program was initiated by the U.S. Fish and Wildlife Service to expand the range of red-bellied turtles into several additional ponds and significantly increase the number of turtles in ponds with existing populations by offsetting the high mortality rate of first-year turtles in the wild (Amaral, 1994). Eggs or hatchling turtles are brought into captivity and raised until they reach a

more advanced stage of growth. The young turtles are then released into the wild where presumably, due to their larger size, they will experience lower mortality rates from predators such as great blue herons, raccoons, bullfrogs and fish (Amaral, 1994). Between 1980 and 2010, over 2,500 turtles from this program were released into 22 sites in Plymouth and Carver, including several ponds located within MSSF. Survivorship from the program has been quite high. The re-introduction program is now close to reaching its objective of establishing a diverse population of 3,500 red-bellied cooters in 17 core ponds (Crane, 2010).

Eastern Box Turtle. Eastern box turtle is classified by the NHESP as a species of Special Concern. The NHESP reports that in the past 15 years, fewer than 200 sightings have been reported in Massachusetts, with the largest number of reports originating from the southeastern part of the state. Threats to this species include habitat loss to development, road mortality, field mowing, disturbance of nest sites by off-highway vehicles, wild fire, poorly planned and/or implemented prescribed burns, collection for the pet trade and disease (NHESP, 2007).

The eastern box turtle is a terrestrial turtle ranging from four to six inches in length. They are typically found in dry and moist woodlands, brushy fields, thickets, marsh edges, bogs, stream banks and well-drained bottom lands. Due to moderate winter temperatures, it is more frequently found in southeastern Massachusetts, especially on Cape Cod. In MSSF, box turtles are most often observed in the white pine-oak forests, but have also been sighted in pitch pine-scrub oak communities and scrub oak shrubland in the southeast portion of the forest.

Snakes. MSSF provides habitat for at least 10 species of snakes known to occur in southeastern Massachusetts (see Appendix F). The abundant Pine Barrens plant communities are suitable habitat for species such as the eastern milksnake, northern black racer and red-bellied snake. Species such as the eastern hog-nosed snake prefer areas in open woodland with sandy soils, which is an abundant habitat in MSSF. The numerous ponds of MSSF provide habitat for the northern watersnake, while the managed grassland areas and cranberry bogs in MSSF provide suitable habitat for the smooth greensnake. Generalist species such as the common gartersnake can be also found throughout MSSF (Epsilon, 2001).

Amphibians. MSSF contains suitable habitat for a number of amphibian species (see Appendix F). The numerous ponds on the property provide breeding and foraging habitat for both frogs and toads. Species that are known to currently inhabit the ponds within the forest include the green frog, bullfrog and pickerel frog. These species are seldom found far from open water bodies (Epsilon, 2001).

MSSF also provides suitable habitat for Fowler's toad, Eastern American toad, wood frog, gray treefrog and northern spring peeper. These species require standing water for breeding, but spend the majority of their lives in a terrestrial setting. Fowler's toads frequent pine and oak dominated forests with sandy, well-drained soils. Eastern American toads are a common generalist species found in almost any habitat type. The gray treefrog is often found on mature, lichen-covered trees near shallow water. All of these species have been observed in MSSF (Epsilon, 2001).

Spotted salamander is the only documented salamander species in MSSF that requires vernal pool habitat for breeding. Spotted salamanders are secretive forest-dwelling animals that spend most of the year underground or in the leaf litter on the forest floor. As a result, they are seldom observed outside of their breeding season (Epsilon, 2001).

The annual reproductive success of vernal pool breeders can be greatly affected by drought years when the pools dry up earlier than usual. However, it is the temporary nature of these pools that make them a valuable breeding habitat to the salamanders and other vernal pool inhabitants. Fish cannot survive in a pool that dries up each year; hence there is less predation on the eggs and larvae. Vernal pool dependent amphibians have evolved a breeding strategy in which an occasional season of reproductive failure is less detrimental to the population than heavy predation by fish every breeding season (Epsilon, 2001).

Fisheries

Given the absence of flowing water, fisheries resources within MSSF are confined to the numerous kettle hole ponds located on the property. Most of the ponds are relatively shallow and only support warm water fish species such as largemouth

bass, smallmouth bass, chain pickerel, yellow perch, pumpkinseed, brown bullhead and golden shiner (Epsilon, 2001). Since the ponds in MSSF reflect groundwater levels, some of the shallower ponds completely dry up during drought years, eliminating existing fish populations. A summary of fisheries information for MSSF is presented in Appendix G.

Many of the ponds in MSSF provide excellent fishing opportunities for anglers, especially the ponds located within campgrounds or ones that are easily accessible by road. East Head Reservoir can only be fished by boat since the land around it is privately owned. Current fisheries management in MSSF is limited to Fearing Pond, which the DFW stocks in the spring and fall with rainbow, brook and brown trout. Fearing Pond is the only pond known to contain coldwater species in MSSF. Occasionally, the DFW stocks the larger ponds with smallmouth bass to control non-game species.

Invertebrates

The presence of numerous rare invertebrate species contributes significantly to MSSF's biodiversity. The NHESP has documented 24 species of state-listed moths, butterflies, damselflies, dragonflies and beetles within MSSF.

Moths and Butterflies. Numerous species of moths and butterflies inhabit the Pine Barrens communities in MSSF. A study conducted adjacent to MSSF, in Camp Cachalot, documented 213 species of moths in habitats equivalent to those found in MSSF (Epsilon, 2001). MSSF contains 17 species of rare moths and butterflies currently listed by the NHESP (see Table 2.1.7).

This relatively high number of rare species of a given taxonomic group, in a geographically limited area, is attributed to the unusual Pine Barrens plant communities in the forest and the reliance of some of these moth species on these plants (principally scrub oak and low bush blueberry). Threats to these species include loss of habitat to development, loss of habitat structure due to fire suppression, invasion by exotic plants, introduced generalist parasitoids, insecticide spraying, loosening and erosion of consolidated soils by off-highway vehicles, excessive deer browsing of larval host plants and light pollution. There have been no reports of any federally protected moth or butterfly species in MSSF (Epsilon, 2001).

Table 2.1.7. State-listed Moths and Butterflies Documented in MSSF

Common Name *Scientific Name*	**NHESP Status**[a]	**Habitat**[b]
Barrens Buckmoth *Hemileuca maia*	SC	S
Barrens Daggermoth *Acronicta albarufa*	T	S
Buchholz's Grey Moth *Hypomecis buchholzaria*	E	S
Coastal Heathland Cutworm *Abagrotis nefascia*	SC	S
Coastal Swamp Metarranthis *Metarranthis pilosaria*	SC	PBW
Frosted Elfin Butterfly *Callophrys irus*	SC	SG
Gerhard's Underwing Moth *Catocala herodias gerhardi*	SC	S
Melsheimer's Sack Bearer *Cicinnus melsheimeri*	T	S
Pale Green Pinion Moth *Lithophane viridipallens*	SC	PBW
Sensitive Butterfly Species[c]	E	SG
Pine Barrens Speranza Moth *Speranza exonerata*	SC	S
Pine Barrens Zale *Zale lunifera*	SC	S
Pine Barrens Zanclognatha *Zanclognatha martha*	T	PB
Pink Sallow Moth *Psectraglaea carnosa*	SC	S
Slender Clearwing Sphinx Moth *Hemaris gracilis*	SC	S
Water-willow Stem Borer *Papaipema sulphurata*	T	PW
Waxed Sallow Moth *Chaetaglaea cerata*	SC	PB

[a] E = Endangered; T = Threatened; SC = Special Concern Species.

[b] S = Shrubland; PBW = Pine Barrens Wetlands; SG = Sandplain Grassland; PB = Pine Barrens; PW = Pond Shore Wetlands.

[c] This species is 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.

Damselflies and Dragonflies. One species of state-listed dragonfly and four species of state-listed damselflies have been documented by the NHESP in the forest (see Table 2.1.8). There have been no reports of any federally protected damselfly or dragonfly species in MSSF (Epsilon, 2001).

Table 2.1.8. State-listed Dragonfly and Damselflies Documented in MSSF

Common Name *Scientific Name*	NHESP Status[a]	Habitat[b]
Attenuated Bluet Damselfly[c] *Enallagma daeckii*	SC	V
Comet Darner Dragonfly *Anax longipes*	SC	CPP
New England Bluet Damselfly[d] *Enallagma laterale*	SC	CPP
Pine Barrens Bluet Damselfly *Enallagma recurvatum*	T	CPP
Scarlet Bluet Damselfly *Enallagma pictum*	T	CPP

a. E = Endangered; T = Threatened; SC = Special Concern Species.
b. V = Vegetated ponds, swamps and stream backwaters; CPP = Coastal Plain Pondshore.
c. It has been proposed that this species be changed from a Special Concern Species to Threatened.
d. This species is relatively secure in the state and may be removed from the state list.

These species inhabit coastal plain ponds with a sand substrate and floating or emergent vegetation. Larvae are primarily found in aquatic habitats such as coastal plain ponds and vernal pools. Adults are usually found in flight near aquatic habitats during the spring, summer or fall. Larval and adult damselflies and dragonflies eat a variety of organisms including other insects, crustaceans, segmented worms, mollusks and even small vertebrates (Peckarsky et al., 1990). Threats to these species include shoreline development, water table drawdown, off-highway vehicle traffic along pond shores, pond eutrophication and indiscriminate or frequent use of insecticides.

Beetles. Tiger beetles are active in the spring, dormant in mid-summer and active again in the late summer and early autumn. Habitat must include bare patches of consolidated sand. This type of habitat can be found along the margins of trails and unpaved roads. Threats to these species include loss of habitat to development and plant succession, loosening and erosion of consolidated soils by off-highway vehicles, loss of habitat structure due to fire suppression or invasion by exotic plants and indiscriminate or frequent use of insecticides (NHESP, 2007). Two species of state-listed beetles have been documented by the NHESP in the forest (see Table 2.1.9). Neither species is federally listed (Epsilon, 2001).

Table 2.1.9. State-listed Beetles Documented in MSSF

Common Name *Scientific Name*	NHESP Status[a]	Habitat[b]
Sensitive Beetle[c]	E	PB
Purple Tiger Beetle *Cicindela purpurea*	SC	PB

a. E = Endangered; T = Threatened; SC = Special Concern Species.
b. PB = Pine Barrens.
c. This species is 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.

Wildlife Management Areas

The Massachusetts DFW actively manages two Wildlife Management Areas (WMA) within the boundaries of MSSF: (1) a pheasant area located in the center of the forest; and (2) a quail area located on the southeastern edge of the forest (see Figure 10). The DFW published a management plan for these two areas in 1971 (Burrell and Turner, 1971). There is no written agreement between the DFW and DCR concerning management of the WMAs. The WMAs are managed to provide quality public game bird hunting opportunities in the forest. This is accomplished through bird stocking and habitat management programs. During the pheasant and quail hunting season (mid-October to the last Saturday after Thanksgiving), ring-necked pheasant and bobwhite quail are stocked on a weekly basis.

In the mid-1950s, the pheasant area was established on approximately 1,150 acres within the central part of the forest. The quail area, which includes approximately 870 acres in the southeastern portion of the forest, was established in 1964 following a large forest fire that year. The habitat management strategy implemented in the pheasant and quail areas involves the creation of small clearings of early successional habitat within the dominant Pine Barrens community. These areas were initially cleared with a bulldozer and replanted with a mix of native and non-native perennial grasses and legumes, as well as some shrubs and trees (DEM, 1987). All of the existing fields are mowed periodically to prevent successional woody growth. Two invasive plant species, spotted knapweed and autumn olive, have been identified in the quail area (Kadis, 2010).

These clearings are particularly important to grassland wildlife for nesting and brood rearing, as they supply food in the form of herbs, grasses and

insects. Game species that have benefited from the grassland clearings include bobwhite quail, ring-necked pheasant, ruffed grouse, white-tailed deer, eastern cottontail and woodchuck (Epsilon, 2001). Non-game species that have benefited include hawks, owls, small mammals, bluebirds, sparrows, warblers and other songbirds (Epsilon, 2001).

CCC Fearing Pond Fireplace Construction, c.1935

2.2. CULTURAL RESOURCES

The land within the DCR's parks is a storehouse of cultural resources; its historic buildings, structures, archaeological sites and landscapes are reminders of the important role these lands have played in this nation's history since long before the Pilgrims landed at Plymouth. These historic resources are milestones in the course of history and teach us about how people lived during prehistoric, pre- and post-Colonial times. They inform us about the industrial and technological changes of the 19th and 20th centuries,and even give us a glimpse of life during the Great Depression and two world wars.

Collectively, these diverse historic resources document the human experience in Massachusetts. Scattered across the landscape, this ensemble of buildings, structures and sites tell the story of our common heritage. Their protection and preservation is a vital component of the DCR's mission and policy for resource stewardship.

Over the past several years, the DCR's Office of Cultural Resources (OCR) has established procedures for the protection of the significant cultural resources that are contained within agency's parks (see Appendix H). As part of this effort, the following sections are meant for the specific purpose of ensuring that the cultural resources of MSSF are identified, evaluated, registered and treated.

The RMP development process has resulted in an improved body of knowledge on the cultural resources of MSSF. Data has been field verified and collected using a handheld GPS unit, recording spatial data (location) as well as condition, materials, threats and recommendations. Myles Standish is one of the first DCR facilities recorded using this methodology, as OCR moves toward a more accessible online inventory format.

Cultural resources that are over 50 years old are considered potentially historic and evaluated for significance. The DCR uses the nationally accepted standards for evaluating historic significance, primarily the National Register of Historic Places. The DCR treats properties as historically significant if they meet the criteria for listing on the National Register, even if the property has not been formally nominated or listed. The OCR coordinates all regulatory compliance related to state and local laws protecting historic and archaeological resources.

This section describes the known and potential cultural resource areas in MSSF, including pre-contact and post-contact archaeological resources, and historic buildings, structures and landscapes. Section 5.3 provides specific recommendations for the cultural resources that require additional research, documentation, stabilization or preservation. All cultural resources are to be managed in accordance with the OCR procedures provided in Appendix H.

Regional Pre-contact Context

About 12,000 years ago, New England's first true colonists, Paleo-Indian hunters and gatherers, entered a landscape recovering and revegetating after the retreat of the Wisconsin Glacier from its terminus at Cape Cod. The post-glacial landscape was similar to the tundras of the north Canadian provinces. This barren landscape was succeeded by a boreal woodland vegetative community that dominated southern New England between c. 12,000 to 9,500 years ago and then gradually replaced by a pine-oak forest.

Although sites from the ***Paleo-Indian Period*** (c. 12,000 to 9,500 years ago) are quantitatively few in New England, it is currently believed that the Paleo-Indian subsistence strategies reflected the high species diversity and unstable post-glacial ecosystems. These ecological conditions favored a flexible generalist subsistence strategy that focused on a wide range of available food resources, as opposed to exploiting only a few food types.

The low site frequencies have been interpreted as a result of low Paleo-Indian population densities, with people organized into small, highly mobile groups, possibly familial units, who moved within large territories exploiting seasonally abundant plants and animals. The site frequencies may also be partly a function of sample error, as rising sea levels created by the melting glaciers inundated a large extent of former coastal plain on which Paleo hunters and gatherers may have lived.

Evidence of the presence of Paleo-Indians in the vicinity of MSSF is sparse, but compelling. One of the larger and better known Paleo sites in New England is located not too far away at Wapanucket, on Assawompsett Pond, in Middleborough. This site featured a comprehensive tool kit of eastern fluted points, gravers, scrapers, channel flakes and other flaking debris. Interestingly, most of the raw materials were exotic cherts and jaspers, suggesting long distance trade links. Isolated finds of Paleo-Indian points have been reported from Mansfield, Bridgewater, Wrentham, Carver and Norwell. A rare recovery of a Paleo-Indian artifact by Jesse Brewer at the well-known Peach Orchard site in Marshfield suggests that coastal or near coastal zones were occupied at this time.

The ***Early Archaic Period*** (c. 9,500 to 8,000 years ago) is also poorly represented in the archaeological record of southern New England and there is little substantive data on which to make interpretations of Early Archaic lifeways.

About 9,500 years ago, the environment of southern New England had transformed into a mixed pine-hardwood forest. This forest classification is, however, highly generalized because at the smaller, local level, biotic communities would have varied as they do today according to elevation, slope, aspect, drainage and soils. The complex topography and physiography of southeastern Massachusetts probably encouraged the growth of a diversity of forest types by this time, as well as for most of pre-history.

As with the preceding Paleo Period, the low frequency of Early Archaic sites is interpreted as a result of low populations. Further, it was believed that Early Archaic activity focused around a few core areas, such as the Taunton River, where high site densities have been recognized for years. However, recent research has identified additional clusters and many more sites with diagnostic bifurcate base points have been found scattered across the landscape as isolated occurrences, including one on East Head Reservoir. One was also found just north of MSSF on Great South Pond and several miles to the south on Great Herring Pond. The wide variety of habitats in which Early Archaic sites are found suggests a settlement pattern based on the use of many different locations to exploit different types of available foods. The seasonal cyclical settlement pattern was a strategy that persisted throughout pre-history and was probably an adaptive response to the seasonally defined ecosystems of New England.

One of the recorded sites within MSSF was occupied during Middle Woodland times near East Head Reservoir and just north of the forest a collector recovered a diagnostic Middle Archaic point somewhere around Great South Pond. Both of these sites were first utilized during the previous Early Archaic period and may represent site use during the different periods.

During the ***Middle Archaic Period*** (c. 8,000 to 6,000 years ago) sites are much more numerous in the region than those of the previous periods, with sites occurring in a wide range of habitats: margins of bogs, swamps, rivers, lakes and ponds. This diversity has led to the speculation that seasonal scheduling of subsistence activities was well established by this time. The spawning behavior of anadramous fish is also believed to have been reestablished after having been disrupted by the Wisconsin Glacier. The intensified use of estuaries and streams connecting with interior spawning ponds is interpreted as a response to this newly available seasonal resource.

While the majority of Middle Archaic sites tend to be located on streams, rivers, ponds and wetlands, a few have been found in what is today a coastal setting. When these sites were occupied between

8,000-6,000 years ago, these locations were gradually changing from an interior setting to a maritime one, as Plymouth Bay became inundated as the shoreline began to reach its current configuration.

As elsewhere in Massachusetts, more sites in the southeastern part of the state have yielded diagnostic ***Late Archaic Period*** materials than the preceding periods and may document a population increase c. 6,000 to 3,000 years ago. Late Archaic sites have been found in the widest range of habitats and are larger and more complex than earlier periods. Studies that have included reconstructing past climatic conditions in the area suggest that recurrent or long lasting dry periods greatly reduced available open water, forcing intensive use of the larger and deeper bodies of water. Some very large sites have been identified on the Taunton River and Assowompsett Pond. Elaborate burials, the result of rich ceremonial activities, occurred in some of these interior core areas. By this time, the coastline had stabilized and large shell middens in Kingston, Duxbury and Plymouth indicate a shift to maritime resources.

During the ***Early, Middle and Late Woodland*** **periods** (3,000 to 450 years ago) the coastal resources continued to be exploited and marine mammals, such as seals and whales were either actively hunted or butchered where they became stranded. Interior ponds, wetlands, streams and rivers continued to be occupied, each depending on the season of the year. Wooded sheltered lakes, ponds and wetlands were favored during the winter. Large rivers and streams, particularly at falls and rapids, became springtime fishing stations and the estuaries and coastal marshes were occupied during the summer. With the coming of fall, groups began to move back inland getting ready to occupy their winter camps. Hunting game birds and the migratory fowl that were briefly abundant and the larger fur bearing animals whose pelts were thickening in their own response to the changing seasons, became the focus of subsistence activities. By winter, the groups had split up into smaller family units and they began to draw down on some of the food surpluses that they cached from the previous seasons.

Pre-contact Archeological Sites

Currently there are five pre-contact archaeological sites recorded within MSSF, but artifact collectors discovered them, so little is known about them. For most sites there is little more than location information, but nothing is known of the site's functions, age, size, seasonal use, integrity or significance.

Only one site, located near East Head Reservoir, has any information other than location. Diagnostic artifacts indicate that the site was first occupied during the Early Archaic Period between 9,500 and 8,000 years ago; again during the Middle Archaic Period between 8,000 and 6,000 years ago; and then in the Late Archaic and possibly Early Woodland periods anywhere from 6,000 to 2,200 years ago.

A short distance north of MSSF, a site with a similar occupation range was discovered around Great South Pond. Similarly, Micajah and Little Micajah Ponds are considered a single large site, only a small portion of which lies within MSSF itself. These are best thought of as collecting territories, having been identified by artifact collectors who frequently returned to an area over a number of years, but seldom precisely recorded where their finds were made. A short distance to the north, the Billington Sea has 18 sites recorded around its margins. These huge sites clearly reflect the presence of a favorable habitat in the past, and thus, the area's high archaeological sensitivity.

The lack of more sites within MSSF is surely because as one of the oldest state forests in Massachusetts, there has been little development and therefore, few collecting opportunities have presented themselves to the artifact hunter.

The MHC's files reveal a high frequency of prehistoric archaeological sites in the Plymouth-Carver region and indicate that this area was more or less continuously inhabited by Native Americans for over 10,000 years. One of the sites within MSSF documents the presence of Native Americans at East Head Reservoir, possibly from as early as 9,500 years ago and more or less continuously through the Late Archaic-Early Woodland periods to about 2,200 years ago.

The lower frequency of documented sites within MSSF, as compared with the surrounding landscape, does not necessarily indicate less intensive occupation. To the contrary, the environmental setting and natural resources within MSSF are virtually identical to those that exist around it,

except for the coastal and estuarine zones. Native Americans of course knew no such boundaries, so there is every reason to speculate that similar site densities exist within the forest as outside of it.

Significantly, the existing archaeological record suggests that archaeological resources located in areas protected from development and most extensive disturbances are likely to survive intact below ground. Therefore, it would be predicted that MSSF would have good potential for the survival of undisturbed prehistoric sites at strategically favorable locations. Inland sites in this region are concentrated around mid to large sized ponds, but important sites are also found in other locations depending on the proximity to fresh water, degree of slope and presence of well-drained soils. Combined, these criteria help determine the suitability of any given location for prehistoric habitation.

