dcr
Massachusetts

Resource Management Plan
Lancaster State Forest

Adopted by the DCR Stewardship Council MONTH, 2025

Massachusetts Department of Conservation and Recreation
Division of Conservation and Resource Stewardship
Office of Cultural Resources

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Purpose

Resource Management Plans (RMPs) are foundational documents that identify a park, forest, or reservation's defining natural, cultural, and recreational resources and identify potential threats and opportunities to guide DCR's continued stewardship of the property and to inform future decisions about the property in a way that celebrates and preserves its identity.

RMPs are prepared for "all reservations, parks, and forests under the management of the department" (M.G.L. c. 21, § 2F). These 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." DCR finalizes RMPs following a public process and adoption by the DCR Stewardship Council. The contents of this RMP represent the best available information at the time of adoption by the Stewardship Council.

Mission and Core Principles

The Massachusetts Department of Conservation and Recreation, an agency of the Executive Office of Energy and Environmental Affairs, oversees 450,000 acres of parks and forests, beaches, bike trails, watersheds, dams, parkways, and over 100 National Register listed properties. The agency's mission is to protect, promote, and enhance our common wealth of natural, cultural, and recreational resources for the well-being of all.

DCR strives to be an exemplary leader in conservation and recreation. DCR's staff is passionate, dedicated, and continuously employs best practices, expertise, and a sense of place in carrying out the mission. The following core principles ground the agency in its work. For the benefit and well-being of all—people and the environment—DCR pledges to:

- Provide access to a diversity of outdoor recreational experiences and unique landscapes that is equitable, inclusive, and welcoming.
- Conserve lands, water, and forests by integrating science, research, and technical expertise into the management of our natural resources.
- Advance climate change mitigation and adaptation efforts by implementing sustainable practices and advancing resiliency across our infrastructure, assets, and resources.
- Support healthy communities by providing places for people to connect with nature and each other.
- Inspire generations of stewards by recognizing and honoring our legacy through partnerships, public engagement, and education.

Stewardship

DCR honors Indigenous peoples for their care, throughout many generations, of the land that DCR now stewards on behalf of the people of the Commonwealth. DCR embraces this legacy of stewardship, fostering a sense of shared responsibility by all people for protection of the waters, lands and living things for the enjoyment and appreciation of all.

To learn more about the DCR, its facilities, and programs please visit us at www.mass.gov/dcr. Contact us at mass.parks@mass.gov.

Lancaster State Forest

1. Property Overview

Characteristic	Value
Date Established	1911 / 1931
Location	Lancaster
Ecoregion	Worcester Plateau
Watershed	Nashua
DCR Region	Central
DCR District	Central Highlands
DCR Complex	Wachusett
Management Forestry District	Mid-State
Fire Control District	North Worcester
Size (acres)	90.7
Boundary Length (miles)	2.2
Elevation - Minimum (feet)	268.0
Elevation - Maximum (feet)	411.2
Environmental Justice (acres)	90.7
Estimated Annual Attendance (2019)	Unknown
Interpretive Programs (# programs, 2023)	0
Interpretive Programs (# attendees, 2023)	0

2. Landscape Designations

Designation	Acres
Parkland	0.0
Reserve	0.0
Woodland	90.7
No Designation	18.1

3. Regulatory Designations

Designation	Acres
Area of Critical Environmental Concern – Central Nashua River Valley	90.7

4. Long-Term Agreements

Agreement	Expiration Year
None Identified	N/A

5. Concessions

Concession Type
None

6. Partners & Friends

Group(s)
None

7. Features of Interest

Feature
Assaceeic Hill
Trails Network

8. Natural Resources

Resource	Value
Tree Canopy (acres)	90.4
Rivers and Streams (miles)	0.5
Open Water (acres)	0.0
Wetlands (acres)	13.5
Certified Vernal Pools (#)	1
Potential Vernal Pools (#)	0
State-Listed Species (# Regulatory)	0
State-Listed Species (# Non-Regulatory)	0
Federally Listed Species (#)	0
Aquatic Invasive Plants (# known species)	0
Terrestrial Invasive Plants (# known species)	4

9. Forest Management (Since 2012)

Management Objective	Acres
N/A	0.0

10. History of Wildfires and Conditions Influencing Future Wildfires

Wildfire Attribute	Value or Characteristic
Number of wildfires on property; 2019–2023	0
Acres burned by wildfires on property; 2019–2023	0.0
Number of wildfires in Fire Control District; 2019–2023	294
Acres burned by wildfires in Fire Control District; 2019–2023	1,169.6
Type of Wildland-Urban Interface	Intermix
Predicted rate of spread, based on Fire Behavior Fuel Model 13	Moderate

11. Natural Hazards

Hazard Type	Acres
Flood (1.0%-chance)	18.0
Flood (0.2%-chance)	21.7
Hurricane Inundation (Cat. 1)	N/A
Hurricane Inundation (Cat. 4)	N/A

12. Climate Change (By 2070)

Type of Change	Amount of Change
Increase in annual days over 90° F	>30
Change in annual maximum daily rainfall (inches)	>10
Massachusetts Coastal Flood Risk Model area of inundation (acres)	N/A

13. Cultural Resources

Resource Type	#
Archaeological	0
Historic - Total MACRIS Listed	0
Historic - National Register Listed	0
Historic - National Historic Landmark	0

14. Recreation Resources

Resource	#
Trail System	1

15. Recreation Activities

Activity
Bicycling, mountain
Dog walking, on leash
Hiking/walking
Hunting
Snowshoeing

16. Roads and Trails

Metric	Value
Roads - Unpaved (miles)	0.0
Roads - Paved (miles)	0.0
Forest Roads - Unpaved (miles)	0.5
Forest Roads - Paved (miles)	0.0
Trails - Unpaved (miles)	0.1
Trails - Paved (miles)	0.0
Trails - Unauthorized (miles)	0.0
Trail Density (miles/acre)	0.007
Area of Impact (acres)	46.6

17. Parking

Parking Resources	#
Lots	0
Parking Spaces - Total	0
Parking Spaces - Accessible (HP)	0
Parking Spaces - Other	0

INTRODUCTION

Lancaster State Forest (Lancaster or the Forest) is in the Town of Lancaster (the Town), a bedroom community approximately 34 miles west of Boston and 16 miles north of Worcester. The Forest is landlocked; with no direct access from public roads to the Forest, only from adjacent Town-owned lands. The Forest is just north of, but does not abut, the North Nashua River (a tributary of the Nashua River) and is bounded to the south and east by the Town-owned Cook Conservation Area, which extends south to the river, west to Interstate 190, and east to Route 70 (Lunenberg Road). Privately owned sand and gravel pits, soccer fields, and forested upland bound the Forest to the west and north. The nearest DCR property to Lancaster is Johnny Appleseed State Park, which is also located along the North Nashua River, approximately 1 mile west of the Forest.

