

# Wildlands in New England

*Past, Present, and Future*



**Wildlands  
Woodlands  
Farmlands &  
Communities**

**An Integrated Conservation Initiative**

## Key Terms Used in This Report

### ***Wildland***

Capitalized; land meeting this study's Wildland definition and criteria based on (i) intent, (ii) current and future management, and (iii) level of protection. Wildland is free-willed, being allowed to develop without significant human intervention once designated, but may be in any current condition from past human use. A term applied in the Wildlands, Woodlands, Farmlands & Communities initiative.

### ***Wildland block***

An abutting, or nearly so, set of Wildlands.

### ***Wilderness***

Capitalized; federal lands formally designated under the Wilderness Act.

### ***Woodland***

Capitalized; an area of permanently conserved forestland that is or can be actively managed; not a Wildland. A term applied in the Wildlands, Woodlands, Farmlands & Communities initiative.

### ***passive management***

A "hands-off" approach to management that allows all species the freedom to self-will, free from active human control, development, and extraction.

### ***protected land, protected open space***

Lands that are permanently secured from development or conversion, with no specific reference to the type or intensity of management. Wildlands represent the strictest level of protected land.

### ***wildland, wilderness***

Not capitalized; generic concept, as widely used in popular conversation for nature largely lacking in evidence of human impact.

### ***old-growth forest***

Forests with abundant old trees and structural features, including snags, downed trees, and pit and mound topography, that exhibit minimal evidence of human land use. Old-growth forests comprise less than one-tenth of 1 percent of New England.

### ***old forest***

Forests with some of the structural characteristics of old-growth forest, including old trees, but which may have had significant human influence in the past and may be actively managed.



# Wildlands in New England

## *Past, Present, and Future*

*David Foster, Emily E. Johnson, Brian R. Hall, Jonathan Leibowitz,  
Elizabeth H. Thompson, Brian Donahue, Edward K. Faison, Jamie Sayen,  
David Publicover, Nancy Sferra, Lloyd C. Irland, Jonathan R. Thompson,  
Robert Perschel, David A. Orwig, William S. Keeton, Malcolm L. Hunter Jr.,  
Susan A. Masino, and Lillian Howell*



HARVARD FOREST  
NORTHEAST WILDERNESS TRUST  
HIGHSTEAD FOUNDATION




**An Integrated Conservation Initiative**

*May 2023*

# Table of Contents



<b>Executive Summary</b> .....	5
<b>Introduction and Background</b> .....	15
The Knowledge Gap: Where Are the Wildlands?.....	15
Goals of the Present Study .....	16
<b>BOX 1 / Wildland Visions for New England and the Appalachian Region</b> .....	17
Historical and Ecological Setting for Wildland Conservation.....	23
Why Conserve Wildlands? A Wide Range of Values.....	26
Questions Guiding This Study .....	28
What Is a Wildland? Developing a Clear Definition with Consistent Criteria .....	29
<b>Approach and Methods for This Study</b> .....	45
Exploration, Outreach, and Data Collection.....	45
Minimum Data Requirements to Meet the Wildland Criteria.....	45
Obtaining and Reconciling the Spatial Data for the Wildlands Map.....	46
Project Review and Data Correction .....	46
<b>Results and Discussion</b> .....	49
The Setting for Wildland Conservation: New England Land Cover and Conservation Lands .....	49
Wildland Characteristics and Distribution.....	49
Regional Pattern of Wildlands.....	49
<b>BOX 2 / A Wildland Origin and Future for the Appalachian Trail</b> .....	52
Remoteness and Access: Legacies from the Origins of Wildland Conservation .....	58
History and Timeline of Wildland Conservation in New England.....	60
Ownership.....	63
Mechanisms for Securing the Protection of Wildlands .....	69
The Precarious Status of Many State-Owned Wildlands .....	72
Conservation Characteristics of Wildland Areas .....	73
Comparisons of Wildlands with Other Classifications of Land Protection and Management.....	76
<b>Conclusions</b> .....	81
<b>Recommendations</b> .....	87
Center Wildlands in an Integrated Approach to Land Planning.....	87
Strengthen Existing Wildlands .....	87
Advance Wildland Conservation.....	91
<b>Wildlands, Woodlands, Farmlands &amp; Communities:</b>	
<b>Actions to Advance Wildland Conservation</b> .....	95
Increase Wildlands Outreach, Education, Conservation Action, and Policy Development.....	95
Evaluate Elevating the Goal for Wildlands in the Region to As Much As 20 Percent .....	95
Integrate Wildlands Conservation, Local Food and Resource Production, and Community Development .....	95
Enhance and Maintain the New England Protected Areas and Wildlands Database and Web Map.....	95
<b>Online Appendixes &amp; Resources</b>	
(found at <a href="http://wildlandsandwoodlands.org/wildlands-in-new-england">wildlandsandwoodlands.org/wildlands-in-new-england</a> ) .....	96
<b>Appendix 1:</b> Wildlands in New England: Attributes and Characteristics	
<b>Appendix 2:</b> Conservation Properties Screened in the Course of This Study	
<b>Appendix 3:</b> Detailed Map of Wildlands in New England	
<b>Interactive Web Map</b> of Wildlands in New England	
<b>All Figures and Tables</b> from the Report	
<b>Downloadable GIS and Tabular Data</b> Used in the Report	
<b>References</b> .....	96
<b>Roles and Responsibilities</b> .....	108
<b>Acknowledgments</b> .....	108

A photograph of a dense forest with many tall, thin trees. The ground is covered in moss and fallen branches. The trees are mostly evergreens, and the forest appears to be a wildland. The lighting is soft, suggesting a slightly overcast day or a shaded area within the forest.

***Wildlands** are tracts of any size and current condition, permanently protected from development, in which management is explicitly intended to allow natural processes to prevail with “free will” and minimal human interference. Humans have been part of nature for millennia and can coexist within and with Wildlands without intentionally altering their structure, composition, or function.*



# Executive Summary



## Introduction and Background

*Wildlands in New England* is the first U.S. study to map and characterize within one region all conserved lands that, by design, allow natural processes to unfold with no active management or intervention. These *forever wild lands* include federal Wilderness areas along with diverse public and private natural areas and reserves. Knowing the precise locations of Wildlands, their characteristics, and their protection status is important as both a baseline for advancing conservation initiatives and an urgent call to action for supporting nature and society. Wildlands play a unique role in the integrated approach to conservation and land planning advanced by the Wildlands, Woodlands, Farmlands & Communities (WWF&C) initiative, which calls for: at least 70 percent of the region to be protected forest; Wildlands to occupy at least 10 percent of the land; and all existing farmland to be permanently conserved. This research was conducted by WWF&C partners Harvard Forest (Harvard University), Highstead Foundation, and Northeast Wilderness Trust, in collaboration with over one hundred conservation organizations and municipal, state, and federal agencies.

The concept of Wildlands embraces the enduring presence of Indigenous groups in New England, living for millennia in reciprocity with the whole land community, including old and majestic forests that allowed the full diversity of life to thrive. Wildland conservation, like all of conservation, is only necessary due to unchecked development and destructive practices—first introduced to this region by colonizing people—that have threatened all natural systems and society itself.

As a complementary strategy to protecting actively managed Woodlands and farmlands, there are myriad reasons to protect Wildlands:

- Most importantly, Wildlands hold immense intrinsic value—wild nature simply has a right to exist, as do all of the species that inhabit Wildlands.
- Wildlands are essential for maintaining and increasing biodiversity. Over time, Wildlands that are allowed to mature under the influence of natural processes will support unique ecosystems, rich assemblages of species, and many structural features missing from much of the actively managed landscape.
- Wildlands are critical in mitigating climate change by storing vast quantities of carbon.
- Wildlands add key contributions to a resilient landscape, with their complexity and diversity.
- Wildlands offer quiet space for spiritual and physical renewal.
- Wildlands can serve as ecological references for scientific inquiry as well as forest management and conservation.
- Finally, Wildlands form a central component of **30x30**, the national and international goal to protect 30 percent of the land and waters of the Earth to address the looming crises of biodiversity, climate change, and human welfare.

*Since there is nowhere enough wilderness to permit the full mystery of evolution to flourish, we, as a culture, must begin the daunting task of restoring vast tracts of damaged land to a condition where they can re-wild themselves. To speak of ecological restoration by humans of ecosystems is to speak in paradoxes. Enter at your own risk. Bring a healthy dose of humility and recognize that you are doing work that only Mother Earth can properly do. Be not deterred by the apparent absurdity of the task. The alternative is the collapse of the biosphere.*

—Jamie Sayen,  
“Notes Toward a Restoration Ethic,” 1990



© David R. Foster

*Each town should have a park, or rather a primitive forest, of five hundred or a thousand acres, either in one body or several—where a stick should never be cut for fuel—nor for the navy, nor to make wagons, but stand and decay for higher uses—a common possession forever, for instruction and recreation.*

—Henry D. Thoreau,  
*Huckleberries*,  
1862

## The Knowledge Gap: Where Are the Wildlands?

Why is this report needed now? The Earth is in peril and New England has a critical opportunity to address this crisis by assembling a thriving Wildland infrastructure to support nature and society within the six New England states (Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island), and extending well beyond the region's borders. Nonetheless, prior to this study, there existed only a general sense of the extent and characteristics of Wildland properties in New England, with no available map or database. We undertook this comprehensive study to fill this knowledge gap, to underscore the importance of Wildlands, to encourage bold efforts to advance Wildland conservation and all forms of land protection, and to ensure that policy makers, public agencies, conservation organizations, and landowners have regional context, accurate data, and clear recommendations for advancing conservation efforts.

## Goals of the Present Study

To support land planning and climate and conservation policy and action we addressed the following goals:

1. Establish a definition of Wildlands applicable to the land ownership of New England, and of the United States.
2. Identify all lands fitting this definition from over 650 areas recommended by hundreds of groups.
3. Develop and maintain an open-source database and web map for all Wildlands and protected conservation lands in New England, adding to and complementing existing databases of conserved lands.
4. Disseminate the results and recommendations to landowners, practitioners, and policy makers to increase the understanding, appreciation, and conservation of Wildlands as a critical part of an integrated approach to land planning, both regionally and worldwide.
5. Initiate further research on and tracking of Wildland conservation as part of the WWF&C initiative.

Our Wildland definition draws from conservation history; the federal Wilderness Act and its application; international standards for protected lands; and feedback from conservation scientists and practitioners.

***Wildlands*** are tracts of any size and current condition, permanently protected from development, in which management is explicitly intended to allow natural processes to prevail with “free will” and minimal human interference. Humans have been part of nature for millennia and can coexist within and with Wildlands without intentionally altering their structure, composition, or function.

Three key criteria determine whether a property meets this definition:

***Wildland intent.*** The property has a deliberate Wildland purpose.

***Management for an untrammelled condition.*** The property is allowed to mature freely under prevailing environmental conditions and natural processes with minimal human intervention.

***Permanent protection.*** Wildland intent and management are in perpetuity or are open-ended and expected to persist.

**The wild condition of the land derives not from the land's history but from its freedom to operate untrammelled, today and in the future.**

In New England, where the land has experienced widespread use, most Wildlands develop through a process of natural “rewilding” that is unconstrained by people and unpredictable in its dynamics. Although a few Wildlands may be true old-growth forests, others may be recently clear-cut areas or former pastures with legacies of human history. As Wildlands, all will develop old forest conditions over time.





## Results and Discussion

### Characteristics and Geography of Wildlands

This study determined that New England (40.2 million acres) is 81 percent forested and contains 1.3 million acres of Wildland, or 3.3 percent of the region. Wildlands comprise 426 individual properties, on state, federal, and private lands, a number that increases monthly (see Figures 1 & 2). Highly varied in size, these Wildlands range from fewer than 10 acres to more than 150,000 acres (Baxter State Park, Maine), and are found in a variety of geographical, ecological, and cultural settings. They also vary in human history and in current ecological condition. New England lacks an immense Wildland comparable to New York's approximately 6-million-acre public-private Adirondack Park, which contains about 2.9 million acres that are constitutionally protected as "forever wild."

Wildlands are largely confined to the remote and rural portions of New England, in a band extending from northwestern Connecticut through western Massachusetts, across the mountainous and northern areas of Vermont and New Hampshire, to north-central Maine and Baxter State Park. Large, more developed areas of New England—much of Connecticut and Rhode Island, eastern Massachusetts, southeastern New Hampshire, and the southern quarter of Maine—support few Wildlands. The Appalachian Trail, conceived in 1921 by Benton MacKaye as a wilderness way, comprises a nearly continuous line of Wildlands that helps to define the regional pattern.

The great diversity of public and private entities contributing to Wildland conservation is exemplified by the 100-Mile Wilderness area in northern Maine, which is comprised in the north of Baxter State Park (State of Maine), Katahdin Woods and Waters National Monument (National Park Service), the Debsconear Lakes Wilderness Area (The Nature Conservancy), and the Nahmakanta Ecological Reserve (State of Maine). Southward it extends along the Appalachian Trail to Roach Ponds Reserve, Katahdin Iron Works Reserve, and Baker Mountain Reserve, which are owned by the Maine Woods Initiative LLC of the Appalachian Mountain Club. Smaller, but equally complex examples of adjoining and mutually supporting Wildland and Woodland ownerships occur elsewhere in New England.

In New England, Maine contains half of all Wildland acres (54.7 percent), followed by New Hampshire (17.6 percent) and Vermont (16.7 percent), with Massachusetts contributing 8.8 percent and Connecticut slightly more than 2 percent. Rhode Island has a single known Wildland tract.

The distribution of Wildlands has two consequences for the region's population. On the one hand, the rural location of most Wildlands provides solitude and quiet, qualities long sought by wilderness proponents. On the other hand, this distribution, and that of conservation lands more broadly, imposes challenges for society: a lack of equitable access to open space for all communities and an absence of green spaces in every neighborhood. A democratic approach to Wildland conservation will support a combination of large rural Wildlands and a constellation of smaller but more accessible Wildlands.

### History of Wildland Conservation and Ownership

Wildland conservation in New England began slowly in the early twentieth century, increased through the 1990s, and surged from 2000 to 2023, a period in which more than 660,000 Wildland acres have been protected. The number of organizations, agencies, and entities conserving Wildlands in New England now exceeds one hundred and continues to increase.

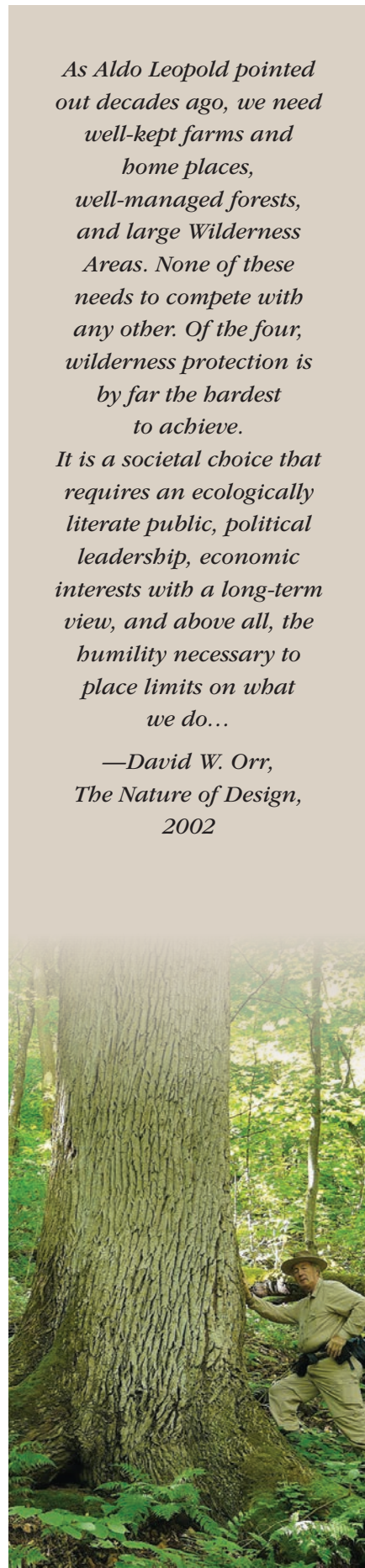
#### **Public Agency Ownership**

Wildland ownership is strongly skewed to public control (75 percent) and split between state (39 percent) and federal (36 percent) agencies. It is important to note that many parts of national parks, national monuments, national forests, many state forests and parks, and state reserves *are not* Wildlands.

*As Aldo Leopold pointed out decades ago, we need well-kept farms and home places, well-managed forests, and large Wilderness Areas. None of these needs to compete with any other. Of the four, wilderness protection is by far the hardest to achieve.*

*It is a societal choice that requires an ecologically literate public, political leadership, economic interests with a long-term view, and above all, the humility necessary to place limits on what we do...*

*—David W. Orr,  
The Nature of Design,  
2002*

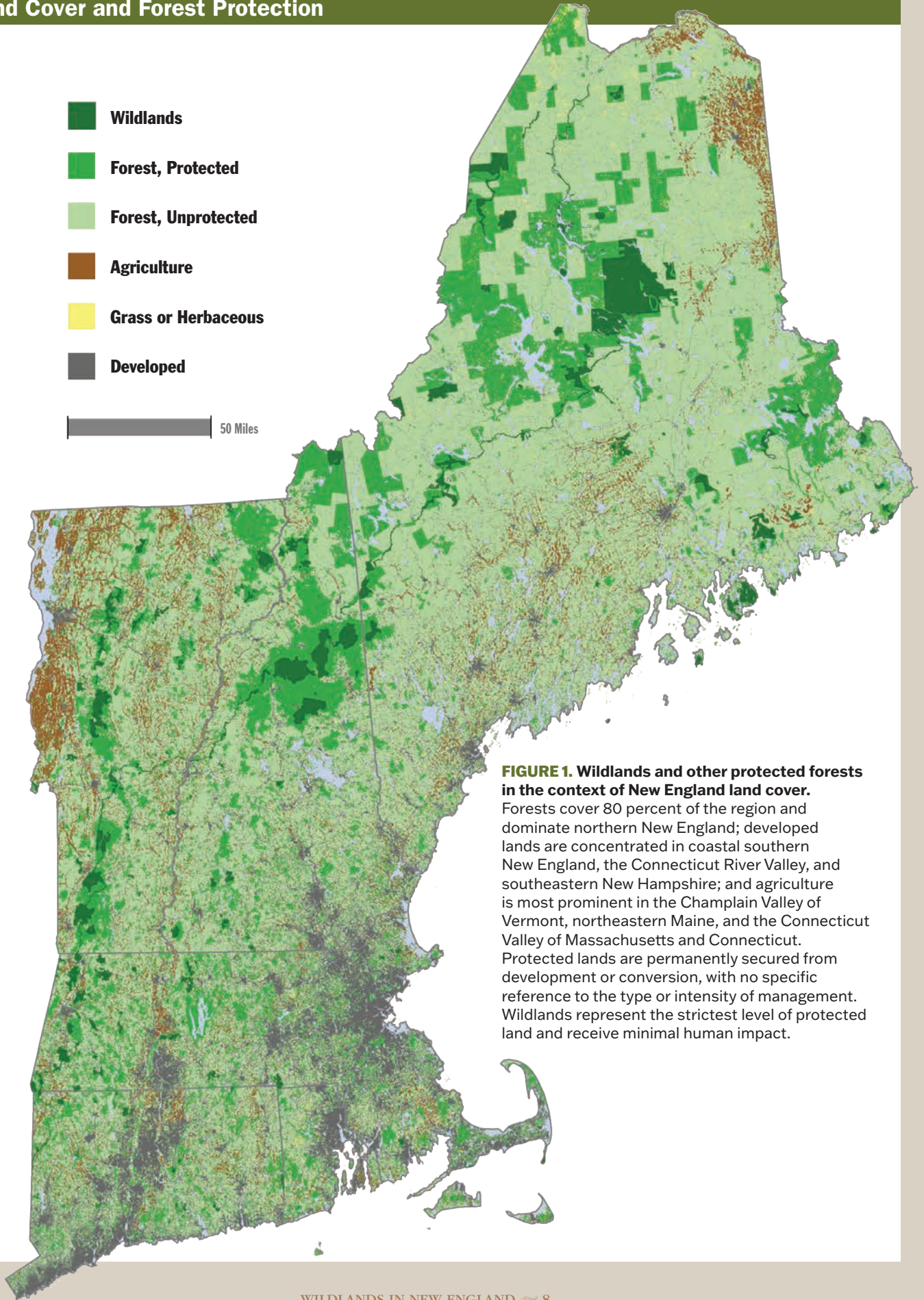


© Bob Leverett

## Land Cover and Forest Protection

- Wildlands
- Forest, Protected
- Forest, Unprotected
- Agriculture
- Grass or Herbaceous
- Developed

50 Miles



**FIGURE 1. Wildlands and other protected forests in the context of New England land cover.**

Forests cover 80 percent of the region and dominate northern New England; developed lands are concentrated in coastal southern New England, the Connecticut River Valley, and southeastern New Hampshire; and agriculture is most prominent in the Champlain Valley of Vermont, northeastern Maine, and the Connecticut Valley of Massachusetts and Connecticut. Protected lands are permanently secured from development or conversion, with no specific reference to the type or intensity of management. Wildlands represent the strictest level of protected land and receive minimal human impact.