Despite the fact that many sites have been recorded regionally, precious little is really known about these sites, i.e., size, age, resource use patterns or significance. This paradox exists because most of the sites were discovered by vocational archaeologists and collected from disturbed contexts in an uncontrolled manner. Importantly, the potentially undisturbed sites in MSSF sites would add immeasurably to our understanding of Native American adaptations, social organization and land use of this important inland habitat.

While this prehistoric overview provides context for the resources within MSSF, little more than the locations of these resources are known. With this veil of uncertainty, it is incumbent upon the agency to take a cautious and conservative approach to project planning, design and implementation. A systematic archaeological study is critical to understanding Native American adaptation, social organization and land use of the MSSF habitat.

Historic Archaeological Resources

During the ***Contact Period*** (1500-1620) core areas were established along major river drainages where local hunters and gatherers made seasonal rounds between the estuaries, the headwaters and associated tributaries and interior ponds. In such a seasonally based subsistence pattern, the interior lands of southeastern Massachusetts, as represented by the 12,404-acre MSSF, were probably used the most during the fall and winter.

At this time, the margins of Plymouth Bay were the central location of the ***Patuxets***, thought to have been a cultural and linguistic sub-group of the Wampanoags. It is believed that extensive settlement of the area's interior was discouraged by the rocky uplands and excessively well drained sandy soils (MHC, 1982). MSSF, together with other interior areas of southern Plymouth and Carver, eastern Fall River and Freetown, appear to have been peripheral to settlement during this time. Between 1616 and 1619, an epidemic referred to as "the plague" by 17th century writers, severely decimated the local Native population by 90%.

With the founding of Plymouth in 1620, English settlements expanded along the coast and up several river drainages, primarily to the north of the original colony. The only interior settlement in the early 17th century occurred in present day Taunton, which developed as an agricultural and industrial center. By 1656, one of New England's earliest iron works was erected in present Raynham.

The expansion of English settlement resulted in the displacement of most of the region's remaining Native population from the coast to inland ponds. MSSF was probably largely uninhabited at this time by either colonials or Native Americans, although travel through it occurred on a long-established trail system (Krussell, 1971).

Between 1710 and 1715, the land that comprises MSSF was included within a 30,000-acre tract of surveyed land known as the ***Ten Great Lots.*** The large plots were granted to individuals, corporations, or held as common land used largely for lumbering. The lots were long on their north-south axis and narrow on their east-west axis. Seldom were such lands actually occupied; rather, they were used for their resources or used for pasture, particularly for sheep. Later, as the core communities grew, land distributions were made to new settlers for occupancy.

King Philip's War was particularly devastating to the local Native American population, as most of their land was confiscated and the survivors were widely dispersed throughout the region; many were sold into slavery in the West Indies.

The English population in the Plymouth Bay and North River areas increased dramatically in the 1700s with a focus on the rich marine resources of

Cape Cod Bay. By 1774, Plymouth was home to 75 whalers and shipbuilding became important. Among the principal industrial developments within the interior portions of the region was the creation of bog iron production centers in Duxbury, Kingston, and Carver. Generally, however, outside of the principal core areas, settlement remained dispersed across the landscape and the economy was based on modest traditional farming activities.

By the 1770s to 1830, several large industrial cities became prominent on the Taunton River and Buzzards Bay, but the region in which MSSF exists remained rural and sparsely settled. Also, by this time use of local bog ore for iron production decreased as superior ores were imported from Europe and the mid-Atlantic states and timber resources were greatly diminished as the forests had been cut over. This, combined with associated wildfires, led to the development of extensive Pine Barrens habitat in MSSF.

Two important changes occurred in and around MSSF between 1870 and 1915. First, was the introduction of cranberry cultivation from Cape Cod, which put the vast bogs of Carver and Plymouth back into economic viability after the collapse of the bog iron ore industry and continues to be prominent features across the landscape today. Second, was the establishment of the summer cottage communities around many of the interior ponds of the region, which still hug the shores of most of the larger ponds within MSSF. In 1916, with the creation of Myles Standish State Forest, which comprised 5,700 acres of open space in the towns of Plymouth and Carver, major private intrusions on the landscape were largely halted. The forest saw several episodes of expansion, first through the cottage program between 1919 and 1940, then in the 1930s with the Civilian Conservation Corps and later in the 1950s with the increase in demand for public recreation following WWII.

In the 1930s, the Civilian Conservation Corps (CCC) was established by President Franklin D. Roosevelt to provide employment opportunities for young men and to improve the forest and recreation resources of the country. The importance of MSSF resulted in the creation of two CCC Camps within the forest from 1933 to 1935. CCC activities at Myles Standish included the construction of over 70 miles of roads, 17 miles of hiking trails and recreation areas at Charge, Fearing, New Long and Fearing ponds. CCC crews also planted 730,000 pine trees, cut brush along roads, burnt slash left from logging operations and controlled gypsy moth and white pine blister rust infestations.

Historic Resources

Dozens of historic sites, buildings, structures and trails are included in the Cultural Resources Inventory (CRI) within MSSF. The historic resources of MSSF appear to represent or otherwise document several important historic events that occurred in Plymouth County ranging from cranberry farming to recreational development. Mast Road, a nearby town road that borders the forest, references the historic harvest of timber for ship masts. Webster Spring Road, running west from Fawn Pond to East Head Reservoir, references the area where Daniel Webster fished for trout. During the mid-19th century, hunting and fishing excursions into the area were quite popular and by the early 20th century, game and quail farms had been established to supplement wildlife gaming.

Historic Archaeological Resources

The principal category of historic resources within MSSF is trails and roads that crisscross the forest and appear to date back to contact and/or Colonial times. Many are shown on 19th century atlases, but it is difficult to verify most of their temporal associations. In some cases, the trails undoubtedly date to prehistoric times.

A few cellar holes and trash dumps of unknown ownership, age or function are recorded in MSSF and undoubtedly there are more. Within an area of approximately 12,400 acres, this low number may reflect the extremely low population density that this interior portion of Plymouth County experienced historically. Not only was the area somewhat marginal to settlement, industrial activities were also limited within MSSF. Two locations where slag mounds were dumped as the waste from the nearby bog iron furnace(s) are located along the western edge of the forest. These are apparently associated with the Federal Furnace and/or the Charlotte Furnace, both of which date to the early 19th century and were located in Carver. It is interesting to note the lack of stone walls at MSSF due to the absence of tillage in the history of the area and the lack of

large rocks in the sandy outwash that dominates the southern two thirds of MSSF.

"The Old Homestead." The area off of Jessup Road, northwest of Barrett Pond, is known to park staff as the "Homestead" and includes a foundation, dump site, two headstones (pets) and a pine plantation. This area roughly corresponds with the site identified as #11 in a 1985 survey, which was noted to have a cranberry bog, cellar hole and dump site. While this is probably not a historic "homestead," it is a historic archaeological site that may relate to several historic periods – cranberry harvesting and forest management. More research is needed to determine its significance.

This area is threatened by both off-highway vehicle use and bottle hunting. Dirt bikers have created an elaborate single track through the pine plantation, with elevated berms and cuts throughout. The dump site has also been systematically dug out, with bottles and debris strewn about.

Webster's Spring. Webster's Spring provides the headwaters for the Wankinco River. This was a large spring, so well known in Colonial times that it was used as a boundary marker for the town line between Carver and Plymouth. This spring fed the Wankinco River with a flow of cold water year-round, allowing it to support a good population of native brook trout, which attracted many sportsmen. During the 1840s, Daniel Webster, an avid fisherman, was known to frequent many of the cold water, spring-fed trout streams in the area. This was one of his favorite springs and consequently became known as Webster's Spring. The road leading to this spring from the Town of Sandwich where Daniel Webster stayed during his visits to the area, became known as Webster Springs Road (Nelson, 2007).

CCC Campsite. Located south of New Long Pond is the site of CCC Camp S-56, which was primarily responsible for road construction, forestry and fire suppression from 1933 to 1937. The remaining features at the site include circulation features, stone steps, raised concrete platforms, foundations and a cleared area where a parking lot and baseball field once stood. The CCC Campsite is a well documented camp and could easily be interpreted for the public through programs or signage.

Historic Buildings

Park Headquarters Complex. The Park Headquarters Complex includes the main headquarters building, several sheds, a concession building, parking lots and landscaped areas. A large boulder with a bronze dedication plaque noting the creation of the state forest in 1916 is located in front of headquarters. The main entrance loop, stone walls and eastern parking lot appear to be a part of the first building period, roughly in the late 1950s. The headquarters building was subsequently expanded several times, resulting in the current T-shaped building and its warren of interior spaces. Equipped to receive visitors and house offices for personnel, this complex is reflective of the increased visitation to state parks experienced after WWII and through the economic downturn of the 1970s. The front of the building and its relationship to the horseshoe drive and side parking lot should be preserved as should the stone walls, commemorative boulder and plantings.

Engineering Barn. The engineering barn is located in the same approximate location of the former park headquarters as shown in the 1937 park map by F. Gilbert Hills and in a 1945 Massachusetts Department of Conservation "General Plan for Improvements." Although the interior of the building was radically transformed for office and meeting space, the exterior retains features that may date to the historic period such as the loft doors at the gable end. It is likely that this building served as the headquarters until the construction of the current headquarters in the 1950s.

Operations Yard. The operations yard at Myles Standish includes two potentially historic buildings: (1) the 10-stall building and (2) the park operations barn. More research is needed to determine the origins of these buildings, but they seem to have appeared after the 1940s, according to historic maps of the forest. It is likely that the park experienced a significant build-out following WWII, when demand for recreation increased. The operations yard buildings and the current park headquarters are probably part of this historic episode in the 1950s.

Perry House. The Perry House is located on Lower College Pond Road to the northwest of the headquarters. The house is a c.1960 Cape Cod style building with a detached garage. Although this site may have been occupied by an earlier building, the

existing house is about 50 years old. While the Perry House may be just 50 years old, it should be considered potentially historic. The best preservation strategy is to find a new use that requires little alteration to the property and provides for appropriate maintenance. The DCR Archaeologist should be consulted when any ground disturbing activities are proposed, since foundations of previous Easthead Game Farm buildings may be present at the site (Nelson, 2011).

Fearing Pond Bathhouse. Built in 1936 by the Civilian Conservation Corps (CCC), the cedar log bathhouse at Fearing Pond is a rare survival. Across the country, the CCC built similar recreation facilities in conjunction with the creation of swimming areas and campgrounds. At MSSF, the CCC built log bathhouses at both Fearing and Charge ponds along with swimming areas, picnic grounds, floats and parking areas. A fire in 1964 destroyed the Charge Pond bathhouse, and the Fearing Pond bathhouse is now the only CCC era log bathhouse left in the DCR system.

Private Cottages. There are 143 private cottages located on public land around six ponds at MSSF. Five of the cottages are now owned by the DCR; private owners did not renew their annual permits and left the buildings on-site, which reverted to DCR ownership. Given the short period of cottage construction, the cottages reflect 1920s and 1930s construction, including wide clapboard, shingle and bead board siding, two-over-two double hung windows and textured concrete block (foundations and outbuildings).

Historic Structures

Historic Parkways. There are two types of historic parkways located within MSSF and they reflect two very different design aesthetics. Alden and Upper College Pond Roads are nearly straight entrance roads originating at the northeast corner of the park and terminating at Fearing Pond Road. These wide, paved roads are flanked on both sides by a broad grassy shoulder. Both a road and a fire break, Alden and Upper College Roads reflect the Commonwealth's management for fire protection.

Lower College Pond Road is also a historic parkway, but it is laid out to take advantage of scenic opportunities. Lower College Pond Road begins just north of College Pond, where Alden Road splits into Upper and Lower College Pond Road. Lower College Pond Road follows a winding route past five ponds, accessing some of the major attractions of the forest – College Pond, Barrett Pond, headquarters and East Head Reservoir. A narrow paved road, Lower College Pond Road skirts the edges of Three Cornered Pond and New Long Pond, sometimes with only a small retaining wall separating the roadway from the water. Set among the wooded forest land, the road provides stunning views toward the ponds as the tree line gives way to the broad expanses of water. The road ends at the park headquarters where it becomes Fearing Pond Road.

Because the historic parkways are integral to the function of the state forest, they are well maintained. Alden Road, especially, is recently paved and the broad fire breaks are mowed frequently. Lower College Pond Road is in satisfactory condition, but its surface is worn and potholed. In some areas, the drainage appears to be poor.

Fearing Pond Road Stone Bridge, Watergates and Sluiceway. In 1862, George P. Bowers built the original dam to create a pond for the breeding and raising of trout (Griffith, 1913). In 1878, the dam was raised to create East Head Reservoir to provide water to cranberry bogs located south of MSSF. A stone waterway located at the southern end of East Head Reservoir bears the engraving "C.P. Bowers 1868 rebuilt 1878." A steel watergate affixed to the stone feature bears the date 2005. The "bridge" may be a culvert through the earthen dam carrying Fearing Pond Road. The road washed out in March of 1997 and has not been repaired, the road remaining closed. A stone lined channel passes through a culvert to the west of the dam. While the dam and roadway may be damaged, the water control features appear to be in good condition. The bridge, watergates and sluiceway are historic resources that should be preserved.

CCC Fire Pits. At College Pond and Fearing Pond there are several stone fire pits built by the CCC (see image at the beginning of Section 2.2). The U-shaped stone formations are still used and should be preserved. Interpreting the fire pits as part of one of the CCC day use areas would enhance visitor experience.

Cultural Landscapes

Plantations. With the history of forestry and the activities of the CCC at Myles Standish, it is no surprise that the forest contains remnants of plantations and forest nurseries. It is striking to walk among the Pine Barrens and scrub-oak forest and suddenly see the pine trees fall into straight lines, marching across the landscape. These areas could be valuable interpretive areas, telling the story of Massachusetts silviculture. The DCR should preserve and interpret intact white pine plantations.

The Ponds. Myles Standish State Forest abounds with kettle ponds, which remain one of the primary attractions for park visitors. These ponds are significant not only for the natural resources they support, but also for their long standing associations with human use. As a state park for 95 years, Myles Standish has protected the archaeological record, resulting in a high potential for undiscovered archaeological resources. A systematic archaeological survey could potentially determine the size, type, integrity and significance of ancient sites going back 12,000 years. Historically, archaeological data recovered from these ponds could contribute important information on cranberry cultivation and public recreational use. In addition, several of the larger ponds reflect an early public-private partnership between the Commonwealth and private cottage owners. Finally, the ponds are a testament to the development of recreation facilities in Massachusetts, including improvements by the Civilian Conservation Corps and later by the DCR's predecessor agencies (DNR, DEM).

College Pond Day Use Area. College Pond contains a day use swimming area, CCC era fire pits, a parking lot, modern bathhouse, and dozens of private cottages. The public beach is crowded into a short section of shoreline, with private cottages taking up the rest of the shoreline. The day use area is set among rolling drumlins in a wooded area on the northern bank of the pond. Picnic tables and modern grills are dispersed throughout, as are several CCC era fire pits. The fire pits, made of large stones placed in a "U" formation, are significant historic features and provide a rustic character to the day use area. The sandy beach is severely eroded and foot paths are compacted. High water has also flooded some planted areas, creating an overall appearance of a worn out beach. A 1960s concession building sits in the woods near the beach, while the modern bathhouse is near the parking lot.

Although the parking area, bathhouse and circulation of the day use area have been altered since the CCC construction, College Pond retains enough of the character of the early recreational design to reflect its history. The "new" bathhouse with its windowless façade and stark light grey clapboards is the most intrusive new feature in the landscape and the existing parking seems to have obliterated the original CCC layout, save for a few stone drainage features.

The overall layout and historic features of the day use area should be preserved, including the historic drainage features, CCC fire pits and the concession building. Selective tree removals would improve the health of remaining trees and open more area for swimmers, alleviating some of the pressures from the narrow swimming beach. Trees that could threaten the concession building should also be removed, as should those that have been affected by the erosion and flooding directly on the shoreline.

The new bathhouse should be painted a darker color and screened with vegetation to better blend it into the landscape. The existing parking areas should be managed to retain a character compatible with the CCC day use area.

Fearing Pond Day Use Area. The Fearing Pond day use area has a large capacity for parking, picnicking and swimming, but the restrooms and changing facilities are no longer useable. Originally developed by the CCC, this day use area retains the character of a CCC era landscape, with the rustic log bathhouse at its center and wooded picnic areas clustered around a sandy swimming beach. Several CCC fire pits are extant. Views toward the opposite shoreline enhance the recreational character of the landscape. A 1950s concession building is unobtrusive and compatible with the rustic style of the bathhouse.

The Fearing Pond bathhouse is in poor condition, but as the only surviving CCC log bathhouse in the DCR system it should be preserved. Adaptive reuse of the bathhouse is preferred, as keeping a building in active use is the best preservation strategy. Restoring active recreation to the day use area will aid in its preservation, eliminating uncontrolled or illicit activities from the historic area.

The DCR should identify a new use for the Fearing Pond bathhouse. Until that long term plan is developed though, the building should be stabilized. Priority stabilization actions include: the removal of vegetation, replacement of some logs, roof repairs and mothballing to prevent further deterioration. The parking lot at the day use area could be better defined and improved, with changes better suited to the CCC character, such as wooden guardrails.

Historic Roads and Trails. The DCR Cultural Resource Inventory identifies 11 "colonial" or "historic" roads and trails throughout MSSF, largely identified through documentary analysis of historic maps and atlases, not field survey. Because it is unknown whether any of these routes retain historic features or are archaeologically significant, they should be treated as potential cultural resources. In some cases additional fieldwork or archaeological testing may be required to determine whether below ground resources are present.

College Pond Day Use Area Beach, © Kindra Clineff

2.3. RECREATION RESOURCES

Myles Standish State Forest is the largest publicly-owned recreation area in southeastern Massachusetts. Its ponds and forests offer recreational opportunities to the fastest growing area in the state. From May to October, camping, swimming, hiking, fishing, boating, biking, nature study, picnicking, horseback riding and pet walking are some of the most popular activities. Winter uses include snowmobiling, cross-country skiing, snowshoeing, hunting and hiking.

Visitor Use Patterns and Attitudes

During the summer of 2009, the UMass Department of Natural Resources Conservation conducted a survey of visitors to MSSF. The purpose of the survey was to understand visitor use patterns, attitudes and satisfaction levels. Between May 25th and September 7th, 2009, 973 individuals were intercepted throughout the forest, with 815 agreeing to participate in the survey. Surveys mailed or e-mailed to the 815 volunteers resulted in 495 completed surveys (Loomis, 2010).

Visitation rates to MSSF are highest in the summer months, lower during the fall and spring and lowest in the winter months. The most common activities visitors reported participating in during the last 12 months were camping (41.5%), swimming (39.3%), hiking (29.3%) and walking/jogging (28.0%), followed by pavement biking (23.9%), fishing (23.5%), boating (18.3%) and snowmobiling (13.0%). Less frequent activities were mountain biking (8.3%), nature study (7.6%), interpretive programs (6.7%) and horseback riding (5.0%) (Loomis, 2010).

Table 2.3.1. Recreational Activity Participation at MSSF

	Primary Activity (%)	Most Recent Visit (%)	Last 12 Months (%)
Interpretive Programs	0.8	7.8	6.7
Nature Study	0.4	8.0	7.6
Hiking	6.3	34.6	29.3
Special Events	1.1	3.0	3.5
Swimming	6.9	54.8	39.3
Fishing	6.3	31.0	23.5
Boating	0.6	22.8	18.3
Camping	53.5	57.1	41.5
Hunting	0.4	1.5	2.4
Walking/Jogging	5.0	34.8	28.0
Horseback Riding	5.0	5.2	5.0
Pavement Biking	8.9	29.6	23.9
Mountain Biking	3.2	10.0	8.3
Pet Walking	-	0.6	3.0
Cross-country Skiing	-	0.4	0.2
Snowmobiling	0.6	15.4	13.0
Picnicking	0.4	3.2	0.9
Park Passport Program	-	5.0	4.3

Percents sum to more than 100% because individuals could participate in more than one recreational activity during a visit.

Respondents to the UMass survey felt the overall natural setting and the various components of the natural setting (vegetation, wildlife and birds), as well as safety issues, were important to their visit. Visitors liked the peace and quiet, the ponds, cleanliness, being in nature, camping, swimming and hiking trails (see Table 2.3.2). They disliked unclean campsite bathrooms, noisy campers and lack of maintenance the most (Loomis, 2010).

Table 2.3.2. What Visitors Liked Most and Least about MSSF

Liked Most (#)	**Liked Least** (#)
Peace and quiet (70)	Unclean campsite bathrooms (80)
The ponds (53)	Noisy campers (41)
Cleanliness (40)	Lack of maintenance (33)
Being in nature (37)	Litter (27)
Camping (36)	Condition of off-road trails (23)
Swimming (34)	Campsites too close together (17)
Hiking trails (31)	Confusing trail markers (17)
Friendly staff (25)	Unclear Maps (14)
Proximity to home (25)	Crowded (14)
Seclusion (23)	Condition of paved bike trail (8)

Survey respondents predicted that a canoe/kayak rental service, extended visitor center programming, a horseback riding concession and hunter education programs would increase their use of MSSF. Respondents that had camped at MSSF in the past 12 months felt that the provision of year-round camping, yurts or cabins and/or electrical and water hookups would increase their use of the forest (Loomis, 2010).

Between 2002 and 2008, the National Survey of Recreation and the Environment (NSRE) interviewed approximately 100,000 Americans in random telephone samplings to identify changes in the national market for outdoor recreational activities. The NSRE survey included approximately 1,350 surveys in Massachusetts (Green, et al., 2008). As shown in Table 2.3.3, within southeastern Massachusetts, viewing or photographing natural scenery (64.2%) was the most popular outdoor activity, followed by swimming in lakes and streams (63.3%), visiting nature centers and zoos (58.1%) and then day hiking (35.3%) and visiting a wilderness or primitive area (35.1%).

Table 2.3.3. Southeastern Massachusetts Participation in Outdoor Recreational Activities

Activity	**Participation (%)**
View/photograph natural scenery	64.2
Swimming in lakes and streams	63.3
Visit nature centers, zoos, etc.	58.1
Day hiking	35.3
Visit a wilderness or primitive area	35.1
Mountain biking	32.4
Developed camping	23.7
Freshwater fishing	19.1
Kayaking	15.6
Canoeing	15.5
Primitive camping	11.9
Cross-country skiing	7.4
Snowshoeing	6.6
Horseback riding on trails	5.6
Hunting (any type)	5.6
Snowmobiling	4.9

Source: National Survey of Recreation and the Environment (Green, et al., 2008).

