dcr
Massachusetts

Resource Management Plan
Ashburnham 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 (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, 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.

Ashburnham State Forest

https://www.mass.gov/locations/willard-brook-state-forest

1. Property Overview

Characteristic	Value
Date Established	1924
Location	Ashburnham
Ecoregion	Worcester Plateau
Watershed	Merrimack, Millers, Nashua
DCR Region	Central
DCR District	Central Highlands
DCR Complex	Otter River
Management Forestry District	Mid-State
Fire Control District	North Worcester
Size (acres)	2,895.3
Boundary Length (miles)	44.1
Elevation - Minimum (feet)	1,064.0
Elevation - Maximum (feet)	1,732.7
Environmental Justice (acres)	131.8
Estimated Annual Attendance (2023)	120,000
Interpretive Programs (# programs, 2023)	230
Interpretive Programs (# attendees, 2023)	900

2. Landscape Designations

Designation	Acres
Parkland	0.0
Reserve	0.0
Woodland	2,210.6
No Designation	796.5

3. Regulatory Designations

Designation	Acres
None Identified	N/A

4. Long-Term Agreements

Agreement	Expiration Year
None Identified	N/A

5. Concessions

Concession Type
None

6. Partners & Friends

Group(s)
Ashburnham Conservation Trust
Friends of the Wapack
Midstate Trail Committee, Worcester Chapter of the Appalachian Mountain Club

7. Features of Interest

Feature
Access to Mount Watatic
Cheshire Pond
Lake Wampanoag
Lincoln Pond
Little Watatic Mountain
Midstate Trail
Mount Hunger
Nutting Hill
Phillips Brook
Wapack Trail

8. Natural Resources

Resource	Value
Tree Canopy (acres)	2,390.9
Rivers and Streams (miles)	5.4
Open Water (acres)	9.2
Wetlands (acres)	507.7
Certified Vernal Pools (#)	1
Potential Vernal Pools (#)	11
State-Listed Species (# Regulatory)	16
State-Listed Species (# Non-Regulatory)	2
Federally Listed Species (#)	0
Aquatic Invasive Plants (# known species)	0
Terrestrial Invasive Plants (# known species)	1

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	1169.6
Type of Wildland-Urban Interface	Intermix
Predicted rate of spread, based on Fire Behavior Fuel Model 13	Rapidly Spreading

11. Natural Hazards

Hazard Type	Acres
Flood (1.0%-chance)	432.9
Flood (0.2%-chance)	432.9
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
Boating, non-motorized
Canoeing/Kayaking
Dog walking, on-leash
Fishing, fin fish
Hiking/Walking
Nature study/Photography
Picnicking
Running/Jogging
Skiing, cross-country
Wildlife viewing

16. Roads and Trails

Metric	Value
Roads - Unpaved (miles)	1.9
Roads - Paved (miles)	0.5
Forest Roads - Unpaved (miles)	3.9
Forest Roads - Paved (miles)	0.0
Trails - Unpaved (miles)	9.5
Trails - Paved (miles)	0.0
Trails - Unauthorized (miles)	0.1
Trail Density (miles/acre)	0.005
Area of Impact (acres)	936.8

17. Parking

Parking Resources	#
Lots	1
Parking Spaces - Total	14
Parking Spaces - Accessible (HP)	0
Parking Spaces - Other	0

INTRODUCTION

Ashburnham State Forest (Ashburnham or the Forest) is located in the Town of Ashburnham. Situated approximately 24 miles north of Worcester, in the Worcester Plateau Ecoregion, the Forest is comprised of seven noncontiguous tracts throughout Ashburnham. These tracts are:

- **Rindge State Road Tract.** This tract is located between Rindge State Road (Route 119) to the south and the New Hampshire border to the north. The Forest's main gateway is located in this tract, along the north side of Rindge State Road. This gateway facilitates most of the recreation at Ashburnham State Forest and nearby Mount Watatic Reservation, and also provides parking for the Midstate Trail. Among the tract's most prominent natural features are Nutting Hill (1,589 feet), rare species habitat, and uncommon natural communities. This tract is mainly bordered by permanently protected open space, including Watatic Mountain Reservation, Massachusetts Division of Fisheries and Wildlife's (MassWildlife's) Ashby Wildlife Management Area (WMA) and Watatic Mountain Sanctuary, and conservation restrictions.
- **Stowell Road Tracts**. These tracts extend from Rindge State Road west to Harris Road. Multiple public roads and hiking trails, including the Midstate Trail, provide public access. These tracts include some of the Forest's best-known features, such as Little Watatic Mountain (1,594 feet) and the 31-acre Lincoln Pond, and some of its most important natural features. Large conservation restrictions border these tracts to the north and south, with rural residential property and unprotected open space abutting the remaining border.
- **Harris Road Tracts**. These tracts are located along the east and west sides of Harris Road and are nestled amongst residential property. Public access is via Harris, Cross, or Lake Roads; trails connect these tracts to the Stowell Road Tracts.
- **Mount Hunger Tract**. This tract protects approximately 170 acres of the Forest, a section of the Midstate Trail, views of Stodge Meadow Pond from Mount Hunger (1,448 feet), and rare species habitat. Public access is on foot, via the Midstate Trail. The tract is surrounded by undeveloped, unprotected open space and rural residential properties.
- **Coughlin Road Tract**. The Coughlin Road Tract is located between Winchendon Road and Upper Naukeag Lake. This 50-acre tract has approximately 2,800 feet of frontage of Coughlin Road that provides public access. It is bordered by conservation restrictions to the north and west and rural residential properties to the south and east.
- **Lake Wampanoag Tracts**. These tracts comprise nearly 500 acres from Lake Wampanoag northward to Winchendon Road. Public access is via a limited trail system from Old County Road, which provides access to the north shore of Lake Wampanoag. These tracts are bordered by Lake Wampanoag, Cheshire Pond Wildlife Sanctuary, Ashburnham Wildlife Management Area, conservation restrictions, undeveloped parcels, and rural residential property. Much of these tracts has been mapped as Priority Habitat for State Listed Species.
- **East Rindge Road Tracts**. East Rindge Road runs north-south through these tracts, which are bordered by rural residential land, unprotected open space, and conservation land. Public access is via a trail on the east side of East Rindge Road. Portions of this tract along Bluefield Brook provide Priority Habitat for rare species.