## State Ownership

While Maine has the largest extent of state Wildlands (296,502 acres), Massachusetts stands out due to the dominant role of state agencies in Wildland conservation, with 90 percent of the Wildland area in the state owned by the Commonwealth. Most of the Massachusetts Wildlands are weakly protected.

## Federal Ownership

Three federal agencies are responsible for 473,781 acres of Wildlands: the U.S. Forest Service (Department of Agriculture) and the National Park Service and U.S. Fish and Wildlife Service (both within the Department of the Interior). The donation of nearly 90,000 acres in Maine to the U.S. government led to the designation of Katahdin Woods and Waters National Monument in 2016 with 76,633 acres of Wildlands.

## Private and Nonprofit Ownership and Stewardship

Private conservation and educational organizations and families own or hold conservation easements on 25 percent of Wildland acres, with a few organizations, listed here, playing a dominant role.

**The Nature Conservancy (TNC)** owns 47 Wildland properties in the three northern states, comprising nearly 220,000 acres, and numerous additional properties in the southern three states.

**Forest Society of Maine** holds permanent conservation easements on just over 100,000 acres of Wildlands.

**Northeast Wilderness Trust**, the youngest of these organizations and the only one in the region dedicated exclusively to Wildland conservation, owns 17 properties comprising 28,163 acres and holds forever-wild easements and deed restrictions on over 39,000 additional acres, across every New England state except Rhode Island.

**The Appalachian Mountain Club**, through its Maine Woods Initiative, has purchased and designated four Wildlands totaling 27,166 acres in the last two decades.

**The Society for the Protection of New Hampshire Forests** owns 39 properties comprising 9,284 acres of Wildlands that range from 15 to over 2,600 acres in size.

## Protection Mechanisms

Wildlands employ various mechanisms varying in strength of protection, ranging from **federal statutes**, **state statutes**, and **legal mechanisms** that impose enduring “deed restrictions” to **policy**, **administrative decisions**, and **management plans**. The last three mechanisms, comprising 465,103 acres, or 35 percent, of all Wildland area and 205 (48 percent) of all Wildland properties, involve “self-oversight,” the weakest level of protection.

## Conclusions

Although Wildland conservation and other modes of conservation that largely prioritize nature are expanding, New England is far from attaining the international goal of conserving 30 percent of the land for nature by 2030. Indeed, much is needed to reach the long-standing Wildlands, Woodlands, Farmlands & Communities goal of conserving at least 10 percent Wildlands in the region. More than 1.3 million acres, or 3.3 percent, of the total land area (slightly less than 4 percent of the forested area) has been secured as Wildlands. This accomplishment falls short by key metrics in conservation science, namely: tract size and total percent of the region’s land area; connectivity and buffering of Wildland properties by compatible conservation lands; representation of the region’s natural physical landscapes and critical habitats; consistency in management and protection; and benefit to all the region’s people. No properties, nor aggregations of properties, encompass landscapes large

*The legacy of the Wilderness Act is a legacy of care. It is the act of loving beyond ourselves, beyond our own species, beyond our own time.*

*To honor wildlands and wild lives that we may never see, much less understand, is to acknowledge the world does not revolve around us. The Wilderness Act is an act of respect that protects the land and ourselves from our own annihilation...*

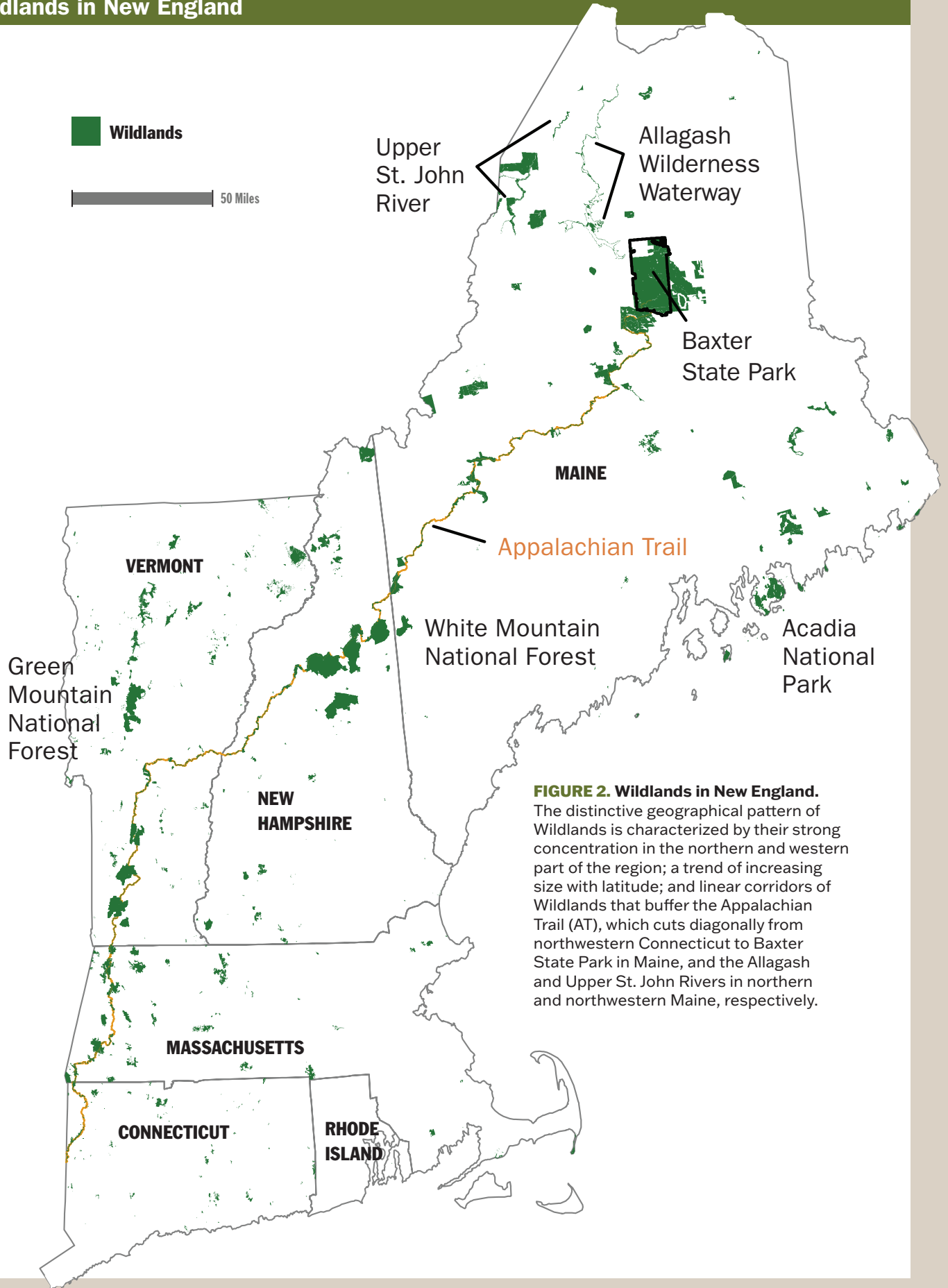
*In wilderness there is acceptance in the evolutionary processes of life. No plant or animal petitions for mercy. There are no complaints rendered or excuses made. There is only the forward movement of life and the inevitable end.*

—Terry Tempest Williams,  
“The Glorious Indifference  
of Wilderness,”  
2014



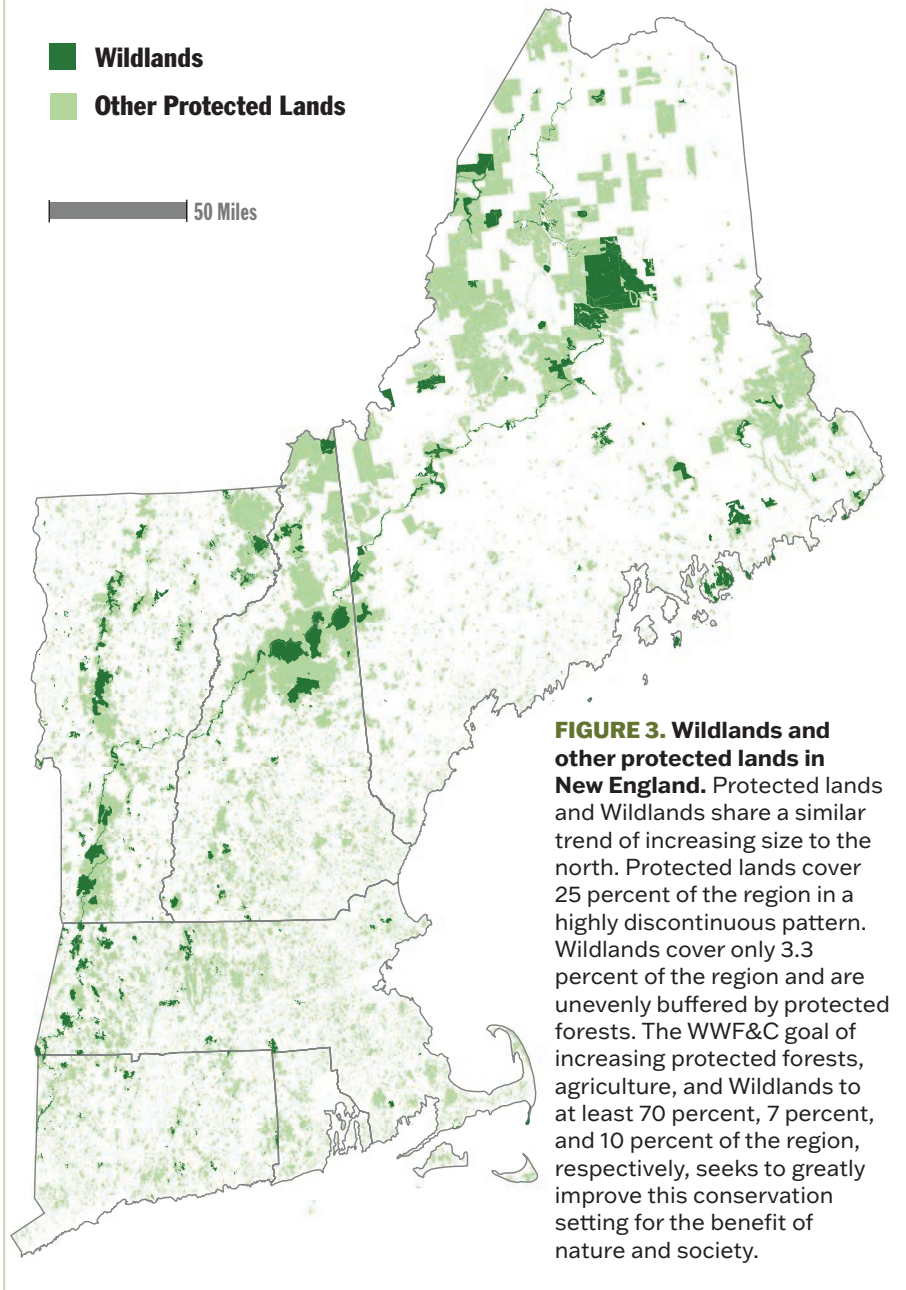
© David R. Foster

# Wildlands in New England



**FIGURE 2. Wildlands in New England.** The distinctive geographical pattern of Wildlands is characterized by their strong concentration in the northern and western part of the region; a trend of increasing size with latitude; and linear corridors of Wildlands that buffer the Appalachian Trail (AT), which cuts diagonally from northwestern Connecticut to Baxter State Park in Maine, and the Allagash and Upper St. John Rivers in northern and northwestern Maine, respectively.

## Wildlands and Other Protected Lands in New England



enough to support the full range of natural processes and human experience recommended by ecological science. Significantly, key species remain absent, including the region's largest native predators—the wolf and cougar. In contrast, adjoining New York State, with twice the population density of New England, supports an array of Wildlands comprising 16 percent of the forestland and approximately 9 percent of the state.

It is important to note that many protected Wildlands are surrounded by carefully managed woodlands, which serve important ecological functions including connectivity, water and air filtration, species habitat, and many others. Buffering Wildlands with carefully managed, largely natural lands is a critical priority for landscape conservation as a whole, but it is no substitute for additional very large Wildlands entirely controlled by natural dynamics.

*More than any other modern land category or management system, Wilderness recognizes our way of relating to the land and the Earth. The wilderness idea that humans are part of a larger “community of life” (and should act like it) has been known to my people for millennia...*

*The wilderness concept helps provide English words for what my ancestors have always intuitively known of this community. We are simple people, we understand if we take care of the land, the land will take care of us. We are interconnected to the land, water and animals.*

—Bernadette Demientieff,  
“A Gwich’in Perspective,”  
2021



© Linda Mirabile

## Recommendations

New England has tremendous opportunity to develop a more robust network of Wildlands, integrated with managed Woodlands and farmlands, supporting diverse human communities that benefit in health and welfare as nature thrives around them. This future is possible because the level of support for land conservation has reached a historic peak regionally and nationally; the number and diversity of Wildland advocates and landowners is increasing; and Wildlands are recognized as critical for addressing the global crises arising from climate change, biodiversity loss, and threats to human well-being. Both the opportunity and the need for Wildland conservation in New England have never been greater.

To secure this future, it will be necessary to:

- **Center Wildlands in an integrated approach to land planning and conservation**, one that includes actively managed forests and farms and sustainably designed communities supported by a low-carbon, demand-reduction economy. Increased local production of agricultural and forest products can provide valuable jobs with low impact on the environment, securing the functionality of the land and avoiding extraordinary climate-change costs.
- **Strengthen existing Wildlands**, specifically:
  - ~ **Develop clear intent**. Ensure that all Wildlands are designated explicitly and protected by clear legal or regulatory language.
  - ~ **Reinforce the unique qualities of wildland management**. Clarify that passive management is the norm, with only rare and minimal human intervention.
  - ~ **Increase the protection of Wildlands in perpetuity**. Add permanent legal protections to Wildlands presently protected by policy, management plans, or stated intentions.
  - ~ **Enhance the landscape setting for Wildlands**. Establish many more and larger Wildlands in a regionally connected network that secures the full diversity of nature. Distribute Wildlands in all biophysical regions and all geophysical settings—appropriately sized, connected, and buffered by protected lands to provide their full ecological function.
- **Advance Wildland conservation, significantly, thoughtfully, and strategically**, specifically:
  - ~ **Recognize the region's history when establishing conservation goals**. Build relationships with and learn from Indigenous and local communities that have long and deep relationships with the land on which we all live and work, and which we seek to conserve.
  - ~ **Embrace humility in conservation**. Learn from nature's ability to manage itself, in spite of natural and anthropogenic stresses and disturbances.
  - ~ **Realize the vision for landscape-scale Wildlands**. Strive for vast, interconnected Wildlands stretching across the region.

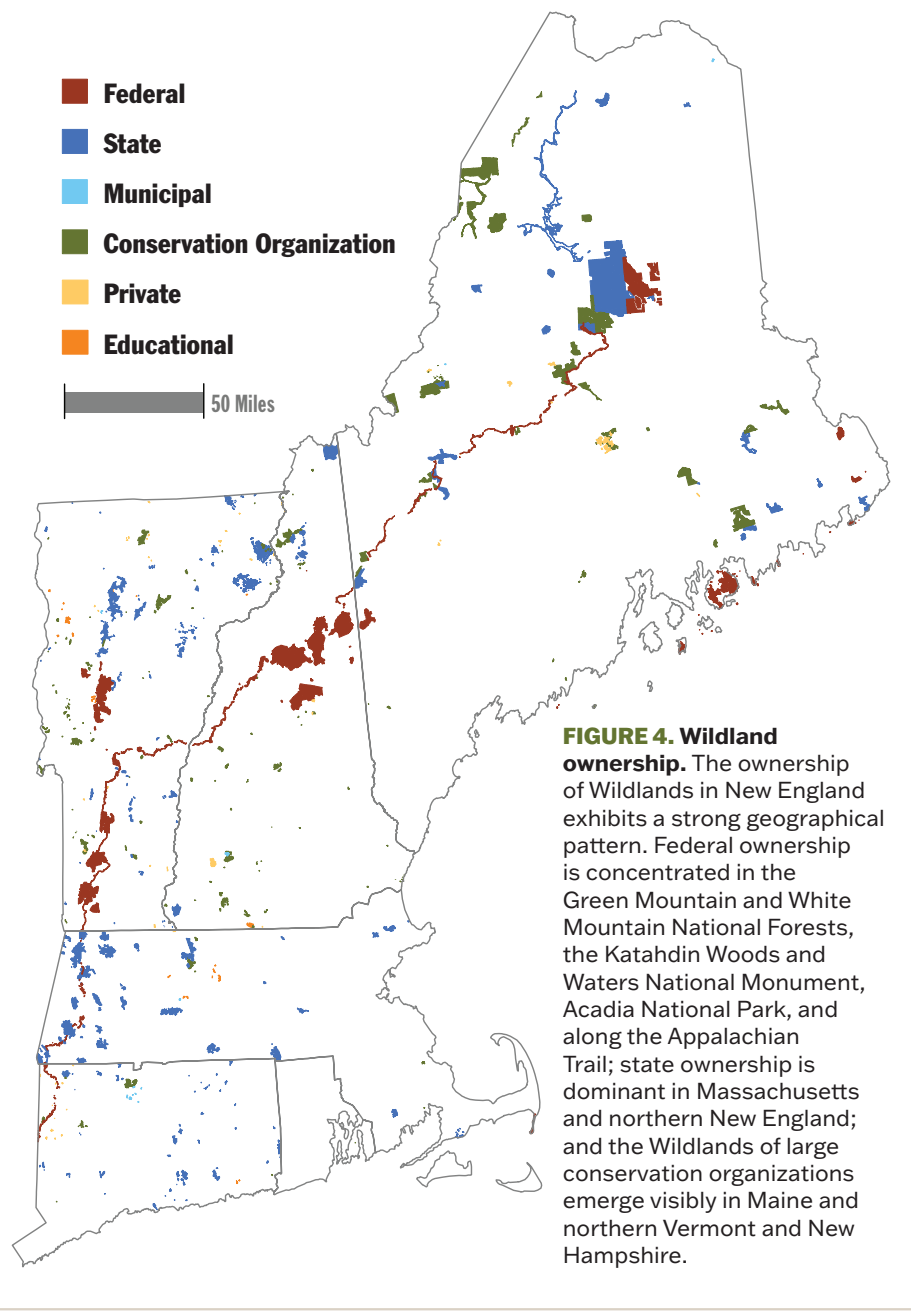
- ~ **Ensure that diverse landowners and groups are included in Wildland conservation**. Exchange knowledge with private landowners, private land trusts, municipalities, and Indigenous groups. Ensure that new Wildlands offer benefits to all people in all places by establishing a combination of small reserves close to major population centers, medium-sized reserves in lightly settled and rural areas, and expansive wild landscapes in more remote and largely forested places.
- ~ **Advance Wildland policy at local, state, and federal levels**. Engage and educate policy makers in Wildland conservation science and practice and promote Wildland protection at all government levels.
- ~ **Increase public and private funding for integrated approaches to land planning and conservation**. Inform decision makers and both state agency and nonprofit organization staff of model state policies and programs from across the United States that incentivize the integration of land planning, conservation, and community development through public-private partnerships and funding.

## Advancing Wildland Conservation through the WWF&C Commitment

The Wildlands, Woodlands, Farmlands & Communities (WWF&C) partners remain dedicated to advancing and strengthening our ambitious goals for land protection and planning. Our commitment to Wildland conservation is strengthened and informed by this study and will be further advanced by engaging in the following activities:

- **Increase Wildlands outreach, education, conservation action, and policy development** through the collaborative communication initiative and joint policy program of WWF&C and Food Solutions New England.
- **Evaluate elevating the goal for Wildlands in the region to 20 percent or more**, considering this report's findings and international goals for Wildland conservation. Extend this research by examining New England's potential to produce a greater proportion of the wood resources and food consumed in the region to help address the growing crises of climate change, biodiversity loss, and food insecurity.
- **Integrate Wildland conservation, local food and resource production, and community development**. Support a network of diverse people and organizations to accelerate the pace and scale of Wildland conservation alongside the protection of well-managed Woodlands and farmlands to promote equitable access to natural lands, foods, and products, as well as the sustainable and equitable development of increasingly climate-resilient communities.
- **Enhance and maintain the New England Protected Open Space database and web map with Wildlands** as part of the WWF&C website to aid education, conservation, and land planning.

## Wildland Ownership



**FIGURE 4. Wildland ownership.** The ownership of Wildlands in New England exhibits a strong geographical pattern. Federal ownership is concentrated in the Green Mountain and White Mountain National Forests, the Katahdin Woods and Waters National Monument, Acadia National Park, and along the Appalachian Trail; state ownership is dominant in Massachusetts and northern New England; and the Wildlands of large conservation organizations emerge visibly in Maine and northern Vermont and New Hampshire.