The NSRE also identified outdoor recreation participation trends between 1995 and 2008 for the state of Massachusetts. As shown in Table 2.3.4, day hiking showed significant gains in the percentage of people participating, followed by kayaking, bicycling and fresh water swimming. Backpacking, camping and horseback riding also showed significant increases. Small game hunting showed a decrease in participation (Green, et al., 2008).

Table 2.3.4. Massachusetts Outdoor Recreation Participation Trends, 1995-2008

Activity	**1995 (%)**	**2008 (%)**	**% Change 1995-2008**
Day hiking	24.7	37.7	+ 13.0
Kayaking	0.7	11.6	+ 10.9
Bicycling	31.2	40.1	+ 8.9
Swimming (freshwater)	53.3	58.5	+ 5.2
Backpacking	10.2	14.3	+ 4.1
Developed camping	20.4	24.1	+ 3.7
Horseback riding	1.7	5.2	+ 3.5
Canoeing	11.6	14.8	+ 3.2
Snowmobiling	3.5	6.2	+ 2.7
Visit zoos, etc.	54.5	57.1	+ 2.6
Cross-country skiing	7.8	8.0	+ 0.2
Small game hunting	3.3	2.6	- 0.7

Source: National Survey of Recreation and the Environment (Green, et al., 2008).

Demographic Profile

UMass survey respondents represented age groups from 18 to 79; the majority (59.6%) was between the ages of 35 and 54. The respondents were primarily white (93.7%), with some of Hispanic (2.2%), Asian (0.9%), Native American (0.4%), black (0.2%) or mixed racial origins (2.6%). Slightly more than half of the respondents had children under 18 living in their household (Loomis, 2010).

UMass survey and Reserve America campsite reservation ZIP Code data was used to determine the geographic origins of these known 2009 park users. Twenty-five percent of these 7,385 known park users originate from within 19 miles of the forest, 50% originate from within 26 miles, 75% originate from within 42 miles and 90% originate from within 104 miles. Residents living within these distances represent potential visitors to MSSF.

More than four million potential visitors live within a 42 mile radius of MSSF (see Table 2.3.5). Demographic information on these potential visitors was obtained from the 2000 U.S. Census, the most recent census for which data are available. Approximately 22.5% of these potential visitors are children, ages 18 and under. Over 170,000 children live within 19 miles of the forest and almost 955,000 live within 42 miles. Seniors account for approximately 14% of the potential visitors. Approximately 94,000 live within 19 miles of the forest and nearly 600,000 live within 42 miles.

Table 2.3.5. Population Potentially Served by MSSF

	19 Miles	26 Miles	42 Miles
Total Population	669,659	1,274,541	4,240,908
Households	248,968	484,132	1,659,810
Children (<18)	170,188	312,714	954,919
Adults (18-64)	405,570	774,732	2,692,029
Seniors (>65)	93,901	187,095	593,960

Many potential visitors come from households where English is not the primary language spoken (see Table 2.3.6). Within 19 miles of the forest, approximately 42,000 households have primary languages other than English. Within 42 miles, this increases to approximately 387,000 households.

Table 2.3.6. Primary Language Spoken in Households Potentially Served by MSSF

Language	19 Miles	26 Miles	42 Miles
English	206,977	397,084	1,272,439
Spanish	8,476	14,911	104,314
Other European	31,329	65,182	218,129
All Asian	1,274	4,550	47,883
Other	912	2,405	17,045

In the 2000 U.S. Census, the household incomes of potential visitors living within a 42-mile radius of MSSF were classified as 26.3% low, 45.2% medium and 28.5% high income (see Table 2.3.7).

Table 2.3.7. Percent of Households, by Income, Potentially Served by MSSF

Income[a]	19 Miles	26 Miles	42 Miles
Low	24.0%	24.8%	26.3%
Medium	47.3%	47.1%	45.2%
High	28.7%	28.1%	28.5%

[a] Low income = < $24,999; Medium income = $25,000 to $74,999; High income = > $75,000.

Households earning less than $24,999 per year have weak outdoor recreation participation rates, with viewing natural scenery (6.0%), mountain biking (5.4%) and freshwater swimming (4.3%) being the activities with the most interest. Without public transportation to MSSF, low income households without a car cannot access MSSF. Participation levels increase sharply for households earning $25,000-$74,999. Approximately one-third of this income group enjoys visiting a wilderness area (34.4%), cross-country skiing (34.2%), hunting (33.3%) and day hiking (31.4 %). Participation rates decline for people who earn over $75,000. One-fourth of this income group enjoys horseback riding on trails (25.6%), with freshwater fishing (15.5%) and kayaking (15.2%) having moderate participation rates.

Table 2.3.8. Percent Participation in Outdoor Recreational Activities, by Family Income, for Southeastern Massachusetts

Activity	Low Income[a]	Medium Income[a]	High Income[a]
Day hiking	1.9%	31.4%	9.3%
Visit wilderness area	1.0%	34.4%	9.8%
Mountain biking	5.4%	23.9%	11.6%
Developed camping	2.9%	28.5%	12.5%
Backpacking	3.7%	27.2%	12.8%
Hunting	-	33.3%	11.3%
Horseback riding	2.3%	14.8%	25.6%
Freshwater swimming	4.3%	25.1%	13.7%
Freshwater fishing	-	26.8%	15.5%
Kayaking	1.2%	26.0%	15.2%
Canoeing	1.3%	22.3%	13.1%
Cross-country skiing	-	34.2%	10.5%
View scenery	6.0%	26.9%	11.5%
Visit zoos, etc.	2.0%	28.3%	12.6%

Source: National Survey of Recreation and the Environment (Green, et al., 2008).
[a.] Low income = < $24,999; Medium income = $25,000 to $74,999; High income = > $75,000.

Local Recreation Demand

In the late 1970s and 80s, rising housing prices in and around Boston made Carver and Plymouth – with their attractive rural environment, inexpensive land, low taxes and relative proximity to Boston and Route 128 – attractive as bedroom, retirement or "next step" communities for people leaving more congested areas up north. As a result, the population of these two abutting towns increased by 167% between 1970 and 1990 (see Table 1.8.1). The rate of population increase has slowed since 1980, with the populations of these towns increasing by 21% between 1990 and 2010 (see Table 1.8.1).

The increase in population has translated into changes in land use in the abutting towns. Data on land use from 1971 and 1991 show a significant increase in residential, commercial and industrial land use for each town and a corresponding decrease in forested land. As a result, unprotected privately-owned open space is being converted into residential land and these new residents are creating an additional demand for recreation facilities at MSSF.

Town of Carver

Between 1990 and 2000, the youth population (under 19 years) of Carver decreased by 7.3%, while the population 45 years and older increased by 42.8%. This followed the national trend, where people are living longer, families are smaller and the general population is aging. Carver's seniors, with their need for more passive forms of recreation, are well served by the abundance of lakes in the area (fishing and swimming), but their opportunities for walking are limited by the lack of sidewalks and trails (Carver Open Space Committee, 2004).

The activities Carver residents participate most in are walking, fishing, swimming and bird watching. Therefore, residents of Carver perceive a need for more trails and opportunities for passive, nature-based recreation. In a survey asking residents to comment on which recreation facilities the town needs more of, protected open space with public access and bike paths and/or trails received the most votes. In addition, residents feel the town needs more picnic areas and nature, hiking and equestrian trails. Although 72% of the respondents visited MSSF, Carver residents would prefer to have picnic sites, trails and beaches closer to their homes (Carver Open Space Committee, 2004).

The Carver Open Space and Recreation Plan proposes a bicycle trail along Cranberry Road connecting to the MSSF paved bike path near the park headquarters (Carver Open Space Committee, 2004). A. D. Makepeace has also initiated the MEPA review process for the development of new cranberry bogs, 1,790 units of housing and one and a half million square feet of commercial and industrial space southwest of the forest with trail connections to MSSF.

Town of Plymouth

Between 1990 and 2000, the young adult (20 to 34 years) population of Plymouth decreased by 9.3%, while the adult (45 to 59 years) population increased by 80.8%. Meanwhile, residents with less than a high school diploma declined by 19.5%, while those with advanced college degrees increased by 48.3% (Town of Plymouth, 2010). In 1980, the Town of Plymouth adopted the Village Center Plan, which established five village areas to encourage growth within the villages and restrict development in outlying areas. The provision of public access to ponds for swimming, boating and fishing is a priority in the Plymouth Open Space and Recreation Plan. The town is also developing a system of bridle, hiking and bicycle trails linking to MSSF, Ellisville Harbor State Park, the town-owned Forges Field and five village centers (Town of Plymouth, 2010).

An increasing amount of residential housing is planned close to MSSF. The Pinehills Community consisting of 2,983 dwellings, over one million square feet of commercial space and two 18-hole golf courses is being constructed east of the forest, with 2,200 acres of land set aside as permanent open space. A. D. Makepeace has received MEPA approval to construct its River Run project, consisting of 1,175 units of housing and 60,000 square feet of commercial space southeast of the forest, while preserving 1,200 acres for open space and walking trails connecting MSSF to the Red Brook Conservation Area.

Day Use Areas

Two popular day use areas with picnicking and swimming facilities are located at College and Fearing ponds. Both areas contain a beach with bathhouse, picnic tables with fireplaces, a concession building and large parking areas. Life guards are on duty at College Pond from the Friday before Memorial Day through the Labor Day weekend. Due to operating budget limitations, the Fearing Pond day use area has been closed for several years.

College Pond Day Use Area

The day use area is set among rolling drumlins in a wooded area on the northern bank of College Pond. The day use area is crowded into a short section of beach (530 linear feet), with private cottages dominating a larger section of beach (840 linear feet) located east of the day use area. The sandy beach and wooded peninsula are severely eroded and foot paths are compacted. High water has also flooded vegetated areas located on both sides of the day use area, creating an overall appearance of a worn out beach. On clear, hot summer weekends the day use area is crowded and visitors are turned away on the July 4th weekend and several other summer weekends when the parking lot has reached capacity.

A 1960s bathhouse is located near the parking lot at the entrance to the day use area. Some corrective maintenance is needed to repair the changing area stalls and interior walls. A small food and kayak rental concession building is located in the woods near the beach.

Fearing Pond Day Use Area

The Fearing Pond day use area contains an ample swimming beach (830 linear feet), large parking lot, picnic sites on a knoll overlooking the pond, a CCC log bathhouse and a 1950s concession building. Due to staff shortages, the day use area has been closed for several years. It is the only pond in MSSF stocked with game fish by MassWildlife.

The Fearing Pond bathhouse, the only surviving CCC log bathhouse in the DCR system, is in poor condition. The concession stand is in fair condition and suitably located to serve as a food concession, camp store for adjacent campers, kayak and fishing gear rental.

Camping Areas

There are 429 campsites organized in 10 camping areas around Charge, Fearing, Barrett and Curlew ponds (see Table 2.3.9). Each site is supplied with a picnic table and fireplace; a campground comfort station and swimming beach is located nearby. There are no utility hookups at the sites. The sizes of the sites vary from 400 to 2,000 square feet. Parking lots for extra vehicles and visitors are associated with most camping areas. During the peak summer season, the campers are served by mobile concession trucks.

Campers register, in advance, by phone or on-line with Reserve America. Reservations may be made as early as six months prior to the date of arrival and as late as one day before arrival. Reservations are limited to 14 cumulative days in any one park between Memorial Day and Labor Day. There is a two-day minimum at most reservations. Fall camping is available between Labor Day and mid-October at Charge and Barrett ponds.

Charge Pond

Charge Pond contains 227 campsites organized into six camping areas (Areas A-F) and two swimming beaches. The campsites are located on large lots in the woods surrounding the pond, leaving the pond shore in a natural vegetated condition. Five group campsites located in Area B each have a capacity of 30 individuals. Area C contains 37 equestrian sites, with enough space for campers and temporary pens for horses. Water stations are located throughout the camping area. Area D has been closed for several years.

As indicated in Table 2.3.9, during peak summer weekends, 90.0% of the sites are reserved in Areas A, B, E and F, with lower reservation rates during the spring (28.5%) and summer weekdays (32.3%). Given the requirement that campers in Area C must have a horse, annual reservation rates are lower (11.4%) for the equestrian area.

The north beach contains a bathhouse in fair condition, picnic pavilion in good condition, a large parking area and a 200 linear foot beach with some soil erosion. The south beach contains a closed comfort station in fair condition and 360 linear feet of beach in good condition. Built in 1972, the seven camping area comfort stations need some exterior repairs, minor interior renovations and dish washing sinks.

Fearing Pond

Fearing Pond contains 72 campsites organized into two camping areas (Areas H and I), with two swimming beaches. The campsites are located in the woods surrounding the pond in close proximity to private cottages. During 2010, the Fearing Pond campgrounds were open from May 6th through the Labor Day weekend.

Fearing Pond Area H contains 43 campsites with two comfort stations on the south side of the pond adjacent to a large (830 linear foot) swimming beach. During the 2010 season, 91.6% of the Area H sites were reserved during summer weekends and 59.6% of the sites were reserved during summer weekdays. The two comfort stations are in adequate condition, needing some corrective maintenance to repair exterior siding and fascia and interior tiles and partitions.

Fearing Pond Area I contains 29 campsites with one comfort station on the northern end of the pond adjacent to a small (80 linear foot) swimming beach. The swimming beach abuts a wetland on the west and cottages on the east. During the 2010 season, 63.6% of the Area I sites were reserved during the peak summer weekends and 38.8% during summer weekdays. The comfort station is in good condition, requiring routine maintenance.

Barrett Pond

Barrett Pond Area J contains 49 campsites, three yurts, two comfort stations and two badly eroded small beaches (east beach at 135 linear feet and west beach at 60 linear feet). During the 2010 camping season, Barrett Pond was open from May 6th through October 10th. Nearly thirty-five percent of the sites were reserved during the spring, 48% during the summer and 46.6% during the fall season. During peak summer weekends, it appears that campers prefer campsites with larger beaches. The east comfort station was recently renovated and is in good condition. The west comfort station needs corrective repairs, including new interior partitions and plumbing fixtures.

Three yurts have recently been installed for public use. These are canvas sided, cabin-like structures that can accommodate 4 to 6 people. Yurts offer bunk beds, chairs, tables and limited electrical service. The yurts at MSSF are very popular and have been reserved for the entire summer season.

Curlew Pond

Curlew Pond Area K contains 81 campsites, three comfort stations and a small (160 linear feet) swimming beach. During the 2010 camping season, Curlew Pond was opened from May 6th through the Labor Day weekend. Approximately twenty-seven percent of the sites were reserved during the spring, 79.9% during peak summer weekends and 54.5% during summer weekdays. The west comfort station, built in 2000, is in good condition. However, the central and eastern comfort stations are in poor condition, lack showers and dish washing sinks and are not ADA accessible. During peak summer weekends, campers appear to prefer camping areas with larger swimming beaches and better sanitary facilities.

Table 2.3.9. Campsite Reservations at MSSF (2010)

Camping Area		Number of Sites	Percent of Available Campsites Reserved[a]				
			Spring (5/6-7/1)	Summer Weekends	Summer Weekdays	Fall (9/6-10/10)	Total Season
Charge Pond	A	49	35.3	85.4	32.7	25.0	41.2
	B	19[b]	32.6	86.6	45.7	31.9	45.3
	C	37[c]	15.0	27.8	4.4	6.4	11.4
	D	31	Closed	Closed	Closed	Closed	Closed
	E	59	17.7	93.6	29.2	Closed	39.1
	F	32	20.0	92.2	29.5	Closed	39.7
Fearing Pond	H	43	40.2	91.6	59.6	Closed	59.7
	I	29	22.3	63.6	38.8	Closed	38.2
Barrett Pond	J	49	34.8	50.7	46.6	26.4	39.0
Curlew Pond	K	81	27.2	79.9	54.5	Closed	50.5
Total		429	27.3	70.1	35.5	21.8	38.9

Source: Reserve America.

[a.] Occupancy rates are lower given no shows, late arrivals and early departures.

[b.] Five group and 14 regular sites.

[c.] Equestrian sites.

Private Cottage Program

The DCR issues 138 seasonal (Patriots Day through Columbus Day) camping permits to private individuals who own structures at five ponds and one reservoir within Myles Standish State Forest. Different from public camping, these sites include privately built structures, known colloquially as "cottages" that surround College, Fearing, Rocky, Curlew and Widgeon ponds and East Head Reservoir. Although regulated by annual permits for use of the underlying public land, the presence of significant personal property, in the form of "cottages" and the long-standing nature of the program has made these permits seem like life tenancies.

Long tenancy has meant that individuals and families have developed strong emotional and financial attachments to the campsites. Prior to 2005, permit holders regularly sold cottages and cottages were freely passed on to successive generations; permits were granted to the new private owner. In a change from past practice, to bring an eventual end to the program, beginning in 2005, permit holders were prohibited from transferring cottage permits and present and future use was limited to the permit holder(s). (In many cases, cottage owners placed additional family members, of different generations, on the permit as "co-permittee(s).")

Private cottage owners argue that they provide a positive presence in otherwise understaffed areas of the forest. However, there are no requirements or expectations on their permit to assist the DCR in forest management or recreational operations and permit holders are only subject to conditions governing the actual use of their cottage and the site. Other members of the public criticize this exclusive use of public parkland by a small, closed group of individuals or families and complain of restricted access to recreational opportunities. Myles Standish State Forest is the largest state park property in the fastest growing region of the Commonwealth, which results in increasing and changing recreational demand.

In the past, some permit holders have erected barriers to public access. Three successive audits of the program by the State Auditor, in 1989, 1992 and 2004, raised important questions about access, health, safety and equity, which the agency has addressed in turn. Following the most recent audit, the DCR prohibited the transfer of permits. Because permits can no longer be transferred, the program, if left to run its course, will terminate when the last permit is surrendered or revoked. In the absence of some accelerated termination, this will likely extend over several decades.

As a part of this resource management plan, the DCR must evaluate the program for its consistency with the plan's management principle and goals and determine if the program contributes to the public purpose of Myles Standish State Forest. The DCR must continue to address the findings of the State Auditor and should determine if the purpose for the initial establishment of the private camp program currently exists, given the increased public demands on the forest, and whether a different opportunity exists to provide equal access to the public at large to enjoy these areas of the forest.

Permit holders pay an annual fee of $3,800 ($1,620 at Fearing Pond only) to occupy their cottages for six months. This revenue, like all revenue collected by the DCR, is returned to the General Fund, with a portion remaining with the DCR as retained revenue. Permit holders are required to maintain the site and cottages in good condition, pay local personal property taxes (where required by local communities), utilities, insurance and perform mandatory testing of drinking water wells. Each spring, the Park Superintendent inspects the cottages for compliance with DCR permit conditions prior to permit renewal.

Table 2.3.10. Private Cottages Permitted within MSSF

Pond	# of Permits
Fearing Pond	26
College Pond	45
Rocky Pond	15
Curlew Pond	18
Widgeon Pond	32
East Head Reservoir	1
Total	**138**

Program History

The Private Recreational Camp Program was established by the State Forest Commission in 1919. The Forest Commission established camp communities to create a presence in the forest and to generate revenue for the Forest Commission. In 1919, the Forest Commission laid out 250 campsites in the forest and offered them to any citizen who would agree to clear a lot, build a cabin and become a resident camper. In 1919, 70 families joined the program – 56 at College, seven at Fearing and seven at Widgeon ponds (State Forest Commission, 1914-1919). To encourage greater participation, the Forest Commission advertised the program in the Boston Post. Enrollment was slow and it was not until 1939 that the program reached its peak participation level of about 250 camps (Massachusetts Department of Conservation, 1920-1953). Losses by fires, sales back to the state and financial inability to remain in the program have reduced the number to 138 cottages. Most of the cottages were constructed during the 1920s and 1930s.

During the 1920s, cottage families assisted with the maintenance of forest roads, tree plantings, fighting forest fires, storm damage clean-up and whatever else was needed under the guidance of the forest staff to restore the forest. During the 1930s, the Civilian Conservation Corps developed new day use areas at Fearing and College ponds, expanding visitor opportunities at those ponds.

Five-year renewable permits were issued prior to 1946. Since then, annual renewable permits have been issued. Post-war prosperity increased the number of outdoor recreational users. Construction of major roads such as Routes 3, 24 and 495 improved the accessibility to MSSF from the population centers of metropolitan Boston and southeastern Massachusetts (DNR, 1954-1974).

In 1964, a fire swept through the southern portion of the forest destroying the recreation facilities and 18 cottages at Charge Pond (DNR, 1954-1974). In the early 1970s, in preparation for the large number of campers anticipated during the 1976 bi-centennial celebration, DNR constructed 250 campsites, eight comfort stations, roads and utilities around Charge Pond. The 12 cottages undamaged by the 1964 fire were removed from Charge Pond. Passage of Article 97 to the Massachusetts Constitution brought new scrutiny to the existing policy of permitting exclusive use in the state forest to a select group of cottage owners at the exclusion of the general public (DNR, 1954-1974).