The Midstate Trail passes north-south through the Ashburnham State Forest. This 92-mile-long regional hiking trail runs from Rhode Island to New Hampshire and links to regional trails in adjacent states. Along its course it passes across Mount Wachusett and 10 other DCR-owned or managed properties, the closest of which to the Forest is Westminster State Forest. The Midstate Trail Committee of the Appalachian Mountain Club's (AMC) Worcester Chapter maintains the treadway and provides trail information. See Midstate Trail Committee (n.d.) for more information.

The Forest is on land shaped by generations of Indigenous peoples and non-Indigenous inhabitants. Past and present Indigenous residents embody fluid, relational connections to the places and spaces now known as Ashburnham State Forest. Groups and individuals, including Indigenous peoples known as the Wabanaki (Dawnland Confederacy), Pennacook, and N'dakina (Abenaki/Abenaquis), are recorded in available documentation (Native Land Digital 2023) as having relationships to this place over seasons and generations. The large ponds in Ashburnham may have attracted Indigenous groups. "Frontier warfare" was associated with European settlement of Ashburnham (Massachusetts Historical Commission (MHC) 1984:3). Following Indigenous peoples' dispossession, the Town of Ashburnham was incorporated in 1765. Initially the Town was supported by agriculture before industrial development in the mid to late-1800s, including establishment of a tannery, wood mills, a cotton factory, and chair manufacturing (MHC 1984). Ashburnham State Forest was established in 1924. The Civilian Conservation Corps (CCC) camp from Otter River State Forest was active at Ashburnham in 1935 and 1940, completing roads, water holes, utility line, and forestry projects (Berg 1999). Today, the Forest is a hiking destination for those seeking to climb Mount Watatic and Little Watatic Mountain, or through-hike along the Midstate or Wapack Trails. It is also an ecologically significant property, with a high number of state-listed species and several uncommon natural communities.

PARK IDENTITY

Ashburnham State Forest is strongly identified with natural resource protection and trail-based recreation. The Forest is a biodiversity hot spot, providing habitat for a large number of plants and animals that are uncommon in Massachusetts. The Forest offers a variety of trail-based visitor experiences, including a challenging hike up Little Watatic Mountain. Ashburnham also serves as the trailhead for Mount Watatic, attracting local and long-distance hikers who come to challenge themselves and enjoy the scenic views. All future activities and improvements should be consistent with the Forest's Woodland Landscape Designations, ensure the continued protection of rare species and their habitats, protect of known and potential cultural resources, provide high-quality recreation opportunities, and employ responsible forest management.

DEFINING RESOURCES AND VALUES

Resources that define the Forest are related to its uncommon natural resources, cultural history, extensive trail system, and the impact of the Civilian Conservation Corps. They include:

- Endangered or uncommon natural resources.
    - The Forest has a high number of state-listed species; 16 within regulatory habitat and an additional two within non-regulatory habitat. Among the regulatory habitat species are seven insects, six plants, two birds, and one reptile. Fifteen of the regulatory habitat species are associated with the Forest's wetlands, streams, or floodplains, the sixteenth species is associated

with dry, recently disturbed areas. The two non-regulatory habitat species are associated with wetlands.

  - Approximately 1,095 acres of Priority Habitat have been mapped in the Forest.
  - Four Priority Natural Communities are known from the Forest. All are palustrine (i.e., non-tidal freshwater) communities.

- Historical homesteads dot the landscape of Ashburnham State Forest, providing visitors a glimpse into the Town of Ashburnham's agricultural past. Numerous stonewalls and cellar holes can be spotted from the Forest's trails.
- The Forest's parking area serves as the gateway to both Ashburnham State Forest and nearby Mount Watatic Reservation.
- Long-distance trails.
  - Approximately 2.5-miles of the 92-mile Midstate Trail passes through Ashburnham State Forest. The Midstate Trail connects visitors to other DCR properties and conservation lands in the area, including Leominster State Forest and Wachusett Mountain State Reservation.
  - About 0.75-miles of the 21.5-mile Wapack Trail, completed in 1923, is partially located in Ashburnham State Forest. The Wapack Trail starts in Ashburnham and leads hikers into New Hampshire, connecting to many smaller trails along the way and terminating at the north end of Wapack National Wildlife Refuge (Friends of the Wapack n.d.).
- The Forest provides recreational amenities to, and enhances environmental quality and equity for, nearby Environmental Justice (EJ) communities in Gardner and Fitchburg.

STATEMENTS OF SIGNIFICANCE

Statements of Significance describe the importance or distinctiveness of a place and its resources (National Park Service (NPS) 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. Significance statements cover the following categories of information:

- The property's significance at the time of its establishment.
- How the property, or society's 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 Ashburnham State Forest. The sequence of these statements does not reflect their level of significance.

- 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.

- Though foresters recognized that forest management could enhance recreational activities, when they created the state forests, recreation was a secondary motivation. State forests were viewed as opportunities to provide a "wilder" recreational experience in contrast to "planned," more landscaped parks. Prior to 1933, only three forests offered recreational facilities. Over time the focus on recreation grew to the point where it is the most visible function of the agency.
- 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.

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 Ashburnham State Forest is:

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

VISITOR EXPERIENCE

Ashburnham State Forest provides a variety of visitor experiences, including the following:

- **Virtual Experience.** Potential visitors will find little information about Ashburnham State Forest on DCR's web site. 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. There is no additional information to help potential visitors plan a trip. The Willard Brook State Forest web page does not list Ashburnham as being one of its "related parks."
- **Entering the Park.** The Forest's main gateway is located north of Rindge State Road (Route 119) at its intersection with the Midstate Trail. This is also the gateway to nearby Mount Watatic Reservation and the trailhead for accessing that mountain's summit.. Several informal entrances and small parking areas dot the perimeter of various forest tracts.
- **Hunting.** Ashburnham is open to all legal hunting.
- **Trail-based Passive Recreation**. Visitors seeking other recreational opportunities may access a large trail network. Over 13 miles of official forest roads and trails wind through woodlands and up hillsides, providing visitors the opportunity for a hike and park exploration. Two long distance trails pass through the Forest, the Wapack Trail and the Midstate Trail, each allowing extended trail exploration through varied landscapes.
- **Special Events.** There is one large-scale event, the Trail Animals Running Club's (https://www.trailanimals.com/) annual springtime "Wapack and Back" 21.5+ mile run.

Approximately 350 participants choose to run either 21.5, 43, or 50 miles along the Wapack Trail in Massachusetts and New Hampshire. This annual race represents the largest known single day number of visitors to the Forest.