Lancaster State Forest contributes to one of Lancaster's Nashua River Greenways, or riparian corridors. In combination with other Town conservation lands, Lancaster Land Trust and Leominster Land Trust properties, nearby Johnny Appleseed State Park, and conserved City of Leominster-owned land (designated the Nashua River Greenbelt in Leominster), the properties form an approximately 4-mile-long and nearly 500-acre riverine corridor that extends from Mechanic Street in Leominster to Lunenburg Road in Lancaster.

The Forest is on land shaped by generations of Indigenous and non-Indigenous inhabitants. Past and present Indigenous residents embody fluid, relational connections to the places and spaces now known as Lancaster State Forest. Indigenous groups and individuals, including peoples known as the Nipmuc, are recorded in available documentation (Massachusetts Historical Commission (MHC) 1984) as having relationships to this place over seasons and generations. The portion of the Nashua River valley that would become Lancaster was an important camping area for the Nashaway group of the Nipmucs until around the beginning of European settlement in 1653 (MHC 1984: 2). Lancaster State Forest was established in 1911 as "reforestation lots" on and around what was known as Assaceeic Hill. Under Chapter 478 of the Acts of 1908, the State Forester was authorized to purchase land and manage it for forest growth, water protection, and demonstration of scientific forestry, with a 10-year option for reacquisition by the previous landowner (Massachusetts General Court (MGC) 1908). Reforestation lots that were not repurchased, such as those in Lancaster, were incorporated into the state forest system through Chapter 126, Acts of 1931 (MGC 1931). The Forest, at first called the French Lot, was first referenced as Lancaster State Forest in 1933, and was reforested with thousands of white pine, red pine, and spruce seedlings during the 1930s (this was not a Civilian Conservation Corps project) (Massachusetts Department of Conservation 1933:15; 1934:12). Forest management projects occurred in parts of the property in the 1980s under an approved Cutting Plan, with the existing forest road created or improved at that time.

Lancaster State Forest consists of two noncontiguous tracts approximately 530 feet apart: French Reforestation Lot #63 and French Reforestation Lot #66 (hereafter referred to as Lot 63 and 66, respectively) (see Land Stewardship Zoning Map on page 21). Lot 63 is sited partially in Nashua River bottomlands (including an area of wooded swamp and an unnamed brook) and partially in adjacent uplands, while Lot 66, to the west, is entirely uplands. The tracts are forested with mixed red oak, white pine, and hemlock, with a stand of red pine on Lot 63. A forest road enters the property from the adjacent Town land and has several branches in the property. Lancaster State Forest provides a scenic place for a short walk or outdoor adventure.

FOREST IDENTITY

Lancaster State Forest is a small property that conserves valuable open space in the Town for recreation, wildlife habitat, forestry, and water resource protection. The Forest's identity is derived from its location near the Nashua River, its connectivity to other conserved lands along the Nashua River that create the Nashua River Greenway (i.e., Greenbelt), and its history and current status as a managed forest. All future activities and improvements should be consistent with Lancaster's identity as a Woodland managed for sustainable forestry and forest productivity, and as a local day-use area for passive recreation.

DEFINING RESOURCES AND VALUES

Resources and values that define the Forest are related to its location near the Nashua River and other conserved lands. They include:

- The Forest contributes to protection of the North Nashua River riparian corridor, which provides important ecosystem and floodplain services and contributes to the greater Central Nashua River Valley Area of Critical Environmental Concern (ACEC).
- Beautiful mixed hardwood and pine forests that demonstrate current and historical silviculture practices, provide wildlife habitat, and create a setting for recreation.
- Its minimal development with user facilities that provides dispersed, passive recreation opportunities in a natural, intimate setting.
- The Forest provides recreational amenities to, and enhances environmental quality and equity for, Environmental Justice (EJ) communities in the Fitchburg-Leominster-Lancaster area.

STATEMENTS OF SIGNIFICANCE

Statements of Significance describe the importance or distinctiveness of a place and its resources (National Park Service 1998). These statements reflect current scholarly inquiry and interpretation and go beyond a simple listing of resources to include contextual information that makes the facts more meaningful. When developing significance statements, the following criteria are considered:

- The property's significance at the time of its establishment.
- How the property, or our understanding of the property, has changed since its acquisition that makes it significant or unique within the state park system today.
- The property's role in recreation and its importance to the community it supports, particularly regarding activities that are unique to that property.

For park planning, these statements focus management actions on the preservation and enjoyment of those attributes that most directly contribute to the importance of the place. For interpretive planning, they comprise the information upon which the interpretive themes and overall program are built.

The following Statements of Significance have been identified for Lancaster State Forest. The sequence of these statements does not reflect their level of significance.

- As part of the Central Nashua River Valley ACEC, Lancaster State Forest Lands contributes to a wildlife corridor extending west of the South Post to the North Nashua River in Lancaster and Leominster (Secretary of Environmental Affairs 1996: 5).

- Beyond the original intents of timber harvesting, pest control, and fire control, DCR forest management objectives have evolved to include carbon sequestration and storage, diverse wildlife habitats, forest resiliency, safety, and water quality. The Massachusetts State Forest system was founded on the principles of scientific forest management. These practices contrasted with ongoing un-managed destructive practices throughout the country. This effort focused on the long-term cultivation of forests to achieve a sustainable harvest. Foresters worked to maximize production and provide a sustained yield over time, aiming for long-term stewardship over short-term profits. The State Forests were also meant to serve as a model for private landowners, who the state foresters assisted in this endeavor.
- Unique to Massachusetts, the reforestation lot program let landowners turn over land to the state for reforestation; within 10 years they could then buy back the land. Unclaimed lots ended up as part of the State Forest system resulting in a system with parcels of varying sizes all over the state.

UNIFYING THEME

The Unifying Theme is a statement that ties a property's stories together and shapes the overall interpretive message that DCR wants to share with visitors in their experience at the property. The theme provides an overarching conclusion for visitors to contemplate (Ham 2013) and answers the question "so what?". The theme guides all interpretation for the park, both personal (i.e., formal and informal interactions with visitors) and non-personal (e.g., exhibits, signage, brochures).

The Unifying Theme for Lancaster State Forest is:

> Managing our State Forests for diversity and resilience leads to a healthier environment.