Table 2.3.11. Cottage Program Timeline

1916	State Forest Commission acquires 5,700 acres in Carver and Plymouth creating Myles Standish State Forest (MSSF).
1918	To raise revenue and secure the forest, the Forest Commission advertises the availability of 250 campsites for use around six ponds in the forest in a program modeled after one by the U.S. Forest Service in the White Mountains.
1919	Two hundred and fifty campsites, with 100 feet of shore frontage and 200 feet in depth, are laid out at Charge, Fearing, College, Curlew, Rocky and Widgeon ponds. Fifty-two cottage permits are issued on College Pond, seven on Fearing Pond and seven on Widgeon Pond.
1923	Over 150 campsites are now under permit.
1930	Two hundred lots under permit, with 167 camps erected on them.
1932	Public campgrounds constructed at Charge and New Long ponds.
1933-1937	CCC constructs day use areas at College and Fearing ponds and five log cabins for rental.
1951	New forestry camp provides labor for park, road and timber management.
1953	Department of Conservation re-organized as Department of Natural Resources (DNR).
1959-60	Forestry camp constructed fisherman's landing on Widgeon Pond and improved parking at Rocky Pond fisherman's landing.
1964-65	Fire burns 1,500 acres in the forest, destroying recreation facilities and 23 private cottages at Charge Pond. Eighty-one campsites open at Curlew Pond.
1970-1972	Two hundred and fifty campsites, eight comfort stations, roads and utilities constructed around Charge Pond. DNR removes 12 cottages undamaged by the 1964 fire at Charge Pond.
1972	Adoption of Article 97 to the Massachusetts Constitution provides increased protection of public parklands for public use and environmental conservation.
1975	DNR reorganized as the Department of Environmental Management (DEM). DEM amends cottage permits to include a right to terminate the cottage program.
1989	State Auditor's Report criticizes DEM management of cottage program.
1990	Coast Line Engineering inspects cottages to determine their structural integrity and compliance with Title 5 of the state sanitary code.
1992	State Auditor conducts follow-up audit of the cottage program. DEM Commissioner recommends termination of the cottage program.
1995	Cottage owners submit cottage self-inspection forms.
1999-2005	DEP monitors testing of cottage wells.
2005	State Auditor issues a report criticizing the cottage program. DCR prohibits the sale or rental of cottages.

1989 State Auditor's Report

In August 1989, the State Auditor issued a report that reviewed the DEM's permit program for privately owned, permanent structures at MSSF, Lake Ashmere, Cochituate State Park and Otis Reservoir. The audit reviewed the DEM's fee policy and the procedures used to protect the environment, ensure public access and maintain safe, sanitary facilities for the public participating in the permit program.

Safe, Sanitary Domiciles and Environmental Protection. The audit observed an unauthorized, newly paved driveway at MSSF that extended from the road to the beach and unauthorized, extensive deck remodeling and concrete walls that had been constructed along the beach adjacent to several cottages. Even though many owners had obtained town building permits and inspections, they had not obtained state approval, as required by their seasonal permit. Some projects were completed without either town or state approvals or inspections. Most cottages have sanitary facilities that have not been inspected by local public health officials (State Auditor, 1989).

The audit recommended that the:

- DEM establish, in writing, specific guidelines to govern future repairs and alterations of the structures on state-owned land (State Auditor, 1989).
- DEM require cottage owners obtain building and septic system permits and inspections.
- DEM extend its annual inspection procedures to detect unauthorized repairs and alterations (State Auditor, 1989).

- DEQE immediately inspect these areas and take whatever action necessary to protect the public land and water from pollution (State Auditor, 1989).

Public Access. The audit recommended that the DEM re-evaluate the program in the context of its long-range goals and spirit of Article 97 of the Commonwealth's Constitution. It should publicly declare the state's long-range plans for the permit sites and phase in appropriate program changes such as a lottery system. These changes should address, as soon as practicable, the right of all the state's residents to the forests and waters while limiting, as much as possible, hardship to the current cottage owners (State Auditor, 1989).

Fee Structure. The audit report criticized the DEM for allowing the use of state property at excessively low fees. The report recommended that the $240 and $160 annual fees at MSSF be raised to market levels. (The higher fee was charged to the 128 cottages owners on five ponds with electricity; the lower fee applied to the 30 cottages at Fearing Pond, which do not have electricity). In 1989, the DEM increased the cottage fees, in steps, to $1,900 for cottages with electricity and $810 at Fearing Pond by 1993 (State Auditor, 1989). In 2002, the DEM doubled the fees to $3,800 for cottages with electricity and $1,620 at Fearing Pond.

1992 Follow-up Audit. In 1992, the State Auditor conducted a follow-up audit to determine the extent to which the DEM followed the recommendations of the 1989 audit report. The Auditor determined that:

- DEM staff had removed "No Trespassing" signs and barriers erected by cottage owners. However, some of the barriers had been reconstructed at College Pond. In March 1993, DEM staff removed the reconstructed barrier and notified the cottage owner.
- The DEM and the Town of Plymouth were requiring that renovated septic systems meet sanitary code standards.
- The DEM was implementing the increased permit rate schedule (State Auditor, 1992).

DEM Review of Cottage Permit Program

After the passage of Article 97, the DEM received growing criticism for renting cottage lots in a state forest for use by a select group of individuals, resulting in the exclusion of the general public. In 1989, the State Auditor criticized the DEM for allowing the private use of state property at excessively low fees. As a result of these criticisms, the DEM concluded that the cottage program should be phased out in an orderly, equitable manner. It was determined that this process should give adequate consideration to the long history of the cottage program, its impact on the forest as a natural resource and the recreational needs of the general public (DEM, 1990).

In 1990, the DEM hired Coast Line Engineering to conduct a visual exterior inspection of 153 cottages to determine their structural integrity and compliance with Title 5 requirements for the disposal of sanitary sewage. Building inspections were limited to observations of obvious visual defects, such as dry rot, sags and settlement. Tape surveys were made of each site locating the pond shore, cottage, out buildings, privies, wells, septic systems and obvious wetland areas. Exterior structural inspections found that 35 of the 153 cottages contained structural defects including sags, settlement and extensive dry rot (Coast Line Engineering, 1990).

Septic systems and wells were located by hand probing the soil with a thin metal rod. In most cases, sketches supplied by the cottage owners were available to aid in the location process. Soils were sampled and visually inspected for suitability of leaching. The survey found that 80 (52%) of the cottages had privies, 45 (29%) had cesspools, 13 (9%) had septic tanks, while 15 (10%) were unknown systems. The septic system survey concluded that 14 (9%) of the cottages passed Title 5 requirements, 121 (79%) failed in some Title 5 requirements, while 18 (12%) did not have sufficient data to make a determination. In general, any leaching facility, no matter how small, which receives wastewater without a septic tank, does not meet the requirements of Title 5 (Coast Line Engineering, 1990).

In 1992, Commissioner Webber recommended terminating the practice of permitting privately-owned cottages located on DEM land in MSSF. He determined that the physical configuration of the buildings gives the strong impression to the public that they are not welcome on this part of the forest. "My decision to terminate the program is based on

my strong belief that the original public purpose, which may have been served by cottage owners, no longer exists; that Article 97 specifically prohibits the exclusive private use of public land; and that the Auditor's conclusions about the program are correct" (Commissioner Webber; DEM, 1992).

2005 State Auditor's Report

In July 2004, there were 146 annual cottage permits issued at MSSF. The cottages could be sold by the permit holders on the condition that the DCR has the "right of first refusal" on any offer to purchase a cottage in the permit program. The 2005 State Auditor's follow-up review of the cottage permit program at MSSF determined that the DCR had not taken sufficient corrective action to resolve the following prior audit issues.

- Non-compliance with Title 5 septic regulations: the audit found that structures had been sold in the past three years without the required Title 5 Certificates of Compliance (State Auditor, 2005).
- Public access improperly restricted: the audit observed several locked gates restricting access to Fearing Pond and temporary fencing along East Head Trail. Docks, decks and ramps built across the beach that obstructed the public's access to the shoreline were also observed (State Auditor, 2005).

In response to the Auditor's report, the DCR required that all cottage owners submit a Cottage Inspection Form during the permit renewal process. The owners were asked to certify that they had complied with all state and local health and safety standards and did not impede public access across the land on which the cottage is situated. The DCR also inserted a provision in the 2005 cottage permits that prohibited the transfer of any cottage permit.

Drinking Water Testing

Private cottage owners have been testing their drinking wells from 1999 to the present. From 1999 until 2005, in accordance with an agreement with the Department of Environmental Protection (DEP), samples taken from all of the private cottage wells were tested for bacteria in the second and third quarters and for nitrate, nitrite and ammonia in the third quarter. The test results were provided to the DEP and DCR. In 2005, the DEP changed the requirement to test for ammonia to periodic monitoring for sodium that year and subsequent years. No harmful concentrations of ammonia were found in any private drinking water well during the period 1999 to 2005. Presence of ammonia is an indicator of a failed septic system. From 1999 through 2010, no nitrate has been found in the private wells (Bentley, letter of August 21, 2011).

In 2005, the DEP selected the MSSF cottage program to conduct extensive baseline testing. The drinking water testing included synthetic organic compounds (SOCs), volatile organic compounds (VOCs), inorganic contaminants (IOCs), radionuclides and secondary contaminants. Two private cottage wells per cottage pond (Fearing, College, Curlew, Rocky and Widgeon) were selected with DEP and DCR concurrence. The cottage owners paid the testing fees. This data was provided to the DCR and DEP. The 2005 baseline drinking water test results are summarized below:

- No SOCs were detected in any of the 10 wells tested.
- No VOCs were detected in any of the 10 wells tested.
- The 10 samples were tested for the presence of 14 IOCs. Sodium, fluoride and nickel were detected. Sodium was within the expected range for sandy soils with a mean of 5.7 mg/L. There is no maximum contaminant level (MCL) for sodium. Fluoride was found at one location at a concentration of 0.31 mg/L. Since fluoride has an MCL of 4.0 mg/L, the sample was at 7.8% of the MCL. Nickel was found at one location at a concentration of 0.005 mg/L. Since nickel has a MCL of 0.1 mg/L, the sample was 5% of the MCL. This sample was also at the limit of detection.
- No radionuclides were found in any of the 10 wells tested.
- Massachusetts secondary contaminant standards were developed by the DEP to protect the aesthetic qualities of drinking water. The 18 parameters are not known to cause a health risk, but may affect the taste, color and/or odor of drinking water. Most of these common contaminants were found in varying concentrations. Iron was found at levels at or above the standard for iron. However, the iron

levels were consistent with levels normally found throughout southeastern Massachusetts.

Fishing and Hunting

Hunting and fishing are allowed at MSSF. Nearly one-quarter (23.5%) of the respondents to the 2009 UMass survey fished at MSSF during the past 12 months and 2.4% hunted (Loomis, 2010). A statewide survey conducted for the DCR in 2004 found that 22% of the Massachusetts households contacted had fished and 4% hunted in a park during the past 12 months (The Insight Group, 2004).

The ponds in MSSF are open for licensed fishing. Fisherman's landings are available at Rocky, Curlew, Fearing and Charge ponds and East Head Reservoir for small, open boats. Gasoline engines are prohibited from the ponds. Fearing Pond is the only pond stocked with brown and rainbow trout. Most of the ponds are shallow and are limited to yellow perch, chain pickerel, pumpkinseed, eels, bluegill sunfish, largemouth bass, smallmouth bass and white perch.

The entire forest is open for hunting from October 1st to March 1st, except near the prison camp, park headquarters and Barrett Pond. On Sundays, hunting is not permitted in Massachusetts. No discharge of firearms, bow and arrows or other weapons is allowed at any other time without special permit. Target shooting is prohibited in the forest.

MSSF contains two Wildlife Management Areas that are managed by the Division of Fisheries and Wildlife. The pheasant and quail areas are stocked with game birds from mid-October through November. MSSF is also popular for deer hunting in late November and early December.

Trail Network

Trail users utilize a network of unpaved roads and trails throughout the forest. The existing trail network is comprised of dirt roads, paved bike trails and single lane dirt trails. A few trails are dedicated for specific uses, while the majority of trails are considered multi-use for a variety of trail user groups.

Trail users may also utilize other linear features in the landscape, particularly electric transmission lines and gas pipelines. This section reviews the existing infrastructure of roads, trails and utility lines and the trail user groups that use them.

Unpaved Roads

Seventy-three miles of unpaved roads in MSSF serve primarily as "forest roads," providing access to remote parts of the forest for forest management, including fire suppression. Due to concern about forest fires, a system of access roads was developed between 1916 and 1937 to access forest fires burning in remote sections of the forest. Forest roads also allow fire fighters and emergency medical personnel to evacuate users who have been trapped by fire or who have become injured or lost in the forest. The forest roads have also become an important part of the forest's trail network. Forest roads are used by many recreational users including hikers, equestrians and mountain bikers, as well as hunters, cross-country skiers and snowmobilers in winter.

These unpaved forest roads are narrow, gravel or natural surface roads suitable for travel only by high clearance and four-wheel drive vehicles. The only motor vehicles allowed on these roads are snowmobiles or DCR authorized forest management, wildlife management, fire safety and other emergency vehicles.

Unauthorized use of the forest roads causes damage to them and presents a safety hazard if the roads become impassable by emergency vehicles. This problem has decreased significantly since OHV use has been banned in the forest. When OHV use was allowed, maintenance of the unpaved roads was ongoing. Each road that received maintenance had to be graded or smoothed at least once every year. This level of maintenance limited the number of roads that could receive proper up-keep. Since the ban, some primary forest roads have been improved and have remained in relatively good condition. However, other roads have not been graded and the vegetation has not been cut back.

The forest staff has instituted a program to reclaim these worn and overgrown forest roads on a regular basis. Much of this work is being accomplished with inmates from the MCI Plymouth.

Utility Lines

Two major utility easements exist in MSSF for: (1) electric transmission lines (6.7 miles), which are maintained by NSTAR Electric and Gas; and (2)

natural gas pipelines (13.8 miles), which are operated by the Algonquin Gas Transmission Company. The easement agreements restrict uses within the easement.

Two electric transmission lines run from the eastern part of the forest northwest across Alden Road, connecting with a second transmission line that runs east-west through the northern part of the forest. The infrastructure associated with this 300-330 foot wide easement includes two rows of transmission towers, which hold high voltage electrical cables bringing power from the Cape Cod Canal and Plymouth nuclear power plants to the Carver sub-station.

NSTAR has cleared trees and underbrush under the transmission lines to provide access to the transmission towers and prevent tree damage to the transmission lines. The DCR has the right to use land within the easement, as long as the uses do not interfere with the transmission lines. Both the paved bicycle path and equestrian trails cross sections of the NSTAR easement. Damage from illegal OHV use along the electric transmission line easement is extensive. OHV riders frequently load and off-load OHVs in areas where the transmission lines meet public roads and use the transmission line easement to enter and exit MSSF.

NSTAR has proposed construction of a third new 345 kV transmission line within the easterly and northern edges of the existing easement. This will require clearing of trees and brush to the edge of the easement and removal of high hazard trees just outside of the easement. As part of the project, the DCR is working with NSTAR to develop a system to monitor and control OHV access along the easement. NSTAR is also working with the Massachusetts NHESP to develop a vegetation management plan to protect state-listed species and Pine Barrens habitat located along the easement.

A natural gas pipeline enters the forest at its southern border, runs north to Upper College Pond Road, then northwest along Bare Hill Road and finally due north along Kamesit Way. The natural gas pipeline is located only a few feet below the ground surface in some places. Because the pipeline carries pressurized natural gas, exposure of the pipe from trail activity or associated erosion can create a dangerous situation. OHVs using the pipeline have caused significant erosion along the southern and northern portions of the pipeline. The Algonquin Gas Transmission Company is responsible for removing trees and brush within the 30 foot easement that may interfere with the pipeline. A portion of the existing equestrian trail is located along 3.7 miles of the pipeline. Hikers, mountain bikers and hunters also use portions of the pipeline.

Current Trail Uses

MSSF has a large trail system, including trails for bicycles, horses and hikers. Currently, there are 15.4 miles of paved bicycle trails that are used by cross-country skiers in the winter. There are two dedicated hiking trails, including a 2.4-mile Healthy Heart Trail around East Head Reservoir and a 3.5-mile loop trail between College and New Long ponds. The Berkshire to Cape Cod Bridle Trail runs from north to south through the forest and there is also a 28-mile equestrian loop within the forest. Snowmobiles may be used on the roads and trails in the winter, except on plowed roads and cross-country ski trails, when there is at least 4 inches of packed snow. In addition, 73 miles of unpaved forest roads and 20.5 miles of utility easements are also used for hiking, mountain biking and horseback riding.

Currently, trails are patrolled and maintained on an irregular basis. The Division of Environmental Law Enforcement is responsible for regulating recreational vehicles and is called on for emergency assistance. Maintenance involves sweeping the paved bicycle trails, grading dirt trails and pruning brush from both types of trails. Primary trail uses allowed in MSSF include: hiking, road biking, cross-country running, horseback riding, in-line skating, mountain biking, snowmobiling, cross-country skiing and nature observation.

Table 2.3.12. Existing Trails

Trail Use	Mileage	Restrictions
Healthy Heart Trail	2.4	No mountain bikes.
New Long Pond Trail	3.5	None
Road Biking	15.4	None
Equestrian	28*	None
Mountain Biking	ND*	Not allowed on East Head Reservoir trail.
Cross-country Skiing	ND*	None
Snowmobiling	ND*	Not permitted on plowed roads or paved bike trail. Must be at least 4 inches of snow.

* ND = None designated; also allowed on 73 miles of unpaved forest roads.

Table 2.3.12 shows the approximate total length of officially designated trails by use. Trails designated for specific uses are shown on Figures 7 and 8. It is important to note that most user groups are allowed access to trails and forest roads other than the mileage noted below. Some of these trails are restricted to specific uses, while most are open for a variety of trail users. For example, mountain bikes are not allowed on the hiking trail around East Head Reservoir. In addition, during the hunting season from mid-October until late February, recreational users are instructed to wear blaze orange. A description of the existing trail network and relevant restrictions for each use is provided below.

Hiking. Hiking is concentrated on the designated hiking trail in the central part of the forest, along the Healthy Heart Trail around East Head Reservoir and the Friends Loop Trail at the East Entrance. These trails are located on the DCR's Summer Recreation map (see Figure 6) and marked with blue blazes to help guide hikers through the forest. Parking is available at the trailheads off of Upper College Pond Road, the forest headquarters and Alden Road.

The East Head Reservoir Healthy Heart Trail starts at the forest headquarters and follows the shoreline of East Head Reservoir. It is a short loop trail approximately three miles in length. Species identification tags have been placed on many of the trees and shrubs located along this trail.

The Bentley Loop branches off of the East Head Reservoir loop and leads up to the public use area at College Pond. This trail of about 3.5 miles can also be accessed from a gravel parking lot at the intersection of Three Cornered Pond Road and Upper College Pond Road. From College Pond to the north, it runs south through upland forest, down to New Long Pond and then loops back along the central pond system by Three Cornered Pond and returns to College Pond. Parts of the trail run along the gas pipeline, paved roads and forest roads. The trails vary in width from location to location, but in general, they are approximately three to five feet wide.

Although there are no other hiking trails specific in MSSF, the extensive network of dirt roads and single-track trails also provide hiking and walking opportunities. The roads are unlike the hiking trails in that they are much wider and provide little tree cover and are opened to multiple trail uses. For these reasons, the dirt forest roads may not be as appealing to hikers. Some of the dirt roads are also part of the Bridle Trail as discussed below.

Due to its low-impact nature, hiking can be located in most areas of the forest without causing impact to natural resources. However, no hiking should be allowed through any vernal pools, Coastal Plain Pondshore communities or frost pockets.

Nature Observation. Nature observation may occur throughout the forest, on hiking trails, dirt roads and paved roads. This use includes bird watching, mushroom hunting, butterfly watching and other organized and non-organized natural history exploration. Nature observation is often focused around ponds, wetlands and vernal pools where wildlife activity is concentrated.

Mountain Biking. Mountain biking is increasing in popularity. Mountain biking is allowed on all trails unless marked closed to that use. Mountain bikes are prohibited from using the Healthy Heart Trail around East Head Reservoir. MSSF is especially suitable for mountain biking in the winter months when the trail surface is frozen and snow cover in other parts of the state hinders biking.

Several different trail systems are available to mountain bikers at MSSF. Trails particularly attractive for mountain bike riding include the paved bicycle trail and the equestrian trails. The extensive fire road system is also used by mountain bikers. Mountain bikers use the paved bike trail for shortcutting between longer off-road sections. The paved bicycle trail is also a good reference route for traffic-free forest exploration. Multiple campsite locations also make multi-day mountain bike trips a possibility in MSSF.

Mountain biking, as with all recreational trail uses, can cause trampling, soil compaction, erosion and sedimentation. The degree of impact is similar to that of hikers (Cessford, 1995). Wheeled uses may create some difference in impacts when compared to "point" impacts created by hikers and horses. Trail uses on steep slopes that follow the fall-line have the greatest potential to contribute to soil erosion and sedimentation.

Due to its low-impact nature, mountain biking can be accommodated in most areas of the forest without impacting natural resources. It is a quiet activity that, in most cases, will not disturb or stress breeding

animals. However, it should be directed away from more sensitive habitats like coastal plain pond shores, vernal pools, heathlands and frost pockets. Fall-line trails on steep slopes should be evaluated for re-routing and structures such as boardwalks and bridges can be used to minimize or avoid impacts in wetland resource areas and buffers.

Road Biking. Bicyclists who require paved surfaces can utilize the paved roadway network throughout the forest. In addition, a paved bike path was constructed in the 1970s to enhance the biking experience by providing a more peaceful and safer setting separate from the main roads. This trail, totaling about 15.4 miles in length, is located on the DCR's MSSF Trail map (see Figure 6). The trail is marked with bicycle symbols to help guide bikers along the trail. Parking for bike path access is available at the forest headquarters, near Charge Pond and near the intersection of Three Cornered Pond Road and Upper College Pond Road.

The bike path network includes several loop options in the area between the forest headquarters and Fearing Pond. Two separate segments of the bike path branch out from this central network and run parallel to the roadways toward the northeast and northwest. These branches provide for longer bike trip opportunities. The paved surface is approximately 6-8 feet wide. Constructed in the 1970s, sections of the paved bicycle trail are in need of pavement repairs.

In-line Skating. In-line skating is gaining popularity throughout the country and its use in MSSF is likely to increase. In-line skaters require a paved surface to skate and therefore, their activity is restricted to the paved bicycle paths.

Trail Runners. Trail runners use paved roads, dirt roads, single-track off-road trails and bike paths throughout the forest. Trail runners do not require a specific type of trail. The use of trails and roads is most dependent on the particular user's preference.

Horse Riding. An extensive designated bridle trail network has been laid out in MSSF. This network of approximately 28 miles of trails serves as a suggested route for riders who are not familiar with the trail network and is used by organized horse riding groups for conditioning. Besides the marked bridle trail, horse riding is allowed on all trails unless posted as closed to that use. As a result, MSSF is considered to be one of the best equestrian riding areas in southeastern Massachusetts.

Designated parking adequate for trucks and horse trailers is available north of Barrett Pond. From this point, a variety of suggested loops can be followed, from 10 miles to 50 miles along marked trails. Horse trailer parking is allowed at all trailhead and Wildlife Management Area parking lots, except for the headquarters parking lot.