THREATS AND OPPORTUNITIES

The following information identifies potential threats to the park's natural and cultural resources and identifies opportunities to enhance their protection and stewardship. Although recreation is not considered a resource under statute (M.G.L. c. 21, § 2F), it is included below because recreation is an important part of the park-going experience, helps define a park's values, and is a key part of 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 27).

Natural Resources

Threats

- Nearly all of the Forest's state-listed species are associated with wetlands, streams, ponds, and other water resources. Changes to hydrology, water levels, and water quality pose a potential threat to nearly all of the Forest's rare species.
- Although the Forest's natural communities have not been systematically surveyed, four Priority Natural Communities have been identified, all are in the Stowell Road Tracts. These communities, and existing and potential threats to their ecological integrity and continued persistence in the Forest are identified below:
    - Acidic Shrub Fen (S3 - Vulnerable). The one known example in the Forest is buffered by an upland forest and forested bog. This community type is vulnerable to nutrient enrichment, alterations to hydrology, and trampling (Swain 2020).
    - Level Bog (S3 - Vulnerable). Two examples of this community type are present in the Forest, both are in good condition. This community type is vulnerable to nutrient enrichment, alterations to hydrology, and trampling (Swain 2020).
    - Open Oak Forest/Woodland (S3 - Vulnerable). The Forest's only known example of this community type is located on the summit of Little Watatic Mountain. The trail to the summit passes through, and ends within, this community. Known threats to this community type include trampling and plant succession (Swain 2020).
    - Red Spruce Swamp (S3 - Vulnerable). The Forest's only known example of this community type is a moderate-sized example with one hiking trail passing through the community and another passing nearby. Known threats include altered hydrology and climate change (Swain 2020).
- Fire roads and water holes continue to deteriorate due to lack of equipment and staff availability to maintain resources for appropriate fire preparedness, potentially impeding future efforts to fight forest fires.
- Potential encroachments from residences along the Forest boundary may be negatively impacting natural resources at Ashburnham.

- Numerous errors in the Forest boundary as identified in the OpenSpace GIS data layer, some with insufficient survey data, potentially impeding efforts to protect natural resources at Ashburnham.
- Ashburnham has experienced significant increases in visitation, leading to roadside parking when the parking lot is full, potentially impacting vegetation through trampling and siltation.
- Trails at Ashburnham State Forest have experienced erosion due to increased visitation, including trails accessed from the Rindge Road Parking Lot.
- The following species of invasive plants has been identified in the Forest: glossy buckthorn. Invasive species may negatively impact both the ecological integrity and biodiversity of the Forest.
- There is at least one unapproved geocache in the Forest. Inappropriately located geocaches may threaten sensitive natural resources.

Opportunities

- Some of the Forest's eleven potential vernal pools may "support rich communities of vertebrates and invertebrates" (MassWildlife 2009) and serve as important habitat components for other wildlife, including one of the Forest's state-listed species. Surveying and certifying these pools (DCR (n.d.a.) and MassWildlife (2009)), as appropriate, may help better protect these animals.
- Relocating trails away from or out of sensitive ecological areas, such as Acidic Shrub Fens and Level Bogs, would better protect these Priority Natural Communities at Ashburnham.
- Ensuring the Midstate Trail corridor passing through Acidic Rocky Summit/Rock Outcrop Community is appropriately marked and provides interpretive signage to help visitors learn about the community and potential negative impacts of trampling would better protect this sensitive natural resource (Swain 2020).
- Clearly marking the official trail to Little Mount Watatic and closing any current or future unauthorized trails could help better protect the example of the Open Oak Forest/Woodland community type from trampling. Interpretive signage near the summit could also help improve visitor awareness about potential negative impacts to this community. Fire may also be a consideration for restoration and management of this community (Swain 2020).
- Within the Forest are occurrences of two types of rare species habitat, Regulatory and Non-Regulatory. Regulatory habitat is based on verified records of state-listed species and has associated mapped Priority Habitat. 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, both are protected under the Massachusetts Endangered Species Act (MESA; 321 CMR 10.00). Requesting pre-filing consultation with the Natural Heritage and Endangered Species Program (NHESP) for "all works, projects, or activities" in the Forest, regardless of location in or out of Priority Habitat, will ensure continued protection of this habitat and compliance with the MESA.
- Most of the Forest is located within the DCR Priority Watershed "selected Millers River Basin Lakes." DCR construction projects within Priority Watersheds maximize Stormwater Control Measures, potentially beyond those necessary to meet regulatory criteria (VHB 2022). By maximizing treatment, DCR addresses existing impairments in the receiving waters and contributes to improving water quality in the Priority Watershed. Designers of future projects at Ashburnham should review the latest MassDEP 303d list to understand other impairments of the receiving water and to fine tune

stormwater treatment to address these pollutants, in accordance with the DCR Stormwater Design Handbook (VHB 2022).

- Improving fire road conditions will better protect natural resources through improved access and fire preparedness.
- There may be opportunities to enhance Open Oak Forest Woodland and fire-influenced woodlands at the Forest through forest management.
- There is an opportunity to minimize forest fire threats and protect cultural resources through maintenance of CCC-era water holes (e.g., debris removal, brush cutting, and inlet/outlet enhancement), in accordance with DCR BMPs for these resources (DCR n.d.b).
- Trail improvements could stabilize and help minimize impact on sensitive environments from crowds of hikers.
- There is an opportunity to protect the Forest's ecological integrity and biodiversity through targeted removal of invasive plant species.
- Approximately 821.8 acres of the Forest has no Landscape Designation (DCR 2012). Assigning Landscape Designations to these portions of the Forest could help with management of associated natural resources and ensure management consistent with other DCR properties statewide.
- The Forest is located within the Quabbin to Cardigan Initiative's (Q2C) project area. This initiative is a public-private collaborative effort to conserve the Monadnock Highlands of north-central Massachusetts and western New Hampshire. The Forest's location within the project area offers opportunities to participate in organizational partnerships, grants, and land acquisitions in support of DCR's and Q2C's mutual conservation and recreation goals (Q2C 2023).

Cultural Resources

Threats

- Cellar holes, wells, and stone walls are the primary cultural resources still extant, and they face problems of erosion and damage from vegetative growth and recreational use.
- A lack of knowledge concerning archaeological resources in the Forest threatens their effective management and protection.
- An uncapped historical well is located in an archaeological site immediately adjacent to trails on the Rindge State Road Tract, posing a potential safety hazard to Forest visitors.
- Natural events leading to increased erosion, vegetation disturbance, and flooding have the potential to impact archaeological resources.
- Unauthorized off-highway vehicle (OHV) use at Ashburnham, including an area near Packard Hill Road on the Coughlin Road Tract, may be negatively impacting cultural resources such as rock walls through dislodging stones.
- There is at least one unapproved geocache in the Forest. Inappropriately located geocaches may threaten sensitive cultural resources.