VISITOR EXPERIENCE

Lancaster State Forest provides the following visitor experiences:

- **Virtual Experience**. Potential visitors will find little information about Lancaster State Forest on DCR's website. The "Find a Park" tool (https://www.mass.gov/info-details/find-a-park) identifies the Forest's location and lists Hiking/Walking as activities that visitors may enjoy here. The Leominster State Forest web page does not list Lancaster among its "related parks."
- **Entering the Forest**. Lancaster State Forest has no direct entry from, and is not marked on, public roads. Visitors wishing to use the Forest park on Route 70 Road in a dirt lot at the Town's Cook Conservation Area, which is marked with town signage and an orientation map, but no DCR signage or references of any sort. From this parking lot, visitors enter the Town's conservation land via a forest road and travel approximately 1 mile on this well-maintained road before entering the Forest's Lot 63. Visitors desiring to access the smaller Lot 66 must walk off trail through Town land or cross private land via a marked forest road.
- **Trail-based Passive Recreation**. Visitors seeking recreational opportunities may access a modest trails network that is partly on Forest land and partly on Town land. (See Town of Lancaster (2014) for a map of this combined trails network.) These trails provide visitors the opportunity for a light hike and exploration of natural resources and for seasonally appropriate hunting.

THREATS AND OPPORTUNITIES

The following information identifies potential threats to the Forest's natural and cultural resources and identifies opportunities to enhance their protection and stewardship. Although not considered a resource under statute (M.G.L. c. 21, § 2F), recreation is also included below because it is an important part of the park-going experience, helps define a park's values, and is a key part assessing the consistency of activities taking place in the Commonwealth's forests, parks, and reservations.

Threats and opportunities identified below are used to inform the development of management recommendations. Potential recommendations must meet prioritization criteria to be included in the Priority Recommendations table (Table 19, page 25).

Natural Resources

Threats

- Lot 63 is accessed via a trail across Town land and Lot 66 is accessed via a trail crossing private land between the two Forest lots. No legal agreement to allow agency or public access to the two lots was identified during the preparation of this RMP.
- Some parcels of Town-owned land next to the forest are not yet legally protected under Article 97 or other legal restriction.
- Unauthorized off-highway vehicle (OHV) use occurs on the parcel, causing soil erosion and possibly threatening native plants and natural communities. Enforcement of OHV regulations is made more difficult by the land-locked nature of the Forest tracts and that DCR does not have control over forest road gates situated outside the Forest (for example, on land owned by the Town).
- A mixed-use development project, the Capital Commerce Center (Executive Office of Energy & Environmental Affairs (EEA) # 16043) is proposed for lands abutting the Forest. Specific threats to the Forest from this project are not understood because Massachusetts Environmental Policy Act analysis is not complete. Anticipated threats include: 1) increased disturbance of wildlife resulting from noise, light pollution, and increased interactions with humans and dogs; 2) encroachment and unauthorized trail construction impacting flora and fauna in the forest; 3) further spread of invasives into the Forest; and 4) negative impacts from stormwater runoff.
- Although the Forest's natural communities have not been systematically surveyed, one Priority Natural Community has been identified. This community, and existing and potential threats to its ecological integrity and continued persistence in the Forest, are identified below:
    - Red Maple-Black Ash Swamp (S2 – Imperiled). The Forest's known example of this community type is located in the southeast portion of Lot #63 Wendell Road Tract. No specific threats to the community are known to be present. This community type is vulnerable to disruption of local hydrology (e.g., of seepages) and to unapproved logging activities (Swain 2020).
- The following two species of invasive plants have been identified at Lancaster State Forest: glossy buckthorn and Oriental bittersweet. Additional invasive species may be present. (Invasives were not inventoried at this Forest during fieldwork for the Invasive Plant Management Plan: Central Region (BSC Group 2017).) Invasive species may negatively impact both the ecological integrity and biodiversity of the Forest.

- There is little information on the presence or distribution of invasive plants in Lancaster State Forest. Such information is needed to determine if any sensitive resources are being impacted by invasive plants.
- The red pine plantation in the Forest is even aged, infested with red pine scale (a non-native insect), and consequently is in poor health. As this plantation fails, the disturbance will open up conditions favorable to the establishment of invasive species in the Forest.
- There are unapproved geocaches in the Forest. Inappropriately located geocaches may threaten sensitive natural resources.

Opportunities

- Establishing permanent legal access to both parcels will ensure ongoing Agency and general public access to the Forest.
- Four Town-owned parcels adjacent to the Forest are not conserved under Article 97 or through conservation restrictions. Increasing the level of protection on these adjacent municipal lands would further protect the Forest.
- Approximately 18.1 acres of the Forest has no Landscape Designation (DCR 2012). However, the Landscape Designation's GIS data does match that of updated (post Landscape Designation) Forest parcel data. Revising the Landscape Designation GIS data and providing a designation for undesignated areas (if any) could help better manage associated natural resources and ensure management consistent with DCR properties statewide.
- There may be opportunities to survey, monitor, and assess management needs (if any) for stewardship of the Red Maple-Black Ash Swamp Community (Schlüter 2024).
- There may be opportunities to restore native natural communities and species habitats through removal of the tree plantation in the Forest.
- The Central Region Invasive Plant Management Plan provides a basis for future management of invasive plant species in the Forest. Collaborating with the Town of Lancaster to identify invasives on adjacent Town land would better protect the Forest.
- Non-Regulatory Habitat for one Massachusetts Endangered Species Act (MESA)-protected species, a bird Species of Special Concern, is present in the Forest. Non-Regulatory Habitat is based on the presence of suitable habitat for state-listed species; there is no associated mapped Priority Habitat. On state lands, Non-Regulatory Habitat is protected under MESA (321 CMR 10.00). Requesting pre-filing consultation with the Massachusetts Natural Heritage and Endangered Species Program (NHESP) for "all works, projects, or activities" in the Forest will ensure continued protection of this habitat and compliance with MESA. Additionally, there may be opportunities to acquire additional habitat for this species and/or to partner with the NHESP on habitat management initiatives.
- Observations of a terrestrial turtle species, designated a Species of Special Concern under MESA, have been made in the Forest. There is no Priority or Non-Regulatory Habitat for this species in the Forest. There may be future opportunities to collaborate with the NHESP on stewardship of this species (e.g. reporting observations through Heritage Hub) (Schlüter 2024).
- Increasing staff presence at the property or adding more permanent positions to the Wachusett Complex may provide an opportunity to improve maintenance and reduce OHV activity in the Forest.

Cultural Resources

Threats

- A cultural resource survey for archaeological sites and cultural landscape features has not been conducted.
- Encroachment from adjacent development may cause unmanaged ground impacts that result in adverse effects to significant archaeological resources.
- There are unapproved geocaches in the Forest. Inappropriately located geocaches may threaten sensitive cultural resources.