Loops of different lengths are important for the conditioning of horses and riders and to provide varied riding experiences. The existing bridle trail predominantly follows sections of the dirt road network. The dirt roads tend to be approximately 10-20 feet in width and are composed of loosely sorted sand and gravel. Other sections of the trail follow single-track trails that are only three to five feet wide.

The designated equestrian trail follows the dirt roads that comprise the western, eastern and southern property lines and includes dirt roads in other parts of the forest, including Three Cornered Pond Road, Kamesit Way and Cobb Road. There are also sections of the bridle trail that use single track trails. These include areas near New Long Pond and Three Cornered Pond and trails west of College Pond.

Individual and small group equestrian riding use is not restricted in the forest. Formal (or group) rides are required to obtain a Special Use Permit.

Horse riding can cause trampling, erosion, sedimentation, soil compaction and nutrient loading. Regular horse riding can produce a well-worn path that results in erosion where slopes are steep and soils are fine. Erosion can occur where horses trample pond bank vegetation while wading into ponds for watering.

Similar to hiking, horse riding is generally slow and methodical with the exception of long straight stretches of trail appropriate for galloping. Because horse riders use similar trail types as other passive users (narrow and wooded), impacts on these trails are often regularly observed through multiple uses. Horse riding is also a quiet activity that, in most cases, will not disturb or stress breeding animals. Horse riding can be accommodated in most areas of the forest without impacting natural resources. It should be redirected away from sensitive natural resources such as coastal plain pond shores, frost

pockets, vernal pools and wetlands, as well as areas with a high potential for erosion such as steep slopes. Impacts from horses can be minimized or avoided by constructing boardwalks in the appropriate locations.

Snowmobiling. Designated snowmobiling trails are located on the DCR Winter Recreation map for MSSF (see Figure 8). Trails follow portions of the dirt road network. Snowmobiling is prohibited when there is less than 4 inches of packed snow in order to prevent erosion and scarring of the underlying trail. Due to insufficient snowfall in southeastern Massachusetts to sustain snowmobiling, snowmobiling is only an occasional activity in MSSF.

Cross-country Skiing. The bike paths and hiking trails (described above) serve as the designated cross-country skiing trail during winter months (see Figure 8). There are no specifically designated or prohibited trails for cross-country skiing. The trails are used, weather permitting, throughout the winter. They are subject to closure only on holidays and Saturdays during the hunting season. Due to the lack of snow in southeastern Massachusetts, cross-country skiing is only an occasional activity in MSSF.

Trailhead Parking. Eight trailhead parking areas containing 290 spaces are located throughout the forest (see Figure 6). The visitor parking lot located at the park headquarters fills beyond capacity during summer weekends and has settled in areas, creating a tripping hazard in front of the interpretive center. The unpaved lot at the East Entrance is in poor condition with some eroded areas.

Table 2.3.13. Trailhead Parking Facilities

Trailhead Parking	# of Spaces	Surface	Condition
Lot 1 - Headquarters Visitor Parking	28	Asphalt	Poor
Lot 2 – Three Cornered Pond	66	Asphalt	Good
Lot 3 - Barrett Pond Equestrian	50	Asphalt	Fair
Lot 4 - East Entrance	10	Natural	Poor
Lot 5 - Charge Pond Road	60	Asphalt	Good
Lot 6 - Fire Tower	20	Natural	Fair
Cutter Field Road Quail Area	50	Asphalt	Fair
Rocky Pond Cranberry Bog	6	Natural	Good

Prohibited Trail Uses

The only specific trail use currently prohibited in MSSF is motorized off-highway vehicle (OHV) riding. In response to the growing number of concerns about OHV use in state forests, the DEM established an off-highway vehicle policy in 1996, which among other directives, prohibited OHV use in MSSF.

In a report submitted to the Board of Environmental Management on October 17, 1995, it was recommended that off-highway vehicles be prohibited in MSSF due to OHVs incompatibility with the agency's statutory mandate to protect natural resources, minimize conflicting recreational uses and protect people from excessive noise (DEM, 1995). The report pointed to direct legal conflicts with the Massachusetts Endangered Species Act; problems with trail erosion; impacts to wetlands and wildlife habitat; the cumulative effects of multiple problem areas; conflicts between recreational user groups; and management problems with OHV users specifically related to illegally cut trails and trespassing on private and public lands abutting MSSF. As a result of the report, the agency implemented a new OHV policy that prohibited OHV riding in MSSF.

Problems observed by park staff or reported by other trail users included:

- Unregulated use of non-OHV trails;
- Creation of 46.5 miles of illegally cut trails;
- Pond shore, frost pocket and other natural resource damage;
- Conflicts with other non-motorized trail users;
- Unmanageable damage to trails, such as erosion and deep gullies; and
- Damage to the unpaved forest road system, adversely affecting emergency access.

OHVs can cause trampling, erosion and sedimentation, soil compaction, noise and motion impacts and pollution from exhaust. Direct impacts on vegetation include crushing of foliage, root systems and seedlings by wheels and uprooting of small plant cover and disruption of root systems of larger plants by shear stress. Indirect impacts include undercutting of root systems as paths widen, creation of new erosion channels by runoff on land not used by the vehicles, burial of off-site areas by

debris carried by runoff and reduction of biological capability of the soil by physical modifications, including stripping of the fertile top layer of the soil (Willshire, 1978).

Regional Trail Network

MSSF is a regional hub for many trail users. The Berkshires to Cape Cod Bridle Trail crosses MSSF. Due to its large size, central location and position in a chain of protected lands, MSSF has been identified as a hub for trails being developed in Plymouth, Carver and Wareham. Proposed regional trail connections are shown on Figure 11.

The Buzzards Bay Greenway would run north up the Wankinco River, through the middle of a large A.D. Makepeace landholding and enter MSSF via the Frog Foot Connector west of Charge Pond. A second path would connect the Cape Cod Canal, Bourne Road and Agawam Road connector trails through Camp Cachalot to MSSF at Fearing Pond Road.

The West Plymouth Greenway would run from Sampson Pond in Carver northwest into MSSF, north of Federal Pond, and would connect with the Kingston Link and Kings Pond entrance trails at Curlew Pond. The Pine Hills, Eel River and Town Brook trails would connect at Snake Hill Road. These greenways would support non-motorized recreational trail users such as walkers, hikers, bikers, equestrians and cross-country skiers.

Story at CCC Amphitheater, Judy Perry

2.4. Interpretive Services and Environmental Education

Interpretation is a mission-based communication process that forges emotional and intellectual connections between the interests of the audience and meanings inherent in the resource. Interpretation plays an important role in the creation of meaningful connections between park visitors and the natural and cultural resources at MSSF. Interpretive programs include a mix of educational programs and activities geared primarily towards children, catering to campers, day use visitors and residents from surrounding communities.

The level of interpretive services and programs at MSSF has fluctuated with the availability of interpretive staff for the facility. In 2009 and 2010, two short-term seasonal (mid-June to August) interpreters were assigned to MSSF. Interpretive services and programs at MSSF are historically seasonal (May-September). Recently, special events have been provided off-season by the Friends of MSSF and the year-round regional interpretive coordinator assigned to the Southeast Region.

Interpretive Facilities

The interpretive staff work out of a small interpretive center located east of the park headquarters, adjacent to the visitor parking area. The interpretive center contains public restrooms, a visitor services desk, a small reception area and storage space. The interpretive center is open mid-June through August, when seasonal interpretive staff are not running interpretive programs elsewhere in the forest. Interpretive staff provide trail maps, distribute informational brochures and provide discovery packs at the interpretive center. Discovery packs contain items to explore geology, insects and nature in the forest.

An outdoor amphitheater, dedicated to the Civilian Conservation Corps, was constructed in 2008 behind the park headquarters. The CCC amphitheater is used for story-telling programs, live animal demonstrations, campfire marshmallow roasts and other special events. Both facilities are new, ADA accessible structures in excellent condition. The interpretive center does not contain space for audio-visual presentations, permanent exhibits, indoor programs, meetings or special events. During wet weather, outdoor programs are cancelled.

The entrance to the 2.4 mile Healthy Heart Trail around East Head Reservoir is located near the interpretive center parking lot. A local botanist, Irina Kadis, has tagged many of the native plant species

located along the trail. A brochure keyed to 14 numbered markers along the trail is available at the interpretive center for self-guided nature walks. The trail is also used by the interpretive staff for guided nature walks. The trail is generally in good condition, with the exception of a section of the wooden boardwalk that has missing and rotten decking. The trail entrance is not well marked and does not have a brochure holder for the self-guided trail brochure.

A small trailhead facility on Bare Hill Road provides access to a one-mile long trail around the Rocky Pond cranberry bogs operated by the UMass Cranberry Experiment Station. The trail is used for interpreted cranberry bog hikes.

Informational Kiosks

Thirteen informational kiosks are located within MSSF at the:

- East Entrance parking lot - one new kiosk.
- Headquarters visitor parking lot - two kiosks are located around the visitor parking area, providing an introduction to MSSF and a large-scale painted map of the state forest.
- Upper College Pond Road parking lot #2 - two underutilized informational kiosks with hunting safety and bicycle helmet signs.
- Rocky Pond Cranberry Bog parking area - one interpretive kiosk that describes the history of local bog iron and cranberry growing industries and development of sustainable cranberry growing practices by the UMass Cranberry Experiment Station.
- Curlew Pond camping area - one informational kiosk.
- College Pond day use area - two interpretive kiosks describing the history of MSSF, role of the CCC in developing recreation facilities like the College Pond day use area, map of MSSF and park rules.
- Charge Pond camping area - one informational kiosk.
- Barrett Pond camping area - one informational kiosk.
- Fearing Pond camping area - two informational kiosks in camping areas H and I.

The DCR's interpretive staff are working with The Nature Conservancy (TNC) to develop a two-foot by three-foot Pine Barrens interpretive panel. The panels will be displayed at existing informational kiosks located at the park headquarters visitor parking lot and Lot #2 located on Upper College Pond Road. The DCR's interpretive staff are also working with The North Face partnership to produce one updated copy of the general MSSF interpretive panel. There are no information kiosks at the Fearing Pond day use area, Charge Pond Road parking lot #5 and Fire Tower parking lot #6.

Interpretive Programs

Interpretive programs led by the seasonal interpretive staff focus on the natural and cultural resources at MSSF. Most of the participants are camping families with children. Each year, a variety of programs provided by the DCR's interpretive staff are enjoyed by numerous visitors to the forest (see Table 2.4.1).

Table 2.4.1. Number of Interpretive Programs and Participants, 2006-2010

Year	# of Programs	# of Participants
2006	128	1,382
2007	132	1,068
2008	57	1,122
2009	72	1,142
2010	88	554

Programs offered by the DCR's interpretive staff during 2010 are included:

Rocky Pond Cranberry Bog Tour - Explore the biodiversity of plant and animal life that lives in and around a cranberry bog while learning about this native fruit and the local bog iron industry that preceded the cranberry bog.

Nature Exploration - Discover the natural world of MSSF.

Junior Rangers - Activities that grow future stewards of the environment and earning a Junior Ranger Badge for children ages 8-12.

Kidleidoscope - Hands-on nature activities, stories, exploration and crafts for pre-school aged children.

Swamp Tromp - Use nets and buckets to explore the creatures that live in the ponds and wetlands of MSSF. Addresses water quality and the Plymouth-Carver aquifer.

Hike to Health - Brisk hike along the forest trails.

Night Hike - Learn how animals survive in a nocturnal world

Art & Nature - Express feelings about nature through art from journaling to photography.

Wildflower Walk - Walk through the woods searching for wildflowers.

Bike Hike - Guided bike tour through the forest.

Family Campfire - Songs, stories, games and toasting marshmallows.

Astronomy Campfire - Stargazing and other activities about constellations, the moon and other features of the night sky.

Fire Tower Climb and Fire Safety - Climb the fire tower for a bird's eye view of the forest, learn about fire safety, play some games and meet Smokey Bear.

Fishing Clinic - Hands-on fishing demonstration and instruction.

Special Events

Special events provide opportunities to involve other organizations in exploring ecological communities and recreational opportunities available at MSSF. The following special events were offered in 2010 and the winter of 2011:

Changing Landscape of MSSF - Hike to explore a recently reforested area, an abandoned cranberry bog and old homestead.

Full Moon Hike - Absorb the peace, tranquility and beauty of the forest's trails after sunset.

Pine Barrens Exploration - Explore the globally rare Pine Barrens of MSSF.

Fire and Ice Hike - Winter hike around East Head Reservoir to explore forest landscape shaped by glaciers and forest fires.

Halloween Night Hike - Evening walk through the woods to uncover the mystery of the forest at night.

Take Me Fishing - Annual fall event sponsored by the Friends of MSSF, DCR and MassWildlife, including fishing contests and nature activities for all ages.

Wampanoag: People of the East - Staff from the Plimoth Plantation Wampanoag Village demonstrate Wampanoag life in the 17th century.

Sound of Rain - Interactive story where the audience creates the sound of a rain storm.

Kayak Demonstration Day - Eastern Mountain Sports demonstrates safe use of kayaks.

Live Animal Programs - MassAudubon provides live native animal demonstrations.

First Sunday Hikes - Friends of MSSF conduct guided hikes through different sections of the forest.

Bird Walks - Friends of MSSF organize night time woodcock and whip-poor-will walks.

Snowshoe Clinic and Hikes - Eastern Mountain Sports and Friends of MSSF provide a snowshoe clinic and guided snowshoe walk in the forest.

This page intentionally left blank.

Controlled Burn, DCR

SECTION 3. MANAGEMENT RESOURCES AND PRACTICES

The operations and management of DCR properties often requires close coordination between multiple bureaus, offices and programs of the DCR and is highly dependent upon fluctuating operating budgets. Each facility has its own management challenges, which are generally influenced by many factors, including seasonal or year-round visitor use numbers, staffing availability, condition of recreation facilities, the equipment available for property management and regulations that the agency must follow. Operational procedures at MSSF have evolved over the past 95 years. The following section summarizes the current management and operations of MSSF.

3.1. MANAGEMENT STRUCTURE

MSSF is part of a group of DCR facilities within the Southeast Region, under management of the Southeast Regional Manager. The Southeast Region office and support staff are located at MSSF. Southeast Region staff provide support for various aspects of park management throughout the region including, but not limited to:

- Regional Management Forester provides support for maintaining forest health, pruning hazardous vegetation and controlling insect pests and invasive plant species.
- District 2 Fire Warden organizes controlled burns, promotes fire safety and supervises the fire control staff that operate the fire tower and fight wild fires.
- Regional Ranger provides support for public education about and enforcement of park rules and supervises district Rangers. Regional Rangers report to park supervisors.
- Regional Interpreter provides support for interpretive programs and special events and training of seasonal interpreters.
- Regional Beach Manager coordinates water safety programs and trains seasonal lifeguards.
- Regional Mechanic provides vehicular maintenance support.
- Regional Carpenter coordinates carpentry projects to help maintain DCR structures and facilities.

The Southeast Region is divided into two smaller management districts. MSSF is located within the Cape Cod District, under management of the Cape Cod District Manager. MSSF has a full-time, year-round Recreation Facility Supervisor.

Planning and Engineering

The Bureau of Planning and Resource Protection prepares Master Plans, Resource Management Plans and Trail System Plans; develops and updates GIS data; provides technical assistance with the management of archaeological and historic resources; identifies and acquires properties to be added to the DCR system; maintains an archive of park documents; and provides technical support on ecological resources and the monitoring of conservation restrictions. The Bureau also plans, designs and permits park building and landscape projects.

The Bureau of Engineering is responsible for the engineering and construction of parkways, utilities, dams, buildings and park and recreation facilities. It also provides Resident Engineers to oversee maintenance and construction projects.

Law Enforcement and 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. DCR staff are not law enforcement officers, but have limited authority to issue citations on the reservation (e.g., parking tickets). The Massachusetts State Police has primary law enforcement authority on state-owned lands. Within MSSF, the State Police respond to vehicle crashes, medical emergencies, intoxicated visitors, visitor evictions, search and rescue, domestic violence and burglary incidents. The Massachusetts Environmental Police provide primary enforcement of off-highway vehicle, boating, hunting, trapping and fishing regulations. The Environmental Police will also respond to search and rescue, domestic violence, dumping, vehicle law violations and camping issues within the forest. Local police, from both Plymouth and Carver, provide additional law enforcement at MSSF within their respective jurisdictions.

DCR Rangers and lifeguards provide first aid services. Fire control and first aid services are also provided by the DCR District 2 Fire Control staff, with support from the Plymouth and Carver fire departments. DCR Rangers also provide search and rescue services, manage traffic and parking, administer the Park Watch Program and educate visitors about park rules and regulations. Approximately 90% of the visitors lost in MSSF each year do not have a trail map when they get lost. During 2010, 10 of the 12 Park Watch calls regarding MSSF involved illegal OHV use. In 2010, DCR Rangers were able to respond to all Park Watch calls related to MSSF.

3.2. CURRENT STAFFING

The number and job titles of permanent year-round and temporary seasonal personnel that work at MSSF are presented in Table 3.2.1. As fiscal challenges require the DCR to make some tough staffing decisions, facilities such as MSSF that have a quiet winter season have been reducing its year-round staff and increasing its seasonal staff during the peak summer season. In 1983, MSSF was staffed by 17 year-round state employees, supplemented by 15 seasonal employees during the summer season. During 2010, MSSF was staffed by 5 year-round and 26 seasonal employees. This has the effect of reducing the full-time equivalent of 23 employees in 1983 to 14 in 2010. This shift from a reliance on year-round employees to seasonal employees impacts long-term maintenance, which occurs in the off-season. This has necessitated the closure of several day use and campground areas at MSSF. It also represents a loss of institutional knowledge and memory, which becomes increasingly difficult to recreate. This plan is a partial attempt to staunch the loss of knowledge and experience through recordation.

Table 3.2.1. Fiscal Year 2010 MSSF Personnel

Job Title	Number
Year-round	
Recreation Facility Supervisor IV	1
Forest and Parks Supervisor II	1
Forest and Parks Supervisor I	1
Recreation Facility Repairer	1
Laborer II	1
Long- term Seasonal (May to mid-October)	
Clerk II	1
Forest & Parks Supervisor I	4
Laborer II	1
Laborer I	4
Short-term Seasonal (June to Labor Day)	
Lifeguard II	1
Lifeguard I	4
Park Interpreter	2
Park Ranger	1
Recreation Facility Supervisor I	2
Summer Worker	6

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. During the 2010 camping season, host campers provided a total of 164 days of service at MSSF (nine at Charge Pond, 35 at Barrett Pond, 99 at Fearing Pond and 21 at Curlew Pond). 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. They provide support services ranging from welcoming visitors, distributing park information, performing light maintenance work around campgrounds, cleaning the campground comfort station, to reporting concerns or hazardous situations to park staff. A sign is posted at the host campsite. 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. Host campers must first apply then sign an agreement with the DCR (see http://www.mass.gov/dcr/recreate/campInfo/camphost.htm).

MCI Plymouth Work Crew

On occasion, park personnel are also supplemented by an eight-member work crew from the Massachusetts Correctional Institution located within MSSF (MCI Plymouth). This crew provides litter control, leaf raking, trimming and cleaning of culverts along roads and paved bike trail cleaning. The crew also assists with painting, minor carpentry projects and off-season campsite clean-up. The work crews have assisted with comfort station renovations and the construction of yurt platforms. A carpentry shop at MCI Plymouth also constructs picnic tables and signs for the DCR. These crews are supervised by both DOC and DCR staff. The DCR is responsible for providing materials and hand tools needed to complete the work.

Volunteers

Volunteers contribute to the operation and maintenance of MSSF. They plant trees and flowers, pick-up litter, build and erect bluebird boxes, help pull invasive plants and help maintain trails. Some volunteers make one-time or short-term contributions while others make ongoing contributions to the management of park resources. One-time and short-term volunteers are typically associated with youth groups, corporations and special volunteer events (e.g. Park Serve Day).

Organized volunteer groups, such as the Friends of the Myles Standish State Forest and park user groups also provide ongoing support to the maintenance and safe use of MSSF. The Friends of MSSF also sponsor nature hikes and special events to promote the use and understanding of the forest's recreation, natural and cultural resources.

The DCR has prepared a draft volunteer policy that sets forth the conditions under which organizations and individuals can engage in volunteer projects on DCR properties. Volunteers may perform a wide range of activities including: general clean-ups; providing park visitors with information about the facility; assisting DCR staff with education programs and events; removing invasive plant species; researching historical or scientific information; maintaining the park's recycling center; planting flowers, trees or shrubs; performing minor trimming or weeding with hand tools; performing trail maintenance activities; and organizing events to promote public awareness of park resources.

3.3. Current Operating Activities

MSSF personnel perform a variety of activities related to the operation and maintenance of the forest. Recreation related activities include: safeguarding swimmers at the College Pond day use area and operating the four campgrounds. The College Pond beach is typically guarded from Memorial Day through Labor Day. The College Pond beach staff and lifeguards have two shifts (a.m. and p.m.), while the campground staff have three, eight-hour shifts.

Buildings and grounds maintenance activities include: cleaning, painting, minor carpentry, electrical and plumbing tasks, mowing grass, removing leaves and branches, picking-up litter, beach clean-up, emptying trash barrels and graffiti removal. The comfort stations and College Pond bathhouse are cleaned twice daily when open to the public.