Opportunities

- Clearing rock walls and cellar holes of debris and vegetation, in accordance with Best Management Practices, will help preserve these cultural resources.

- Numerous homestead sites are visible from trails and roads in the Forest. Providing interpretation of historic homestead, cellar hole sites, and park history could improve public awareness and respect for these resources.
- Stone features have been identified in the Forest; their origins and cultural significance remain undetermined. Assessing, inventorying, and preserving these resources are a high priority for DCR.
- There is an opportunity to preserve the historical integrity of CCC-era water holes through routine maintenance in accordance with DCR BMPs for these resources (DCR n.d.b).
- There is an opportunity to improve management, protection, and interpretation of significant cultural resources in the Forest through completion of a Forest-wide cultural resources reconnaissance survey in partnership with municipal, tribal, and regional entities.
- Installing access barriers, such as gates, and appropriate regulation signage could help deter unauthorized access by visitors on OHVs, avoiding further degradation to cultural resources.
- Approximately 821.8 acres of the Forest has no Landscape Designation (DCR 2012). Assigning Landscape Designations to these portions of the Forest could help with management of associated cultural resources and ensure management consistent with other DCR properties statewide.

Recreation

Threats

- Approximately 15% of the park is within the 1.0%-chance flood zone and the 0.2%-chance flood zone. There are approximately 500 ft of trails within the flood zones that may be damaged by flood events (Massachusetts Bureau of Geographic Information (MassGIS) 1997). (These data are derived from the FEMA's paper Flood Insurance Rate Maps, or FIRMS, dating to 1979. Because of their age, FIRMS may only be used to portray zones of uncertainty and possible risks associated with flooding, not the absolute delineation of flood boundaries.)
- There is limited official information available on-line for Ashburnham 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 Stowell Road Tracts lack signage indicating the property is part of Ashburnham State Forest, potentially negatively impacting visitor experience.
- Ashburnham does not have signage indicating the property received funds for land acquisitions from the Land and Water Conservation Fund Forest Legacy Program, as required by the program (NPS 2023).
- Fire roads continue to deteriorate due to lack of equipment and staff availability, potentially impeding emergency response services, like search and rescue, at Ashburnham.
- Ashburnham has experienced significant increases in visitation, leading to roadside parking when the parking lot is full, potentially increasing roadside hazards and impacting residential neighbors.
- The Forest lacks directional trail signage on most parcels, potentially leading to difficulties navigating trails at Ashburnham.
- Unauthorized OHV use at the Forest may be negatively impacting visitor experience and increasing wear on trails.

- A Public Health Fish Consumption Advisory has been issued for Lake Wampanoag due to the presence of Mercury in fish tissue (Massachusetts Department of Public Health (DPH) 2023). Signs informing the public of this health advisory are absent from access points.

Opportunities

- Adding a webpage for Ashburnham State Forest to DCR's website could help increase public awareness of the Forest and its recreational opportunities.
- Main Identification Signs would increase property visibility locally and help passersby and visitors know when they reached the Forest.
- Increasing internal navigation signage and trail markers would help orient trail users in the Forest.
- Adding trailhead signage and internal navigation signs to the Stowell Road tracts will improve visitor experience.
- Formalizing a gateway at the East Rindge Road tract, with dedicated parking, would help improve visitor experience at the western tracts of Ashburnham.
- Adding signage indicating the property received funds for land acquisitions from the Land and Water Conservation Fund Forest Legacy Program would help DCR better comply with program requirements.
- Unprotected open space around the Forest presents an opportunity to further protect recreational resources, like long distance trails, through acquisitions or conservation restrictions.
- There may be opportunities to increase outreach to local clubs and organizations (snowmobile, mountain bike) for volunteers to assist with trail rehabilitation.
- Working with the Town's Department of Public Works and the Massachusetts Department of Transportation (MassDOT) to install Trail Crossing signs would improve visitor's experience crossing roads that divide the Forest.
- Improving the forest roads through vegetation management and regrading would help improve access to interior forest areas for emergency response, as well as maintain a recreational resource for visitors.
- Some trails go through private property before connecting again on Forest land. Redirecting or closing these trails or establishing a formal agreement with property owners would better protect the trail and visitors from negative encounters with landowners on the trail.
- Increasing the presence of Environmental Police Officers, DCR rangers, and other DCR staff could help deter unauthorized OHV use, dumping, and other unauthorized activities.
- 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 Massachusetts Executive Office of Energy and Environmental Affairs (EEA) 2024a), in alignment with the EEA's EJ Policy (EEA 2021) and the Executive Order on Environmental Justice (No. 552) (Patrick 2014).

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 2024b). 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 Climate Change Vulnerability Assessment (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 Resource Management Plans 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 CO2 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" (MassWildlife 2015: 357). In addition, it is the position of the Massachusetts Natural Heritage and Endangered Species Program 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

Phillips Brook, a tributary of the North Nashua River that flows through the Stowell Road Tract, has been identified as a Coldwater Fisheries Resource by MassWildlife. Such streams provide important habitat for coldwater species, which are typically more sensitive than other species to alterations in stream flow, water quality, and temperature (MassGIS 2021). The entire lengths of these streams within the Forest are exposed to climate impacts.

One of the Forest's rare species, a state-threatened plant, is at the southern limit of its range, making it particularly susceptible a warming climate.

Five of the Forest's known natural communities have been identified as having high exposure to the impacts of climate change. The Massachusetts Natural Heritage and Endangered Species Program has identified Red Spruce Swamp and Spruce-Fir Northern Hardwoods Forest as being threatened by climate change, and Acidic Shrub Fen, Red Spruce Swamp, Level Bog, and Highbush Blueberry Thicket as being threatened by hydrologic alterations (Swain 2020).

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, some of the Forest's pools and associated wildlife may be negatively impacted.

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 2024). 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

Recreation activities at the Forest likely to be negatively impacted by exposure to weather changes resulting from climate change include hunting and snow-dependent sports (i.e., cross-country skiing and snowshoeing). Fishing and other water-based activities may experience increased participation due to the anticipated increase in temperature (i.e., more than 30 additional days with temperatures over 90° F; Table 12).