© Shelby Perry

© David R. Foster





# Introduction and Background

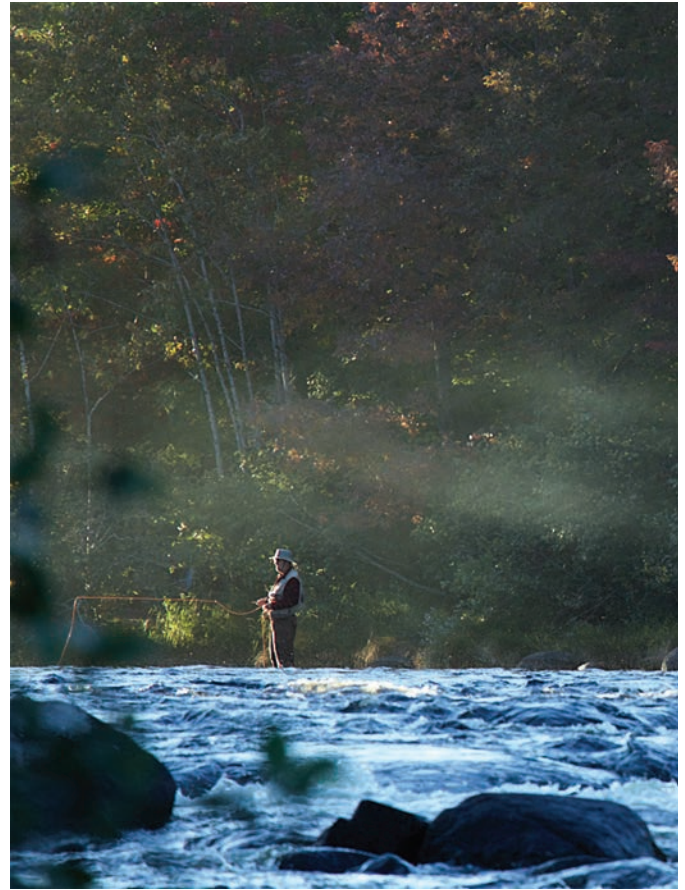


In 2004, a group of ecologists, foresters, and environmental historians gathered at the Harvard Forest in Petersham, Massachusetts, to discuss a seemingly simple question concerning land conservation in New England. Given the region's history of deforestation, farming, and logging, the group asked whether the region's subsequent transformation through farm abandonment and natural reforestation warranted support for wildland conservation. That is, did it make sense, in a cultural landscape shaped by centuries of intensive colonial land use following millennia of Indigenous activity, to conserve large tracts of land to operate freely as wild areas? After discussing the issue intensely, the group fully embraced Wildland conservation in New England.

However, the group also recognized, as did Bob Marshall, Aldo Leopold, Benton MacKaye, and other founders of the Wilderness Society before them, that the resulting wild tracts needed to be immersed in a much larger landscape of extremely well-managed forests that were protected from development (i.e., Woodlands) to yield wood products and many complementary benefits to nature and society. Moreover, given the healthy benefits of locally produced food, over time the group came to embrace a grander conservation perspective in which well-managed farms and forests would knit together with well-planned and livable communities, ranging from rural forested and farming villages to suburban towns and more densely populated cities. Thus, starting with a singular focus on wildlands, the Wildlands, Woodlands, Farmlands & Communities initiative arose (Foster et al. 2005, 2010, 2017; Donahue et al. 2014). The group embraced the notion that nature and society must and can thrive together, but only if the entire region is managed in a thoughtful, just, and integrated manner that honors all life and all people.

## The Knowledge Gap: Where Are the Wildlands?

From the beginning in 2004, one critical piece of information was recognized as frustratingly elusive—a comprehensive list and map of the region's Wildland areas. Until the publication of this report two decades later, that information has remained unavailable for New England as it has for most of the United States and the globe. This data gap does not arise from a lack of interest or effort. Indeed, the value of accurate maps of wild areas has been recognized in the United States throughout the last century. In 1936, Bob Marshall and Althea Dobbins strove to identify the potential wilderness areas in the contiguous United States by compiling *Largest Roadless Areas in the United States* (Marshall and Dobbins 1936; Belote and Aplet 2016). Their initial effort reported more



© David R. Foster

than 3,200 square kilometers (1,240 square miles) of unfragmented tracts of forest and desert; 45 percent of this area is now formally protected as Wildlands, 15 percent remains roadless, and the rest is partially fragmented (Belote and Aplet 2016). Formal Roadless Area Review and Evaluation (RARE) reports were mandated by Congress and completed in 1972 (RARE I) and 1977 (RARE II) by federal agencies to guide Wilderness designations on federal lands throughout the United States. The Marshall-Dobbins compilation was updated and greatly expanded in 1992 by Dave Foreman and Howie Wolke (1992) in *The Big Outside*, which identified 368 wilderness regions in the United States outside of Alaska. That same year in Massachusetts, Nancy Smith began leading Sweet Water Trust to advance wildland conservation in New England and began collaborating with The Nature Conservancy to categorize conservation areas by management status, with the ultimate goal of identifying all wild areas free from active management (Bateson and Smith 2001), an effort that was never completed.

A complementary, but distinctly different effort to locate New England's remaining old-growth forests—tracts supporting large old trees with little evidence of

human impact—was advanced through the heroic archival and field work of many researchers (Cogbill 1985, 1995, Dunwiddie and Leverett 1996, Dunwiddie et al. 1996, Davis 1993, D’Amato et al. 2006, Barton and Keeton 2018). The resulting map of old-growth forests in Massachusetts provided a highly conservative underestimate of wildlands in the first Wildlands and Woodlands report (Foster et al. 2005). This use of old-growth forests as a surrogate for wildlands was undertaken with full recognition that many old-growth tracts are still not permanently protected from harvesting and that, conversely, numerous second-growth forests qualify as Wildlands due to their “forever wild” protection from active management.

Through this history of uncertainty concerning the extent and location of the region’s wild areas, powerful visions emerged for connected systems of Wildlands across and beyond New England. These visions have been spurred on by groups such as the Northern Appalachian Restoration Project and its [Northern Forest Forum](#) (NFF 2002; Sayen 2023), Sweet Water Trust (Smith and Bateson 2001), the Wildlands Project and [Wildlands Network](#) (2022, Noss 1992, Foreman 1999), [Northeast Wilderness Trust](#), [Appalachian Mountain Club](#), [The Nature Conservancy](#), the Northern Forest Alliance (1997), and [Two Countries One Forest](#). During the 1990s, the four-state (New York, Vermont, New Hampshire, Maine) Northern Forest Lands Council (1994) resisted calls for the establishment of large Wildlands, but it did recommend the establishment of state-based ecological reserve systems. Support for Wildland conservation has grown progressively both regionally and globally, strengthening in recent decades with recognition of the unsurpassed role

that passively managed forests play in mitigating climate change and yielding environmental and social benefits (Finzi et al. 2021, Anderson 2021, IPCC 2022).

## Goals of the Present Study

The current research emerged from this history of uncertainty, research, and advocacy concerning Wildlands and sought to fill the large gap in information through a rigorous and consistent process. To address that task and inform conservation planning and decision making, the Harvard Forest, Highstead Foundation, and Northeast Wilderness Trust launched this collaborative study with the following goals:

- Establish a definition of Wildlands applicable to the land ownership of New England, and of the United States;
- Identify all lands fitting this definition from over 650 areas recommended by hundreds of groups;
- Develop and maintain an open-source database and web map for all Wildlands and protected conservation lands in New England, adding to and complementing existing conserved lands databases;
- Disseminate the results and recommendations to landowners, practitioners, and policy makers to increase the understanding, appreciation, and conservation of Wildlands as a critical part of an integrated approach to land planning regionally and worldwide;
- Initiate further research on and tracking of Wildland conservation as part of the WWF&C initiative.

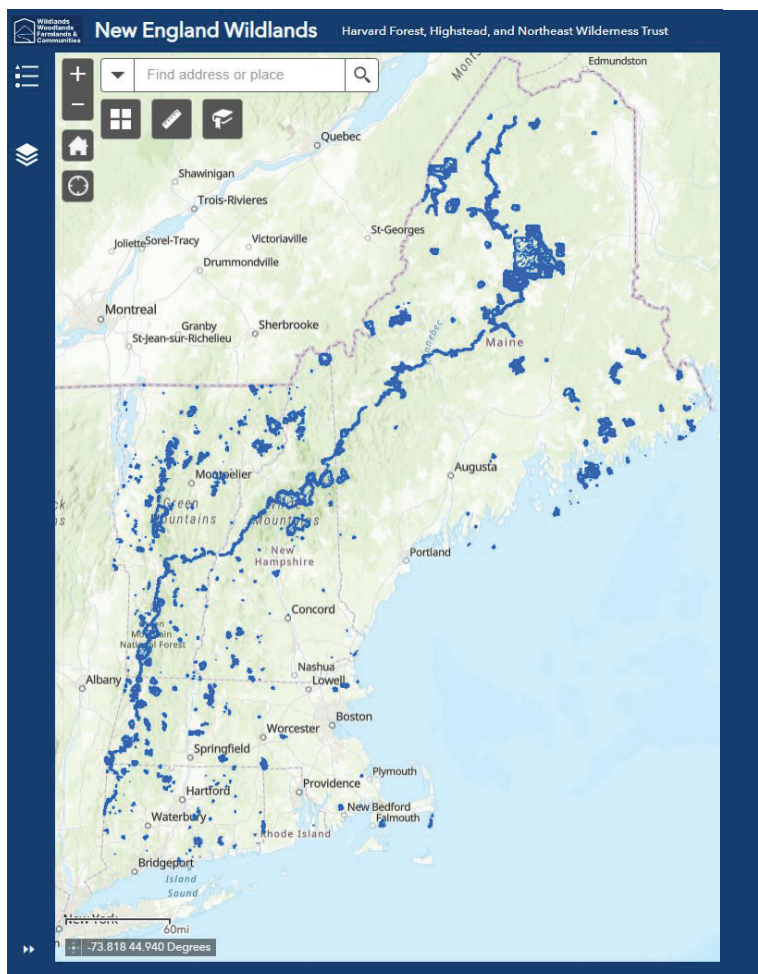


## BOX 1 / Wildland Visions for New England and the Appalachian Region

Visions for the Wildlands in New England date back at least to Henry David Thoreau's trips to northern Maine, but were first articulated in the early twentieth century and continue to motivate many people today. Here, we review five that have been impactful on conservation thinking and action.

**I. The Appalachian Trail.** The first big vision for Wildlands in the Northeast was the one that has had the most evident impact on the region and yet, remarkably, is seldom recognized as a Wildland achievement. The Appalachian Trail (AT) is buffered, narrowly in most cases but robustly in a few, by Wildlands on federal, state, and private lands to form a distinctive track running southwest across the region, from Mount Katahdin to the Connecticut–New York border. This linear array of Wildlands arose from Benton MacKaye's 1921 "[An Appalachian Trail: A Project in Regional Planning](#)," a truly visionary article published in the *Journal of American Institute of Architects* that proposed a primitive or wilderness path running down "the skyline along the top of the main divides and ridges of the Appalachians through to Georgia." This trail and associated camping areas were intended by MacKaye to serve as the backbone for his even grander proposal for the reorganization of the demographic, economic, and social geography of the eastern United States (See Box 2; also cf., Anderson 2000, 2008, Cronon 2013).

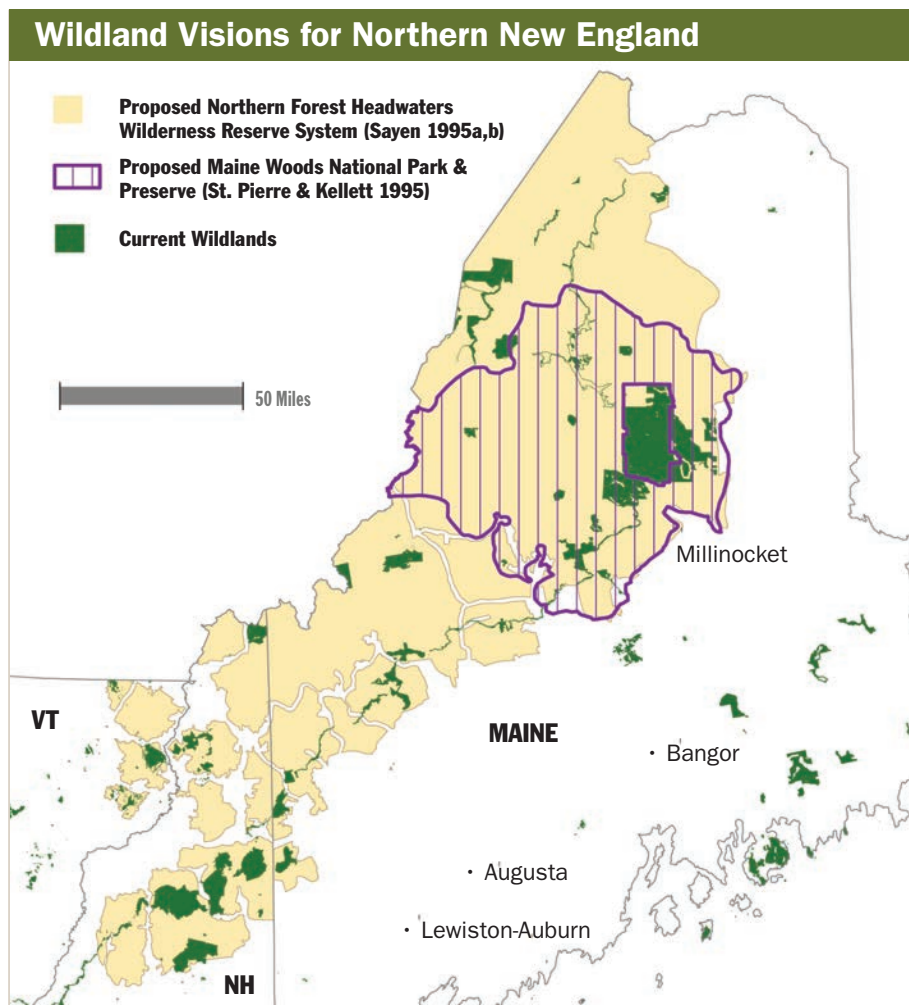
*As we search for strategies to protect and restore biological diversity and ecological integrity, we must grapple with the tragedy of Euro-American history—our cultural estrangement from the land.... The howling wilderness which so terrified and offended the European was the source of life, strength, and joy to the land-based indigenous cultures of North America. It was home.*  
—Jamie Sayen,  
"The New Wild Land Ethic,"  
1995



◀ **FIGURE 5.** At a regional scale, one of the most distinctive Wildland features of New England is the linear corridor, or "Wilderness Way," of the Appalachian Trail, which enters the region in northwest Connecticut and reaches its northern terminus on Mount Katahdin in Baxter State Park. The figure displays all of the Wildlands in the six New England states and is reproduced from the [New England Wildlands mapper](#), a digital mapping tool compiled by Brian Hall at the Harvard Forest as a major product of this project.

**II. The Appalachian Mountains: Vision and Wilderness.** Sixty-five years after MacKaye penned his grand regional plan, a writer and activist hiking the Franconia Ridge section of the AT recognized that widening this Wildland corridor would yield the large connected system of reserves that conservation scientists were beginning to assert would be most beneficial for promoting ecosystem integrity, evolutionary vigor, and the survival of endangered species. Jamie Sayen developed this line of thinking in “The Appalachian Mountains: Vision and Wilderness,” an expansive 1987 article in the journal *Earth First!* that proposed “a contiguous Appalachian Wilderness reuniting the Florida Keys with the Maritimes of Canada by bolstering the backbone of “slipped disks and cracked vertebrae” represented by the AT and its associated protected lands. Sayen’s vision invoked the Mohawk tradition of Turtle Island and First People living in a sustained and sustaining way with the land before both it and they were violated by European colonists. The article spurred the formation of Preserve Appalachian Wilderness (PAW). A nonprofit organization active from 1987 to 1993, PAW advocated for large core reserves supporting old-growth forests and natural disturbance processes, buffered by extensive, mature, managed forests. It emphasized the potential for big Wilderness areas in the Green Mountains, the White Mountains, and the northern half of Maine that would support the recovery of native predators—cougar, lynx, wolf, and pine marten.

**III. Northern Forest Headwaters Wilderness Reserve System.** In 1995, focusing on those three northern New England states, Sayen refined his eastern vision in a detailed proposal for an 8.7-million-acre Northern Forest Headwaters Wilderness Reserve System. Published in *The Northern Forest Forum (NFF)* (NARP 1992–2002)—a magazine dedicated, as worded in its mission statement, to *Working for Sustainable Natural & Human Communities* by advancing local forestry, farming, fisheries, communities, and tribal concerns—the proposal sought to establish



**FIGURE 6. Wildland Visions for Northern New England.** The proposed Northern Forest Headwaters Wildland Reserve System (Sayen 1995a,b) would be comprised of numerous nearly contiguous Wildland reserves stretching across northern Maine into northern New Hampshire and northeastern Vermont. The Maine Woods National Park proposed by RESTORE (St. Pierre and Kellett 1995, RESTORE 2022) falls within this larger area in north-central Maine. By comparison, existing smaller Wildland areas that are described in the present study are highlighted throughout the region and form a highly discontinuous pattern. [Based on a map developed by Brian Hall for *Children of the Northern Forest: Wild New England’s History from Glaciers to Global Warming* (Sayen 2023).]

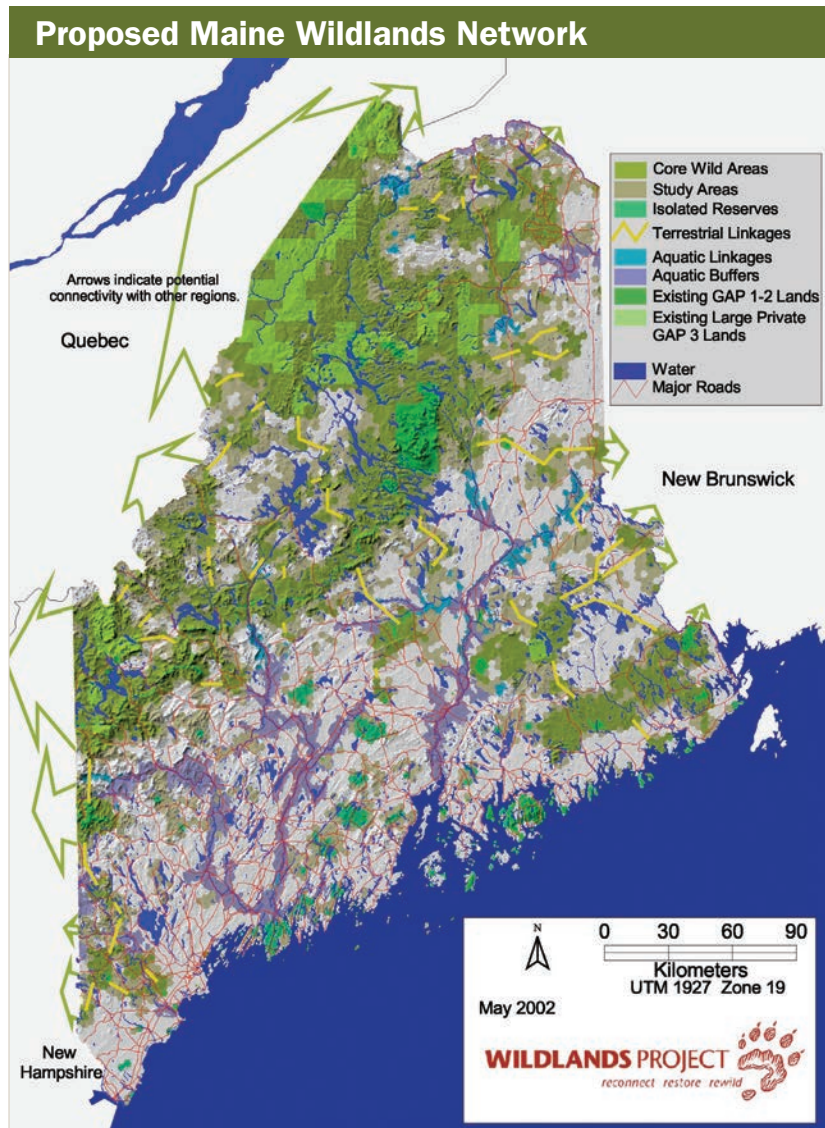
## BOX 1 / Wildland Visions for New England and the Appalachian Region

a network of 16 very large Wilderness Reserves ranging in size from 20,000 to 4.6 million acres to protect and restore native biological diversity (Noss and Cooperrider 1994) and evolutionary and ecological integrity, while advancing economic revitalization, cultural restoration, and political restoration. The 1995 issue of *NFF* dedicated to the Headwaters Reserve included a number of supporting articles that addressed: a new land ethic that recognized that the howling wilderness of colonist Cotton Mather was home and the source of life, strength, and joy to the Indigenous people of North America (Sayen 1995c); new economic directions afforded by Wildlands (Whittaker 1995); the principles of Low Impact Forestry (Lansky 1995b); and an economic argument for public land acquisition (Publicover and Steinbach 1995).