Table 3.3.1. Current Management Activities

Activity	Summer	Fall	Winter	Spring
Litter and graffiti removal	As needed	As needed	-	As needed
College Pond day use fee collection	Daily	-	-	-
Water safety monitoring	Daily	-	-	-
Camping administration	Daily	Daily	-	Daily
Visitor guidance and information	Daily	Daily	Daily	Daily
Interpretive programs	Daily	As needed	As needed	As needed
Trash barrel pick-up	Daily	Daily	As needed	Daily
Empty dumpsters	Twice weekly	Weekly	-	Weekly
Sweep and clean visitor and interpretive centers	As needed	As needed	As needed	As needed
Seasonal opening and closing of comfort stations and bathhouse	-	Annually	-	Annually
Routine patrols	Twice daily	Daily	As needed	Daily
Minor painting, carpentry, plumbing and electrical work	As needed	As needed	As needed	Daily
Picnic table, fence, guardrail and grill maintenance	As needed	As needed	As needed	As needed
Mowing, trimming and leaf removal	As needed	As needed	-	As needed
Weed flower beds and paved areas	Monthly	Monthly	-	Monthly
Mulching and fertilizing	-	-	-	Annually
Road pavement maintenance	As needed	As needed	As needed	As needed
Catch basin, drain, spillway and culvert maintenance	-	As needed	-	-
Comfort station cleaning	Twice daily	Twice daily	-	Twice daily
Parking lot maintenance	Daily	As needed	-	As needed
Snow removal	-	-	As needed	-
Campground maintenance	Daily	As needed	-	As needed

Visitor services related activities include: day use parking fee collection at College Pond, camping registration, Parks Pass sales and processing, routine patrols, promoting awareness and enforcement of regulations. The trailhead parking lots, paved bike path and Healthy Heart Trail are monitored periodically to assess conditions and user activity.

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

Daily operations and management efforts associated with MSSF are influenced by several key laws including the Wetlands Protection Act (WPA; 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); and the State Building Code (M.G.L. c.143 § 93-100) and its associated regulations (780 CMR). A list of regulations applicable to MSSF can be found in Appendix L.

A DCR Waterfront Program Procedure Manual has been adopted to unify how waterfront properties operate (DCR 2007). The manual covers topics from designating swimming areas, water quality standards, emergency response and preparedness, to management of designated swimming areas and lifeguard recruitment and testing guidelines. All lifeguard staff receives the same annual trainings outlined in the Waterfront Program Procedure Manual.

3.4. A SUMMER DAY AT MSSF

No summer day is the same at MSSF, but general routines are followed to maintain operations of the property. The following section provides a snap-shot of a summer day in MSSF. These summaries do not include work performed by outside contractors (i.e. dumpster collection).

12:00 a.m. – 8:00 a.m. Night Shift, Supervisor and Park Ranger

- Patrol camping areas
- Staff headquarters communication center
- Respond to complaints and emergencies

7:30 a.m. – 8:00 a.m. Supervisors, Clerk, Laborers, Summer Workers

- Check reservations
- Complete paperwork for revenue collection
- Prepare park headquarters for camper registration
- Open bathhouse and clean comfort stations
- Trash pick-up and empty trash barrels

8:00 a.m. – 8:00 p.m. Supervisors, Clerk, Seasonal Park Ranger, Laborers, Summer Workers

- College Pond day use parking fee collection and periodic revenue collection
- Distribution of radios
- Continued comfort station cleaning
- Report writing, staff scheduling and other office work
- Staff park office
- Public relations
- Coordinate firewood program, make available to visitors
- Rules and regulations oversight
- Painting and staining as needed
- Grass cutting at campgrounds and day use area
- Trash collection in parking lots
- Collection of staff radios
- Close of business revenue count and bank deposit

8:30 a.m. – 7:00 p.m. Lifeguards

- Lifeguards on duty
- Morning workouts
- Litter and debris pick-up on beach
- In-house rescue and first aid practice
- Public safety oversight, including lifeguard duties and provision of first aid as needed
- Rules and regulations oversight
- End of day equipment storage
- Collection of radios
- Report writing and staff scheduling

8:00 p.m. – Midnight Seasonal Supervisor and Summer Worker

- Close gates and bathhouse at College Pond day use area
- Check comfort stations
- Staff communications desk at park office
- Monitor campground quiet time after 10:00 p.m.
- Respond to complaints

3.5. MAINTENANCE ACTIVITIES

Maintenance activities at MSSF vary on a seasonal basis, but involve all five year-round employees, 10 long-term and six short-term seasonal maintenance employees (excluding seasonal lifeguards, Rangers and interpretive staff). The year-round staff of five cover the park seven days a week from 7:30 a.m. until 4:00 p.m. These staff perform many skilled tasks such as carpentry, welding, utility repair, forestry and road maintenance. The MCI Plymouth work crew assists with large projects that can be accomplished by hand labor.

The biggest job in the fall is the winterization of buildings in the camping and day use areas. This takes several weeks and includes putting up shutters, draining the pipes and noting necessary repairs. Picnic tables and barrels are picked up and brought in for repairs and painting. After the growing season, the road side fire breaks and Wildlife Management Area fields are mowed.

In the winter, major repairs to buildings and equipment that can be worked on inside are undertaken. Snow removal, tree pruning and road maintenance are also performed during the winter season. In the spring, the campsites are cleaned and set-up and the comfort stations are repaired and reopened.

From Memorial Day until Labor Day, park maintenance operations change dramatically. Instead of work projects and major repairs, routine maintenance becomes the focus. The summer maintenance routine includes camping area patrol, trash pick-up, bathhouse cleaning, campground and beach maintenance and vandalism repairs.

The maintenance staff works out of a maintenance complex made up of a maintenance building with a two-stall mechanics garage, a carpentry shop, 10-stall garage, storage garage and a salt/sand storage shed.

3.6. INFRASTRUCTURE

Buildings and Structures

There are 44 buildings and structures owned and operated by the DCR at MSSF (see Appendix I). Thirty are in adequate or better condition, meeting all performance requirements. Ten are in fair condition, requiring extensive corrective

maintenance and repairs. Two are in poor condition, requiring extensive renovations and two failed, requiring complete replacement. Additional information on these 44 buildings and structures is provided in Appendix I.

Charge Pond

The north beach contains a bathhouse in fair condition and a picnic pavilion in good condition. The south beach contains a closed bathhouse in fair condition that needs extensive exterior and interior repairs. Built in 1972, the seven camping area comfort stations need some exterior repairs, minor interior renovations and dish washing sinks.

Fearing Pond

The Fearing Pond bathhouse, the only surviving CCC log bathhouse in the DCR system, is in poor condition, requiring complete renovation. The concession stand is in fair condition and suitably located to serve as a food concession, camp store for adjacent campers, kayak and fishing gear rental. The two Area H campground comfort stations are in adequate condition needing some corrective maintenance to repair exterior siding and fascia and interior tiles and partitions. The Area I campground comfort station is in good condition, requiring routine maintenance.

Barrett Pond

The east campground comfort station was recently renovated and is in good condition. The west comfort station needs corrective repairs, including new interior partitions and plumbing fixtures. With the installation of yurts at Barrett Pond, consideration should be given to winterizing the comfort stations so the camping season can be extended.

College Pond

The 1960s day use area bathhouse needs some corrective maintenance to repair the changing area stalls and interior walls. The small food and kayak rental concession building is in adequate condition, requiring routine maintenance.

Curlew Pond

The west campground comfort station, built in 2000, is in good condition. However, the central and eastern comfort stations need to be replaced with new buildings because they are in poor condition, lack showers and dish washing sinks and are not ADA accessible.

Fire Tower

Built in 1987, the fire observation tower and generator shed are in good condition.

Perry House

The Perry House is a c. 1960 Cape Cod style building with a detached garage. These vacant buildings are in fair condition, requiring extensive corrective maintenance and repairs. The best preservation strategy is to find a new park use (e.g. EPO district office, camp store or interpretive center) that requires little alteration to the property and provides for appropriate maintenance.

Park Headquarters

The Park Headquarters Complex includes the main headquarters building, engineering barn, several sheds and an interpretive center. The interpretive center does not contain space for audio-visual presentations, permanent exhibits, indoor programs, meetings or special events. The interior of the engineering barn was recently renovated for office and meeting space, however, the exterior retains features that date to an earlier period. It is likely that this building served as the park headquarters until the current headquarters was constructed in the 1950s. These buildings are in adequate to good condition, requiring routine maintenance.

Maintenance Yard

The maintenance staff works out of a maintenance complex with nine buildings including a maintenance building with a two-stall mechanics garage, a carpentry shop, 10-stall garage, storage garage and a salt/sand storage shed. The maintenance buildings are in adequate condition, requiring some corrective maintenance. However, the salt/sand storage shed needs major renovations including new siding and doors.

Paved Roads

A 31.9 mile network of 30 paved roads provides access to different areas of the forest. The paved roads are comprised of 12.3 miles of primary parkways, 11.2 miles of secondary parkways, and 8.4 miles of local roads in day use and camping

areas (FST, 2009). The primary access road runs 6.6 miles from the West Entrance to the forest northeast to the East Entrance (see Figure 6). This primary access road system starts with Cranberry Road at the forest's West Entrance, passes the MSSF headquarters, follows Fearing Pond Road across the East Head Reservoir Dam onto Upper College Pond Road and then follows Alden Road to the East Entrance.

In 1997, the section of Fearing Pond Road that crosses the East Head Reservoir dam was closed after a car plunged into a breach in the dam. Since the accident, vehicles have been detoured around the dam along Lower College Pond and Halfway Pond Roads. Not paved for heavy traffic, these roads have been damaged by heavy truck traffic serving the forest, MCI Plymouth and Camps Cachalot and Squanto. In addition, visitors and DCR staff traveling between the forest headquarters and campgrounds at Fearing and Charge ponds must travel an additional 2.3 miles each way (see Fearing Pond Road Detour map). Closure of this crossing also adds critical time needed for headquarters staff to respond to emergencies in the College Pond day use area and the Fearing and Charge pond campgrounds. It also impedes emergency evacuation of the park and abutting areas during an emergency at Pilgrim Nuclear.

Visitors from Rhode Island, western Massachusetts and the South Coast take I-195 and I-495 to Route 58 in South Carver to the West Entrance. Visitors from the Metropolitan Boston Area, eastern Massachusetts and Cape Cod take Route 3 and then Long Pond Road to the East Entrance.

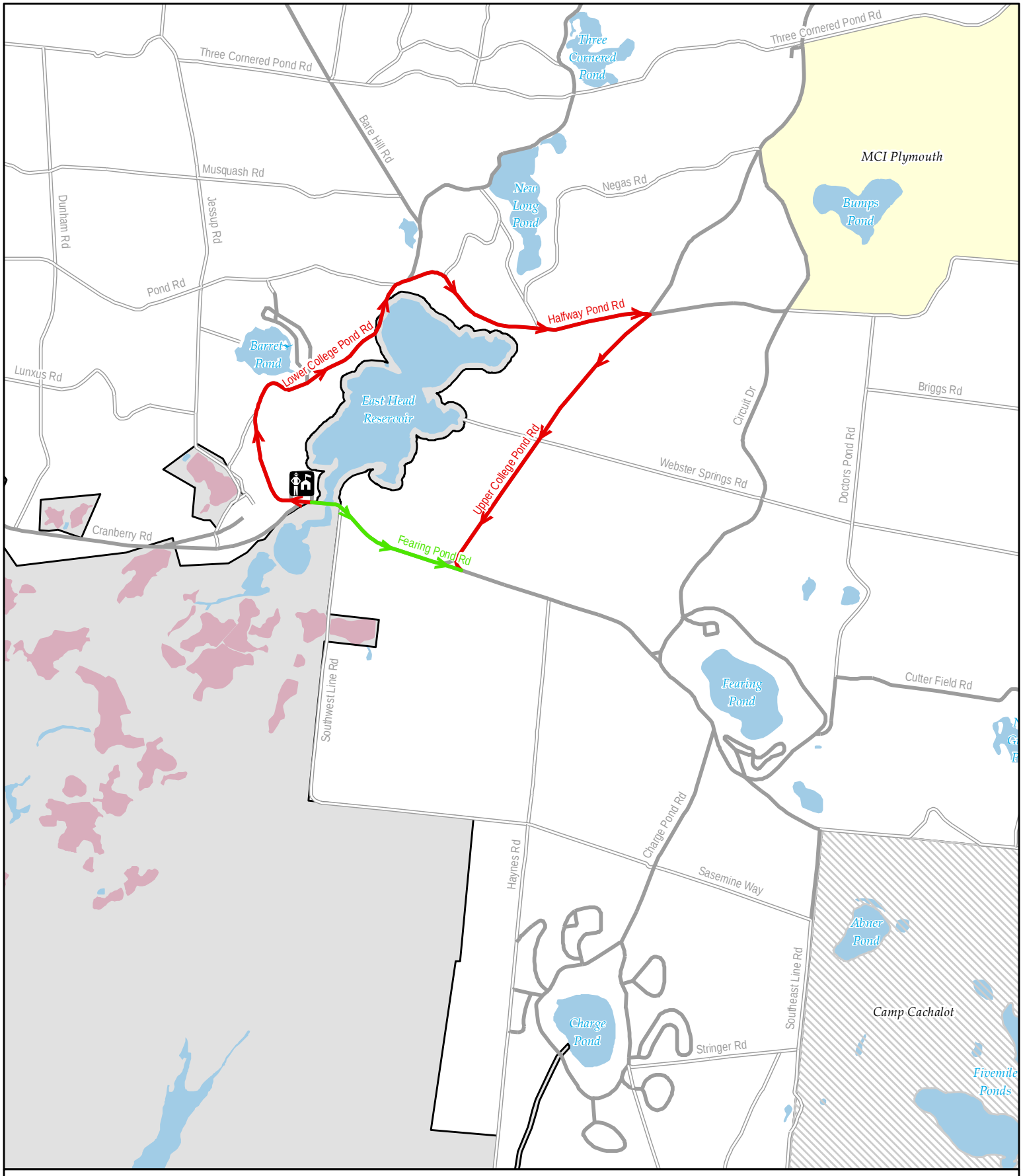
Other primary parkways include: Lower College Pond Road, Bare Hill Road, leading to the northwestern part of the forest and Halfway, Fearing and Charge Pond roads, which provide access to the Charge Pond and Fearing Pond campgrounds, MCI Plymouth and camps Cachalot and Squanto, east of the forest. Commercial vehicles are prohibited from using the paved roads in the forest, except to provide goods and services to the forest, the correctional facility or to camps Cachalot and Squanto.

In 2009, Fay, Spofford & Thorndike conducted an inventory and assessment of the paved roads in MSSF (FST, 2009). The survey found that 3.3 miles of the paved roadways were in excellent condition, requiring no work; 4.5 miles of the roads were in good condition, requiring routine maintenance; 11.7 miles required preventative maintenance; 7.1 miles needed structural improvements; and 5.3 miles required base rehabilitation (see Figure 9). In 2009, Fay, Spofford & Thorndike estimated that these repairs would cost approximately $4.4 million (see Table 3.6.1).

Table 3.6.1. Recommended Road Pavement Treatments

Recommended Treatment	Length (miles)	Estimated Cost
Do Nothing	3.3	$0
Routine Maintenance	4.5	$36,583
Preventive Maintenance	11.7	$804,034
Structural Improvement	7.1	$1,479,845
Base Rehabilitation	5.3	$2,048,921
Total	**31.9**	**$4,369,383**

Source: MSSF Parkway Management Study (FST, 2009)



Forest Headquarters
Current Route (2.8 miles)
Preferred Route (0.5 mile)
Unpaved Road
Paved Road
Cranberry Bog
Open Water

MCI Plymouth
Myles Standish State Forest
Fee Interest
Conservation Restriction

Fearing Pond Road Detour

0 0.25 0.5 Mile

1:24,000

dcr Massachusetts

DCR GIS Dec-11

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

3.7. General Budgeting Information

A variety of operating, capital and federal funds support the operation and maintenance of MSSF.

Operating Budget

The annual state operating budget supports daily operations and maintenance, including staff salaries, utilities, supplies, equipment leases, administration and the maintenance of facilities, vehicles and equipment. Operational funding is an ongoing issue for the operation of MSSF, as it is throughout the DCR system. The agency's overall operating budget decreased by 30.6% from Fiscal Year 2009 to 2011.

Capital Budget

The capital budget supports projects (e.g., construction) 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. Table 5.7.1 contains a list of future capital projects identified for MSSF.

Capital expenditures include both stand alone capital projects and ongoing programs. The ongoing capital programs have annual budgets that are divided each year between the DCR's 350 facilities (e.g., Clean State Environmental Remediation @ $2,400,000 per year, Lakes and Ponds @ $200,000 per year and Parkway Paving @ $1,500,000 per year).

Recent capital projects at MSSF included shoreline restoration at Fearing Pond and repaving 11 miles of Alden and Upper College Pond roads. A total of $1,601,290 of capital funds were spent at MSSF during fiscal years 2005 through 2010 (see Table 3.7.1).

Federal Funding

During fiscal year 2011, the DCR received an American Recovery and Reinvestment Act (ARRA) grant for southeastern Massachusetts wildfire fuels mitigation. A total of $422,735 of these federal grant funds were spent at MSSF for mechanical fuel reduction, controlled burns and fire control staff.

Table 3.7.1. Capital Expenditures at MSSF during Fiscal Years 2005-2010

Fiscal Year	Capital Program	Amount Expended
05-10	Clean State Environmental Remediation	$407,515
06-09	Landscape Improvements and Aborcultural Services	$44,916
05-10	Small Repairs to Park Facilities	$447,054
06	Snow Removal Equipment Purchase	$32,577
09	Lakes and Ponds Program (Fearing Pond Bank Restoration)	$66,900
10	Storm Water Repair Services	$2,423
09-10	Parkway Paving (Alden and Upper College Pond Roads)	$586,214
10	Campground Modernization	$13,691
Total MSSF Capital Expenditures Fiscal Years 05-10		**$1,601,290**

Conservation Trust Fund

This trust fund uses donations to support special state park initiatives, above and beyond basic property maintenance. It is funded through charitable contributions to the DCR, including those donations placed into the "iron ranger" (i.e., a secure metal donation box) located at the MSSF interpretive center. Iron ranger donations are used for MSSF improvements.

Retained Revenues

The state operating budget specifies the maximum amount of park revenue from fees, licenses and rents charged by the DCR that may be retained by the agency in a given fiscal year. This amount changes yearly. In fiscal year 2011, these retained revenues were capped at $8,489,419. Revenues from day use parking fees, camping reservations, rental of cottage sites and donations for firewood at MSSF are deposited in the state's general fund. The DCR may then use up to (or "retain") $8,489,419 of these park revenues statewide for its operating expenses and improvements to its facilities. Retained revenues cannot be used to hire full-time agency personnel.

During fiscal year 2010, $758,773 of park revenues were collected at MSSF, including $485,100 for cottage site rentals, $233,948 in camping fees, $27,765 in day use parking fees, $10,185 for the sale of firewood, $1,250 in season pass sales and $525 for non-camper dump station use.

3.8. PARTNERSHIPS

The DCR Office of Partnerships works to enhance the agency's constituency of supporters and users by: working in partnership with park users and supporters to develop and sustain community-based stakeholder groups; facilitating external financial assistance for the planning, design and construction of capital projects; managing the DCR Partnerships Matching Funds Program, which leverages private contributions to improve DCR facilities; and serving as a dedicated point of contact for individuals and non-profit, institutional and community-based organizations. It is this office that is responsible for identifying and coordinating private and institutional giving and partnerships at MSSF.

There are a number of existing partnerships that support DCR's operational, interpretive and resource protection efforts at MSSF.

Friends of Myles Standish State Forest

The Friends of MSSF is a non-profit volunteer group founded in 2007 to promote and conserve the natural, cultural and historic resources of MSSF. The Friends are dedicated to restoring and maintaining the forest and its trails for sustainable recreation, to educating themselves and others about the forest and to promoting a healthy habitat for native plants and wildlife. The Friends encourage all visitors to enjoy the forest in a manner consistent with protecting its rare and endangered Pine Barrens ecosystem. The Friends of MSSF is directed by a local board of advisors who represent the various forest user groups. Current Friends of MSSF activities include:

- The *Pine Barrens Community Initiative* to encourage residents of southeastern Massachusetts to landscape with native plants, help eradicate invasive plants, guard water resources and live sustainably on the land.
- Native plant propagation and distribution of plants native to the local Pine Barrens. The DCR Partnerships Matching Funds Program recently matched a grant from A.D. Makepeace to the Friends of MSSF for the construction of a greenhouse near the interpretive center. The greenhouse will provide a place to propagate Pine Barrens plants, establish an interpretive native plant garden and encourage native Pine Barrens planting on public and private property.
- *Trail Enhancement Project* to connect, sign and help maintain designated hiking, biking and equestrian trails. Seek funding for maintenance of the forest's 15 miles of paved bike trails and develop a better trail map.
- *Native Bird Support Group* to build and monitor bird nesting boxes in the forest, support birds within the region and promote knowledge about birds.
- *Vernal Pool Program* to identify, certify and monitor vernal pools located in the forest.
- *Annual Take Me Fishin' Derby* promotes fishing and other family nature activities.
- *Annual Photo Contest* generates photos of the natural resources and recreational use of the forest.
- Enforcement of OHV laws, working with Park Watch program, DCR Rangers and state and local law enforcement officials to reduce the use of OHVs in the forest.
- Five Resource Management Plan workshops were hosted in cooperation with the DCR to provide an opportunity for people and groups who have local knowledge of the forest to contribute the RMP (see Appendix M).

Private Cottage Program

During the recreational season, cottage families watch over the ponds and report any conditions, situations, accidents or behaviors that need attention from the DCR. Their knowledge of the forest allows them to give directions and assistance to visitors who are unfamiliar with the forest. Their presence within the forest allows them to occasionally respond to accidents, fires, rescues and searches for lost children. Cottage families regularly police their areas to remove dangerous and unsightly litter to protect all users from injury and improve the forest's appearance (Nelson, 2005).

Other Partnerships

The following organizations also support management activities at MSSF:

- Numerous non-profit organizations, another state agencies and the Federal government have partnered with the DCR in land conservation efforts or have protected land in close proximity to MSSF including: The Nature Conservancy, Town of Plymouth, Wildlands Trust of Southeastern Massachusetts, The Trustees of Reservations, MassWildlife, Boy Scouts of America, Girl Scouts of Eastern Massachusetts, and the USFWS Massasoit National Wildlife Refuge.
- The Manomet Center for Conservation Services and MassAudubon assist with monitoring and stewardship of native bird habitat as well as public education.
- MCI Plymouth provides work crews to help with forestry, landscape maintenance and building repair services at MSSF.
- The Massachusetts Division of Fish and Game manages the pheasant and quail Wildlife Management Areas located within MSSF and stocks trout in Fearing Pond.
- Local Boy and Girl Scout troops repair trail signage, perform trail maintenance, clean-up the paved bike path and conduct special projects.
- The NHESP and local volunteers perform rare plant monitoring at MSSF.
- A dedicated turtle conservationist manages the red-bellied cooter reintroduction program.