Opportunities

- An archaeological reconnaissance survey (950 CMR 70), including research into related ancient and historical period contexts, could help to identify, protect, and interpret archaeological sites in the Forest.
- If cultural resources are found to exist at the Forest, then implementation of proper stewardship and management programs, such as Best Management Practices (BMPs) (found at https://www.mass.gov/info-details/best-management-practices-dcr), would provide an opportunity to preserve those resources.
- Approximately 18.1 acres of the Forest has no Landscape Designation (DCR 2012). However, the Landscape Designation's GIS data does not align to that of the current Forest parcel data and there are discrepancies between the polygon shapes of these two data sets. Revising the Landscape Designation GIS data and providing a designation for any undesignated areas could help better manage associated cultural resources and ensure management consistent with DCR properties statewide. Reconciliation of the two GIS data sets also could provide a more accurate understanding of the acreage and distribution of Parkland, Woodland, and Reserve across the Commonwealth.

Recreation

Threats

- Development of adjacent private parcels could impinge recreational access to the Lot 66 portion of the Forest.
- Staffing is insufficient to monitor user activities at the Forest.
- There is limited official information available on Lancaster State Forest. DCR's web page does not include information on the Forest, making it difficult for potential visitors to become aware of the property and its recreational opportunities.
- The Forest is not identified on public signage at the Town's Clark Conservation Area trailhead or where the forest road passes onto DCR land, so visitors are unaware of the Forest and its rules.
- The Town's marked and mapped trails network crosses from Forest property to private property and then to Town land, so visitors may be unaware of when they are crossing onto agency lands or subject to agency regulations. (See Town of Lancaster 2014.)
- Forest roads and trails are not marked with DCR blazes.

- As discussed in the Natural Resources section of this RMP, a red pine plantation in the Forest is in poor health. As trees in this stand fail, they may obstruct the trail through this location and/or impact visitor safety.
- Lancaster is located near the Nashua River, and portions of the Forest at lower elevations are exposed to 1.0%- and 0.2%-chance floods. There is no DCR infrastructure in the flood zones. However, recreational access to the Forest is via a forest road through Town-owned land and the majority (approximately 0.75 miles) of this forest road is within flood zones (Massachusetts Bureau of Geographic Information (MassGIS) 2023). Therefore, certain flooding events may cut off access to the Forest for the general public.

Opportunities

- Adding a Lancaster State Forest web page to DCR's website would allow potential visitor to become aware of the Forest, its resources, and associated recreation opportunities.
- Because of the Forest's close proximity (approximately 0.5 miles) to an Environmental Justice (EJ) Community, there may be opportunities to advance environmental justice and equity via DCR's Environmental Justice Strategy (see pages 79–88 in EEA 2024), in alignment with the EEA's EJ Policy (EEA 2021) and the Executive Order on Environmental Justice (No. 552) (Patrick 2014).
- The Nashua River Valley in Lancaster and surrounding communities is recognized for its scenic, natural, and historic qualities through inclusion in the Freedom's Way National Heritage Area, which offers opportunities for agency partnerships, grants, and potentially higher visibility for the Forest (Freedom's Way Heritage Association 2015).
- Town of Lancaster residents are aware of and value the Forest as a component of the Town's open space, particularly in relation to the Nashua River Greenway and the Lancaster Green Belt Vision Plan, a projected continuous greenway from south Lancaster to north Lancaster (Town of Lancaster 2017). In the future, this may present opportunities for partnerships to improve the Forest and its neighboring conserved lands through Volunteer Services Agreements or other means.
- Opportunities exist to partner with local non-profit and Town organizations on recreation and open space improvements. These organizations include the Freedom's Way National Heritage Area, Nashua River Watershed Association, Town Open Space and Recreation Committee, the Town Trail and Bikeway Coalition, and the Lancaster Land Trust.
- If trails are improved in the future, there will be an opportunity to assess the trail system for accessible trail options. Because of the Forest's geographic relationship to Town conservation lands, there may be an opportunity to partner with the Town on such improvements.

CLIMATE CHANGE

Climate change impacts nearly every aspect of DCR's properties, from ecosystem health, to infrastructure, to recreation. (See DCR 2024 for an overview of these impacts.) The Department is actively working to mitigate and adapt to current and future impacts through such actions as forest management; decarbonizing DCR's buildings, vehicles, and power equipment; protecting wetlands; and using nature-based solutions to minimize stormwater impacts. Information on these, and other, efforts is incorporated into RMPs as available and appropriate.

Any discussion of climate change requires a shared understanding of terminology. Because of this, this RMP section adopts commonly accepted terms to the greatest extent possible. In general, climate-related technical terms used in this RMP are as defined in the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC 2021). Exceptions to this are the terms Adaptation, Risk, and Sensitivity, which are used as defined in DCR's Climate Change Vulnerability Assessment (CCVA; Weston and Sampson 2022).

DCR manages its forests to provide a range of ecosystem services such as recreation, clean water, wood commodities, and wildlife habitat (DCR 2020). For ecosystems under its management, DCR carefully considers both their vulnerability to climate change and their ability to mitigate the effects of climate change by storing carbon in ecosystems and harvested wood products. Several approaches are used to monitor DCR forests and to design forest management strategies to adapt to climate change and provide ecosystem services. (See Swanston et al. (2016) for information on adaptation strategies and approaches associated with DCR's forest management.) Established in 1957, DCR's Continuous Forest Inventory (CFI) system uses a network of more than 2,000 permanent plots on which repeated measurements are taken on an ongoing basis. The CFI measures the status, size, and health of over 100,000 trees; other vegetation; down woody material; and the forest floor. (See DCR 2022 for additional information on the CFI system.) This information helps DCR understand at a strategic scale the current character, condition, and trends of forest ecosystems under its care. DCR also uses operational inventory to help plan specific treatments and evaluate their outcomes. Using these different scales of information, remotely sensed data, and local and regional external expertise, DCR plans projects that help its stands, forests, and other lands adapt to climate change and mitigate greenhouse gas emissions. The conservation and science-based management of forest lands are an essential element to ensuring crucial carbon storage and advancing climate change resilience (EEA 2024). For additional information on the relationship between DCR's forest management practices and climate change, please see pages 77–85 in Massachusetts Forest Action Plan 2020 (DCR 2020) and Managing Our Forests…For Carbon Benefits (DCR 2023).