### IV. Maine Woods National Park.

Centered within the Headwaters boundaries in northern Maine and surrounding Baxter State Park, the 3.2-million-acre Maine Woods National Park was proposed in 1994 by Michael Kellett and David Carle of **RESTORE: The North Woods**, a regional wilderness advocacy group, and championed by *The Northern Forest Forum* in its promotion of regional sustainability (Kellett 1994). At the time, RESTORE estimated that the entire park could be purchased from large timberland owners for \$300 million. The group developed a sustained outreach and policy campaign supported by more than one hundred organizations and businesses (Long et al. 2002), the writing and advocacy of Kellett, Jym St. Pierre, and others, consistent exposure in *The Northern Forest Forum* (e.g., St. Pierre and Kellett 1995), and the development of many products including a faux national park pamphlet and map and brochures (RESTORE 1999, 2000, 2022). A regional economic analysis by Thomas Power (2001a,b) cast the large Wildland as a viable, alternative economic base for local communities

and a region long dependent on a declining timber industry controlled by multinational firms. The effort broadened to promote the reintroduction of wolves to the Northeast (Deboer 1998) and to mount an early and persistent effort to thwart expansive housing, commercial, and industrial development of lands in the Moosehead Lake region owned by Plum Creek Timber Company, Inc. (and subsequently Weyerhaeuser), as well as opposing subsequent proposals for power lines through the north woods (Kellett 2000).



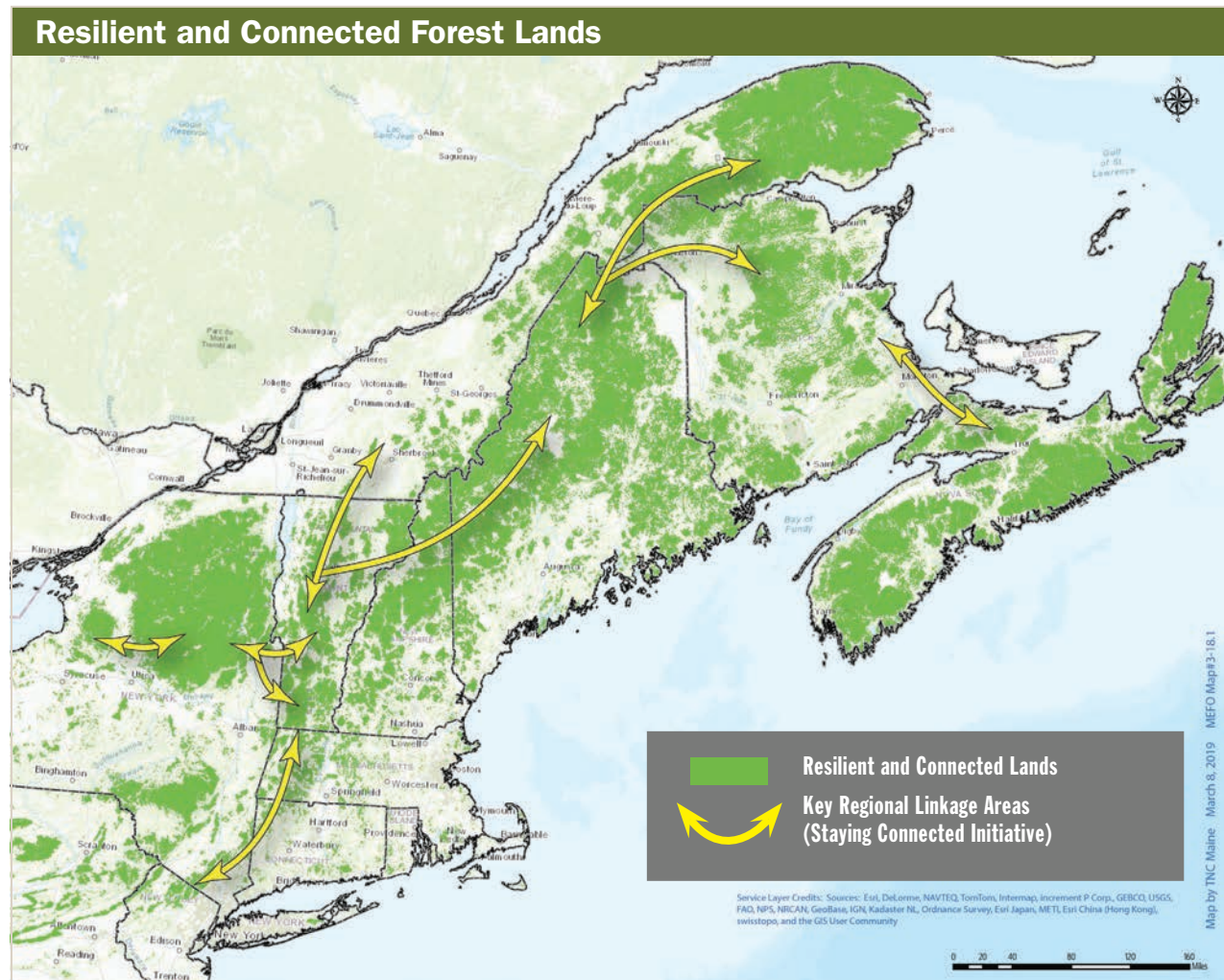
**FIGURE 7. Proposed Maine Wildlands Network.** Applying a wide range of terrestrial and aquatic data and extensive quantitative analyses, the Wildlands Project (Long et al. 2002) produced an integrated vision for conservation in Maine that prioritized linkages and buffering of key regions for biodiversity, wildlife movement, and ecological processes. [Reprinted with permission.]

## BOX 1 / Wildland Visions for New England and the Appalachian Region

### V. Maine Reserve of the Wildlands Network.

One of the region's most scientifically rigorous proposals for expansive Wildlands emerged when the Maine Wildlands Network applied the biosphere reserve concept (UNESCO 1974, Noss 1983) to the biodiversity goal of representing native ecosystem types, maintaining viable populations of native species, sustaining ecological processes (disturbance, hydrology, nutrient cycling, and biotic interactions), and adapting to environmental change (Long et al. 2002). The approach evaluated landscape diversity, special elements such as large wetland complexes and roadless areas, and the habitat needs for populations of focal and keystone species, including large carnivores (lynx and wolf) and mesocarnivores (marten) that play an important

role in ecosystem function. The resulting design—which included nearly 7.4 million acres of core wild areas, 300,000 acres of aquatic linkages, and 1.2 million acres of aquatic buffers—sought to connect with wildland networks from Ontario and across Vermont and New Hampshire to the Adirondacks (Reining 2002, Reining et al. 2006). These calls for a structured approach to land planning were reinforced by studies seeking to determine the minimum size for forest reserves in the region (Anderson et al. 2002) and persistent calls for wildlands to cover from 25 percent to 50 percent of the landscape on public lands in regionally and continentally connected systems within a matrix of sustainably managed private lands (Klyza 2001b). The focus on the public purchase of Wildlands was galvanized by growing recognition



**FIGURE 8.** The regional context for Wildland visions and proposals across New York, New England, and adjoining eastern Canada, depicting resilient and connected forest lands as identified by Anderson et al. (2016) and represented by The Nature Conservancy (TNC)–Maine (2019). Key regional linkage areas identified by the [Staying Connected Initiative](#) (SCI) within this region and across state and national borders are shown as large arrows. [Map modified from TNC–Maine 2019 by Dan Coker and reprinted with permission.]

## BOX 1 / Wildland Visions for New England and the Appalachian Region

that so-called mega-easements were expending significant public and private funds for development rights on corporate forest lands that had little actual development threat, while doing little to curtail ongoing environmental degradation through clear-cutting, herbicide use, road development, and related forestry practices (Long et al. 2002).



These Wildland visions share many common motivations, perhaps most importantly establishing truly immense Wildland areas so that natural landscape-scale processes and wide-ranging organisms can operate freely in ways not possible for centuries in New England. Such a future must also honor the sacred cultural traditions that Indigenous groups have yet to see incorporated into the current conservation movement. While these visions have yet to gather adequate support and funding to advance to their full realization, their strong underlying scientific, economic, and social rationale coupled with persistent public outreach and policy initiatives has done much to galvanize public and private support for Wildland conservation. They have led to major Wildland achievements in northern New England over the last four decades (Table 1). The largest private efforts have been in Maine: Katahdin Woods and Waters National Monument (77,007 acres) purchased by the Quimby family and accepted by the National Park Service along with an endowment of \$40 million in 2016; six large tracts acquired by The Nature Conservancy; and five by the Appalachian

Mountain Club as part of its Maine Woods Initiative. This latter effort, which dates to 2003 and centers on the 100-Mile Wilderness, is described as “an innovative approach to conservation that combines outdoor recreation, resource protection, sustainable forestry and community partnerships” (Publicover 2013, 2016, Vail 2016). Large Wilderness areas were designated in the White Mountain National Forest in 1984, 1990, and 2006 and in the Green Mountain National Forest in 2006. In 2002, the Northeast Wilderness Trust was established as the region’s only regional land trust focused exclusively on rewilding and protecting wilderness areas and has protected more than 41,000 acres of Wildlands in 44 Wilderness Preserves.

In the vast majority of these Wildland visions (and projects that have been completed), the intent is to advance the health and well-being of natural and human communities together, including strong consideration of Indigenous populations (Power 2001b, Publicover 2016). This shared motivation leads to a vision for the region in which wild areas are buffered and supported by actively managed forestlands and farmlands that sustain equally well-designed human settlements. It seeks to enable human communities and natural ones to be integrated in ways that resonate with the earliest Wildland vision of a century ago. As with that vision of MacKaye and other founders of the Wilderness Society, these efforts call for a major rethinking of political and economic systems to embrace and advance ecological sustainability, social equity, and the inherent values of nature. ♦



© Susan Bull Riley / The Mansfield Ridgeline / Oil on canvas

## BOX 1 / Wildland Visions for New England and the Appalachian Region

**TABLE 1: Wildland Areas Larger than 10,000 Acres Established Since 1980 in New England**

[Note: Year refers to the date when the Wildland was established as determined in this study and often postdates the year of original acquisitions. CE refers to Conservation Easement.]

WILDLAND	STATE	FEE OWNER	YEAR	ACRES
Katahdin Woods and Waters National Monument	ME	National Park Service	2016	76,633
Upper St. John River Reserve	ME	The Nature Conservancy (ME)	2018	75,173
WMNF – Pemigewasset Wilderness	NH	US Forest Service	1984	44,048
Debsconeag Lakes Wilderness Area	ME	The Nature Conservancy (ME)	2007	38,987
WMNF – Sandwich Range Wilderness	NH	US Forest Service	1984	34,990
GMNF – Breadloaf Wilderness	VT	US Forest Service	1984	25,116
WMNF – Wild River Wilderness	NH	US Forest Service	2006	24,023
Spring River – Narraguagus Forest	ME	The Nature Conservancy (ME)	2021	22,947
GMNF – Glastenbury Wilderness	VT	US Forest Service	2006	22,261
Connecticut Lakes Natural Area: Nature Preserve	NH	State of New Hampshire – F&G	2002	14,785
Mount Mansfield State Forest: Highly Sensitive Areas	VT	State of Vermont – FPR	ND	14,103
Bradley-Sunkhaze Preserve CE	ME	The Nature Conservancy (ME)	2007	12,762
West Mountain WMA – Core Area	VT	State of Vermont – VFWD	1999	12,440
GMNF – Joseph Battell Wilderness	VT	US Forest Service	2006	12,333
WMNF – Caribou-Speckled Mountain Wilderness	ME	US Forest Service	1990	11,324
Nahmakanta Ecological Reserve	ME	State of Maine – BPL	2001	11,047
Roach Ponds Reserve CE	ME	AMC–MWI–LLC	2011	10,480
Vickie Bunnell Preserve	NH	The Nature Conservancy (NH)	2001	10,450
Mount Greylock State Reservation	MA	Commonwealth of Massachusetts – DCR	2012	10,342
Katahdin Iron Works CE – Ecological Reserve	ME	AMC–MWI–LLC	2007	10,225
Leuthold 2011 – Number 5 Mountain	ME	The Nature Conservancy (ME)	2011	10,121
			<b>TOTAL</b>	<b>504,588</b>

*A thing is right when it tends to preserve the integrity,  
stability, and beauty of the biotic community.*

*It is wrong when it tends otherwise.*

—Aldo Leopold,

*“The Land Ethic” in A Sand County Almanac,  
1949*



## Historical and Ecological Setting for Wildland Conservation

Through the lens of ecological history, we can place the region's Wildlands in the context of the long-term dynamics of the New England landscape and human activity. During the last ice age, the Laurentide Ice Sheet covered the entire region until its retreat approximately 20,000 years ago. Approximately 10,000 years later, humans arrived in the region and, for the next 10,000 or so years before European colonization, the region was home to many Indigenous people and a diversity of old forests that varied under a continually changing climate (Fisher 1933, Lorimer 1977, Lorimer and White 2003, Foster et al. 2008, Oswald et al. 2007, 2020, Cachat-Shilling 2021). The natural dynamics of this largely forested landscape were dominated by small-scale disturbances and infrequent, but occasionally intense, meteorological events, including hurricanes, windstorms, ice storms, and drought; outbreaks of insects and pathogens; and geographically constrained processes such as flooding and beaver activity (Meigs and Keeton 2018). Outside the cold and dry conditions that favored boreal species during the early post-glacial period, fire was uncommon on all but sandy outwash soils and rocky ridgetops (Lorimer 1977, Engstrom and Mann 2011, Cachat-Shilling 2021, Oswald et al. 2020, 2023). Most forest regeneration occurred in small- to moderate-sized openings created by the death of one or several trees, leading to a prominence of long-lived and shade-tolerant tree species (Seymour et al. 2002, D'Amato and Orwig 2008). For the last 8,000 years a temperate climate supported forests that varied geographically in ways that would be familiar today, but contained old-growth trees and features that are largely absent from the modern landscape.

Oaks, hickories, black birch, and eventually chestnut were common in the south; beech, hemlock, yellow birch, white pine, and maple dominated the central and northern uplands; and increasing amounts of spruce, fir, and paper birch prevailed with northern hardwoods farther north and on mountains throughout (Cogbill et al. 2002, Thompson et al. 2013).



1880s

© Harvard Forest Archives



2010

© John O'Keefe

Following two centuries of deforestation and intensive harvesting, the southern two-thirds of New England had been transformed from a heavily forested region to an agrarian landscape of farms and scattered woodlots, with a peak in the mid-1800s. Following westward expansion and the removal and genocide of Indigenous populations, New England's extensive agriculture declined and allowed a process of natural reforestation to commence. As depicted in this pair of photographs from the Swift River in Petersham, Massachusetts (top: 1880s, bottom: 2010), the transformation of the landscape has been remarkable. This natural rewilding of the vegetation, animal life, and ecological processes across the region provide the basis and impetus for further rewilding and wildland conservation.

Indigenous people thrived throughout this landscape, living in small groups and in greater numbers in the south. Larger populations flourished in areas of abundant natural resources, such as river valleys, adjacent large wetland systems, and along coastal marshes and estuaries that were rich in shellfish, anadromous and catadromous species, and near-shore fisheries (Dincauze 2010, Chilton 2002, Goodby 2021). Life in small mobile groups that applied complex and seasonally varying foraging and hunting systems across the landscape provided great flexibility in coping with changing climatic and ecological conditions (Foster et al. 2008, Foster 2017). Horticulture played a minor component of subsistence strategies that never embraced the large agriculturally centered villages distinctive to many Indigenous groups to the west and south of New England (Duranleau 2009, Chilton 2010, Goodby 2021). As a consequence, the estimated one hundred thousand or so people exerted modest, though locally intensive impacts on the region's 40 million acres of land (Cachat-Schilling 2021). For many thousands of years, climate change and natural disturbances controlled the pace and nature of ecological change, with wildlife and human activity playing a subtle role in modifying ecological processes (Oswald et al. 2020, Cachat-Schilling 2021). Although a peopled land for millennia, New England was a vast, heavily forested, untrammled region supporting an array of native plants and animals with concentrated areas of significant human impact.

Beginning in the sixteenth century, human relations with the land began to change and then transform with

the arrival of increasing numbers of European explorers, whalers, fishermen, trappers, and finally, colonists. The newcomers engaged, displaced, uprooted, and catastrophically reduced the population of Indigenous people through trade, disease, conflict, land theft, settlement, and ecological destruction (Spence 2000, Taylor 2016). They simultaneously reduced or eliminated important game species and predators and progressively converted forests to farms and villages, starting along the coast and major river valleys (Foster et al. 2002). Outside of the vast far north and rugged mountains that comprise half of New England, the southern region took shape as an agrarian landscape of pastures, crop fields, woodlands, many villages, and a few emerging cities. Remaining forests were cut for fuelwood, charcoal, potash, lumber, furniture, and then pulp. Streams and rivers were degraded by deforestation, erosion, dams, log drives, and, as industry and populations increased, by effluent and sewage. Yet, even as farming peaked in the last half of the nineteenth century, New England's agrarian landscape began to return to forest through a process that Henry David Thoreau documented and termed "the succession of forest trees" (Foster 1999). Thousands of farms and millions of acres of pasture were abandoned and reforested naturally. As forests began to regrow, timber harvesting and wood product industries peaked and then gradually declined as these enterprises shifted to other parts of the country and world (Hall et al. 2002).

In contrast, in the vast "North Woods" of northern Vermont, New Hampshire, and Maine, a harsher climate, rugged terrain, and poorer soils for agriculture



A log drive on the White River in Vermont gives a sense of logging and deforestation in northern New England in the nineteenth and early twentieth centuries.



© David R. Foster

On Wilderness areas in the White Mountain National Forest that were heavily harvested and burned in the nineteenth and twentieth centuries trails now replace old logging roads and railroad beds, the forests have regrown, and natural processes assert themselves. Here, the trail and bridges have been eliminated by the occasionally raging forces of the Dry River.

limited colonial settlement but favored forest exploitation (Irland 1999, Judd 2014). Big white pines were selectively culled first, followed by old stands of spruce, pine, and northern hardwoods, which were eventually cut repeatedly to feed the region's sawmills, tanneries, and extensive paper industry (Irland 1999). Today, especially in the 8 million acres of northern Maine, expanses of cutover timberland occupy large parcels owned by a small number of large family-owned forest product companies such as Pingree and Irving and numerous absentee institutional and investment owners, along with conservation organizations and public agencies (Irland 2018, 2020, Sayen 2023). Despite falling investment and employment in the forest industry and significant mill closures, timber-harvest levels continue to roughly equal forest growth in northern Maine. As a consequence, the forests are predominantly young and the amount of standing wood or biomass is approximately half that found in southern parts of the state (Duveneck and Thompson 2019).

New England's land-use history has transformed its forest ecosystems (McKibben 1995, Foster and Aber 2004, Barton et al. 2012, Thompson et al. 2019). In comparison with the precolonial landscape, long-lived species such as beech, hemlock, and oak are greatly reduced whereas successional taxa such as red maple, birch, and aspen are

much more common (Thompson et al. 2013). Many features of thriving old-growth landscapes that were common four hundred years ago are rare, including immense old trees; large, downed trees that add complexity to the ground, streams, and lake shores; and deep, spongy soils occasionally churned into mounds and pits by immense windthrows. Meanwhile, although much of New England's wildlife has rebounded since Thoreau remarked that the muskrat was the largest native mammal in eastern Massachusetts, the largest of the native carnivores—wolf, wolverine, and cougar—remain absent (Foster and Aber 2004).

Nonetheless, the resilience of New England forests provides great opportunity for the expansive conservation of well-managed Woodlands and thriving Wildlands. Indeed, despite the region's great human population and the ongoing destruction of some twenty-five thousand acres of forest each year by development, New England is the nation's most heavily forested region. It is a landscape that is extremely well positioned in natural resources and conservation capacity for broadscale land protection, including Wildland conservation and purposeful rewilding (Klyza 2001a,b, Sayen 2023).

## Why Conserve Wildlands? A Wide Range of Values

As a complementary strategy to protecting actively managed Woodlands and farmlands, there are myriad reasons to protect Wildlands (Irland 1979, Trombulak 1998, Cordell et al. 2005, Baldwin and Beazley 2019). Paramount among them is that, for many, such places hold immense intrinsic value—wild nature simply has a right to exist, as do all of the species that inhabit Wildlands (Moore 2007). In addition to this inherent value, Wildlands are recognized as essential for maintaining and increasing biodiversity; mitigating climate change by storing large quantities of carbon; enhancing landscape resilience; offering quiet space for spiritual or physical renewal; and serving as reference sites for scientific inquiry and the development of ecological approaches to forest management and conservation.

Collectively, these benefits and values make Wildlands indispensable.

**Wildlands have intrinsic value.** In the millennia following the last continental glaciation, and until the rapid change that began with European colonization four centuries ago, the area we now call New England was predominantly wild forest, essential to human life but neither exploited nor actively managed at a broad scale. The authors of this paper share a belief that the wild condition, wild places, and the species that occupy them have intrinsic value.

**Wildlands contribute to local, regional, and global biodiversity.** When it comes to richness of life, there are important differences between forests that are actively managed for resource extraction and other purposes and those managed passively as Wildlands. In the Northeast, lands designated as Wildlands will largely become old forests with ancient trees and others of all ages; abundant down and standing deadwood; and species that are absent or less abundant in younger forests (Haney and Schaadt 1996, Tamao et al. 2020). A study of Pennsylvania old-growth forests, contrasted with younger forests in the Northeast, found that a number of bird species are many times more abundant in old forests. These include Blackburnian warbler (45 times more abundant), Magnolia warbler (40 times more abundant), and Swainson's thrush (20 times more abundant) (Haney and Schadt 1996). Lichen and bryophyte communities also differ in older forests—as cited by Lapin (2005) from his review of North American and European comparisons of old-growth and younger forest epiphytic plant communities. In our region, *Lobaria pulmonaria* is a conspicuous example among lichens, as it grows most commonly on old trees with complex bark structure. Among bryophytes, *Neckera pennata* is frequently reported as growing more abundantly on older trees. Studies of bryophytes in old-growth and young forests highlight many great differences (Lesica et al. 1991, Vellak and Paal 1999). Fungi, and underground mycorrhizal networks, are more diverse and more abundant in old-growth forests in the Pacific Northwest



© John Burk

where they have been studied more thoroughly than in the Northeast (Smith et al. 2002; Simard and Durall 2004). Above the ground, species richness of tree-inhabiting fungi is positively correlated with old-growth characteristics such as tree age diversity and abundance of deadwood (Tomao et al. 2020). Wildlands that are large and connected can offer important habitat to wide-ranging “shy” mammals such as cougar (LaRue and Neilsen 2011) and gray wolf (Potvin et al. 2005), both of which are currently absent in the region, and a few species—black bear and lynx for example—that are present but would benefit from more extensive wild forests.