Trail segments located within the most recent FEMA flood zones (MassGIS 1997), including portions of the Mid-State Trail, are exposed to the anticipated increase in precipitation (i.e., a greater than 10-inch increase in maximum daily rainfall; Table 12). (Precipitation changes due to climate change (see EEA 2022 and Weston and Sampson 2022) are not factored into FEMA flood plain modeling. Climate change may result in additional exposure to and impacts from flooding for cultural resources in the future. A FEMA-contracted report (AECOM 2013) finds that: "For the riverine environment, the typical 1% annual chance floodplain area nationally is projected to grow by about 45%, with very large regional variations ... approximately 70% of the 45% (or 31.5%) growth in the 1% annual chance floodplain is due solely to

climate change" (AECOM 2013: ES6–ES7). Site-specific projections for future floodplain areas were not available at the time this RMP was prepared.)

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 Ashburnham State Forest was designated Woodland. Identification of Land Stewardship Zones within Ashburnham 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 23.)

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 Ashburnham have been designated Zone 1.

- All examples of the following Natural Communities, which have been identified as vulnerable to trampling (Swain 2020):
  - Level bog (S3 – Vulnerable)
  - Acidic shrub fen (S3 – Vulnerable)
  - Acidic Rocky Summit/Rock Outcrop Community (S4 – secure)
  - Open Oak Forest/Woodland (S3 – Vulnerable)

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 Ashburnham have been designated Zone 2.

- All areas not identified as Zone 1 or Zone 3.

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 Ashburnham are currently developed, appropriate for potential future development, or intensively used for recreation. They have been designated Zone 3.

- Parking Areas
  - The Mount Watatic Trailhead off Rindge State Road.
  - Grassy area for parking (potential expansion) off East Rindge Road.

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 Overlays were developed for Ashburnham.

- **Surface Water Protection Zone A.** Land uses and activities within this overlay should be consistent with Massachusetts' Drinking Water Regulations to protect surface water supplies. Refer to 310 CMR 22.20B and 310 CMR 22.20C for specific guidance.

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 Best Management Practices 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 Natural Heritage and Endangered Species Program (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 Best Management Practices (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 24.)

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

Seventeen priority management recommendations were developed for this property. They are presented in Table 19, page 27. 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 27) into CAMIS as a separate work order, noting "*RMP" in the description field. Non-traditional work orders (e.g., volunteer trail work, posting of DPH Fish Consumption Advisory posters, certification of vernal pools) should be closed out by the property manager, once the recommendation has been implemented.

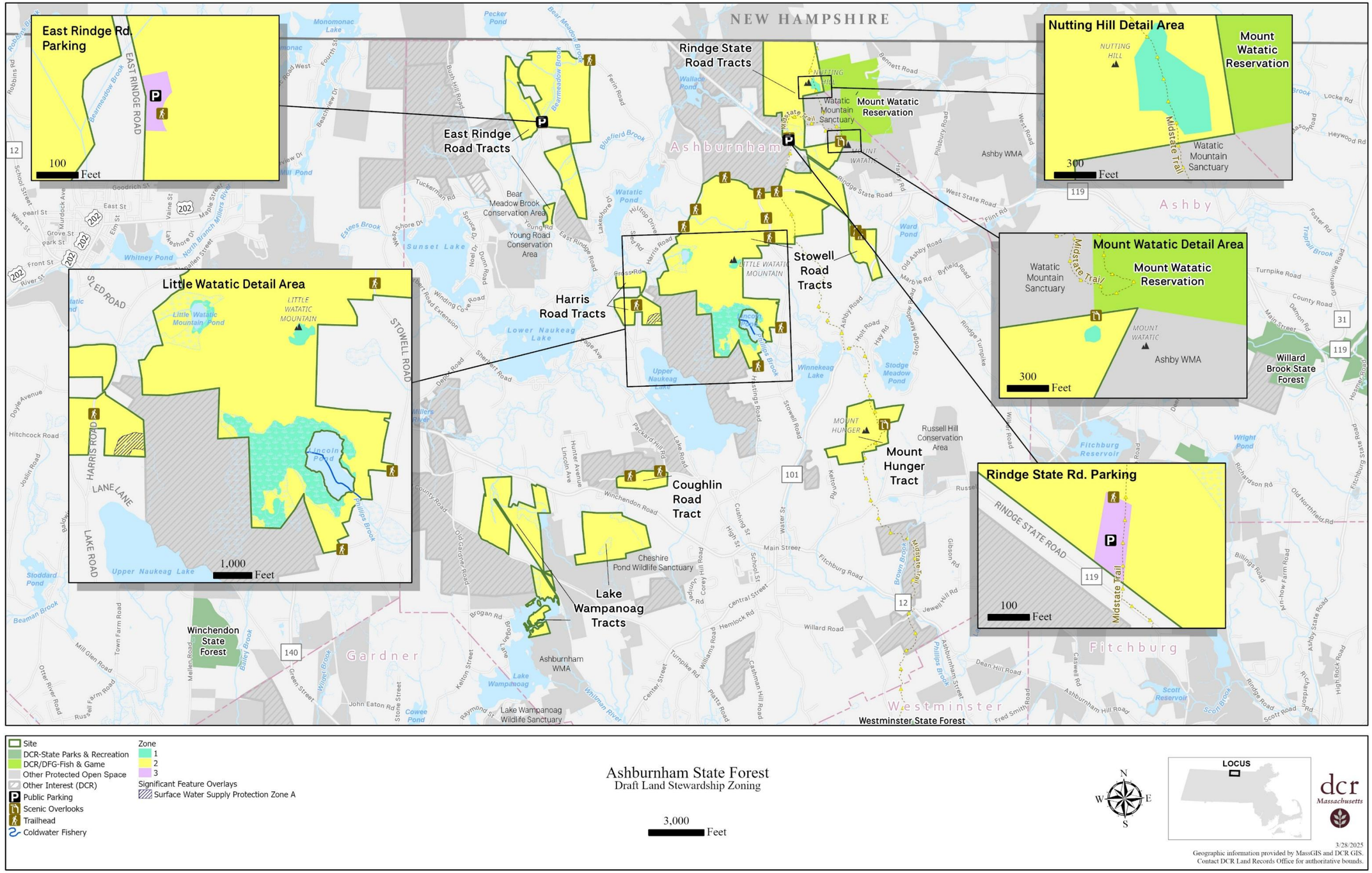

Figure 1. Land Stewardship Zoning Map.