The Department is actively assessing and addressing the vulnerability of its properties and facilities to the impacts of climate change. In 2022, DCR conducted a CCVA (Weston and Sampson 2022). Findings from this CCVA are being used by DCR to enhance park operations and maintenance, inform resilient investment, and provide a framework for hazard mitigation and climate adaptation for natural resources, cultural resources, recreational activities, buildings, facilities, and other infrastructure. Property-specific climate change information from the CCVA is included in the Climate Change (by 2070) table (Table 12) at the beginning of this RMP. An overview of the impacts of climate change on DCR facilities and operations is presented in the DCR Climate Impacts Story Map (DCR 2024).

Climate Exposure and Impacts

A summary of the ways in which the Commonwealth's natural, cultural, and recreational resources may be impacted by climate change is provided below. During the preparation of RMPs some resources may be identified as having particularly high exposure and/or sensitivity to the anticipated hazards or consequences of climate change. When this occurs, these resources and the projected impacts to them are described. In some instances, the potential impacts of climate change on a given resource are not well understood. When this occurs, only exposure is discussed.

Natural Resources—General Impacts

Climate change affects temperature, precipitation, and atmospheric and ocean chemistry, which in turn directly and indirectly affect the natural environment, including the plants, animals, and natural communities of DCR's forests, parks, and reservations.

Climate is known to influence the presence, absence, distribution, reproductive success, and survival of both native and non-native plants (Finch et al. 2021). Native northern and boreal species, including balsam fir, red spruce, and black spruce may fare worse under future conditions, but other species may benefit from the projected changes in climate (Janowiak et al. 2018). Some non-native invasive species will be affected by climate change while others will remain unaffected, and some non-invasive non-native species are likely to become invasive (Finch et al. 2021). In general, elevated temperature and CO_2 enrichment associated with climate change increases the performance of non-native plants more strongly than the performance of native plants (Liu et al. 2017). Climate change may result in the presence of new non-native invasive plants on a property, and changes to the distribution and/or abundance of invasives already present on a property.

Exposure to a changing climate affects wildlife in a variety of ways. For animals that live in or near aquatic environments, "changes in habitat and hydrological regimes are expected to shift their abundance and distribution" (Isaak et al. 2018: 89). Impacts to terrestrial animals are expected to be highly variable (Halofsky et al. 2018) but may be considered to fall into the following four categories: 1. habitat loss and fragmentation; 2. physiological sensitivities (i.e., innate characteristics that influence the ability to cope with changing temperature and precipitation conditions); 3. alterations in the timing of species' life cycles; and 4. indirect effects (e.g., disruption of ecological relationships) (Friggens et al. 2018). Although all Northeast wildlife are exposed to hazards associated with climate change, some groups, "including montane birds, salamanders, cold-adapted fish, and freshwater mussels, could be particularly affected by changing temperatures, precipitation, sea and lake level, and ocean processes" (Massachusetts Division of Fisheries and Wildlife (MassWildlife) 2015: 357). In addition, it is the position of the NHESP that state-listed species and Priority Natural Communities are likely to be highly sensitive to climate change and that all state-listed species will be negatively affected by hydrologic changes, changes in water, soil, and air temperature, and changes in forest composition.

Natural Resources—Property-Specific Exposure and Impacts

Climate change may cause some vernal pools to dry earlier in the season than they have historically, potentially interfering with amphibian life cycles (Cartwright et al. 2022). Because of this, the Forest's pool and associated wildlife may be negatively impacted.

The Forest's known Priority Natural Community, a Red Maple-Black Ash Swamp, is vulnerable to hydrologic alteration. Changes in precipitation have the potential to impact this community.

Responses of Massachusetts' invasive plants (i.e., those categorized as Invasive by the Massachusetts Invasive Plant Advisory Group (MIPAG) (n.d.)) to a changing climate are largely unknown. However, sufficient information exists to project the likely future trend of Oriental bittersweet. "Available data suggest that bittersweet is likely to benefit from the warming and increased precipitation that are predicted for the Northeast" (Rustad et al. 2012), resulting in expansion throughout New England. Areas where the forest canopy or forest floor has been disturbed are particularly susceptible (McNab and Loftis

2002). Because of this, it is anticipated that Oriental bittersweet will continue to expand within Lancaster State Forest in response to climate change.

Cultural Resources—General Impacts

Climate change may negatively affect cultural resources, their preservation, and maintenance (EEA 2022; International Council on Monuments and Sites (ICOMOS) Climate Change and Cultural Heritage Working Group 2019; Rockman et al. 2016: 3, 18; United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Center 2007). In Massachusetts, cultural resources may be exposed to the following natural phenomena that are correlated with adverse impacts: higher annual average temperature (especially in winter), increased numbers of freeze-thaw cycles, increased precipitation intensity, higher relative humidity, higher wind speeds, an increase in severe storm events, increased numbers and severity of wildfires, more severe seasonal droughts, increase in number and severity of inland flood events, increased coastal flooding and erosion, increased probability of landslides, changes in groundwater levels, shifts in native and invasive species distribution, performance, and phenology; and changes in oceanic and atmospheric chemistry (Rockman at al. 2016; Commonwealth of Massachusetts 2023: 5.1-31–5.1-61).

The phenomena listed above may produce a variety of adverse impacts to Massachusetts' cultural resources. Sensitivity and potential impacts vary based on resource category (i.e., archaeological sites, cultural landscapes, ethnographic landscapes and sites, and buildings and structures). Resource-specific factors such as location, design, materials, condition, etc. will also influence sensitivity and consequent impacts. All categories of cultural resources may be subject to complete or partial destruction through wildfire, inland flooding, sea level rise, storm surge, or landslides. Additionally, these resource categories may be subject to other types of impacts, as follows. Archaeological sites may have site stratigraphy disrupted by changes in hydrography, may suffer accelerated decomposition of artifacts and features, and may be impacted inadvertently during disaster response. Cultural landscapes may lose plantings due to a variety of stressors (e.g., drought or flood, pests, soil salinity), may be infiltrated by invasives, may be eroded by surface runoff, may experience more rapid deterioration of hardscaping and site furnishings, and may be damaged by high wind or heavy snow events. Ethnographic landscapes, traditional cultural places, and associated communities (including Indigenous peoples) may suffer both tangible and intangible impacts such as loss or diminishment of natural species used for food, ceremony, or medicine; alterations in timing of hunts, etc.; increased difficulty of vulnerable subgroups (e.g., the elderly) to perform outdoor tasks; and a loss of cultural knowledge associated with resources and practices. Buildings and structures may be damaged or destroyed by high wind or heavy snow events, suffer accelerated deterioration through a variety of mechanisms (e.g., elevated humidity, chemical reactions, destructive pests and organisms), may be destabilized by hydrological changes, or be damaged by inadequate gutters or drainage systems (ICOMOS Climate Change and Cultural Heritage Working Group 2019: 73–89; Rockman et al. 2016: 20–24). (See Rockman et al. 2016: 19–24 for a detailed assessment of the potential impacts of climate change on cultural resources.)