**Wild forests store abundant carbon and mitigate climate change.** There is clear evidence that old and wild forests store large amounts of carbon, helping them to serve as an effective natural climate solution (Meyer et al. 2022). While the rate of carbon uptake (*sequestration*) is often higher in young forests, mature and old-growth forests typically remain stable or even net-positive carbon sinks for long periods, depending on disturbance and climate (Keeton 2018, Begović et al. 2022). In some cases old trees have shown a remarkable and unexpected ability to increase their rates of uptake as they emerge in the canopy after decades of competition (Cada et al. 2022). In two studies that have compiled decades of carbon flux data from mature hardwood and conifer forests in Massachusetts and Maine, the forests have been a consistent and large carbon sink for three decades and the rate of carbon uptake has increased as the forests have aged (Finzi et al. 2020, Hollinger et al. 2021). However, carbon cycling is highly dynamic across large landscapes and varies with forest type, site conditions, disturbances, and climate variability, such as drought. Importantly, *carbon storage*—the amount of carbon present in living and dead trees, on the ground, and in the soil—is significantly greater in old



***Wildlands offer quiet places for reflection.***

Many people value Wildlands for their quiet and as spaces to find solace in a busy world. Though wilderness has long been recognized for the value it affords humans (Marshall 1930, MacKaye 1929), an increasing body of research confirms the benefits of wild places to human mental and physical health (e.g., Thomsen et al. 2018). The opportunity to experience towering trees, the richness and subtlety of natural sounds, and the astounding diversity of life replenishes our spirits and lays the foundation for durable, reciprocal relationships between people and nature.

In an increasingly noisy and

hypertechnological world, Wildlands are essential for those who seek them and are beneficial to all.

***Wildlands are baselines and reference points.***

Wildlands have a lengthy history of serving as baselines and controls for scientific investigations and the development of ecological approaches to forest management and conservation (Fisher 1927, Spurr and Cline 1942, D'Amato et al. 2017). Such a comparative approach to research and innovation helps us to understand more clearly how natural systems operate in terms of disturbance,

forests, as reviewed in detail by Barton and Keeton (2018) and Catanzaro and D'Amato (2019). Old-growth northern hardwood-conifer forests can store up to three times more carbon than mature forests (Keeton et al. 2011). They are *carbon reservoirs*—the outcome of decades or centuries of past sequestration—locking up carbon that would otherwise flux to the atmosphere if logged or cleared, even when accounting for the fraction of total forest carbon transferred to wood products (Nunery and Keeton 2010). The most recent comprehensive analysis of approaches to mitigate climate change using forests estimated that Wildland management stored carbon at twice the rate of actively managed forest (Meyer et al. 2022).

***Wildlands add key contributions to a resilient landscape.*** Lands managed as Wildlands will, over time, grow increasingly complex in structure and function, yielding complex habitats that confer resilience with regards to critical attributes including water storage and flood resilience (Thom et al. 2019). As Wildland forests age and mature, they contribute abundant down wood in streams, along lakeshores, in wetlands, and on the ground, and their soils become richer in organic matter. These qualities, aided by the activities of beavers and the absence of roads, log landings, manufactured impervious surfaces, and culverts, contribute to keeping water in the woods, especially during the high rainfall events that are increasingly common as the climate changes. In wild forests, where soil is undisturbed, mycorrhizal networks help trees share carbon with one another, even between different species (Simard and Durall 2004). The older and less disturbed a forest becomes, the more connected these networks become, which in turn helps forests react to and survive stresses, further contributing to resilience. The myriad interconnected habitats in Wildlands offer great support for flora, fauna, and fungi to survive and adapt to a changing climate.





© David Middleton

regeneration, biodiversity, wildlife dynamics, and many other processes. This understanding is critical for anyone managing land, whether passively or actively. As described in a report by New England Forestry Foundation (NEFF), Wildlands provide a critical approach to forest management, and “undisturbed forest reserves provide scientists the best laboratories to investigate and monitor the intricate and complex ecological relationships and processes of forest ecosystems. They provide ecological benchmarks to compare with managed forest stands” (Perschel et al. 2014). In many ways, Wildland management is the foundation for our understanding, management, and conservation of nature.

**Wildlands are a key component in global goals for nature conservation.** New England’s Wildlands form a central component of **30x30**, the national and international goal to protect 30 percent of the land and waters of the Earth to address the looming crises of biodiversity loss, climate change, and threats to human welfare (Dudley and Stoljin 2022, Hiss 2022).

### Questions Guiding This Study

New England’s complex history raises many questions for Wildland conservation. That history includes slow natural and cultural change over millennia followed by comprehensive disruption of the prevailing ecological and cultural conditions with European colonization. Clearing of the land and displacement of Indigenous people was later followed by reforestation in more remote areas, and subsequent intensifying human settlement in urban and suburban areas. Among the questions raised by this history are:

- How does the concept of Wildlands accommodate the deep history of people on the land, especially Indigenous groups who rightfully seek access to and benefit from the region’s lands and waters?

- How do we incorporate the extensive legacies of past land use into the concept and approach to management of Wildlands that are designated to be forever wild? How do landscapes with a history of environmental degradation through intensive logging, fire, land clearing, and agriculture qualify as Wildlands?
- What level of human activity should be allowable, or necessary, for responsible Wildland stewardship in the face of perceived threats from climate change, other indirect human stresses and impacts, invasive organisms, and unknown future economic, biological, and societal needs and desires?
- What roles do and should Wildlands play alongside other lands in efforts to support nature and society in an increasingly populated and fragmented region like New England now and in the future?

This study seeks to grapple with these and other issues by exploring the current abundance, distribution, history, and characteristics of Wildlands in the six New England states. That effort commenced by clarifying the criteria that define Wildlands.



© Elizabeth H. Thompson

## What Is a Wildland? Developing a Clear Definition with Consistent Criteria

*“Wildlands” are tracts of any size and current condition, permanently protected from development, in which management is explicitly intended to allow natural processes to prevail with “free will” and minimal human interference. Humans have been part of nature for millennia and can coexist within and with Wildlands without intentionally altering their structure, composition, or function.*

Developing the criteria for Wildlands was a challenging and critical step in this study. Searching internationally, we failed to identify a standard that could be readily applied to the heterogenous range of ownerships, protection mechanisms, and management frameworks that characterize New England’s more than 100,000 conservation properties.

### The Approach to Defining Wildland Criteria

Our review of potential Wildlands revealed that diverse public and private landowners and entities engage in Wildland conservation to advance varied cultural, ecological, environmental, recreational, experiential, and spiritual objectives. These individuals and organizations also employ diverse mechanisms in securing the protected status of the properties, ranging from federal and state legislation to easements and other legal mechanisms, and

including administrative designations. The properties vary considerably in size, geographical, ecological, and cultural settings, land use and disturbance history, and current condition, and are exposed to a range of anthropogenic threats and stresses. All of these factors present challenges in defining the essential qualities of Wildlands. Adding to this complexity, wildland thinking and conservation practices have evolved over more than a century of active wildland conservation, and under changing legal, cultural, and ecological environments.

Despite growing support for wildland conservation there is no established set of criteria, and no inventory or registry for wildland properties at state or national levels. Strong federal interagency coordination in the development of standards applied to the National Wilderness Preservation System does provide key insights to our work (Cordell et al. 2015, Landres et al. 2008, 2015). However, these standards are not directly applicable to the plethora of other public and private Wildlands in our region. The lack of a clear wildland standard stymies baseline assessments and hinders public understanding, as well as coordination among wildland owners and efforts to build a coherent wildland network at landscape to continental scales. These challenges are especially great in New England where the complex pattern of private landownership is complicated by small property size, multi-jurisdictional responsibilities, and a great diversity of land-protection entities with diverse management goals and approaches.



© Natalia Boltukhova



To develop a clear standard for Wildland conservation we drew from the history of wildlands thinking, policies, and practice to select criteria that could be applied flexibly across the diversity of settings recognized above. Our review began by acknowledging the inherent ambiguity and paradox embraced in Wildland conservation. The ambiguity arises from the diversity of motivations for wildlands and lack of clear guidelines for their establishment and management (Aplet 1998, Aplet et al. 2000). The paradox of wildlands is multidimensional (Sayen 1990). First, wildland conservation occurs through purposeful management that seeks to minimize human land use and elevate natural processes. Like any land use designation, whether it be for development or managed woodland, it proposes to do this for lands that were home to Indigenous people for thousands of years and often managed intensively over recent centuries. Second, to ensure adherence, the hands-off approach to Wildland management demands unceasing human oversight to prevent violations and is the most challenging type of conservation to advance politically (Orr 2002). A third paradox is that the quality of wildness is defined not

by the land's history or its current condition but by its freedom to operate untrammelled today and in the future (Cole 2012). Thus, a recent clear-cut, securely protected from human manipulation, will qualify as a Wildland if that intent is in place and is enduring. In contrast, an adjoining old-growth forest that is not fully secured from future manipulation or conversion is not yet a Wildland. Wildland conservation embraces the full range of natural dynamics and their consequences, as driven by succession, disturbance, the arrival of new species, and environmental change. The future dynamics and ecological condition of every Wildland is uncertain, and may be surprising, outside the range of past conditions, as well as challenging to owners and managers. Wildland conservation is a complex and demanding undertaking.

The criteria we apply in our Wildland definition are derived from five principal sources. First is the well-articulated thinking behind the Wilderness Act of 1964 and its expansion in 1975. This includes the writings of Howard Zahniser (1956, 1957, 1961, 1963c, 1992; Harvey 1998, 2014), others promulgating that legislation, and the founders of the Wilderness Society, especially Bob Marshall, Benton MacKaye, and Aldo Leopold. A second critical resource is the application of the Wilderness Act across four U.S. agencies—Fish and Wildlife Service, Bureau of Land Management, Forest Service, and National Park Service (Landres et al. 2015). The third are, together, the national Protected Areas Database (PAD-US) and the International Union for Conservation of Nature (IUCN) standards for secured and protected lands (Dudley 2008, Dudley and Stolton 2022) and The Nature Conservancy's *Conservation Management Status* (Crist et al. 1998, Baldwin et al. 2018). The fourth is the influential writing of Jay Vest (1984, 1985) in *Wilderness Solitude: The Sacred Will-of-the-Land*, which explored the ancient history of wilderness and its etymological meaning of “self-willed land.” Finally, the review of hundreds of properties and conversations with dozens of conservation managers helped us refine the criteria that emerged.

### Wildland Criteria

We used three primary criteria to identify Wildlands in this study:

#### **Criterion i. Wildland Intent**

There must be a deliberate Wildland purpose or goal stated in the documents designating, enforcing, and guiding property management. The controlling entity must have the authority and *presumed* capacity to enforce this intent. It was beyond the scope of this study to evaluate this authority comprehensively.

**A third paradox is that the quality of wildness is defined not by the land's history or its current condition but by its freedom to operate untrammelled today and in the future.**



**Criterion ii. Management for an Untrammelled Condition**

The property is allowed to develop freely under prevailing environmental conditions and natural processes, including climate change, natural disturbances, and the arrival of new species. Management is not motivated by any explicit outcome and does not seek to either guide ecosystem development or shape ecosystem structure, function, or composition.

**Criterion iii. Permanent Protection**

Wildland intent and management are *either* in perpetuity *or* open-ended and expected to persist. Though well-conceived legal and legislative designations represent the most secure protection, no mechanism is perfect and not all Wildlands have this level of security. Recognizing that there is a gradient in the security among Wildlands, we accept a clear intent expressed in organization or agency policies, management plans, agreements, administrative decisions, or mission statements, if supported by a history of past actions and deemed likely to continue indefinitely. It is also recognized that other means of protection may arise in the future as, for example, public and private engagement with Indigenous groups and local communities increases (Wood and Welcker 2008).

Many additional criteria are emphasized in other treatments of wildland conservation, including size, remoteness, and naturalness as well as accessibility of the property and the opportunity it provides for solitude, self-reliance, recreation, and other human benefits (Lesslie and Taylor 1985, Soulé 1999, Dawson and Thorndike 2002, Cordell et al. 2005). While we capture many of these attributes in our analyses, they were not employed in the screening of properties. Indeed, guided by the belief that

Wildlands can benefit everyone and should be accessible to as many communities as possible, we include properties of any size and setting, from rural to urban. That said, due to the large number of properties under consideration, we only committed to reviewing properties consisting of more than 10 acres.

**Background: Recognizable Gradients in Management and Protection**

Our criteria were developed with full recognition of the major gradients among conservation properties in types and degree of active management and in the nature and security of protection from future development (Dudley 2008, Anderson and Olivero Sheldon 2011). While Wildlands occupy the extreme conservative end of the management gradient in which there is minimal impact, there remain significant differences in the interpretations of allowable or necessary intrusion by human activity in Wildlands and in the type, intensity, and frequency of management allowed on different Wildland properties. In similar fashion, the strength and durability of the mechanisms that secure a property as a Wildland vary in their legal nature and potentially in their effectiveness and durability over time. Therefore, Wildland *management* and *protection* each occupy a continuum and together form the broad axes of variation in Wildland condition. This variation in permitted management and protection compelled us to identify a subjective cutoff for acceptance of a property as a Wildland. It also enables a comparison of Wildland condition across a range of properties like those assembled in this study. Our data is freely available in online repositories to others who wish to analyze them employing other criteria or different thresholds for management and protection.



© Shelby Perry

We examine this variation in management and protection below. The broader context for gradients in wildland management and condition has been reviewed by Aplet (1998), the federal interagency group (Landres et al. 2015), and Lesslie and Taylor (1985), who present a Wilderness Continuum framework. Recognition of these gradients helps to differentiate Wildlands from other protected lands and should assist landowners and organizations in determining whether and how best to pursue Wildland conservation to meet their specific objectives.

### **Criterion i. Wildland Intent**

As described by Zahniser (1963b), intent is critical to the integrity of all Wildlands:

*No areas will persist as wilderness except as they are deliberately so preserved. Except as we manage them to be unmanaged they will certainly come under management.*

We examined supporting documents to ensure that the Wildland status for each property is purposeful. This intent may appear in the property description, with terms such as “wilderness,” “wildland,” or “forever wild,” or it may be inferred from objectives outlined for the property. The latter may include phrases such as: to allow “old-growth forest conditions to develop,” “natural processes to

prevail,” or “human impacts to be absolutely minimized.” Management on the ground must align with that intent and the responsible public or private party must have the authority to support the intent.

The application of intent as a criterion results in the exclusion of many properties that may not be actively managed and may develop without human constraint for other purposes or simply due to a lack of landowner engagement. These include areas secured principally for scenic qualities and recreation; for regulatory purposes such as water, wetland, or elevation protection; and due to physical constraints, inoperability, or inaccessibility. Because these areas are protected for purposes other than to ensure Wildland condition, their future management may vary in ways that are inconsistent with Wildland conservation (Landres et al. 2015).

### **Criterion ii. Management for an Untrammelled Condition**

To begin, it is critical to recognize that Wildlands are managed, as suggested by the above Zahniser quote. Wildlands are consciously managed to be free-willed, with minimal human interference.

This management criterion is informed by The Wilderness Act of 1964, which emphasizes the importance of management in defining a Wildland, as shown in the excerpts that follow:



© Jerry Monkman / EcoPhotography



© David R. Foster

Rapid recovery of a hardwood forest a year after an accidental fire in Baxter State Park, Maine.

*An act to establish a National Wilderness Preservation System for the permanent good of the whole people, and for other purposes.*

...

*A wilderness ... is ... an area where the earth and its community of life are untrammelled by man. ... An area ... retaining its primeval character and influence, ... managed so as to preserve its natural conditions.*

Above, the federal Wilderness Act begins with a clear intent followed by a hierarchy of qualities, as summarized by Zahniser (1963b):

*The first sentence defines the character of wilderness, the second describes the characteristics of an area of wilderness.*

[and]

*Wildness is a quality. Wilderness is an area of certain character. Wildness is the essence of wilderness, yet it characterizes also that which is not wilderness, including many natural and wildland areas that are not wilderness.*

In other words, the key criterion for Wildlands is management for the untrammelled quality of the area. Of secondary importance is the area's actual character as *primeval* or *natural*, terms that many early wilderness advocates used to harken back to times before colonial impacts that included the presence of Indigenous people, but which have subsequently been applied in ways that may ignore or deny that history (Taylor 2016, Fletcher et

al. 2021). By focusing on management, this approach, which was adopted in this study, is forward-looking and focused on the land's future condition rather than its past. It prioritizes minimal human intervention over past land use while recognizing the millennia-long and continuing presence of people (Cole 2001, Foreman 2001).

This forward-looking approach was decisively elevated by the Eastern Wilderness Areas Act of 1975,<sup>1</sup> which expanded Wilderness designations in the eastern United States where most sizable forested areas had a long history of land use, oftentimes including intensive harvesting, fire, and agriculture. That legislation took a pragmatic approach that fit the geographical setting by accepting lands of any condition, but it required that they be managed thereafter and in perpetuity for wildness and freedom from human constraint. In shifting the emphasis in the 1964 Act beyond lands that were primeval and natural, the 1975 and subsequent federal Wilderness bills in 1984 and 2006 centered the wilderness concept on places where wildness prevailed despite complicated land use histories. In doing so, it affirmed the Wilderness Act's national scope and application (U.S. Congress 1964, Turner 2001). This line of thought, embracing the notion that any land could be forever free and wild now and in the future, regardless of its past condition, set the stage for the introduction of the term *rewilding* (Sayen 1990, Martin 1992, Foreman 1999,) and the rewilding movement that emerged in the 1990s (Foreman 1999, IUCN 2021). Idaho Senator Frank Church, a champion of the 1975 legislation, made this intent clear (Turner 2001), stating:



*[Some] would have us believe that no lands ever subject to past human impact can qualify as wilderness, now or ever...Nothing can be more contrary to the meaning and intent of the Wilderness Act.*

**Untrammelled means free and self-willed, unbound, unhampered, unchecked, and unrestrained.** It does not imply the absence of humans, but only their lack of dominance in the landscape. Landres et al. (2015) translate the term into a clear management directive:

*The basic legal and philosophical tenet in wilderness is to watch what happens and not direct this change.*

The notion of untrammelled condition is conveyed in the word *wilderness*, which means “self-willed land” (Vest 1985, Foreman 1999). It emphasizes nature operating in a free, unconstrained, and unpredictable way, as opposed to the controlled and orderly fashion characteristic of modern civilization and human control. This condition existed across most of New England for millennia before colonization, as Indigenous people thrived, living on and with the land (Chilton and Doucette 2002, Mrozowski et al. 2019). Recognizing this Indigenous history of the region, the notion of a peopled wilderness, free from the designs of European colonization, industry, and manipulation, was advanced by Henry David Thoreau. This notion, including recognition of Indigenous rights to vast lands, was

subsequently embraced by Wilderness Society founders Marshall, MacKaye, and Leopold as they sought to protect large areas from the increasingly mechanized world and its rural manifestations, railroads, and automobiles (Glover 1986, Sutter 2002, 2004; but also see Marafiotte 2006).<sup>2</sup> The promotion of lands unconstrained by human action emphasizes the inherent value of nature, rejects the hubris underlying much land stewardship and “restoration” activity, and embraces humility in accepting nature as the sole determinant of future conditions.

Wildland management, although often rooted in a deep understanding of the land’s history, is undirected. It makes no attempt to recreate historical conditions, develop desired future conditions, or maintain the existing conditions and ecosystems. It establishes no target for individual species or environmental states. It accepts natural change as inherent to all ecosystems and allows ecological processes—natural disturbances, physical and biological flows, and their interactions—to operate without constraint. It is open to surprises, novel conditions and events that may challenge human comfort, aesthetics, and safety. As such, Wildland as a management scheme demands humility. It openly embraces ecosystem dynamics and rejects the notion of a static landscape with a fixed cast of flora, fauna, and fungi. As described by Colwell et al. (2014) for National Park Service (NPS) lands:

*The overarching goal of NPS resource management should be to steward NPS resources for continuous change that is not yet fully understood.*

Although an untrammled approach is the ideal, every organization and agency engaged in Wildland and Wilderness management recognizes that practical considerations may limit its application under certain circumstances. Variation in the interpretation and response to the range of issues confronting managers differentiates organizations and ultimately determines whether a property is a Wildland or not.