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).	Unknown
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.	Yes
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.	Yes
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.	No
Natural Resources	4. Aquatic areas adjacent to beaches, boat ramps and launches, roads, and hiking trails are free of eroded sediments.	No
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.	Unknown
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.	Yes
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.	Yes
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.	No
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.	No
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.	No
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 2019a) 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.)	Yes
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 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.	No
Recreation	9. Recreation facilities are located outside of areas subject to flooding, storm surge, or sea-level rise.	No
Sustainable Forest Management	1. Forestry activities are consistent with Landscape Designation and associated forestry guidelines.	N/A
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 Ashburnham 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	Following appropriate review and approval, implement species-specific management recommendations as described in the Central Region Invasive Plant Management Plan (BSC Group 2017). Maintain actions as needed.	Office of Natural Resources (Lead), Park Operations, Partner
Natural Resources	Survey, document, and submit documentation to certify potential vernal pools that are in NHESP habitat of MESA-protected vernal pool obligate species or in Woodland portions of the Forest, in accordance with DCR (n.d.a.) and MassWildlife (2009), as warranted.	Office of Natural Resources (Lead), Volunteers
Natural Resources	Improve forest roads for emergency vehicle access and maintain water holes to assist firefighting activities.	Office of Cultural Resources, Bureau of Fire Control and Forestry (Lead), Park Operations
Cultural Resources	Conduct an archaeological reconnaissance survey (950 CMR 70) in cooperation with municipal, tribal, and non-profit partners, including the Town of Ashburnham. Complete appropriate Massachusetts Historical Commission archaeological site forms for identified archaeological resources.	Consultant, Office of Cultural Resources (Lead), Partners
Cultural Resources	Fill or cap the open well adjacent to trails on the Rindge State Road Tract.	Office of Cultural Resources, Park Operations (Lead)
Cultural Resources	Maintain Civilian Conservation Corps water holes in accordance with the DCR Best Management Practices for these resources (DCR n.d.b.).	Forest Fire Control (Lead), Office of Cultural Resources, Park Operations
Cultural Resources	Work with Indigenous peoples partners to inventory, document, conserve, and interpret Indigenous resources and Indigenous history within the Forest.	Office of Cultural Resources, Partner

Category	Recommendation	Implementation
Recreation	Establish a DCR web page for Ashburnham State Forest.	Interpretive Services, Regional Staff (Lead), Park Operations, Web Content Creator
Recreation	Formalize the parking area at the East Rindge Road Tract.	Park Operations
Recreation	Resolve trail-related threats and opportunities identified in this RMP, in accordance with Trails Guidelines and Best Practices (DCR 2019, or update), through the following actions: • Maintain authorized trails, as identified in the DCR Trail Data Layer provided to the Natural Heritage and Endangered Species Program in 2021, and in accordance with the Recreational Trail Maintenance and Biodiversity Conservation 2021 update. • Evaluate trail segments for discontinuation or active closure, including those that are: unauthorized, unsafe, connecting to privately-owned property, located in environmentally or culturally sensitive areas, or otherwise inconsistent with DCR Trails Guidelines and Best Practices (DCR 2019). Provide an updated trail data layer to the Natural Heritage and Endangered Species Program. • Establish new trails, as warranted, following regulatory review. Provide an updated trail data layer to the Natural Heritage and Endangered Species Program.	Management Forestry, Office of Cultural Resources, Office of Natural Resources, Park Operations (Co-Lead), Partners, Trails and Greenways Section (Co-Lead)
Recreation	Coordinate with the Ashburnham Department of Public Works and MassDOT, as appropriate, to install Trail Crossing signs where the Midstate Trail crosses Rindge State Road (Route 119) and at other trail crossings of concern.	Facilities Engineering, Park Operations, Trails and Greenways Program (Lead)
Recreation	Post Department of Public Health Fish Consumption Advisory Posters (https://www.mass.gov/doc/fish-consumption-advisory-poster-for-marine-and-fresh-water-bodies-0/download) at fishing access locations along Lake Wampanoag.	Park Operations

Category	Recommendation	Implementation
Recreation	Install trailhead signage and internal navigation signs at the Stowell Road Tract.	Park Operations
Recreation	Install a permanent Land and Water Conservation Fund acknowledgement sign at the Mount Hunger Tract in accordance with funding requirements (NPS 2023).	Land Protection Program, Park Operations (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 locations of 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)
Recreation	Increase the presence of Environmental Police Officers, DCR Rangers, and/or Forest operations staff, as appropriate and available, in areas with high unauthorized off-highway vehicle (OHV) use.	Bureau of Ranger Services (Co-Lead), Regional Staff (Co-Lead), Park Operations
Recreation	Implement measures to curb unauthorized off-highway vehicle (OHV) use, such as adding gates and other physical barriers, and erecting signage prohibiting OHV use.	Park Operations

REFERENCES

AECOM. 2013. The impact of climate change and population growth on the National Flood Insurance Program through 2100. Prepared for Federal Insurance and Mitigation Administration and Federal Emergency Management Agency.
https://aecom.com/content/wp-content/uploads/2016/06/Climate_Change_Report_AECOM_2013-06-11.pdf (PDF)

Askew, A. E., and J. M. Bowker. 2018. Impacts of Climate change on outdoor recreation participation: Outlook to 2060. Journal of Park and Recreation Administration 36: 97–120.
https://www.srs.fs.usda.gov/pubs/ja/2018/ja_2018_bowker_001.pdf (PDF)

Berg, S. P. 1999. The Civilian Conservation Corps, shaping the forests and parks of Massachusetts. A statewide survey of Civilian Conservation Corps resources. Prepared for the Department of Environmental Management, Boston, MA by Shary Page Berg, Landscape Preservation Planning and Design, Cambridge, MA.
https://archives.lib.state.ma.us/handle/2452/835790

BSC Group. 2017. Invasive Plant Management Plan: Central Region. June 2017.