Cultural Resources—Property-Specific Exposure and Impacts

No cultural resources with known elevated exposure or sensitivity to potential consequences of climate change were identified at this property.

Recreation—General Impacts

Outdoor recreation and park visitation are dependent on weather and climate and will be affected by a warming climate (Wilkins and Horne 2024). Higher temperatures positively affect participation in most outdoor activities, except snow-based activities (Wilkins and Horne 2024). "Winter is warming substantially faster than other seasons, and winter warming is especially pronounced in the...Northeastern United States" (Wilkins and Horne 2024: 15). Exposure to this climate change phenomenon is projected to significantly reduce the length of winter recreation seasons for downhill skiing, cross-country skiing, and snowmobiling, decreasing recreational opportunities and causing substantial economic impacts (Wobus et al. 2017). Whitewater rafting, primitive area use, and hunting are also projected to be negatively impacted by exposure changing weather patterns associated with climate change (Askew and Bowker 2018). Although "coldwater fishing habitat is expected to decline under a warming climate, which will likely result in fewer fishing days," overall fishing participation in the Northeast is projected to rise "due to the more favorable temperatures" (Wilkins and Horne 2024: 11). Horseback riding on trails, boating, swimming, and visiting interpretive sites are also expected to see higher participation in the Northeast under climate change (Askew and Bowker 2018). Temperature preferences of campers indicate that the "number of ideal days" for camping will also increase (Wilkins and Horne 2024: 13). Participation in biking is also projected to increase, especially in the winter and shoulder months (Wilkins and Horne 2024: 13). Climate change may also impact outdoor recreation through increased impacts to recreation infrastructure (e.g., flooding impacts), and increased exposure to disease vectors (e.g., mosquitoes and ticks), longer pollen seasons, and heat-related illnesses (O'Toole et al. 2019).

Recreation—Property-Specific Exposure and Impacts

No recreation resources or activities with known elevated exposure or sensitivity to potential consequences of climate change were identified at this property.

APPLIED LAND STEWARDSHIP ZONING

DCR assesses the appropriate uses and stewardship of its properties at two spatial scales: the landscape level and the property level.

Landscape Designation

In 2012, DCR engaged in a comprehensive system-wide assessment of lands managed by its Division of State Parks and Recreation, designating them as Reserve, Woodland, or Parkland. (See Landscape Designations for DCR Parks & Forests: Selection Criteria and Management Guidelines (DCR 2012) for details.) Multiple Landscape Designations may apply to individual properties with diverse resources and levels of development. All of Lancaster State Forest was designated Woodland. Identification of Land Stewardship Zones within Lancaster was performed in the context of the Woodland Landscape Designation.

The following Land Stewardship Zoning is recommended to guide management and any future development. (See Figure 1. Land Stewardship Zoning Map, page 21, and the Land Stewardship Zoning layer on DCR's Stewardship Map: https://dcrsgis-mass-eoeea.hub.arcgis.com/.)

Zone 1

Zone 1 areas have highly sensitive ecological and/or cultural resources that require additional management approaches and practices to protect and preserve these special features and their values (DCR 2012). The following areas of Lancaster have been designated Zone 1.

- No areas within the Forest have been designated Zone 1.

Zone 2

Zone 2 areas provide for a balance between resource stewardship and recreational opportunities that can be appropriately sustained. They include stable yet important cultural and natural resources. These areas provide a buffer for sensitive resources, recharge areas for surface and groundwaters, and large areas where existing public recreation activities can be managed at sustainable levels (DCR 2012). The following areas of Lancaster have been designated Zone 2.

- All areas of the Forest.

Zone 3

Zone 3 areas include altered landscapes in active use and areas suitable for future administrative, maintenance, and recreation areas (DCR 2012). The following areas of Lancaster are currently developed, appropriate for potential future development, or intensively used for recreation. They have been designated Zone 3.

- No areas within the Forest have been designated Zone 3.

Significant Feature Overlay

Significant Feature Overlays provide precise management guidance in order to maintain or preserve recognized resources features regardless of the zone in which they occur. The following Significant Feature Overlay was developed for Lancaster:

- **Area of Critical Environmental Concern (ACEC) Overlay.** The Central Nashua River Valley ACEC, designated 1996, encompasses a 20-mile riparian corridor. All of Lancaster State Forest falls within the ACEC. Projects and activities within ACECs must minimize adverse effects on sensitive resources and are guided by a variety of regulations and programs that are summarized in the ACEC Guide to State Regulations and Programs (DCR 2017).

DCR Stewardship Map Tool

This RMP should be viewed in conjunction with DCR's Stewardship Map, a GIS-based tool that allows users to view a property's natural, cultural, and recreational resources. The Stewardship Map tool is dynamic, and information continues to be updated after adoption of an RMP. Guidance for using the tool, as well as BMPs for resource stewardship, are located on the Stewardship Map site: https://dcrsgis-mass-eoeea.hub.arcgis.com/.

Because authorized trails are located within State-Listed Species Habitat on this property, managers should consult an additional GIS-based tool, the NHESP 2022 Guidance Codes for DCR Trail Maintenance Map. (https://mass-eoeea.maps.arcgis.com/home/item.html?id=cb252e8df40d408c81fe8fcf690e14f6) This tool allows users to select specific trail segments and identify restrictions and regulatory review associated with performing 10 common trail maintenance activities on these segments. Because site-

specific rare species information is confidential under Massachusetts law (M.G.L. c. 66, § 17D), access to this tool is restricted.

CONSISTENCY REVIEW

Resource Management Plans "shall ensure consistency between recreation, resource protection, and sustainable forest management" (M.G.L. c. 21, § 2F). For planning purposes, an activity is considered consistent with resource protection if it has no significant, long-term, adverse impact on resources. To this end, a series of indicators were developed to evaluate the impacts of recreation and forest management on natural and cultural resources.

Many activities with the potential to negatively affect resources are already subject to agency and/or regulatory review (e.g., forest management activities, projects within Priority Habitat). For these activities, compliance with state regulations, regulatory authority guidance, DCR policies and processes, and BMPs is considered an indicator of consistency between park use and resource protection. New indicators were generated for activities not subject to agency or regulatory review, and are based on available data, information readily identifiable via aerial imagery or site visits, assessments by DCR subject matter experts, or the property manager's knowledge of park conditions and use. (See Table 18, page 22.)

Indicators are applied during the RMP planning process in order to ensure a standardized assessment of consistency across all properties in the DCR system. Inconsistencies identified via the application of indicators are used to inform the development of management recommendations.