### Challenges to Wildland Management

Many groups that embrace Wildland conservation desire to retain the ability to intervene under unusual circumstances to address specific issues that affect, for example, “human safety,” “ecological integrity,” or “extreme impacts on ecosystems.” In developing our management criterion, we recognized these widely shared concerns and sought to draw an admittedly arbitrary line between acceptable and unacceptable management practices. In this effort we have consulted organizations such as Northeast Wilderness Trust, Appalachian Mountain Club, and The Nature Conservancy in Maine, many colleagues at other land trusts and agencies, and reports of the interagency task force (cf., Scott 2002, Stephenson and Millar 2014).

We began by focusing on the definition of trammeling employed by the federal interagency group (Landres et al. 2015), which describes a *trammeling action* as “an action

that intentionally manipulates ‘the earth and its community of life’” and further defines the terms “*intentional*: done on purpose; deliberate; willful” and “*manipulation*: an action that alters, hinders, restricts, controls, or manipulates.”

Two crucial concepts emerge from this definition: restraint and intentionality. Trammeling occurs when opportunities for restraint are ignored or bypassed; if there is no opportunity for restraint, there is no potential to trammel. Activities such as climate change, air pollution, the dispersal of species, herbivory, and natural disturbances, mandated federal control of a damaging invasive insect, and human emergency operations—which occur *largely* outside of a manager’s control—are *not* trammeling. Actions may be taken to minimize the impacts of these activities, but their occurrence is not trammeling.

Intentionality relates to the *purposeful* manipulation of the structure, function, and composition of a landscape or ecosystem. Minor small-scale actions that carry no intent to alter the ecosystem or direct its future trajectory may occur. Examples include maintaining backwoods cross-country ski and hiking trails, installing small-scale scientific instruments, removing trash, restoring a campsite, and conducting search-and-rescue operations. In evaluating these practices, a pragmatic threshold is generally established for the maximum scale (size, magnitude), frequency, and duration of the response.



© Jerry Monkman / EcoPhotography

Farmlands and Wildlands often exist in close proximity, and moving from one to the next can offer a dramatic contrast.



© Paul Willis

When acquired by Northeast Wilderness Trust, the Binney Hill Wilderness Preserve contained a large log landing (top) that suffered from compaction by skidders and was heavily used by off-road vehicles. A gate was installed to curtail vehicle access and topsoil and a seed mix were added to attract pollinators and control erosion. The following summer the site supported bees and butterflies (bottom) and native trees and shrubs began spreading in from around the edges.

The establishment and application of management standards is especially challenging given the increasing number of invasive organisms and changing technologies for recreation and accessing the land.

Ideally, Wildland management prioritizes wildness over the specific goals, benefits, and values that motivate Wildland conservation, such as supporting biodiversity by conserving critical habitat (Sarkar 1999). In practice, many organizations emphasize the protection of rare species and so our criteria required us to set pragmatic thresholds for management type and intensity in Wildlands. Hand-weeding of nonnative species competing with a rare species may be allowed, whereas broad application of herbicides, fire, or mechanical treatment to maintain an open forest understory or to perpetuate successional vegetation for the benefit of open-land species are not because they purposefully alter the trajectory of ecosystem development.

A few other issues arise frequently enough to warrant discussion, including:

### **PREEXISTING CONDITIONS**

Trammeling activities should cease when Wildlands are designated. However, given the complex land-use history of Wildlands, we encountered nonconforming situations that we noted as exceptions. These include old woods roads and former skid roads used infrequently for supervision or travel between properties; historical structures such as stone walls, cellar holes, rock mounds, cemeteries, and abandoned equipment that are retained as legacies of prior human use; and remote campsites or small seasonal structures. In general, this study treats public roads, active private roads, and maintained structures as exclusions from Wildland areas.

### **RESTORATION OF ECOLOGICAL PROCESSES AND INTEGRITY**

Management, including restoration activities intended to shape the ecological characteristics of a Wildland, is generally not allowed after Wildland designation. However, comprehensive management plans developed for new Wildlands often outline focused activities to remove human-made structures, or other infrastructure and landscape modifications that are viewed as constraining ecological processes, affecting human experience, or otherwise restricting the self-willed expression of nature. Such projects include the removal of culverts, dams, dikes, bridges, fences, and other structures that constrain the flow of water or the natural movement of organisms; removal of transportation infrastructure such as pavement, parking areas, and railroad tracks; removal of communication structures including towers, buildings, and telephone and electrical lines; decommissioning of woods roads, trails, log landings, and campgrounds; deconstruction of houses and outbuildings; and harvesting of tree plantations and populations of nonnative species. In most cases it is possible to complete this work before Wildland designation goes into effect, but occasionally these activities need to extend into, wind down during, and cease within the early years of a newly established Wildland.

In contrast, if management is ongoing for the restoration of specific conditions and processes such as old-growth features (D'Amato and Catanzaro 2022), vegetation structures, and communities such as savannas and barrens (Neill et al. 2007), or for the maintenance of particular plant or animal species (Askins 2001), then the tract (though a desirable conservation priority) should be considered a Woodland rather than a Wildland.

## RETENTION OF CULTURAL ARTIFACTS AND LEGACIES

In strong contrast to the elimination of human constraints on ecosystem processes, federal guidelines for Wilderness management and many public and private stewardship protocols call for the inventory, evaluation, and retention of historic human structures and “improvements” in Wilderness areas (Cowley et al. 2012). The intention of these efforts is to acknowledge, respect, and retain these legacies of prior use by Indigenous people, early colonial settlers, and others. Once documented and interpreted, these features are often left intact or treated to be secure and safe, offer educational value, and, in notable cases, yield ongoing wildlife benefits, such as the habitat offered to bats by abandoned human structures, including mine shafts.

## TRAILS, CAMPING, AND HUMAN SAFETY

Low-impact hiking and walking trails are allowed in most Wildlands to facilitate human experience and enjoyment. Maintenance generally involves the least intensive means possible and is often limited to nonmechanized hand tools. Many public and some private Wildlands permit low-impact camping under conditions consistent with property management plans. Strong efforts are undertaken to disperse this activity to minimize impacts on ecosystem processes and visitor experience. Many Wildlands, especially smaller areas in more accessible areas, preclude overnight use. Federal agencies may exclude areas of extremely active use from Wilderness designation (cf., USDA 2005), while managing them in ways that are as consistent with Wildland criteria as possible. Most organizations allow management exceptions for human safety that are limited in geography and occurrence.

## MOTORIZED AND MECHANIZED VEHICLES, AND OTHER MODES OF TRAVEL

While motorized vehicles are excluded from nearly all Wildlands except for exceptional management purposes, the illegal incursion of all-terrain vehicles (ATVs), snowmobiles, and motorcycles is one of the most challenging management issues for most areas. Bicycles and other mechanized vehicles are strictly prohibited from federal Wilderness Areas and the properties of many Wildlands. The advent of drones and electric bicycles, which are broadly excluded from many Wildlands, underscore the evolving nature of management challenges even on tightly secured conservation lands. Horse use is largely determined by organizational policy and specific circumstances.

## HUNTING FOR SPORT, HERBIVORE CONTROL, AND SUBSISTENCE

Hunting is a widely debated activity and we have not incorporated it in our Wildlands definition. The Interagency Task Force (Landres et al. 2015) considers hunting as *not* trammeling because, in standard practice, hunters take individual animals with no intention to manipulate wildlife populations or alter predator–prey relationships. Some organizations impose a complete ban on hunting, trapping, and fishing. Others restrict hunting to large herbivores such as deer, moose, elk, or species determined to be changing ecosystem structure and composition (McInnes et al. 1992, Healy 1997). In this latter case there is intentionality to constrain populations in the absence of natural predators. In cases we have examined, hunting is limited in duration and scale, closely tied to management plan objectives, and precludes the taking of native predators and the use of bait, dogs, or trapping. Hunting to control the population dynamics of



© David R. Foster



White-tailed deer have become overabundant in many places in the Northeast as a result of the loss of top predators. The woody plants in this photo are heavily browsed, impacting the ability of the forest to regenerate and function fully.

native animals and their ecological interactions is clearly trammeling. Conversely, groups that allow hunting argue that the failure to manage herbivores, which are capable of altering the structure and function of ecosystems severely, should be considered trammeling.

Hunting has gained support with efforts to increase land access and return lands to Indigenous groups where they may engage in diverse subsistence activities that also include fishing and the collection of native plants and other resources (Hessami et al. 2021, Moola and Roth 2019). These efforts have been accompanied by increasing awareness that Indigenous people served as key apex predators of large herbivores for thousands of years and have helped to maintain rich biodiverse landscapes (Martin 1984, Gill et al. 2009, Zurba et al. 2019, M's-it No'kmaq et al. 2021). A countervailing argument opposed to hunting cites evidence that large herbivores themselves are a key natural process that have been widely depredated following colonization. Because large herbivore biomass is depleted in most Wildlands relative to historical

immigrations and population shifts have been supported by changes in hunting, trapping, and fishing regulations and purposeful reintroductions (e.g., deer, bear, beaver, turkey, and many fish) by state fish and wildlife agencies and conservation organizations.

baselines, an important component of rewilding is to allow ungulate populations to fluctuate naturally with little intervention (Vera et al. 2006, Fløjgaard et al. 2022). In this view hunting may be considered unnecessary active management in Wildlands.

**REWILDING, ACTIVE REINTRODUCTIONS, AND ASSISTED MIGRATION**

The historical reforestation of the New England landscape following broad-scale land abandonment from intensive management was a largely unintentional and unguided process (cf. Foster and Aber 2004, Foster 2017). This natural increase in the untamed nature of the landscape was accompanied by a rewilding of many ecological processes and wildlife through population expansion and opportunistic immigration of native species (e.g., deer, bear, moose, fisher, lynx) as well as novel species to the region such as coyote. Many of these



Eastern cougars, or pumas, are described by biologist John Laundré as “guardians of ecosystems.” When cougar are present on the landscape, herbivores like deer and moose tend to be fearful in certain habitats where the predators are especially active. Selected areas in this “landscape of fear” become refugia for the natural diversity and abundance of native plants and the animals they support.





© Photo and caption Susan C. Morse

Invasive Japanese barberry forms a dense cover in many secondary forests that are heavily browsed by deer.

Today, rewilding is a recognized conservation strategy that has been adopted by the IUCN (2021), among others, and is being employed across the world, oftentimes in diverse ways. As defined in “Guiding Principles for Rewilding” (Carver et al. 2021): “The ultimate goal of rewilding is the restoration of functioning native ecosystems containing the full range of species at all trophic levels while reducing human control and pressures.” This active approach through restoration management lies in contrast to passive rewilding, which is based on the resilience of nature and is more closely aligned with this paper’s definition of Wildlands.

Few policies, management plans, or easements in New England address the issue of purposeful introductions, beyond prohibiting the release of nonnative species. However, many organizations, agencies, and scientists nationally and internationally support the reintroduction of native species or their surrogates, as a central step to restoring key ecological processes (Terborgh et al. 1999, Donlan et al. 2006, Fisher 2019). In particular, trophic rewilding has emphasized the reintroduction of native top predators such as wolf, cougar, and lynx, and keystone species, especially beaver (Deboer 1998, Foreman 1999, Ripple et al. 2022). More extreme efforts at trophic rewilding that involve the introduction of Pleistocene and other ancient species such as mammoth, wild horse, aurochs (wild cattle), or their surrogates are avidly advanced in parts of Europe, South America, and elsewhere (Macias-Fauria et al. 2020), but have received little consideration in New England to date.

Recent discussions concerning the assisted migration of southern species or the introduction of genetically

modified populations intended to replace extinct or dwindling native species are pushing new boundaries in conservation and Wildland management, but are not examined in this study.

### **INVASIVE SPECIES**

Many agency policies, easements, and management plans allow for or encourage control of invasive plants and animals. However, given that the threat of nonnative and invasive species is often uncertain and overstated and their values underappreciated in many landscapes (Del Tredici 2021), many groups and the federal interagency task force argue for minimal control (Landres et al. 2015). At the very least, a comprehensive review of and evidence for negative consequences should be well documented, control measures should be highly targeted and limited, and long-term monitoring of the consequences of management should be instituted.

In the approach to the management of nonnative and invasive species, forthright consideration should be given to consistent policies (Knapp et al. 2001). National policies and procedures have been outlined that would greatly reduce the unintended incursion of nonnative insect and pathogen species (Lovett et al. 2016). Meanwhile, policies that support the purposeful development, production, and introduction of nonnative and genetically modified species and their hybrids with the intention of either replacing native and extinct species or enhancing recreational hunting and fishing appear inconsistent with intense parallel efforts to control nonnative organisms. It makes little sense to combat selected organisms (e.g., Norway maple, garlic mustard, and zebra mussels) while expending



Active management employing mechanical equipment and fire disqualifies areas as Wildlands. The Manuel Correllus State Forest on Martha's Vineyard is one of two reserves managed by the Massachusetts Department of Conservation and Recreation that were excluded as Wildlands in this study.

significant resources to release hybrid American Chestnut, rainbow trout, and pheasant or to clone a Heath Hen surrogate (American Chestnut Foundation 2022, Revive and Restore 2022). Similar inconsistencies exist in apex predator management as bobcat are regulated closely, a largely open season exists for coyote, and yet there is little state or federal agency support for the reintroduction of the native wolf or cougar back into New England.

In the absence of consistent policies and solid data on their negative consequences, constraint in the active management of all populations of plants and animals seems prudent for Wildlands.

## **FIRE**

Although fire is an important consideration in Wildland conservation nationally, in New England the incidence of natural fires is currently low and was similarly low through much of the region's history (Irland 2013, Oswald et al. 2023). Natural lightning fires are rare in this region known nationally as the "asbestos forest" (Irland 2014). An exception may be localized fire-prone landscapes such as glacial outwash plains, bedrock ridges, and mountain summits that support open and dry pitch pine and oak communities. However, many landscapes are interpreted as "fire-prone" today due to the great increase in fire that followed colonial settlement and land-clearing activity (Foster 2017, Oswald et al. 2020). This was especially true during the nineteenth century, when intensive logging, widespread clear-cutting, and regional

farm abandonment created unusual conditions that allowed fires to flourish due to abundant fuels, ignition sources including locomotives, slash-and-burn fires, and carelessness, lax regulation, and limited control. Following a long period of frequent and notable fires, the region witnessed a dramatic decrease in fire activity from the mid-twentieth century to the present due to widespread recovery of maturing forests of low flammability, reduced ignitions, and increases in regulation, safety precautions, and control (Irland 2013 and 2014, Foster 2017). Given this history and the intent of active fire management to control for specific vegetation structure and composition, most management guidelines call for the immediate control of fires and we exclude sites managed with prescribed fire from consideration as Wildlands.

### ***Criterion iii. Permanent Protection***

The strongest standard for Wildland protection is that which is "in perpetuity," legally defensible, and enforced by a third party or legal mechanism. Perpetual protection is paramount because it takes decades or centuries to achieve wild complexity within forest ecosystems—a process which can be unwound quickly without proper legal protection. To that end, the minimum requirement accepted in this study is language that clearly articulates—in management plans, administrative designations, or institutional policies—an open-ended Wildland intent reinforced by a history and ongoing commitment to Wildland management.

**Legal Protection:** Secure Wildland protection is offered through carefully crafted legislation and legal documents including easements, deed restrictions, and trusts. Groups including Northeast Wilderness Trust (NEWT 2019), Connecticut Land Conservation Council (CLCC 2019), and Sweet Water Trust (SWT 2018) have created robust templates for Wildland easements that are available online for broad use and modification. Other organizations and agencies have chosen to add restrictive Wildland language to standard easements. Legislative designations vary across the different levels of government jurisdictions. Best known and most secure are the federal Wilderness areas designated in 1964, 1975, 1984, and 2006. In the United States, at least eight states have established their own wilderness programs (Dawson and Thorndike 2002), but New England is represented only by Maine's single area, the Allagash Wilderness Waterway. Designated in 1966 by the state legislature and further protected through the National Wild and Scenic Rivers system in 1970, this extremely narrow 92-mile-long ribbon of ponds, wetlands, and streams adjoins many intensively managed industrial timberlands.

Other legislative designations to advance Wildland conservation include the Ecological Reserve System of Maine, comprising approximately 93,000 acres of Wildlands (Kuehne et al. 2018, MNAP 2000, 2022, Maine Legislature 2022). This program includes a cap on the total acreage and precludes the addition of lands that would

reduce harvest levels from state lands. A few legislatively designated state Wildland programs have languished, including the Connecticut Natural Area Program and the Massachusetts Wildlands Program (MA DEM 1989).

Just beyond New England, one of the nation's strongest state wilderness designations covers slightly more than 3 million acres of Forest Preserve in the Adirondack and Catskill State Parks of New York. This strong Wildland protection was implemented by public referendum in 1894 through amendment to the New York State constitution, establishing a "forever-wild clause," which was subsequently revised in 1972 to include "wilderness." The designation has withstood vigorous legal challenges over the past one hundred and twenty-five years and can only be overturned by a two-thirds vote of the state legislature followed by public approval through a statewide voter referendum.

**Less Secure Administrative Protection:** For the Wildland properties of many private conservation organizations and many state reserve and natural area programs, permanency is implied but currently lacks legally binding enforcement mechanisms. We have included properties in this category if careful review of management plans, the history of designation and management, and conversations with senior personnel indicate that the Wildland intent is clear, is evident in management history, and management guidelines are expected to be enduring. Two examples illustrate the application of this approach. The most



© David R. Foster

common group includes Wildlands secured through a management plan or administrative designation. These include extensive state lands designated as Old Forest Management Sites (Connecticut Department of Energy & Environmental Protection), Forest Reserves (Massachusetts Department of Conservation and Recreation), and Highly Sensitive Management Areas (Vermont Agency of Natural Resources). In similar fashion, many conservation organizations do not have conservation easements on their land, or forever-wild easements on their Wildlands, but they rely instead on organizational mission or property management plans to guarantee the permanency of protection and specific approaches to conservation management.

A much smaller category includes a very few properties that, although supported by a long history of Wildland intent and management, have no management plan, no institutional designation, and no other guarantee of permanency. One example is the Pisgah Tract of the Harvard Forest, a 22-acre private inholding owned by Harvard University in the Wildland portion of Pisgah State Park in New Hampshire. This property was purchased in 1922 to protect the more than 300-year-old old-growth forest from imminent harvest (Cline and Spurr 1942). As relayed by Richard Fisher (1927), the director responsible for this purchase, who said of the property: “Its interest and value will be the greater in proportion as it remains unaltered and undisturbed.” Despite more than a century of publications and archived correspondence by directors of the Harvard Forest stating the resolve to protect the area

from human impact, there is no formal management plan, binding document, or university declaration to reinforce that intent, which is secured solely by departmental-level administrative decision.<sup>3</sup>

These protected public and private properties are included as Wildlands in this study due to their importance and to highlight the vulnerability of their permanency as Wildlands in the absence of a forever-wild easement or rigorous legislation.

**Transient Wildlands:** In our review we discovered that some organizations and agencies, including the Forest School in the Yale School of the Environment and the Massachusetts Division of Fisheries and Wildlife, establish transient reserves on lands under their management that meet the Wildland management criteria but are impermanent and expected to change over time (personal communication, Mark Ashton and John Scanlon). These areas, reserves established on private lands under state-administered Current Use programs (e.g., Snyder 2021), and other properties that lack an intent for permanent protection, are not recognized as Wildlands in this study.

**Concluding Thought on Permanence:** In the early days of wildland advocacy, the mechanisms available for designating a wildland were limited and public ownership was considered “the only basis on which we can hope to protect the incalculable values of the forests” (Bob Marshall in *The People’s Forest*, 1933). Since then, conservation easements have become widespread on private lands, and forever-wild easements offer secure



© John Burk

Wildland status. Today, a wide range of approaches to Wildland conservation addresses the varied interests of most landowners and the distinct qualities of most properties. Meanwhile, innovation continues. Additional approaches to land ownership and access are needed and are being pursued with tribal groups that seek to incorporate and address the unique political status and cultural needs of Indigenous groups (Wood and Welcker 2008, Wood and O'Brien 2008). Similarly, new energy is being applied to collaborations between conservation groups working with community land trusts to address affordable housing needs that may yield other results including new models for community-held Wildlands (Michaels and Hindin 2023).

Despite great progress in expanding the portfolio of options for land protection, no approach is ironclad or immune from weaknesses. The interpretation and strength of legislation and conservation easements will change with time and cultural context, and both may be subject to a variety of legal challenges (cf., Landres et al. 2008, 2015). Federal wilderness areas allow administratively approved trammeling and national monuments are presidentially designated and reversible, as occurred under the Trump administration, and nearly transpired at Katahdin Woods and Waters.

It is often challenging to distinguish the Wildland portions of complicated public and private lands. For example, many federally owned lands in national monuments and national parks (Department of the Interior), national forests (U.S. Department of Agriculture), and national wildlife areas (U.S. Fish and Wildlife) have significant portions that are actively managed or support intensive visitor impacts. The national forests include natural areas such as scenic areas or recreational areas that do not meet the Wildland criteria for permanence, intent, or prohibition on salvage harvesting. Large federal areas such as Cape Cod National Seashore and most national historic parks and sites do not conform to our Wildland criteria. Similar challenges exist on many state and private properties. The wide variation among conservation properties and the mechanisms securing them precludes easy categorization and requires that each property be examined individually and revisited over time.