This page intentionally left blank.

Eastern Tiger Swallowtail Butterfly, Bob Conway

SECTION 4. LAND STEWARDSHIP ZONING

The purpose of this Resource Management Plan is to achieve a sustainable balance between the conservation of important natural and cultural resources and providing quality outdoor recreational opportunities. This requires knowledge of a property's natural and cultural resources and the identification of compatible recreational activities. The natural, cultural and recreation resources of MSSF are described in Section 2. This section includes Landscape Designation and Land Stewardship Zoning recommendations to ensure consistency between the conservation of natural and cultural resources and outdoor recreational use at MSSF.

The DCR uses a two-tier system for guiding the management of its parks, forests and reservations: (1) the Landscape Designation of entire properties, or major portions of properties, is intended to assess and guide land use activities of properties throughout the entire DCR system; and (2) Land Stewardship Zoning, which is applied to properties on an individual basis through the Resource Management Planning process, incorporates site specific information to guide the management of specific areas within these properties.

Regardless of the landscape level designation or site specific zoning application, the DCR's objective is to provide sound stewardship for natural and cultural resources, while complying with all applicable state and federal regulations, and to provide sustainable recreational opportunities.

At the statewide scale, the DCR is designating all of the facilities within the State and Urban Parks System as parklands, woodlands or reserves, as a means to differentiate the primary ecosystem services provided by these facilities, make land use management decisions based upon these services and communicate the agency's land use management objectives to the public. These designations, which can be applied to a facility in its entirety or split facilities so that more than one designation is applied to an individual facility, have been determined via the use of available GIS computer modeling information, drawing upon statewide resource databases with additional input by DCR field staff. These designations are designed to provide a framework of overarching management guidelines for the entire DCR system.

At the site specific level, the inventory and assessment of resources during the preparation of a Resource Management Plan leads to the zoning of specific sites and resources within DCR properties, based on their sensitivity to recreational and management activities that are typical for that facility. Through this process, site specific resource information can be factored into land use management and decision making and provide guidance for the stewardship of these resources.

The three land stewardship zones provide a general continuum to categorize resources relative to the potential degradation from human activities, from undisturbed sites with highly sensitive resources, through stable/hardy resources, to sites that have been developed and consistently used for intensive recreation or park administration purposes. Significant feature overlays are applied to highlight resource features that have been researched and assessed by professional resource specialists. Management and protection of these significant features is guided by specific management recommendations that have been developed by resource specialists. The Land Stewardship Zoning system helps to ensure that visitor and management activities do not degrade ecological or cultural resources.

Application of the three-zone system to individual DCR properties is facilitated by gathering available field data related to natural and cultural resources, recreational uses and developed facilities during the RMP process. Lands of special resource sensitivity and significance are identified and mapped. Resource and landscape features such as priority habitat areas, endangered species, wetlands, streams and ponds are mapped as part of this approach. This type of mapping and data collection, based on the best information currently available, provides the basis for subsequent analysis and the development and application of appropriate management guidelines for specific resources, designed to provide greater protection to valuable natural and cultural assets.

The Land Stewardship Zoning process identifies areas where the general management guidelines for the overarching Landscape Designation are not adequate to fully protect these embedded areas (e.g. highly sensitive ecological or cultural assets within any of the three Landscape Designations). The finer grained land stewardship zones are needed to provide management guidelines on a site and resource specific level.

4.1. LANDSCAPE DESIGNATIONS

As an overarching template for organizing its land management and forestry activities, the DCR is adopting a management structure that categorizes its properties into three Landscape Designations: Forest Reserves, Parklands and Woodlands. The three Landscape Designations will enhance the provision of ecosystem services by segregating incompatible activities and allowing for prioritization of goals.

Forest Reserves protect large contiguous bocks of high-value ecosystems. These are areas where the dominant ecosystem service objectives are biodiversity maintenance, nutrient cycling and soil formation, watershed protection and long-term carbon sequestration. There will be no commercial harvesting of timber in Forest Reserves. Forest management would generally consist of letting natural processes take their course, although in some cases, more active management might be permitted. For example, wildfire fuels management may be necessary for Forest Reserves located in southeastern Massachusetts (DCR, 2010b).

Parklands are areas where the primary ecosystem service objectives are the provision of public recreational opportunities that depend on natural areas, the preservation of ecologically significant areas and special places and the promotion of cultural values (aesthetic, historical, educational and tribal). Areas of Forest Reserves with existing high recreational values may be designated as Parklands.

Woodlands emphasize the provision of ecosystem services that require management prescriptions with intensities that are less compatible with the activities in Parklands or Forest 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.

The DCR recently held a series of public meetings to discuss the draft designations of DCR properties. Myles Standish State Forest was draft designated as a Forest Reserve, with some portions designated as Parkland (the existing administration area, day use areas, campground and other recreation areas). Additional information about the Landscape

Designation process can be found on the DCR website at: http://www.mass.gov/dcr/ld/landscapedesignations.htm.

Reserve management allows natural processes to determine the long-term structure, composition, function and dynamics of the forest to the maximum extent possible. Equally important is monitoring and studying these conditions, then applying this knowledge to low impact forest management techniques within Parklands and Woodlands and on privately managed forests. The DCR will be forming a Forest Reserves Science Advisory Committee, consisting of conservation biologists and forest ecologists, statisticians and wilderness policy experts, to review major restoration and management activities within Forest Reserves. This committee would deal with management issues such as: invasive species, fire suppression, controlled burning, rare species habitat, long-term monitoring and trail, road and facility location or relocation (DCR, 2010b).

The MSSF Forest Reserve will have to be more flexible than other Forest Reserves. There are many homes and businesses surrounding MSSF that are embedded in the "fuels" of this fire prone Pine Barrens, so prescribed burning and other vegetation management strategies will have to be used to protect lives and property. Also, the important Pine Barrens ecosystem might gradually change to a white pine-oak forest over the coming decades through natural succession, necessitating active management to maintain the Pine Barrens.

4.2. Land Stewardship Zoning Guidelines

The Landscape Designation system described above is a coarse filter suitable for identifying overarching management goals for entire state forests, parks and reservations. The following Land Stewardship Zoning system is an important supplement to Landscape Designations; it identifies more detailed stewardship guidelines for specific areas within a DCR facility.

The Land Stewardship Zoning Guidelines provide a framework that guides the long-term management of DCR facilities. These Guidelines define three standard zones. They also define significant feature overlays, which are applied on a supplemental basis. A brief description of these three zones and the significant feature overlays is provided below. A more detailed description of the Land Stewardship Zoning Guidelines is available in Appendix K.

Zone 1. This zone includes highly sensitive natural and cultural resources that could be degraded by typical recreational or management activities and therefore require a focused management approach to provide adequate resource protection. Examples include rare species habitat identified as being highly sensitive to human activities and sensitive prehistoric or historic archaeological sites.

Zone 2. This zone includes areas containing commonly encountered, yet important natural and cultural resources. Zone 2 is the keystone to the DCR's management responsibilities because this protected landscape provides a buffer for sensitive resources, recharge for surface and groundwater and large areas where typical public recreational activities can be managed at sustainable levels. Examples include ecosystems characterized by a diversity of wildlife and plant habitats, rare species habitat that is compatible with dispersed recreation, agricultural resources and resilient cultural sites and landscapes.

Zone 3. This zone includes 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, skating rinks, paved bikeways, swimming beaches, campgrounds, playgrounds, 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 recognized resource features. The resource features have been recognized through a data inventory and assessment process by resource specialists and experts in conservation agencies and organizations. The purpose of the overlays is to provide precise management guidance in order to preserve the recognized resource features, regardless of the zone in which they occur. An area characterized by intensive visitor use that overlaps with resource protection obligations, such as a popular ocean beach that is recognized under the CZM Barrier Beach Guidelines, coastal wetlands regulations and MESA guidelines for the protection

of rare shorebirds, provides an example of where a Significant Feature Overlay may be applied.

4.3. RECOMMENDED LAND STEWARDSHIP ZONES

The development and application of these Guidelines is the result of a step-by-step analysis of the natural and cultural resources of MSSF in the context of compatible public recreation and public access. In a sense, they are the culmination of the planning process and are intended to help guide the long-term management of MSSF. Please see the Recommended Land Stewardship Zoning map.

Zone 1. Highly sensitive natural and cultural resources including: fragile frost pocket and heathland habitat, rare species habitat surrounding undisturbed coastal plain ponds, and sensitive prehistoric and historic archaeological sites.

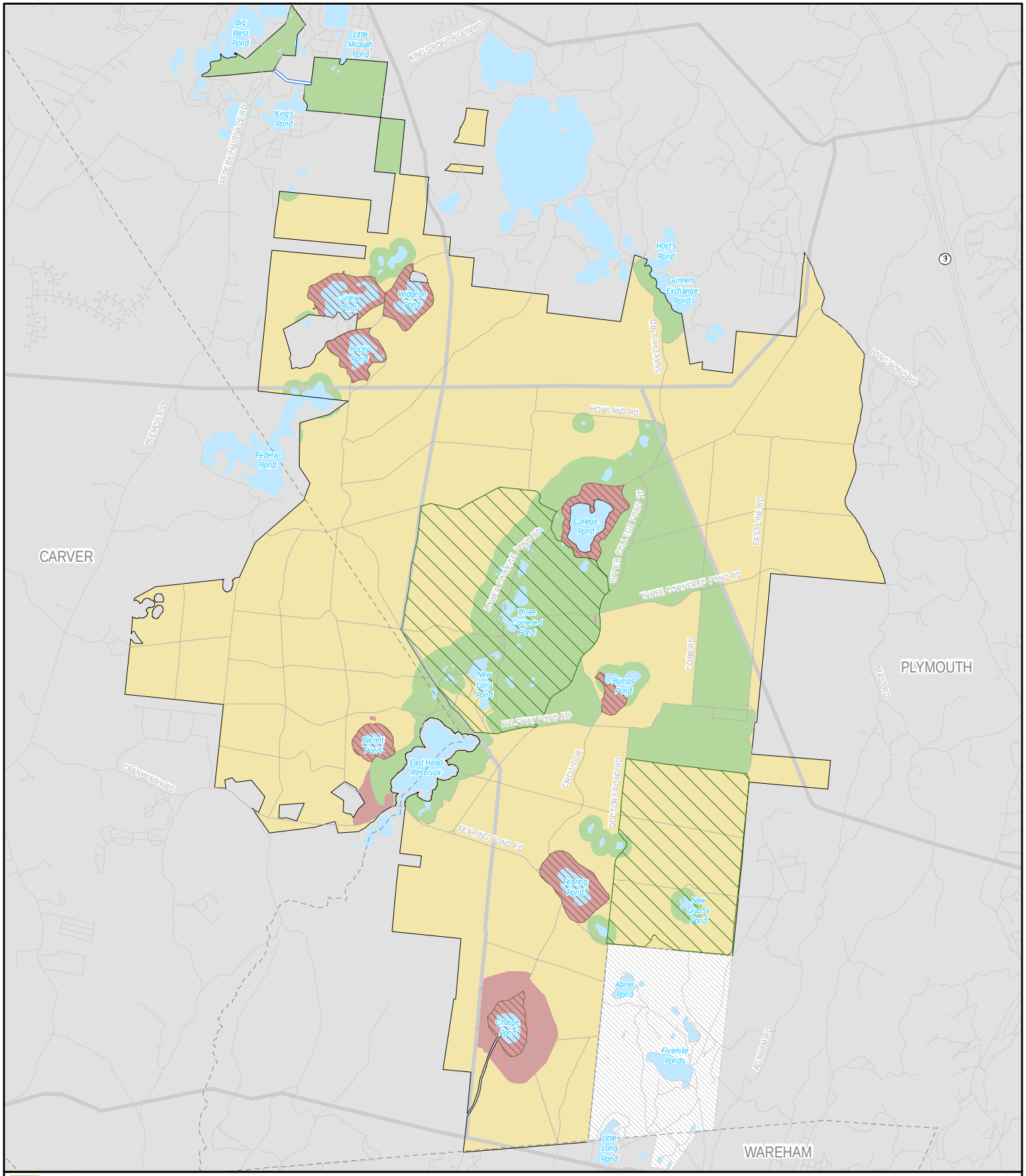
Zone 2. Most of the forested habitat including white pine forests, pine plantations and hardy Pine Barrens pitch pine and scrub oak communities.

Zone 3. Portions of MSSF that support the most intensive levels of use, including the swimming beaches, picnic areas, campgrounds, parking areas, comfort stations, MCI Plymouth, private cottages, maintenance and administrative areas.

Significant Feature Overlays

Developed Coastal Plain Ponds. All coastal plain ponds that support existing recreation facilities, including swimming beaches, bathhouses, picnic areas, campgrounds, boat launches and private cottages are included in this overlay. Ponds included in this overlay should be managed to enhance and protect the coastal plain pond shore habitat from overuse and avoidable environmental damage. Recreational activities should be concentrated in previously established recreation areas using education signage, fencing and appropriately located trails. Recreational use of pond shores with intact soil and vegetation should be discouraged.

Wildlife Management Areas. The DFW pheasant and quail Wildlife Management Areas (WMAs) are included in this overlay. The habitat management strategy implemented in the WMAs involves the creation of small clearings of early successional habitat within the dominant Pine Barrens community. These clearings are important to grassland wildlife for nesting and brood rearing, as they supply food in the form of herbs, grasses and insects for bluebirds, whip-poor-wills, bobwhite quail, ring-necked pheasant, ruffed grouse and small mammals. The WMAs included in this overlay should be managed to enhance and protect Pine Barrens, coastal plain pond shore and vernal pool habitat from overuse and avoidable environmental damage. Hiking and hunting should be concentrated on previously established and appropriately located trails. Access to pond shores with intact soil and vegetation should be avoided. The presence of invasive species should be monitored and controlled. Review management practices with DFW and re-establish a MOA.



Zone 1
Zone 2
Zone 3
Significant Feature Overlay
Developed Coastal Plain Pond
Wildlife Management Area
Road or Trail
Utility Line
Open Water

Myles Standish State Forest
Fee Interest
Conservation Restriction
Other Legal Interest

Recommended Land Stewardship Zoning

N W E S

0 0.25 0.5 1 Mile

1:57,000

dcr Massachusetts

DCR GIS Dec-11

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

This page intentionally left blank.

Northern Red-bellied Cooter, © John White

SECTION 5. MANAGEMENT RECOMMENDATIONS

This chapter describes management recommendations to achieve a sustainable balance between the conservation of important natural and cultural resources and the provision of quality outdoor recreational opportunities at MSSF. The management recommendations that follow are organized by the six management goals adopted to guide future management of MSSF.

The recommendations related to each management goal are summarized and prioritized in a table. Management recommendations were assigned one of three levels of priority ranking: high, medium or low.

Recommendations were given a ***high*** priority if they meet any of the following criteria:

- Correct serious health or safety concerns.
- Protect state-listed endangered species habitat from immediate threats.
- Prevent damage or deterioration of significant cultural resources.
- Required by legal responsibilities or regulatory compliance.

Recommendations were given a ***medium*** priority if they meet any of the following criteria:

- Provide stewardship for significant natural and cultural resources.
- Maintain essential park infrastructure.
- Significantly improve or enhance a facility's recreational programming.
- Reduce facility operating costs.
- Leverage non-commonwealth funds.

Recommendations that did not meet the above criteria were assigned a ***low*** priority.

5.1. Maintain and Enhance Habitats for Rare Species, Native Plants and Wildlife

- Implement a program of prescribed fire and mechanical fuel reduction to maintain and improve Pine Barrens habitat for rare Pine Barrens species and reduce the potential for wildfire in consultation with the Forest Reserves Science Advisory Committee.
- Remove tree plantations consisting of non-native species to improve fire safety and improve Pine Barrens habitat after consulting with the Forest Reserves Science Advisory Committee.

- Pursue the acquisition or protection of in-holdings and abutting properties containing significant Pine Barrens habitat.

If the Pine Barrens remain undisturbed for long periods of time, the ecosystem will transition into shade-tolerant white pine and hardwoods, displacing rare species that rely on open Pine Barrens habitat. Prescribed burning and mechanical cutting are effective means of maintaining disturbance dependent Pine Barrens. When managing for biodiversity in fire-adapted Pine Barrens natural communities, fire is a preferred management tool. In addition to maintaining an open habitat structure, periodic fires release scarce nutrients and stimulate seedling establishment of fire-adapted vegetation.

Mowing of shrubs or cutting of trees can be effective management tools for maintaining and restoring open Pine Barrens habitat. Mechanical cutting is a necessary prerequisite to prescribed fire when the fuel load exceeds that which can be burned in a controlled manner (NHESP, 2007).

Mechanical disturbance of the soil (plowing or harrowing) is undesirable. Such treatment destroys the root stock of native Pine Barrens plants, disturbs the consolidated substrate necessary for tiger beetles and may disturb in situ archaeological sites. Pine Barrens habitat scarified by plowing or harrowing is more readily colonized by invasive plants at the expense of native shrubs important for state-listed species and other wildlife. These same problems occur in areas scarified by off-highway vehicle use, making such activity incompatible with the conservation of Pine Barrens communities (NHESP, 2007) and cultural resources.

Table 5.1.1. Plant and Wildlife Habitat Recommendations

Recommendation	Priority	Fund[a]	Lead[b]
Pine Barrens Management			
Develop and implement a comprehensive fire management program to include a combination of mechanical fuel reduction and prescribed fire to improve and maintain habitat quality for rare Pine Barrens species, as well as to reduce the potential for an uncontrollable wildfire.	High	2	F
Continue to exclude motorized off-highway vehicles (OHV) from MSSF and limit motorized vehicle traffic on unpaved forest service roads and utility corridors to minimal traffic for the purposes of maintenance, safety, habitat management and monitoring. Monitor and enforce OHV restriction using the Park Watch Program with law enforcement support.	High	2	S
Develop and implement a plan to remove tree plantations consisting of non-native species in consultation with the Forest Reserves Science Advisory Committee to reduce fire danger and improve Pine Barrens habitat. Following cutting, controlled burning should be implemented to stimulate sprouting of native Pine Barrens shrubs.	High	1	F
Conduct both natural and cultural resource surveys to identify sensitive resources in areas scheduled for fuel reduction, controlled burns or plantation removal operations.	High	1	F
Avoid bulldozing, harrowing or other soil scarification in habitat consisting of scrub oak, low bush blueberries and other native shrubs or in areas of high archaeological sensitivity.	Medium	1	S
Acquire or protect in-holdings and adjacent properties containing significant Pine Barrens habitat.	Medium	1	P
Do not pave or spread crushed stone on unpaved service roads within sensitive Pine Barrens scrub oak or heathland habitat to maintain sand patches.	Medium	1	S
Develop a mowing plan for the roadside firebreaks in consultation with the NHESP that is more patchy and less frequent to protect rare species and allow a more complex vegetation structure to develop. Mowing should not be conducted during the growing season. (See http://www.mass.gov/dfwele/dfw/nhesp/conservation/pdf/mowing_guidelines.pdf.)	Medium	1	P/S
Control invasive plant species to the greatest extent possible to lessen adverse affects on state-listed species and priority habitats.	Medium	2	V/P
Conduct long-term biodiversity surveys and monitoring to track the condition of Pine Barrens and species inhabiting the Pine Barrens.	Medium	2	F/P/V

Table 5.1.1. Plant and Wildlife Habitat Recommendations (Continued)

Recommendation	Priority	Fund[a]	Lead[b]
Rare Turtle Management			
Install "Turtle Crossing" signs and scored pavement at known sites of frequent turtle crossing of paved roads in consultation with the NHESP's Turtle Biologist.	Medium	2	P/S
Create new turtle nesting areas and additional basking habitat for the northern red-bellied cooter according to the NHESP Guidelines for Creating Turtle Nesting Habitat (see http://www.mass.gov/dfwele/dfw/nhesp/conservation/pdf/creating_turtle_nesting_sites.pdf) in consultation with the NHESP's Turtle Biologist.	Low	2	P/S
Survey potential eastern box turtle habitat to identify their numbers, movements and general ecology in MSSF.	Low	3	P
Native Bird Management			
Maintain a variety of native grasslands and early successional forests to provide habitat for uncommon grassland and shrubland bird species such as whip-poor-wills, prairie warblers, American kestrels and bluebirds.	High	2	F/S
Work with MassWildlife to prepare a new management plan and MOA for the pheasant and quail Wildlife Management Areas to control non-native species, promote native plants and reduce trail impacts in consultation with the NHESP.	High	1	F/S
Install and monitor the use of large bird boxes for barn owls.	Medium	2	V/S
Promote native plant propagation and reintroduction, for food and shelter, to benefit native wildlife using locally obtained stock of native genotype.	Medium	2	V/S

[a] Availability of funding to implement recommendations: 1 = funding is currently available; 2 = funding is currently unavailable, but may become so in the near future; 3 = funding is currently unavailable, but may become so in more than five years.
[b] The following codes identify the party responsible for implementing the recommendation: C = contractor or consultant; E = Bureau of Engineering; F = Bureau of Forestry and Fire Control; L = Legal Services; O = Other; P = Bureau of Planning and Resource Protection; S = Division of State Parks and Recreation; T = State Forest Tenant; V = Volunteer or partner; W = Lakes and Ponds Program; X = Office of External Affairs and Partnerships.

5.2. Protect and Enhance the Quality of Water Resources within the Forest

- Protect and enhance the quality of water resources of the forest to ensure healthy and safe water-based recreation.
- Conserve and improve the habitats of native aquatic plants and animals.
- Protect the Plymouth-Carver Sole Source Aquifer.
- Manage the coastal plain pond shores to enhance and protect endangered species habitats from overuse and avoidable environmental damage.

Pond management should focus on keeping soil and natural vegetation around and within the ponds intact and free from disturbance. Both natural vegetation and nesting turtles along exposed shorelines are susceptible to damage from hiking, swimming, fishing, camping, horseback riding, off-highway vehicles and boating. These activities disturb turtle nests, basking of turtles, disrupt the seed bank and damage individual plants. In the submerged areas of the pond fringe, aquatic plants, hatchling/juvenile turtles and insect larvae can be disturbed by wading, swimming and fishing.