Cartwright, J., T. L. Morelli, and E. H. Campbell Grant. 2022. Identifying climate-resistant vernal pools: Hydrologic refugia for amphibian reproduction under droughts and climate change. Ecohydrology 2022, 15, e2354.
https://onlinelibrary.wiley.com/doi/epdf/10.1002/eco.2354 (PDF)

Commonwealth of Massachusetts. 2023. ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan. ResilientMass Action Team, Boston, Massachusetts.
https://www.mass.gov/doc/resilientmass-plan-2023/download (PDF)

Finch, D. M., J. L. Bitler, J. B. Runyon, C. J. Fettig, F. F. Kilkenny, S. Jose, S. J. Frankel, S. A. Cushman, R. C. Cobb, J. S. Dukes, J. A. Hicke, and S. K. Amelon. 2021. Effects of Climate Change on invasive species. Chapter 4 *in* T. M. Poland, T. Patel-Weynand, D. M. Finch, C. F. Miniat, D. C. Hayes, and V. M. Lopes (Editors) Invasive species in forests and rangelands of the United States: A comprehensive science synthesis for the United States forest sector. Springer.
https://library.oapen.org/bitstream/handle/20.500.12657/46792/2021_Book_InvasiveSpeciesInForestsAndRan.pdf?sequence=1&isAllowed=y (PDF)

Freedom's Way Heritage Association, Inc. (FWHA) 2015. Freedom's Way National Heritage Area Management Plan.
https://freedomsway.org/wp-content/uploads/2021/10/FWNHAmanagementplan.pdf (PDF)

Friends of the Wapack. n.d. Trail Overview and Map.
https://wapack.org/trail-overview-and-map/

Ham, S. H. 2013. Interpretation: Making a difference on purpose. Fulcrum Publishing, Golden, CO.

Intergovernmental Panel on Climate Change (IPCC). 2021. Annex VII: Glossary [Matthews, J.B.R., V. Möller, R. van Diemen, J.S. Fuglestvedt, V. Masson-Delmotte, C. Méndez, S. Semenov, A. Reisinger

(eds.)]. In Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 2215–2256, doi:10.1017/9781009157896.022.
https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_AnnexVII.pdf (PDF)

International Council on Monuments and Sites (ICOMOS) Climate Change and Cultural Heritage Working Group. 2019. The Future of our Pasts: Engaging Cultural Heritage in Climate Action. ICOMOS, Paris, France.
https://civvih.icomos.org/wp-content/uploads/Future-of-Our-Pasts-Report-min.pdf (PDF)

Isaak, D. J., M. K. Young, C. Tait, D. Duffield, D. L. Horan, D. E. Nagel, and M. C. Groce. 2018. Effects of climate change on native fish and other aquatic species. Pages 89–111 *in* Halofsky, J. E., D. L. Peterson, J. J. Ho, N. J. Little, and L. A. Joyce (Eds.). Climate change vulnerability and adaptation in the Intermountain Region. Gen. Tech. Rep. RMRS-GTR-375. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Part 1. Pp. 1–197.
https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd578946.pdf (PDF)

Liu, Y., A. M. O. Odour, Z. Zhang, A. Manea, I. M. Tooth, M. R. Leishman, X. Xu, and M. Van Kleunen. 2017. Do invasive alien plants benefit more from global environmental change than native plants? Global Change Biology (2017), doi: 10.1111/gcb.13579.
https://www.researchgate.net/profile/Xingliang-Xu/publication/310902903_Do_invasive_alien_plants_benefit_more_from_global_environmental_change_than_native_plants/links/5a20bb30a6fdcccd30e032dc/Do-invasive-alien-plants-benefit-more-from-global-environmental-change-than-native-plants.pdf (PDF)

Massachusetts Bureau of Geographic Information (MassGIS). 1997. MassGIS Data: FEMA Q3 Flood Zones from Paper FIRMs.
https://www.mass.gov/info-details/massgis-data-fema-q3-flood-zones-from-paper-firms

Massachusetts Bureau of Geographic Information (MassGIS). 2021. MassGIS data: MA Wildlife Coldwater Fisheries Resources. February 2021.
https://www.mass.gov/info-details/massgis-data-ma-wildlife-coldwater-fisheries-resources

Massachusetts Department of Conservation and Recreation (DCR). n.d.a. Best Management Practices: Vernal pool certification on DCR lands. Office of Regional Planning, Boston, MA.
https://www.mass.gov/doc/vernal-pool-certification-on-dcr-lands/download (PDF)

Massachusetts Department of Conservation and Recreation (DCR). n.d.b. Best Management Practices: Water holes. Office of Cultural Resources, Boston, MA.
https://www.mass.gov/doc/water-holes/download (PDF)

Massachusetts Department of Conservation and Recreation (DCR). 2012. Landscape designations for DCR parks & forests: Selection criteria and management guidelines. March 2012. Boston, MA.
https://archives.lib.state.ma.us/handle/2452/200210

Massachusetts Department of Conservation and Recreation (DCR). 2014. Manual for continuous forest inventory field procedures. Bureau of Forestry, Division of State Parks and Recreation, February 2014. https://archives.lib.state.ma.us/handle/2452/624791

Massachusetts Department of Conservation and Recreation (DCR). 2019. Trails guidelines and best practices manual. Updated July 2019. https://www.mass.gov/doc/dcr-trails-guidelines-and-best-practices-manual/download (PDF)

Massachusetts Department of Conservation and Recreation (DCR). 2020. Massachusetts State Forest Action Plan 2020. Executive Office of Energy & Environmental Affairs, Department of Conservation and Recreation, Massachusetts Bureau of Forest Fire Control and Forestry. https://archives.lib.state.ma.us/handle/2452/840801

Massachusetts Department of Conservation and Recreation (DCR). 2022. Manual for Continuous Forest Inventory field procedures. Bureau of Forestry, Division of State Parks and Recreation. Rev. March 2022.

Massachusetts Department of Conservation and Recreation (DCR). 2023. Managing our forests…for carbon benefits. https://www.mass.gov/info-details/managing-our-forests-for-carbon-benefits

Massachusetts Department of Conservation and Recreation (DCR). 2024. DCR Climate Impacts. Story Map series highlighting the expected impacts caused by climate change across the DCR's facilities and operations in Massachusetts. https://storymaps.arcgis.com/collections/666258ae0e3543efa3612b9bf380bb30

Massachusetts Department of Environmental Protection (MassDEP). 1995. Wellhead protection tips for small public water supply systems. https://www.mass.gov/files/documents/2016/08/op/welltips.pdf (PDF)

Massachusetts Department of Environmental Protection (MassDEP). 2011. Implementation of Zone I requirements. DWP Policy 94-03. Effective Date: 3/10/2008. Amended Date: 5/01/2011. https://www.mass.gov/files/documents/2016/08/qs/9403a.pdf (PDF)

Massachusetts Department of Environmental Protection (MassDEP). 2023. Final Massachusetts integrated list of waters for the Clean Water Act 2022 Reporting Cycle. CN. 568.1. May 2023. Prepared by: Watershed Planning Program, Division of Watershed Management, Bureau of Water Resources. https://www.mass.gov/doc/final-massachusetts-integrated-list-of-waters-for-the-clean-water-act-2022-reporting-cycle/download (PDF)