### **How Large? Size Was Not a Criterion in This Study**

One final area of discussion concerned the size and geography of Wildlands. A divergence in viewpoint emerged among contributors and reviewers of this paper on this subject that highlights differing motivations for Wildland conservation and the perceived values and benefits that these convey. Many advocates emphasize the role of Wildlands in supporting landscape-level ecological attributes and processes such as regional biodiversity; wildlife movement; and meteorological, geological, and hydrological processes—and associated ecosystem dynamics, along with the human experience of wild nature, solitude, and physical challenge. This perspective

emphasizes large tracts, rural locations, and connected landscapes that are frequently associated with Wilderness areas and the goals of organizations like the **Wildlands Network** (Noss 2003, Reining et al. 2006) and **RESTORE: The North Woods** (Kellett 2000, 2014, RESTORE 2022). An alternative perspective embraces the potential for all people to experience natural processes and forests that are or will become old-growth even in small reserves in highly humanized landscapes. Proponents of this view emphasize the value of suburban and urban wildlands and urge the inclusion of properties even below the practical threshold of 10 acres that was adopted for this study. One national proponent of this approach is the **Old-Growth Forest Network (OGFN)**, which seeks to identify at least one tract in every forested county in the United States. (Goold and Abdo 2018). Although few tracts in the OGFN currently meet all of our criteria, the adoption of rigorous management and protection strategies by the OGFN and other urban/suburban conservation entities would contribute significantly to more equitable accessibility to the region's Wildlands and their benefits.

This report embraces the full spectrum of Wildland geography and recognizes that these extremes, from small local reserves to expansive wildland landscapes, were acknowledged and embraced by a leading voice for wild nature, Henry David Thoreau. Thoreau famously embarked on expeditions to and beyond Moosehead Lake, Mount Katahdin, and the Penobscot River in northern Maine, where his level of comfort and skills of navigation paled beside those of his Indigenous companions and guides (Thoreau 1864). His narratives from those experiences still inspire the visions for a vast connected set of Wildlands across this northern region. And yet, Thoreau also reveled in the wildness that persisted in entirely domesticated landscapes, such as the wetlands and small woodlots in his native agrarian Concord (Foster 1999). There, where he was never distant from the sound of a lowing cow, passing wagon, or woodman's axe, Thoreau imagined his immersion in a Labrador wilderness. From that experience came his argument that every town should have its primitive forest or park.

<sup>1</sup> This untitled act, signed into law by then president Gerald Ford (Pub.L. 93-622) has come to be known as the Eastern Wilderness Areas Act. It established 16 wilderness areas in 13 states in the eastern United States. Subsequent federal legislation designating additional Wilderness areas in New England includes the New Hampshire Wilderness Act of 1984, the Vermont Wilderness Act of 1984, and the New England Wilderness Act of 2006.

<sup>2</sup> The application of wilderness thinking and land conservation often failed to retain this original embrace of Indigenous belonging and rights and the larger notion of peopled wilderness (cf., Catton 1997, Moon Stumpff 2000, Marfiote 2006, Hall Hansen 2007, Stevens 2014, Taylor 2016, Arthur and Burns 2020).

<sup>3</sup> Active efforts to secure Harvard Forest lands through easements only commenced in the 1990s, beginning with vulnerable properties in north-central Massachusetts. This ongoing effort has secured approximately 40 percent of the institution's 4,000 acres from development but has yet to address the Wildland status of the Pisgah tract.



© Photo and caption Susan C. Morse

# Approach and Methods for This Study



**R**esearch progressed through several iterative phases: (1) establishment of the study's scope and approach to identify and evaluate potential Wildlands; (2) region-wide outreach to public agencies and conservation organizations for potential Wildlands, collection of supporting information for each property, and refinement of evaluation methods; (3) systematic review of properties according to the established criteria, review of the emerging database with all external collaborators, data correction, and final review of challenging and newly uncovered parcels; and (4) analysis, interpretation, and product development.

## Exploration, Outreach, and Data Collection

Beginning in 2019, we initially contacted more than 125 professionals across conservation organizations and agencies throughout New England to develop an expanding list of properties for evaluation. We revised this list through referrals to additional individuals, agencies, and organizations, and ultimately received information on over 600 potential wildlands. We obtained pertinent documents for every property through online review and extensive conversations with organizations and agencies. In the few cases where complete information was unavailable, we set the parcels aside for future evaluation. Every accepted Wildland was given a "Wildland Property I.D." to facilitate cross-referencing the database, Geographic Information System (GIS) map, and archival records. Each resulting Wildland is unique, based on (i) owner, (ii) protection mechanism, (iii) type of management, and (iv) name. An individual Wildland may comprise a single tract or multiple adjoining tracts that share a common owner, protection mechanism, management, and name (e.g., Whetstone Woods Wildlife Sanctuary in Wendell, Massachusetts, with a dozen or more tracts and Connecticut College Natural Areas with three tracts). Tracts with a common owner that are managed, protected, or named differently were given unique numbers and names, such as the four Wildlands in Baxter State Park or nine separate Wildlands in the White Mountain National Forest.



© Elizabeth H. Thompson

**Left:** Black bears are built to climb. The young learn this skill early, and use it to their advantage to stay away from danger. Wild places—including old forests as well as young forests caused by natural disturbance—are important for black bears, offering feeding and denning habitat, mating opportunities, and safety. Although black bears are found in human-inhabited areas, they thrive best when humans are distant.

## Minimum Data Requirements to Meet the Wildland Criteria

As reviewed above, we evaluated each area for: (i) Wildland intent, (ii) translation of that intent into management for natural process and minimal human impacts, and (iii) permanent protection of this Wildland status.

Our approach recognizes that land conservation embraces great variation in philosophy, intent, level of protection, and approach to management and that the resulting size, setting, condition, and human experience of different properties vary significantly. While we set strict criteria for Wildland conservation, the application of our criteria sought to accommodate the significant variation in conditions that occur from large and remote Wilderness areas to small suburban reserves and from previously harvested industrial timberlands on new Wildlands to ancient old-growth forests.

In addition to documentation on the three criteria above, we also gathered the following information for each accepted Wildland property.

1. *Property name (many properties have multiple names)*
2. *Fee owner*
3. *Owner type (public agency or organization type, etc.)*
4. *Year (when preserved as Wildland, not acquired or protected from development)*
5. *Town/municipality*
6. *State*
7. *Catalyst or motivation for Wildland designation*
8. *Acres (Wildland area only; areas were estimated on the resulting GIS map of all properties)*
9. *Protection mechanism (based on documents describing excluded activities)*
10. *Entity that enforces the terms of Wildland protection*
11. *Whether resource extraction is explicitly excluded*
12. *Whether the governing body (e.g., board of directors, director, president) may create exceptions to allow for active management*
13. *Whether broad exceptions exist for active management to:*
  - a. *address human health and safety concerns,*
  - b. *maintain or create trails or open scenic viewpoints, or*
  - c. *broadly support concepts like ecosystem integrity, health, functioning, etc.*
14. *Spatial location and characteristics*

## Obtaining and Reconciling the Spatial Data for the Wildlands Map

We developed the Wildlands GIS layer to be compatible with existing layers of protected open space in order to support combined analyses, minimize spatial inconsistencies among different datasets and applications, and encourage broad and open use in other applications. Most Wildlands were entered into the GIS database by copying existing polygons from the Harvard Forest–Highstead Foundation [New England Protected Open Space \(NEPOS\) layer](#) (Harvard Forest 2020), which is freely available and assembled from widely used regional data sources such as TNC’s Secured Areas, National Conservation Easement Database, PADUS, and state GIS layers.

Additional information was employed to confirm or adjust property shape from the NEPOS layer, including maps and acreages from deeds, easements, or management plans and GIS layers provided by landowners or easement holders. If sources revealed additional protected lands not in NEPOS, these were digitized to match parcel boundaries in NEPOS and/or state tax parcel maps. Although the resulting property shapes in the Wildland layer may be slightly less accurate than surveyed maps available to the fee or easement holders, the larger objective of compatibility with the NEPOS layer and associated map layers used widely by our collaborators (cf., Thompson et al. 2020, Sims et al. 2022) overrode the desire to resolve minor inconsistencies. Ponds, lakes, and other open-water areas contained in the National Hydrography Dataset (NHD) are not included in many Wildland properties and were removed from all Wildlands for consistency. Small areas of active land management that we detected in Wildlands such as mowed fields, established roads, and

developed areas, were digitized from aerial photographs and removed from the Wildland polygon.

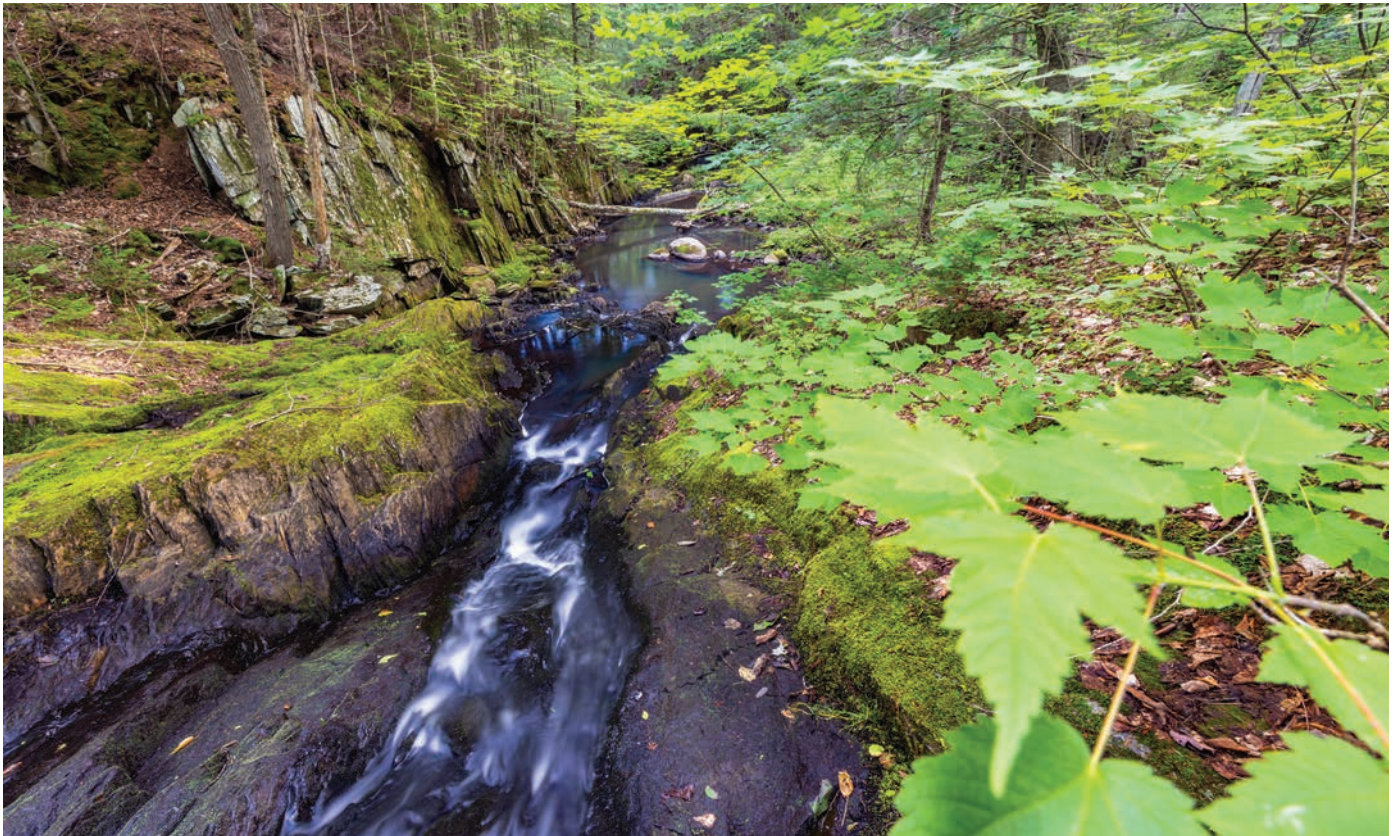
## Project Review and Data Correction

In late December 2020, we provided an update consisting of a project summary, list of all properties considered, and database and map of Wildland properties to more than three hundred collaborators who had shared data or insights with the project, in order to solicit feedback on the study, confirm the accuracy of existing data, and identify additional properties. This exchange yielded corrections to the data, additional supporting documentation on protection mechanisms and management, and several properties for review. Subsequent outreach and data collection concentrated on new properties and those with complex or missing data.

Once the full database was assembled (December 2021), we developed a companion online web map depicting all Wildlands and shared both database and map with all previous correspondents, every organization and agency represented in the database, and numerous collaborators. Initial analysis was performed on these data as final corrections were made to the database. Recognizing that the Wildland landscape of New England is continually expanding, we established a cutoff date for new properties and final corrections (June 2022) and undertook the analyses presented in this report on that database. Any subsequent corrections to the data and map are noted in the Online Appendixes. We continue to receive and review additional properties on a rolling basis. Additional Wildlands are being added to the online database and map, but are not included in the analyses, tables, and maps presented in this report. Those Wildlands recorded on the online database and map subsequent to this report do not appear in the analyses, tables, and maps presented here.







© Jerry Monkman / EcoPhotography

### Resulting Data and Archive

The final dataset, map overlays, reports, and all figures and tables in this report are openly available through the Harvard Forest information management system and WWF&C website.

Under agreement with the landowners, organizations, and agencies that informed this study, a subset of property

and organizational information will remain confidential, including legal documents, organizational policies, and related correspondence. These materials are permanently archived at the Harvard Forest and all may be obtained through direct application to the landholding organizations and agencies.



© Nina Mirabile



© Photo and caption Susan C. Morse

# Results and Discussion



**Note.** While the tables, maps, figures, and photographs in this report convey substantial information about New England's Wildlands, we recommend exploration of the [New England Wildland Web Map](#) to examine the geographical patterns of Wildlands and protected lands in detail and in association with multiple map layers and satellite images. The associated Wildlands database (see Online Appendix 1) provides considerable additional information on the 426 Wildlands reported in this study. The best way to appreciate the range of New England Wildlands is to explore them in person.

## The Setting for Wildland Conservation: New England Land Cover and Conservation Lands

Though supporting 15 million people and expansive urban and suburban centers, New England remains a heavily forested region with 32.6 million acres, or 81 percent of its more than 40 million total acres, covered by diverse forests. Maine comprises half of the region's land area, with another 40 percent fairly evenly divided between Vermont (15 percent), New Hampshire (14 percent), and Massachusetts (12 percent). The three northern New England states comprise 82 percent of the forest area followed by Massachusetts (10 percent), Connecticut (6 percent), and Rhode Island (1 percent).

The states display significant variation in their relative progress in permanently protecting their land cover of forests, farmlands, and wetlands from development. New Hampshire (34 percent) and Massachusetts (30 percent) lead the region in land protection, followed by Vermont (26 percent) and Rhode Island (25 percent). Maine and Connecticut lag behind significantly with 22 percent and 20 percent of their land protected, respectively. In terms of forest protection, Massachusetts and New Hampshire again lead with 38 percent, followed by Rhode Island (34 percent), Vermont (29 percent), Connecticut (26 percent), and Maine (23 percent).

## Wildland Characteristics and Distribution

Out of the 652 permanently protected properties reviewed in this study, a total of 426 properties comprising 1.3 million acres were identified as meeting the Wildland

**Left:** Beavers are ecosystem engineers, and are often thought of as a keystone species, one that has a central role in shaping its environment. They have created, and they maintain, many of the ponds and wetlands of the New England forest. Trapped for their fur and deprived of habitat by the clearing of the landscape, they were all but gone from New England by 1900. Thanks to reintroductions and the return of forest to the region, they have become abundant once again.

criteria of (i) intent, (ii) permanent protection, and (iii) management for natural processes. This Wildland area comprises 3.3 percent of the more than 40 million acres of land in New England, 3.8 percent of the 32.6 million acres of the region's forest, and 13.5 percent of the 9.1 million acres of forest area that is permanently protected from future development.

The region's Wildlands vary considerably in many physical, geographical, and land-use characteristics, as well as ownership, protection mechanism, management, and other features. One broad characteristic is clear: More than 97 percent of the Wildland land area in New England is forested.

Over half of the Wildland acres lie in Maine (55 percent) followed fairly evenly by New Hampshire (18 percent) and Vermont (17 percent). Massachusetts contributes 9 percent to the regional total, Connecticut adds slightly more than 2 percent, and Rhode Island has a single Wildland tract, Oakland Forest (21 acres). Due to its limited representation, Rhode Island is not included in every table and figure, but its Wildland area is represented in all regional numbers and analyses.

The percentage of protected forest that is designated as Wildland varies greatly by state, with Maine leading in the amount of protected forests that are Wildlands (16 percent), followed by New Hampshire (12 percent), Vermont (12 percent), Massachusetts (9 percent), and Connecticut (5 percent).

The number of Wildlands broadly increases to the north, from 54 and 57 in Connecticut and Massachusetts to 72 and 85 in New Hampshire and Maine. As a consequence of the large number of relatively small Highly Sensitive Management Areas (HSMAs) in the state, Vermont is an outlier with a total of 157 Wildland areas. The mean average size of Wildlands exhibits a somewhat different pattern, ranging from approximately 530 acres in Connecticut to between 1,400 and 3,238 acres in Vermont, Massachusetts, and New Hampshire, and on to a high of 8,600 acres in Maine. The corresponding median area (middle number in a list of acreages sorted by size) for each state is 97 acres (CT), 130 acres (VT), 169 acres (NH), 1,077 acres (MA), and 2,649 acres (ME).

## Regional Pattern of Wildlands

The map of Wildlands in New England yields many immediate impressions. In comparison with the expanse of the region, the limited extent of Wildlands and the small size and isolated nature of many individual tracts is striking. The uneven geographical distribution of Wildlands is similarly notable, as they are largely confined to a band across rural New England that arcs from northern and

**TABLE 2: Wildlands in New England in Relation to Land Cover Characteristics of the Region**

[Note: Four properties cross multiple state boundaries.]

LAND AREA					FOREST AREA			
	Acres	% of New England's Land	Protected Acres	% Protected	Acres	% of New England's Forest	Protected Acres	% Protected
<b>NEW ENGLAND</b>	<b>40,237,798</b>	<b>100%</b>	<b>10,044,351</b>	<b>25%</b>	<b>32,573,460</b>	<b>100%</b>	<b>9,090,299</b>	<b>28%</b>
<b>CONNECTICUT</b>	<b>3,101,234</b>	<b>8%</b>	<b>615,024</b>	<b>20%</b>	<b>2,034,953</b>	<b>6%</b>	<b>528,599</b>	<b>26%</b>
<b>MASSACHUSETTS</b>	<b>5,019,605</b>	<b>12%</b>	<b>1,483,064</b>	<b>30%</b>	<b>3,208,673</b>	<b>10%</b>	<b>1,209,566</b>	<b>38%</b>
<b>MAINE</b>	<b>19,790,418</b>	<b>49%</b>	<b>4,298,394</b>	<b>22%</b>	<b>17,374,844</b>	<b>53%</b>	<b>4,031,277</b>	<b>23%</b>
<b>NEW HAMPSHIRE</b>	<b>5,742,125</b>	<b>14%</b>	<b>1,930,922</b>	<b>34%</b>	<b>4,899,317</b>	<b>15%</b>	<b>1,839,394</b>	<b>38%</b>
<b>RHODE ISLAND</b>	<b>668,591</b>	<b>2%</b>	<b>166,751</b>	<b>25%</b>	<b>394,746</b>	<b>1%</b>	<b>135,087</b>	<b>34%</b>
<b>VERMONT</b>	<b>5,915,824</b>	<b>15%</b>	<b>1,550,218</b>	<b>26%</b>	<b>4,660,907</b>	<b>14%</b>	<b>1,346,390</b>	<b>29%</b>

**Wildlands in New England in Relation to Land Protection Characteristics of the Region**

	PROPERTIES REVIEWED	WILDLANDS				FORESTED WILDLAND	
		# of Properties	# of Wildlands	Acres	% of New England's Wildland Acres	% Land Area in New England or State that is Wildland	Acres
<b>NEW ENGLAND</b>	<b>648</b>	<b>426</b>	<b>1,321,878</b>	<b>100%</b>	<b>3.3%</b>	<b>1,229,404</b>	<b>3.8%</b>
<b>CONNECTICUT</b>	<b>77</b>	<b>54</b>	<b>28,614</b>	<b>2%</b>	<b>0.9%</b>	<b>27,147</b>	<b>1.3%</b>
<b>MASSACHUSETTS</b>	<b>128</b>	<b>57</b>	<b>116,274</b>	<b>9%</b>	<b>2.3%</b>	<b>111,244</b>	<b>3.5%</b>
<b>MAINE</b>	<b>132</b>	<b>85</b>	<b>722,496</b>	<b>55%</b>	<b>3.7%</b>	<b>654,484</b>	<b>3.8%</b>
<b>NEW HAMPSHIRE</b>	<b>114</b>	<b>72</b>	<b>233,166</b>	<b>18%</b>	<b>4.1%</b>	<b>227,603</b>	<b>4.6%</b>
<b>RHODE ISLAND</b>	<b>8</b>	<b>1</b>	<b>21</b>	<b>0%</b>	<b>0%</b>	<b>20</b>	<b>0%</b>
<b>VERMONT</b>	<b>189</b>	<b>157</b>	<b>221,307</b>	<b>17%</b>	<b>3.7%</b>	<b>208,906</b>	<b>4.5%</b>

westernmost Connecticut northward across Vermont, through western and north-central New Hampshire, and on through north-central Maine where it terminates around Baxter State Park. A prominent collection of Wildlands ranges southward from Baxter State Park to the coast east of Penobscot Bay and over towards Maine's border with New Brunswick.