The status of indicators (Yes, No, Unknown, and N/A) were accurate at the time this RMP was prepared and were used for planning purposes. However, they represent a snapshot in time and may not reflect future conditions. In addition, the status of indicators will change as recommendations get implemented.

MANAGEMENT RECOMMENDATIONS

Ten priority management recommendations were developed for this property. They are presented in Table 19, page 25. All recommendations are of equal importance.

Priority management recommendations derive from Threats, Opportunities, and Consistency Assessment information presented in this RMP. For a recommendation to be considered a priority and listed in the table, it must meet one or more of the criteria listed below. Maintenance and management needs not meeting one or more of these criteria are not included in the table but are identified in the Threats and Opportunities sections.

The following types of recommendations are considered priority:

- Natural resource stewardship and restoration activities consistent with park identity and intended to improve ecological function and connectivity.
- Cultural resource management activities consistent with park identity and intended to prevent the loss of integrity of significant cultural resources.
- Improvements consistent with park identity that are needed to support intended park activities.
- Actions required for regulatory compliance or compliance with legal agreements.
- Activities that prevent or ameliorate threats to the health and safety of park visitors and employees.

- Activities that address inconsistencies among recreation, resource protection, and sustainable forest management, as identified through use of the Consistency Assessment checklist.

Progress toward implementing priority recommendations is tracked through the use of DCR's Capital Asset Management Information System (CAMIS). The property manager should enter each recommendation listed in Table 19 (page 25) into CAMIS as a separate work order, noting "*RMP" in the description field. Non-traditional work orders (e.g., volunteer trail work, posting of Department of Public Health (DPH) Fish Consumption Advisory posters, certification of vernal pools) should be closed out by the property manager, once the recommendation has been implemented.

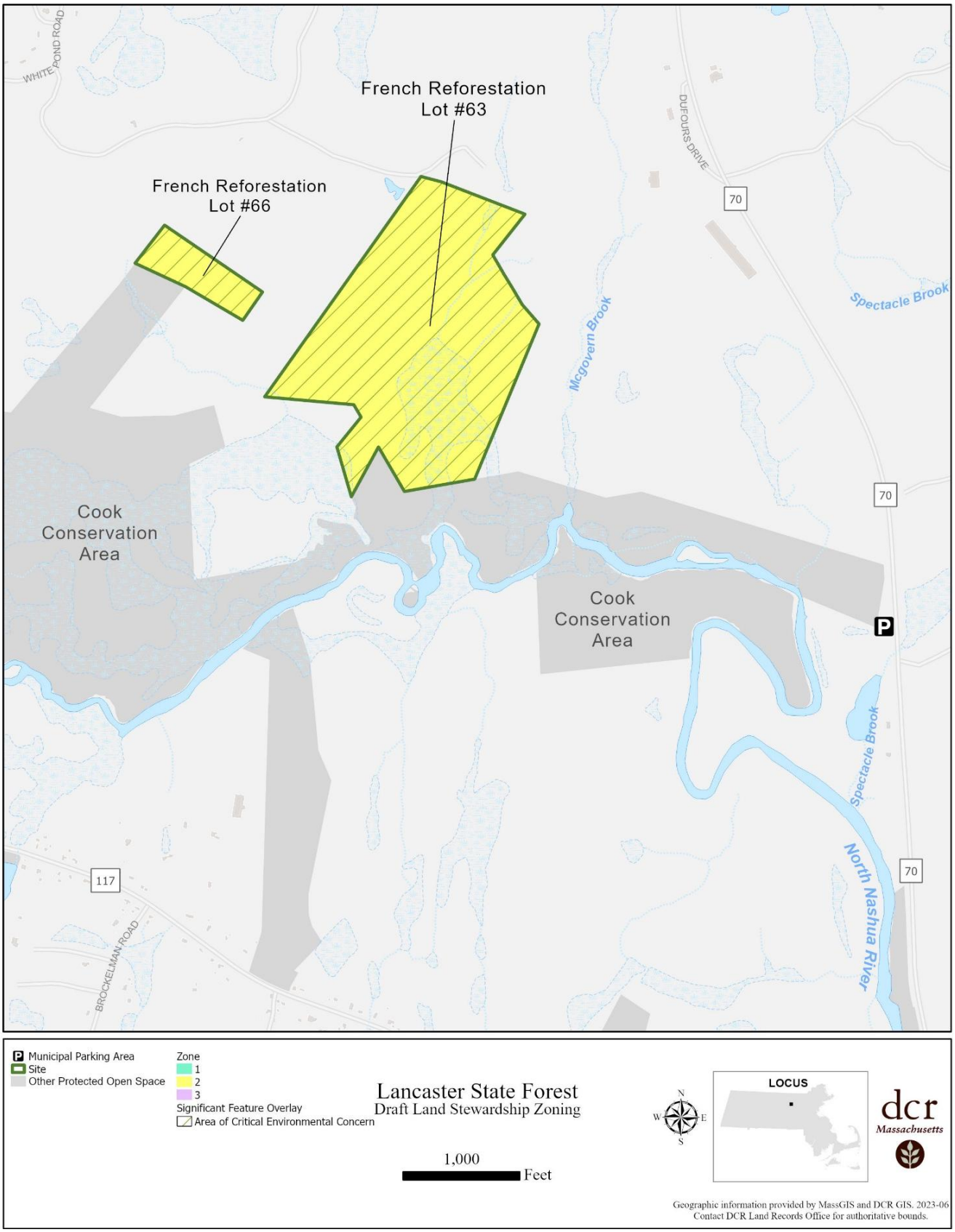

Figure 1. Land Stewardship Zoning Map.

Table 18. Consistency Assessment. This assessment represents a snapshot in time and may not reflect future conditions.