Recreational activities should be concentrated in previously established beach, boat launch and camping areas outside of Coastal Plain Pondshore communities using educational signage, gates and appropriately located trails. Recreational use of pond shores with intact soil and vegetation should be discouraged. Educational materials should be provided to explain the rarity of coastal plain pond plants and animals, vulnerability of the habitat to disturbance and the detrimental impacts of foot, horse and off-highway vehicle traffic on native vegetation and turtle nests.

Ponds should be monitored for terrestrial, wetland and aquatic invasive plant species. Signs with instructions for checking and cleaning boats, to reduce the potential of spreading invasive species, should be posted at heavily used boat launch areas. Ponds located near cottages, campgrounds and cranberry bogs should be monitored for nutrient levels.

Table 5.2.1. Water Resource Recommendations

Recommendation	Priority	Fund[a]	Lead[b]
Post invasive species information signs at the East Head Reservoir, Rocky, Curlew and Charge pond fisherman landings, warning boat owners of the need to avoid transporting invasive species from pond to pond on their boats.	High	1	S/W
Restore compacted and eroded areas at Charge, Fearing, Barrett, College and Curlew ponds.	High	2	S
Avoid development along pond shores that are currently undeveloped and undisturbed, including construction of new buildings and associated septic systems, new boat launches, camping or swimming areas.	Medium	1	S
Survey and monitor for introduced invasive plant species, particularly aquatic species in ponds with boat access, and eliminate or control these species to the best extent feasible.	Medium	2	V/W
Concentrate recreational activities in previously established beach, boat launch and camping areas using educational signs and gates.	Medium	2	S
Do not route trails along pond shores, including trails for bicycling, horseback riding or hiking. Any existing trails along pond shores should be re-routed.	Medium	3	P
Conduct field studies to certify potential vernal pools if they qualify.	Low	2	V/P
Conduct long-term surveys and monitoring to track the condition of and species inhabiting the coastal plain ponds and pond shores.	Low	3	W/P

[a] Availability of funding to implement recommendations: 1 = funding is currently available; 2 = funding is currently unavailable, but may become so in the near future; 3 = funding is currently unavailable, but may become so in more than five years.
[b] The following codes identify the party responsible for implementing the recommendation: C = contractor or consultant; E = Bureau of Engineering; F = Bureau of Forestry and Fire Control; L = Legal Services; O = Other; P = Bureau of Planning and Resource Protection; S = Division of State Parks and Recreation; T = State Forest Tenant; V = Volunteer or partner; W = Lakes and Ponds Program; X = Office of External Affairs and Partnerships.

5.3. PRESERVE THE DISTINCT SCENIC AND CULTURAL QUALITIES OF THE FOREST

The forest's cultural resources represent a range of human endeavors from prehistoric Native American occupation to modern cranberry growing. Preservation of these cultural resources and landscapes connects us to our past. Implement practices to protect the intact archaeological record at MSSF. Preserve the CCC landscape and renovate the Fearing Pond bathhouse, the only CCC log bathhouse remaining in the DCR park system.

The historic landscape of MSSF is diverse. It is a collection of sites that relate to pre-park land use, forestry and wildlife management, as well as features that reflect the evolution of public recreation. Myles Standish is historically significant as one of the Commonwealth's first state forests, including a very early public-private partnership, for its long standing forestry practices and for the work of the CCC and later the DEM/DNR. Although more research is needed, some of the pond areas and circulation features are likely eligible for listing on the National Register of Historic Places.

Next to historic trails, the largest category of historic resources within MSSF highlights the legacy of the CCC. The residential camp of Camp S-56 survives as an archaeological site, with the remains of the recreation and officers' quarters readily visible. A cedar log bathhouse built by the CCC at Fearing Pond dates to 1936 and a number of other recreation facilities were located throughout the forest, including day use and camping areas adjacent to the forest's larger ponds (Barrett, Charge, College, Curlew, Fearing and New Long). Typically the facilities included latrines, bathhouses, parking lots, fire pits, wells, beaches, water holes, signs, gates and floats. Some of these resources have either been altered or no longer exist. Two other sites appear to be related to the CCC: a quail farm and a forestry nursery.

The preservation of cultural resources at MSSF can be accomplished through continued cooperation and teamwork. Good planning and early communication about proposed projects will ensure smooth project implementation. Beyond the dictates of legal compliance and resource protection, the cultural resources of MSSF should be recognized for the opportunities that they are and developed into public programming.

Management practices at MSSF should incorporate the appropriate protection procedures to insure that

its cultural resource base is not adversely affected by its daily operations. Cultural resources represent unique records of past events and behaviors that are part of our communal heritage. Typically, prehistoric sites resulted from short-term sporadic occupation and, under the best of circumstances sites, are difficult to excavate and interpret properly. They are extremely fragile and easily damaged. Archaeological sites cannot be repaired or fixed and their loss is analogous to the extinction of a plant or animal species. Once these resources are gone, they are gone forever. Early consultation with the OCR concerning any proposed development, management and maintenance can ensure that projects are brought to their timely completion.

The preservation of historic structures, buildings and landscapes at MSSF should focus on adaptive reuse, restoring active use to vacant properties. In areas where new facilities are needed to support recreation, such as Fearing Pond, the rehabilitation of the existing bathhouse should be given priority. In other cases, DCR park use, short-term rental or long-term lease may be the vehicle for keeping historic properties in use and in good repair.

Table 5.3.1. Cultural Resource Recommendations

Recommendation	Priority	Fund[a]	Lead[b]
Pre-Contact Archaeology			
Until an archaeological survey has been completed, new alterations of undisturbed, level and well-drained areas around ponds and wetlands should be avoided and monitored where activities are already occurring.	High	1	S
Conduct an archaeological survey to evaluate the significance of known and potential archaeological and historic sites, which should result in the development of a Cultural Resource Protection Plan to provide enhanced protection, interpretation and management of these resources.	Medium	3	P
Historic Archaeology			
Back fill the "Homestead" dump site to eliminate the OHV track and restore the original topography.	High	1	S
Prepare and submit MHC Archaeological Site Forms for sites identified in this plan, but not already included in MHC's inventory.	Medium	1	P
Manage the CCC Campsite in accordance with cultural resource best practices (see Appendix H). Park staff should monitor the area for illegal digging and impacts from vegetation and erosion.	Medium	1	S
Conduct further research to document the history and significance of the "Old Homestead" area, especially to confirm that the two headstones represent pet burials, not human.	Low	1	P
Historic Buildings			
Find a park use for the Perry House that minimizes alterations to the building (e.g. Environmental Police Headquarters, camp store or nature center). If a park use is not found, consider the property for inclusion in the Historic Curatorship Program.	High	1	S/P
Stabilize the CCC Fearing Pond bathhouse to avoid further deterioration.	High	1	E
Research the history of the Park Headquarters Complex and assess its historic significance and integrity.	Medium	1	P
Conduct additional research of the Operations Complex as a whole. Confirm the historic significance of the 10-stall building and Parks Operations Barn and manage them in accordance with the DCR Cultural Resource Policy (see Appendix H).	Medium	1	P
Rehabilitate the Fearing Pond bathhouse for use as public toilets and changing areas, to serve the Fearing Pond day use area in accordance with the Secretary of the Interior's Standards for Historic Properties.	Medium	3	P

Table 5.3.1. Cultural Resource Recommendations (Continued)

Recommendation	Priority	Fund[a]	Lead[b]
Landscapes			
Preserve and interpret intact white pine plantations.	Medium	1	F
Maintain Lower College Pond, Bare Hill, Fearing Pond, Alden and Upper College Pond Roads as historic parkways according to the Preservation Guidelines for Historic Parkways.	Medium	2	E
Paint the College Pond bathhouse a more traditional park color and screen it with vegetation to blend it into the landscape better.	Medium	2	S

[a] Availability of funding to implement recommendations: 1 = funding is currently available; 2 = funding is currently unavailable, but may become so in the near future; 3 = funding is currently unavailable, but may become so in more than five years.
[b] The following codes identify the party responsible for implementing the recommendation: C = contractor or consultant; E = Bureau of Engineering; F = Bureau of Forestry and Fire Control; L = Legal Services; O = Other; P = Bureau of Planning and Resource Protection; S = Division of State Parks and Recreation; T = State Forest Tenant; V = Volunteer or partner; W = Lakes and Ponds Program; X = Office of External Affairs and Partnerships.

5.4. PROVIDE DIVERSE OPPORTUNITIES FOR SUSTAINABLE OUTDOOR RECREATION

Maintain a sustainable network of walking, hiking, biking, horseback riding, snowmobile and skiing trails to provide connections between day use and campground areas and regional greenways. Renovate and maintain comfort stations to provide modern sanitary facilities for public use. Restore natural conditions surrounding recreation facilities to eliminate recreational damage, improve landscape aesthetics and provide sustainable public access to pond shores. Improve forest roads for safety, aesthetics, fire protection and maintenance.

Table 5.4.1. Sustainable Recreation Recommendations

Recommendation	Priority	Fund[a]	Lead[b]
Day Use Areas			
Re-open picnic area and beach at Fearing Pond to reduce over use of the College Pond day use area during peak summer weekends.	High	1	S
Expand College Pond day use area swimming beach.	High	2	S
Camping Areas			
Increase the frequency of comfort station cleanings during peak summer weekends.	High	1	S
Replace the central Curlew Pond comfort station to provide accessible facilities with showers and dish washing sinks.	High	2	E
Complete minor comfort station exterior repairs, interior renovations and install dish washing sinks at the Charge, Fearing and Barrett pond camping areas.	High	2	S
Repair Charge Pond south beach bathhouse to reduce the over use of the north beach during peak summer weekends.	Medium	2	S
Provide additional water spigots in the equestrian camping area.	Medium	2	S
Install additional yurts at Barrett Pond to provide camping opportunities to families that do not own tents or trailers.	Medium	3	S
Install contact stations at the Curlew Pond and Charge Pond camping areas to provide disbursed check-in facilities for pre-registered campers and increase campground security contingent upon the availability of additional seasonal staff.	Medium	3	E
At check-in, provide campers with information on recreation facilities offered in the forest, scheduled interpretive programs and special events, trail etiquette and good camper behavior.	Medium	1	S
Replace the eastern Curlew Pond comfort station to provide accessible facilities with showers and dish washing sinks.	Low	3	E
Winterize the camping area comfort stations at Barrett Pond to extend the camping season at Barrett Pond for use by hunters and winter campers.	Low	3	S

Table 5.4.1. Sustainable Recreation Recommendations (Continued)

Recommendation	Priority	Fund[a]	Lead[b]
Private Cottage Program			
Prepare site plans for each cottage pond that protects sensitive wetland communities, corrects shore erosion, provides appropriate access for public recreation and preserves the cottage communities. The site plans should identify cottages that must be removed or relocated to protect sensitive wetland communities or provide appropriate public recreational access. Upon approval of the site plans, give three years notice of permit termination for cottages identified for removal.	High	1	P/S
For the remaining privately owned cottages, continue the current management policy of eventually eliminating the private cottage program through the gradual retirement of existing permits.	High	1	L
The DCR will maintain and rent appropriately sited cottages in good condition to the general public as cottage titles revert to the Department.	Medium	2	S
As with all DCR facilities, sanitary systems for all remaining cottages must be certified for compliance with Title 5 of the State Sanitary Code.	Medium	2	L
Fishing and Hunting			
During the hunting season, provide signs at the East and West Entrances warning visitors to exercise caution during the hunting season. Provide information brochures on line and at the park headquarters and trailhead kiosks describing the hunting season schedule and recommended safety precautions.	Medium	2	S
Provide fishing gear, bait and boat rental concessions at College and Fearing ponds.	Low	2	S
Trails			
Work with partners to remove pine needles and prune vegetation along the paved bike path.	High	1	S
Repair cracks and heaves along the paved bike trail. As needed, add trail signs at road crossings, winding and hilly areas.	High	2	S
Assess the MSSF trail system to determine whether various classes of power driven mobility devices carrying people with mobility disabilities can reasonably be allowed.	Medium	1	P/S
Install trail orientation signs and trail map dispensers at all trailhead parking facilities. Install intersection directional signs, reassurance markers and blazes along trails and forest roads.	Medium	2	V/S
Create an ADA accessible trail from the headquarters parking lot with connections to the existing paved bike trail and a scenic overlook of East Head Reservoir. Provide trail wheel chairs at the interpretive center for use on the trail.	Medium	2	V/S
Work with the Friends of MSSF to develop a large scale trail map showing all trails and forest roads and possibly include selected hiking routes and significant natural and cultural features.	Medium	2	V/S
Design and construct hiking trails at Charge Pond to provide better pedestrian access between the camping areas, north and south beaches, forest trail network and proposed regional trails.	Low	3	P/S
Design and construct a loop trail connecting the Curlew Pond camping area with the paved bike trail, Rocky Pond, Federal Pond, Widgeon Pond and proposed regional tails.	Low	3	P/S
Roads and Parking			
Resolve the right-of-way legal issues and repair the road over the East Head Reservoir dam to provide direct access from the West Entrance and Park Headquarters Complex to the College, Charge and Fearing pond use areas, MCI Plymouth, Camp Squanto and Camp Cachalot, reducing heavy truck damage to Lower College and Halfway Pond roads.	High	2	L/E
Rehabilitate paved roads as identified in the road assessment prepared by Fay, Spofford & Thorndike (FST, 2009).	Medium	3	E
Enforce speed limit and commercial vehicle regulations.	Medium	1	S
Improve parking at East Entrance trailhead.	Medium	2	S
Improve internal park road signage, including mileage to key locations.	Medium	2	S

[a] Availability of funding to implement recommendations: 1 = funding is currently available; 2 = funding is currently unavailable, but may become so in the near future; 3 = funding is currently unavailable, but may become so in more than five years.

[b] The following codes identify the party responsible for implementing the recommendation: C = contractor or consultant; E = Bureau of Engineering; F = Bureau of Forestry and Fire Control; L = Legal Services; O = Other; P = Bureau of Planning and Resource Protection; S = Division of State Parks and Recreation; T = State Forest Tenant; V = Volunteer or partner; W = Lakes and Ponds Program; X = Office of External Affairs and Partnerships.

5.5. EXPAND INTERPRETIVE AND ENVIRONMENTAL EDUCATION PROGRAMS

Effective park management largely depends on the support of well-informed visitors. Provide interpretive programs and materials that educate visitors about the impact of their actions on the health of the forest's natural and cultural resources.

Table 5.5.1. Interpretive and Environmental Education Recommendations

Recommendation	Priority	Fund[a]	Lead[b]
Provide new interpretive kiosks at the Charge Pond Road Parking Lot #5 and Fire Tower Parking Lot #6. The kiosks should include a map of the forest, forest rules, description of facilities available in the forest and a brochure holder for trail maps. Provide a Fire Danger Sign at the East Entrance.	High	2	S
Install interpretive panels and trail map holders on the existing kiosks at the East Entrance Parking Lot #4 and the Upper College Pond Road Parking Lot #2, including a map of the forest, forest rules and a description of facilities available in the forest.	High	2	S
Develop spring interpretive programs to support educational field trips related to the Massachusetts Science Curriculum Framework to provide opportunities for students from low income urban areas to visit the forest.	Medium	2	S
Develop a comprehensive interpretive plan that identifies appropriate means to assist visitors in understanding the natural and cultural resources of the forest. Such plan should focus on the primary resources of the forest: the Pine Barrens and associated features such as frost pockets, kettle ponds and plants and animals that depend on this habitat.	Medium	1	S
Conduct a DCAM-certified building study to define the program for a visitor center, evaluate building options and provide a schematic design and cost estimate for the preferred option. The visitor center should include a reception desk, park offices, orientation exhibits, orientation video, multi-purpose room for interpretive programs and meetings for 60-100 participants, public restrooms and parking. Explore the feasibility of using an appropriate renewable energy system in the visitor center.	Medium	2	P
Convert one of the short-term seasonal interpretive positions into a long-term seasonal position (May-October) to provide spring and fall programs for local school groups.	Low	3	S
Provide a new interpretive kiosk with trail map holder at the Fearing Pond bathhouse, including a map of the forest, forest rules, description of recreational opportunities in the forest and history of the CCC log bathhouse.	Low	2	S
Post information describing the detrimental effect of keeping native turtles as pets, releasing pet store turtles, leaving dogs off leash during turtle nesting season and feeding wildlife, which artificially increases populations of turtle predators. Encourage visitors to help turtles cross roads in the direction the animal was heading.	Low	1	S

[a] Availability of funding to implement recommendations: 1 = funding is currently available; 2 = funding is currently unavailable, but may become so in the near future; 3 = funding is currently unavailable, but may become so in more than five years.

[b] The following codes identify the party responsible for implementing the recommendation: C = contractor or consultant; E = Bureau of Engineering; F = Bureau of Forestry and Fire Control; L = Legal Services; O = Other; P = Bureau of Planning and Resource Protection; S = Division of State Parks and Recreation; T = State Forest Tenant; V = Volunteer or partner; W = Lakes and Ponds Program; X = Office of External Affairs and Partnerships.

5.6. Involve Partners in the Achievement of the Management Goals

Maintain and develop partnerships with other organizations to provide quality outdoor recreational opportunities while conserving the important natural and cultural resources of MSSF. Establish sustainable standard practices for permitted users within the forest.

Table 5.6.1. Partnership Recommendations

Recommendation	Priority	Fund[a]	Lead[b]
Provide assistance to the Friends of MSSF in identifying and controlling invasive plant species within sensitive natural communities.	High	1	F
Work with the Friends of MSSF to establish a native plant garden and Pine Barrens interpretive programs to educate park visitors and area landowners in techniques for enhancing native plants and birds as well as pest control to prevent chemical poisoning of native wildlife.	High	1	S
Foster partnerships with colleges and universities with degree programs in biology, botany, archaeology and history to assist in carrying out lower priority natural and cultural resource recommendations (e.g., Pine Barrens, eastern box turtle and invasive species surveys and historic documentation for the "Old Homestead" and Park Headquarters Complex).	Medium	1	F/P
Work with the Friends of MSSF to educate the public about native bird populations and measures to promote their survival through interpretive panels, brochures and programs.	Medium	1	S
Work with MassWildlife to prepare a new management plan for the pheasant and quail Wildlife Management Areas to control non-native species, promote native plants and reduce trail impacts in consultation with the NHESP.	Medium	1	F
Prepare and execute a management agreement pursuant to Chapter 755 of the Acts of 1951 for the management of a prison camp on 360 acres of land within MSSF and the employment of prisoners in forest management, maintenance and development of lands owned by the DCR.	Low	1	L
Prepare and post a list of potential volunteer projects that could be conducted by the Friends of MSSF, cottage owners, youth groups, conservation organizations, businesses or individuals within MSSF.	Low	1	S

[a] Availability of funding to implement recommendations: 1 = funding is currently available; 2 = funding is currently unavailable, but may become so in the near future; 3 = funding is currently unavailable, but may become so in more than five years.
[b] The following codes identify the party responsible for implementing the recommendation: C = contractor or consultant; E = Bureau of Engineering; F = Bureau of Forestry and Fire Control; L = Legal Services; O = Other; P = Bureau of Planning and Resource Protection; S = Division of State Parks and Recreation; T = State Forest Tenant; V = Volunteer or partner; W = Lakes and Ponds Program; X = Office of External Affairs and Partnerships.

5.7. Recommended Capital Projects

The state capital budget supports projects (e.g., construction) and purchases (e.g., equipment) with a per-unit cost of at least $5,000 and an expected lifespan of at least seven years. Capital projects are identified and funded through a five-year capital plan. The five-year capital plan identifies proposed capital projects, their estimated costs and the year in which they are to be funded. Capital funding is subject to annual appropriation and approval by the Commissioner of the DCR, Secretary of the Executive Office of Energy and Environmental Affairs and the Governor.

Table 5.7.1. Recommended Capital Projects

Project Description	Estimated Cost	Priority
Stabilize the CCC Fearing Pond log bathhouse.	$75,000	High
Over a five-year period, provide materials and fixtures for repair of eight Charge Pond, two Fearing Pond and one Barrett Pond, camping area comfort stations by DCR staff, supported by MCI Plymouth work crews.	$250,000	High
Repair and reopen the Fearing Pond Road bridge over the East Head Reservoir dam.	$150,000	High
Over a five-year period, conduct routine road maintenance (4.5 miles), preventive maintenance (11.7 miles), structural improvements (7.1 miles) and base rehabilitation (5.3 miles) pursuant to the FST road assessment (FST, 2009).	$4,500,000	Medium
Repair the paved bike path pavement.	$150,000	Medium
Replace the central Curlew Pond camping area comfort station.	$500,000	Medium
Over a five-year period, provide materials and fixtures for repair of the engineering barn, salt shed, carpentry shop, 10-stall garage and park maintenance building by DCR staff, supported by MCI Plymouth work crews.	$150,000	Medium
Renovate the CCC Fearing Pond log bathhouse and parking area for use as a day use swimming area bathhouse.	$650,000	Medium
Winterize the Barrett Pond camping area comfort stations to support an extended camping season.	$200,000	Low
Replace the eastern Curlew Pond camping area comfort station.	$500,000	Low
Conduct a building feasibility study for a new or renovated visitor center.	$100,000	Low
Total	**$7,225,000**	

5.8. STAFF RECOMMENDATIONS

The annual state operating budget supports daily operations and maintenance, including staff salaries, utilities, supplies, equipment leases, administration and the maintenance of facilities, vehicles and equipment. Operational funding is an ongoing issue for the operation of MSSF, as it is throughout the DCR system. The agency's overall operating budget decreased by 30.6% from Fiscal Year 2009 to 2011.

State operating funds are subject to annual appropriation by the legislature and approval by the Governor. The table below identifies additional operating funding that would be needed to implement operating recommendations made in this Resource Management Plan.

Table 5.8.1. Identified Staff Needs

Staff Recommendation	Estimated Annual Cost	Priority
Extend one short-term seasonal interpretive position by 10 weeks to support spring school programs.	$5,000	High
Increase frequency of campground comfort station cleaning on peak summer weekends by adding two labor positions.	$11,000	High
Re-open the Fearing Pond day use area during peak summer weekends by adding a short-term seasonal labor position and two lifeguards.	$18,000	Medium
Provide four short-term seasonal labor positions to staff a contact station to facilitate check-in and security at the Charge Pond campground during peak summer weekends.	$30,000	Low
Add a full-time, year-round Interpreter to staff proposed visitor center.	$32,000	Low
Total	**$96,000**	