Massachusetts Department of Public Health (DPH). 2023. Freshwater Fish Consumption Advisory List. February 2023. https://www.mass.gov/doc/public-health-freshwater-fish-consumption-advisories-2023-0/download (PDF)

Massachusetts Division of Fisheries and Wildlife (MassWildlife). 2009. Guidelines for the certification of vernal pool habitat, March 2009. https://www.mass.gov/doc/guidelines-for-the-certification-of-vernal-pool-habitat/download (PDF)

Massachusetts Division of Fisheries and Wildlife (MassWildlife). 2015. Massachusetts State Wildlife Action Plan 2015. Westborough, MA.
https://www.mass.gov/info-details/state-wildlife-action-plan-swap

Massachusetts Executive Office of Energy and Environmental Affairs (EEA). 2021. Environmental Justice Policy of the Executive Office of Energy and Environmental Affairs. Updated June 24, 2021.
https://www.mass.gov/doc/environmental-justice-policy6242021-update/download (PDF)

Massachusetts Executive Office of Energy and Environmental Affairs (EEA). 2022. 2022 Massachusetts Climate Change Assessment, Volume II – Statewide Report. Executive Office of Energy and Environmental Affairs, Boston, MA.
https://www.mass.gov/doc/2022-massachusetts-climate-change-assessment-december-2022-volume-ii-statewide-report/download (PDF)

Massachusetts Executive Office of Energy and Environmental Affairs (EEA). 2024a. Environmental Justice Strategy. Secretariat and agency strategies for proactively promoting environmental justice in the Commonwealth of Massachusetts. February 2024.
https://www.mass.gov/doc/february-2024-environmental-justice-strategy-english/download (PDF)

Massachusetts Executive Office of Energy and Environmental Affairs (EEA). 2024b. Response to the report of the Climate Forestry Committee.
https://www.mass.gov/doc/forests-as-climate-solution-response-to-cfc-report/download (PDF)

Massachusetts Historical Commission (MHC). 1984. MHC Reconnaissance Survey Town Report: Ashburnham. Massachusetts Historical Commission, Boston, MA.
https://www.sec.state.ma.us/divisions/mhc/preservation/survey/town-reports/asb.pdf (PDF)

Midstate Trail Committee. n.d. Midstate Trail history.
https://www.midstatetrail.org/about-the-midstate-trail/midstate-trail-history/

National Park Service (NPS). 1998. Planning for interpretation and visitor experience. Prepared by the Division of Interpretive Planning, Harpers Ferry Center, Harpers Ferry, WV. 1998.
https://www.nps.gov/subjects/hfc/upload/interp-visitor-exper.pdf (PDF)

National Park Service (NPS). 2023. Land and Water Conservation Fund State Assistance Program. Federal Financial Assistance Manual. Volume 72. Effective October 1, 2023.
https://www.nps.gov/subjects/lwcf/upload/LWCF-FA-Manual-Vol72_2023-10-01_508.pdf (PDF)

Native Land Digital. 2023. Native Land Digital.
https://native-land.ca/

Naughton, M. 2021. Wildlife and recreation: Understanding and managing the effects of trail use on wildlife. Prepared for Vermont Fish and Wildlife and Vermont Forests, Parks, and Recreation. November 2021.
https://anr.vermont.gov/sites/anr/files/2023-01/wildlife_and_recreation_%20M_naughton_2021.pdf (PDF)

O'Toole, D., L. A. Brandt, M. K. Janowiak, K. M. Schmitt, P. D. Shannon, P. R. Leopold, S.D. Handler, T. A. Ontl, and C. W. Swanston. 2019. Climate adaptation strategies and approaches for outdoor recreation. Sustainability 2019, 11, 7030.
https://www.mdpi.com/2071-1050/11/24/7030/pdf (PDF)

Patrick, D. L. 2014. Executive Order No. 552. Executive Order on Environmental Justice.
https://www.mass.gov/doc/executive-order-552-mass-register-1276/download (PDF)

Quabbin-to-Cardigan Partnership. 2023. The Quabbin-to-Cardigan Partnership.
https://q2cpartnership.org/

Swain, P. 2020. Classification of the natural communities of Massachusetts. Massachusetts Natural Heritage & Endangered Species Program. Massachusetts Division of Fisheries and Wildlife. Westborough, MA.
https://www.mass.gov/doc/classification-of-the-natural-communities-of-massachusetts/download (PDF)

Swanston, C. W., M. K. Janowiak, L. A. Brandt, P. R. Butler, S. D. Handler, P. D. Shannon, A. Derby Lewis, K. Hall, R. T. Fahey, L. Scott, A. Kerber, J. W. Miesbauer, L. Darling, L. Parker, and M. St. Pierre. 2016. Forest adaptation resources: Climate change tools and approaches for land managers, 2nd ed. Gen. Tech. Rep. NRS-GTR-87-2. U.S. Department of Agriculture, Forest Service, Northeast Research Station. Newtown Square, PA.
https://www.fs.usda.gov/nrs/pubs/gtr/gtr_nrs87-2.pdf (PDF)

Trail Animals Running Club. n.d. TARC Trail Series.
https://www.trailanimals.com/events

United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Center. 2007. Climate Change and World Heritage. Report on predicting and managing the impacts of climate change on World Heritage and strategy to assist States parties to implement appropriate management responses. World Heritage Reports 22. UNESCO World Heritage Center, Paris, France.
https://whc.unesco.org/uploads/activities/documents/activity-474-1.pdf (PDF)

VHB. 2022. DCR stormwater design handbook. October 19, 2022. Prepared for Massachusetts Department of Conservation and Recreation, 251 Causeway Street, Boston, MA.
https://www.mass.gov/doc/dcr-stormwater-design-handbook/download (PDF)

Weston and Sampson. 2022. Climate change vulnerability assessment. September 2022. Report prepared for Massachusetts Department of Conservation and Recreation.

Wilkins, E. J., and L. Horne. 2024. Effects and perceptions of weather, climate, and climate change on outdoor recreation and nature-based tourism in the United States: A systematic review. PLOS Climate 3(4): e0000266.
https://journals.plos.org/climate/article?id=10.1371/journal.pclm.0000266 (PDF)

Wobus, C., E. E. Small, H. Hosterman, D. Mills, M. Rissing, R. Jones, M. Duckworth, R. Hall, J. Creason, and J. Martinich. 2017. Projected climate change impacts on skiing and snowmobiling in the United States. Global Environmental Change. 45(2017) 1–14.
https://www.sciencedirect.com/science/article/am/pii/S0959378016305556 (PDF)