Category	Metric	Status
Landscape Designation	1. All development and uses of the park since 2012, or currently planned for the park, are consistent with its Landscape Designation(s).	Yes
Natural Resources	1. All projects (normal maintenance activities, special projects, volunteer projects) conducted within Priority Habitat were reviewed and approved through DCR's internal review process and by NHESP for potential impacts to rare species and their habitats.	N/A
Natural Resources	2. All projects conducted within areas subject to state and/or federal wetlands or waterways regulations were reviewed and approved through DCR's internal review process; reviewed and approved through the appropriate, local, state, and/or federal review process; and were carried out in accordance with the terms of a valid permit.	N/A
Natural Resources	3. Sensitive resource areas, such as steep slopes, riverbanks, streambanks, pond and lakeshores, wetlands, and dunes are free of desire paths and other user-created trails.	N/A
Natural Resources	4. Aquatic areas adjacent to beaches, boat ramps and launches, roads, and hiking trails are free of eroded sediments.	N/A
Natural Resources	5. The extent of exposed soil in campground and/or picnic sites is stable or decreasing.	N/A
Natural Resources	6. The extent of native vegetation in campground and/or picnic sites is stable or increasing. (As assessed by property manager.)	N/A
Natural Resources	7. Area of trail impacts in Reserves is less than 50% of total area. (See Naughton (2021) for information on primary area of trail impacts.)	N/A
Natural Resources	8. Congregations of breeding, migratory, or wintering wildlife are protected from disturbance by temporary (e.g., seasonal) restrictions on recreational access.	N/A
Natural Resources	9. Geocaches, letterboxes, orienteering control locations, and other discovery destinations are located outside sensitive natural resource areas and their locations have been reviewed and approved by park personnel. (As assessed by property manager.)	No
Natural Resources	10. Zone I wellhead protection areas are free of vehicle parking, chemical storage, or concentrated recreation.	N/A

Category	Metric	Status
Natural Resources	11. All boat ramps and launches have cleaning stations and/or educational signs and materials on preventing the spread of aquatic invasive organisms. (As assessed by property manager.)	N/A
Natural Resources	12. For each barrier beach there is a current, approved Barrier Beach Management Plan and all beach-related activities are conducted in accordance with this plan.	N/A
Cultural Resources	1. All maintenance activities and projects with the potential to cause sub-surface disturbance are being reviewed by the DCR archaeologist for potential impacts to archaeological resources.	No
Cultural Resources	2. All maintenance activities and projects affecting historic properties (buildings, structures, and landscapes over 50-years-old) are being reviewed by the Office of Cultural Resources to avoid adverse impacts.	N/A
Cultural Resources	3. Historic buildings, structures, and landscapes are being used, maintained, and repaired in a manner that preserves their cultural integrity and conveys their historic significance to park visitors.	N/A
Cultural Resources	4. Recreational activities such as hiking, biking, and boating are not eroding cultural properties such as archaeological sites or historic landscapes through creation of desire lines, rutting in the landscape, damage to historic built features, or excessive scouring (erosion) of coastal and shoreline areas.	Unknown
Cultural Resources	5. Geocaches, letterboxes, and other discovery destinations are located away from sensitive cultural resources, and their locations have been reviewed and approved by park personnel.	No
Cultural Resources	6. Historic buildings, structures, landscapes, archaeological sites, and concentrations of historic resources are located outside of areas predicted to be subject to flooding, storm surge, or sea-level rise.	N/A
Recreation	1. Types of recreation, levels of recreational use, and types and extent of recreation infrastructure are consistent with the park's identity statement.	Yes

Category	Metric	Status
Recreation	2. Trail density is consistent with the park's Landscape Designation(s). (See Trails Guidelines and Best Practices Manual (DCR 2019) for density thresholds.)	Yes
Recreation	3. All authorized trail construction was performed in accordance with an approved Trail Proposal Form.	Yes
Recreation	4. Over 90% of the park's official trails network is classified as being in Fair or better condition.	Yes
Recreation	5. Recurring use by OHVs is restricted to authorized trails. (As assessed by property manager.)	No
Recreation	6. There is a high level of compliance with dog leash regulations and policies. (As assessed by property manager.)	No
Recreation	7. Athletic fields are free of recreation-caused impacts (e.g., bare spots) to turf. (As assessed by property manager.)	N/A
Recreation	8. Water-based recreation is consistent with "Uses Attained" designation as identified by the Massachusetts Department of Environmental Protection (MassDEP) in its most current integrated list of waters (e.g., MassDEP 2023); DPH fish consumption advisories; and/or water quality testing at waterfront areas.	N/A
Recreation	9. Recreation facilities are located outside of areas subject to flooding, storm surge, or sea-level rise.	Yes
Sustainable Forest Management	1. Forestry activities are consistent with Landscape Designation and associated forestry guidelines.	Yes
Sustainable Forest Management	2. Forestry activities are consistent with current Forest Resource Management Plan.	N/A
Sustainable Forest Management	3. Tree cutting is performed in accordance with an approved cutting plan, if required under the Massachusetts Forest Cutting Practices Act (M.G.L. c. 132, §§ 40–46).	N/A

Table 19. Priority Recommendations for Lancaster State Forest. All recommendations are of equal importance. When multiple agency parties are responsible for implementing a recommendation, the lead party, or parties, are identified parenthetically in the Implementation column. Property managers should enter these recommendations as work orders in CAMIS to ensure their tracking and implementation.

Category	Recommendation	Implementation
Natural Resources	Establish formal agreement(s) to allow DCR and public access to the two Forest parcels.	Land Protection Program (Co-Lead), office of the General Counsel (Co-Lead), Park Operations
Natural Resources	Continue to monitor proposed development on adjacent parcels and their potential impacts on the Forest and its resources.	Park Operations (Lead)
Natural Resources	Explore working with the Town to increase protection of Town holdings near the Forest.	Land Protection Program (Lead)
Natural Resources	Design and implement forest management project at the red pine stand in the Forest to address the threats and opportunities associated with this resource.	Management Forestry
Cultural Resources	Conduct a cultural resources and archaeological reconnaissance survey (950 CMR 70) to identify archaeologically sensitive areas, archaeological sites, and cultural landscape features such as cellar holes and stone walls. Complete appropriate Massachusetts Historical Commission archaeological site forms for identified archaeological resources.	Contractor, Office of Cultural Resources (Lead)
Recreation	As appropriate, promote the Executive Office of Energy & Environmental Affairs' (EEA) Environmental Justice Policy goals at Lancaster State Forest.	Interpretive Services (Co-Lead), Land Protection Program (Co-Lead), Partners, Trails and Greenways Section (Co-Lead)
Recreation	Work with the geocaching community to ensure that caches located in sensitive natural and cultural resources are relocated out of those areas and that any new geocaches are placed outside of sensitive areas and with the approval of the property manager.	Office of Cultural Resources, Office of Natural Resources, Park Operations (Lead)

Category	Recommendation	Implementation
Recreation	Establish a DCR web page for the Forest.	Interpretive Services, Regional Staff (Lead), State Parks Operations, Web Content Creator
Recreation	Create a Forest trail map.	GIS Program, Interpretive Services, Trails and Greenways Section (Lead)
Recreation	Collaborate with the Town of Lancaster to add DCR information to town signage, or to add a DCR welcome wayside at the Town's trailhead and to implement a system of wayfinding (consistent with DCR Trails Guidelines and Best Practices (DCR 2019)) through Forest and Town parcels. Install DCR rules and regulations signs where trails cross into the Forest.	Interpretive Services (Lead), Park Operations, Partner, Trails & Greenways Section

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