This distributional pattern leaves large blank spaces across much of Connecticut and Rhode Island, through the eastern half of Massachusetts, and extending up through southeastern New Hampshire to the southern quarter of Maine, which supports few conservation areas in general. A large blank area also occupies the agricultural region of northeastern Maine.

In focusing on the broad geographical pattern, one surprising feature emerges—a distinct, thin, and largely continuous line of Wildlands that traces through and helps to define the regional arc of the larger pattern. This is the Appalachian Trail (AT), conceived by Benton MacKaye in 1921 as a “primeval” or “wilderness” way (MacKaye 1921, 1929) that was central to his larger regional plan for socioeconomic revival (see Box 2). Heading north today from Springer Mountain, Georgia, the AT crosses New York's Hudson River to enter New England in northwestern Connecticut where it extends 698 miles to its terminus on Mount Katahdin in Baxter State Park. To the north and west of Baxter, two other linear features appear. These comprise the extremely narrow Wildland buffers

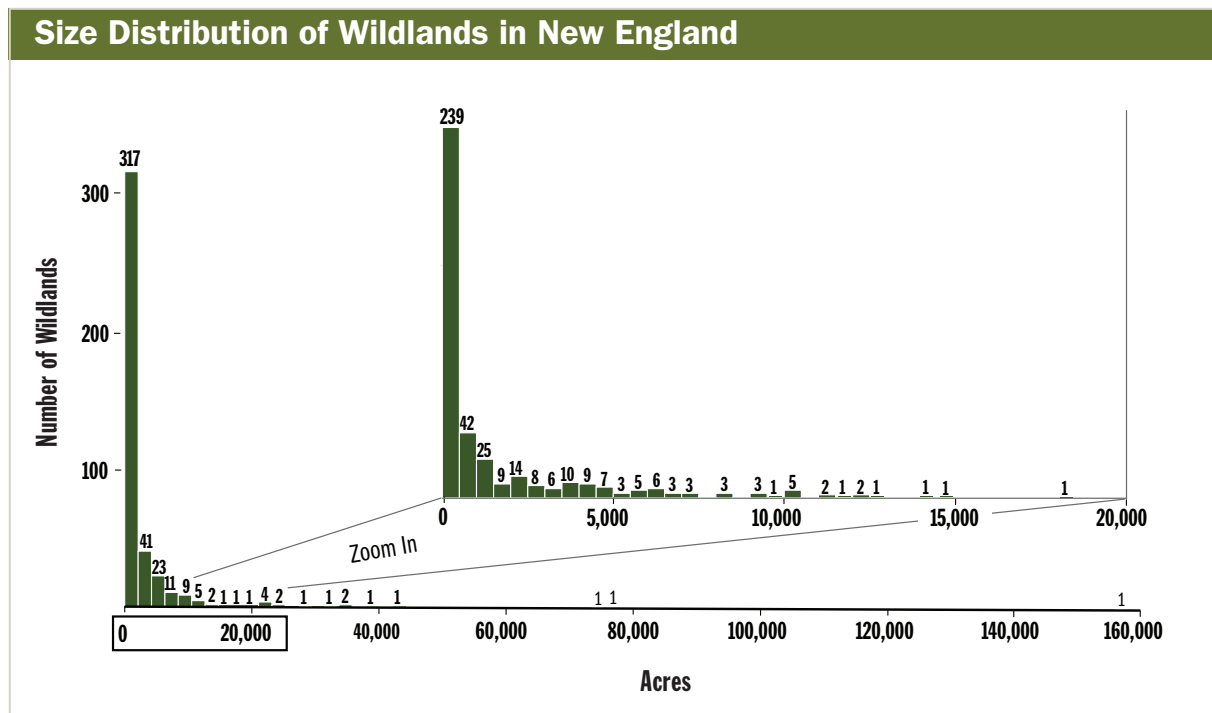
to Maine's great north-flowing rivers: the St. John River (Upper St. John River Reserve) close to Maine's western boundary and the Allagash River (Allagash Wilderness Waterway) to the east (cf. Lansky 1995a, St. Pierre 2022).

Additional patterns emerge on closer inspection, especially when the distribution of Wildlands is examined against the portfolio of all lands protected from future development. Many areas that appear as individual Wildlands are actually Wildland blocks comprised of multiple properties, oftentimes under quite different ownerships or protection mechanisms. One large and clear example of this pattern lies in northern Maine where Baxter State Park (Baxter State Park Authority, State of Maine) anchors the contiguous areas, separated only by the Golden Road logging highway, of Katahdin Woods and Waters National Monument (National Park Service), the Debsconeag Lakes Wilderness Area (The Nature Conservancy), and the Nahmakanta Ecological Reserve (State of Maine). This stretch of Wildlands then connects to the south along the National Park Service's Appalachian Trail to Roach Ponds Reserve, Katahdin Iron Works Reserve, and Baker Mountain Reserve, all owned by the Maine Woods Initiative LLC of the Appalachian Mountain Club. Thus, what appears to be and is broadly treated as one extensive Wildland landscape in north-central Maine known as the 100-Mile Wilderness, is owned and managed by two private conservation groups, two different parts of the National Park Service in the

Department of the Interior, a state agency, and the Baxter State Park Authority. Many smaller but similarly complicated examples of adjoining Wildland ownerships occur across the region.

In contrast to such multi-owner complexes, a wide array of landscape patterns are formed by adjoining Wildland areas that are owned and managed by a single entity. These range from the tightly clustered parcels comprising Holyoke and Skinner State Parks in central Massachusetts, to the more loosely associated wilderness areas embedded in the White Mountain National Forest, and the further disaggregated set of wilderness areas in the Green Mountain National Forest (GMNF). This latter group of Wildlands in Vermont extends an initial 75 miles from the George Aitken Wilderness in the south to the Breadloaf Wilderness in the center of the state. From there, Wildlands extend northward along the Green Mountains through federally owned alpine and subalpine areas of the GMNF to Camel's Hump State Park and Mount Mansfield State Forest and on to The Nature Conservancy's Burnt Mountain.

Close examination highlights peculiarities within and between Wildlands. Many Wildlands have excluded areas that are intensively managed, including roads (Katahdin Woods and Waters, Mount Greylock), transmission lines (Whetstone Woods Wildlife Sanctuary), buildings or activity areas (e.g., the fragmentation of federal Wilderness areas on the summit of Mount Washington



**FIGURE 9. Size distribution of Wildlands in New England.** The distribution is strongly skewed towards many small areas and relatively few large areas. Approximately two-thirds of the Wildlands are comprised of fewer than 1,000 acres, and more than half (238 of 416 properties) contain fewer than 500 acres. The three outlying Wildlands on the main graph are: Baxter State Park, Maine (157,850 acres); Katahdin Woods and Waters National Monument (76,688 acres); and the Upper St. John River Reserve (75,174 acres).

[Note: The bin size is 1,000 acres in the main graph and 500 acres in the detailed inset graph.]

**M**issing from most popular descriptions of the Appalachian Trail (AT) is recognition of the progressive social dimensions of Benton MacKaye’s vision and the central role that wilderness played in that design (cf., Levitt 2021; but, see Anderson 2000, 2008, King 2000, Middlefeldt 2010, 2013). The sinuous line of Wildlands cutting obliquely across New England today is a legacy of that larger vision and one that might still help to advance aspects of MacKaye’s societal and conservation goals. A grand effort to integrate Wildlands, managed forests, farms, and communities from Canada to the Gulf remains alive today and stands as one of America’s most compelling opportunities to address the growing crises of climate change, biodiversity loss, and human inequity (Hiss 2022, Sayen 2023).

In 1921, MacKaye published his “project in regional planning” to address major social and economic challenges facing the industrializing nation following World War I (Anderson 2002). The vision strove to reverse the Appalachian region’s downward trends in rural population, employment, and economy by revitalizing local agriculture and applying scientific forestry to restore natural and human communities devastated by decades of resource extraction. The sweeping project for regional reconfiguration sought to situate the trail, shelter camps, communities, and cooperative housing along a conserved Appalachian spine, thereby fusing leisure and industry, environment and labor, community development, and wilderness preservation. By centering this proposal for comprehensive redevelopment around a national hiking trail and jobs program, MacKaye looked to engage the support of recreationists, a public increasingly interested in outdoor leisure, and federal agencies (Anderson 2000, 2002).

### **MacKaye’s Growing Vision for a “Wilderness Way”**

As enthusiasm grew for the AT in hiking groups and agency leadership, the larger social and conservation dimensions of MacKaye’s design gradually became overshadowed by the trail-building efforts championed by Myron Avery and the Appalachian Trail Conservancy.<sup>1</sup> With the vision threatened to reduction as a simple path, and energized by growing engagement with fellow Wilderness Society founders Bob Marshall, Aldo Leopold, and others, MacKaye began to emphasize the footpath’s critical role in securing expanses of “primitive” and “wild lands.” In his view the AT should serve as backbone for a publicly owned “super national forest” stretching from Maine to Georgia and comprised of wilderness reconstituted where it had long disappeared (Anderson 2000, 2002).

In his presentation to the New England Trail Conference in 1923, MacKaye distinguished between a recreational trail and a trailway that conserved land and human life (Ryan 2017).

*This is not to cut a path and then say—“Ain’t it beautiful!” Our job is to open up a realm...an environment. It is an environment, not of road and hotel, but of trail and camp. It is human access to the source of life...the trailway must preserve (and develop) a certain environment. Otherwise its whole point is lost....The path of the trailway should be as “pathless” as possible; it should be the minimum consistent with practical necessity.*

*To preserve the wilderness the trail must of course be a wilderness trail (as to sounds, sights and tread).*

*There are hundreds of non wilderness ways well connected from Maine to Georgia: to make one more is pointless.... You are for a connected trail—whether or not wilderness. I am for a wilderness trail—whether or not connected.... Wilderness, not continuity, is the vital point.*

—Benton MacKaye,  
letter to Myron Avery,  
1935



© David R. Foster

Appalachian Trail Conservancy's A.T. Community Program



**FIGURE 10.** The Appalachian Trail and its context of federally protected lands and “A.T. Communities™” designated through the Appalachian Trail Conservancy’s A.T. Community™ Program. The map accompanying Benton MacKaye’s 1921 article proposing the trail highlighted that it served a region containing more than half of the population of the United States and over one-third of that of Canada. Although many elements of MacKaye’s larger social and Wilderness vision were deemphasized as the focus on protecting and improving the physical trail advanced, there is renewed and increasing interest in strengthening the ties and benefits to the diverse local communities adjacent to the trail. [Reprinted and used with permission from the Appalachian Trail Conservancy.]

MacKaye’s subsequent article in *Landscape Architecture* nodded to Leopold’s (1921) “wilderness area” concept and framed the AT as a “wilderness way... a wilderness area that goes somewhere” (MacKaye 1929). By the 1935 meeting of ATC, then known as the Appalachian Trail Conference, in Shenandoah National Park, MacKaye was emphatic that “the Appalachian Trail is a wilderness trail or it is nothing,...not merely a footpath through the wilderness, but a footpath of the wilderness... The mere footpath is no end in itself, but means of sojourning in the wilderness, whose nurture is your particular care” (Sutter 1999, King 2000).

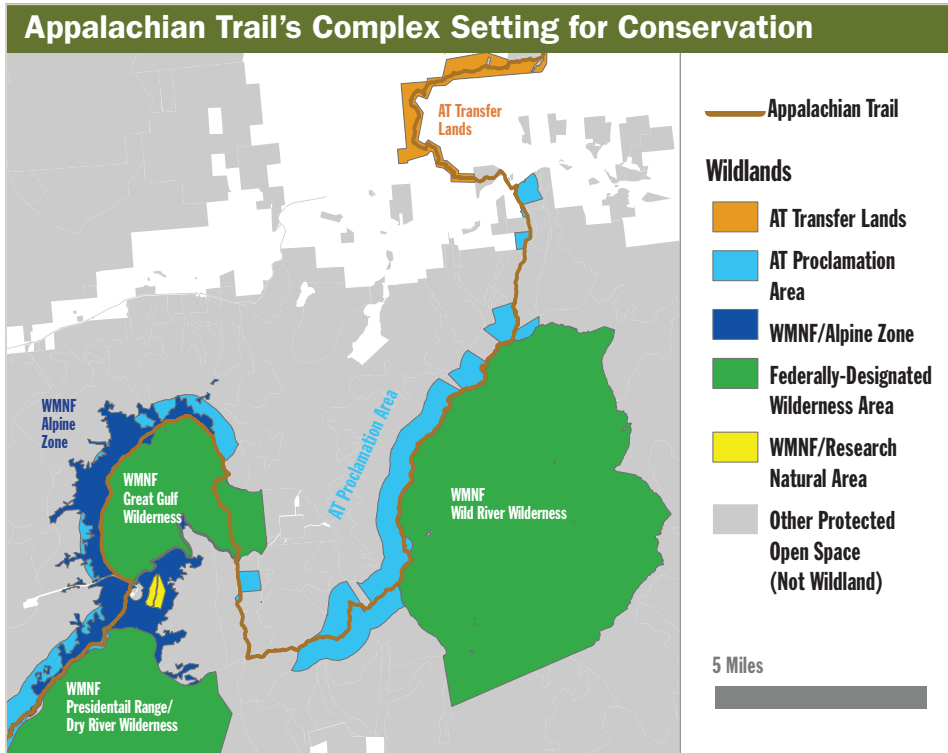
MacKaye’s vision for these large wilderness regions was much more than an “unworked landscape.” Though natural in function, MacKaye’s wilderness was peopled, and he recognized the land’s deep human history that extended back well before the arrival of Europeans. MacKaye viewed this cultural wilderness as playing an important ongoing social role, offering a connection back to nature for an industrializing nation in an integrated mosaic of urban, agrarian, and managed land (Minteer 2001). For MacKaye and colleague Bob Marshall, wilderness preservation was a progressive tool that would help forge social cohesion and a more democratic economic order.

**History of AT Land Acquisition and Wilderness Preservation**

Despite MacKaye’s persistent efforts, the protection of the larger land base for the AT proceeded unevenly (Johnson 2021). In 1938, the National Park Service (NPS) and U.S. Forest Service (USFS) agreed on a “railway concept” of 875 miles of federal land surrounding the trail. This cooperative agreement established a mile-wide “protective zone,” but failed to advance the argument for large wilderness and only excluded logging in the two-hundred-foot buffer. Large-scale land protection subsequently faded as a major priority for the effort until 1961 when ATC Chairman Murray Stevens focused his outgoing address on the threat posed by the post-World War II boom in housing (Jenner 2000, Rubin 2000a), stating:

*The only solution for the permanence of the Appalachian Trail as a wilderness footpath is in public ownership....I propose a “green belt” of public lands with the Trail acting as a spinal cord linking them together.*

The designation of AT as a National Scenic Trail in 1968 authorized the USFS and NPS to acquire land, leading ATC Chairman Stanley Murray to mark the trail’s 50th anniversary by proposing “an Appalachian Greenway” (NTSA 1968, Jenner 2000).



**FIGURE 11. The Appalachian Trail’s complex setting for conservation as seen in the northern section of the White Mountain National Forest (WMNF).** The conservation status of lands adjoining the Appalachian Trail (AT) is extraordinarily complex and is dependent on public and private landowners and agreements forged in collaboration with the Appalachian Trail Conservancy and the federal government. Land owned by the U.S. Forest Service in national forests is stipulated as a “Wildland” via one of four means, primarily depending on whether it is within the AT Proclamation area or federally designated Wilderness areas.



## BOX 2 / A Wildland Origin and Future for the Appalachian Trail

A resulting report (Satherthwaite 1974) envisioned:

*a primitive or wilderness zone acquired by purchase or easement, embracing the Trail and largely following the crest of the mountains; with a surrounding rural or countryside zone of private land secured through land use planning, up to ten miles out from the primitive zone.*

Though endorsed by the ATC Board and membership, the Appalachian Greenway never fueled a consistent land protection campaign (Rubin 2000b, King 2000). Two decades later, the state of MacKaye's conservation vision was characterized as "a backbone of slipped disks and cracked vertebrae" (Sayen 1987).

### Advocacy of the Appalachian Trail as a Wilderness Way

Three recent strategic plans support regional- to continental-scale protection for the AT and embrace MacKaye's sweeping support for people and nature (ALCAG 2022, ATLP 2022, Labich 2021; see also ATC 1981, 2012, 2014). However, all are strikingly silent on the bold Wildland strategies that he and others, including Sayen (1987, 1995), Noss (1992) and the Wildlands Network (2022), have proposed (see Box 1: Wildland Visions for New England and the Appalachian Region). Meanwhile, the latest environmental impacts statement for the White Mountain National Forest decided against giving Wilderness status to AT lands (USDA 2005), asserting:

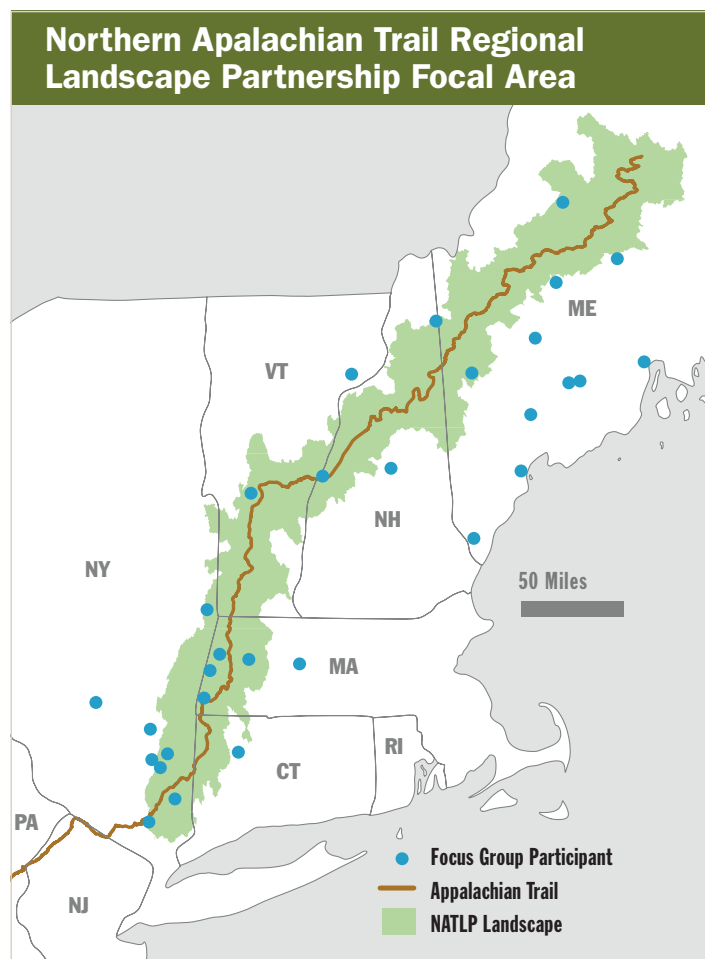
*While Wilderness values are adequately represented in the adjacent Pemigewasset Wilderness, the AT corridor is more appropriately managed to provide backcountry experiences. The AT corridor's high level of use and historic non-conforming uses do not meet the criteria for Wilderness with regard to maximizing primitive character and providing solitude while minimizing human presence.*

In New England, the Northern Appalachian Trail Landscape Partnership (NATLP) has proposed protecting 1.4 million acres of land extending from the Hudson River to Mount Katahdin, including 131,000 acres that lie within one mile of the trail (Labich et al. 2021).

Meanwhile, the AT-wide Appalachian Trail Landscape Partnership plans to assemble a diverse partnership to protect

an additional 100,000 acres and begin to shape a more equitable landscape by connecting "the A.T.'s landscape matrix of forests, fields, farms, parks and trails" and "wild, scenic, and cultural wonders" (Janssen et al. 2019, ATLP 2022).

Finally, and in support of this trail-wide effort, the ATLP and ATC assembled a Climate Advisory Group (ALCAG) of regional and national groups and agencies to assess the AT landscape's value in mitigating climate change and to define a shared vision for its future. *Conserving an Intact and Enduring Appalachian Landscape* (ALCAG 2022) outlines opportunities for inclusive partnerships with communities, stakeholders, and conservationists to ensure an enduring Appalachian landscape.



**FIGURE 12. Northern Appalachian Trail Regional Landscape Partnership focal area.** The pathway for the Appalachian Trail through New England showing the regional context for land conservation efforts and community engagement by the members of the Northern Appalachian Trail Landscape Partnership (NATLP). Development of the NATLP Strategic Plan included outreach and focus-group sessions with individuals and groups throughout the region. [Modified from Labich et al. (2021) and used with permission.]

**TABLE 3: Areas of Protected Lands Abutting the Appalachian Trail That Are Not Designated as Wildlands** [Note: The Appalachian Trail does not go through Rhode Island.]

STATE	FEDERAL	STATE	MUNICIPAL	CONSERVATION ORGANIZATION	PRIVATE	UNKNOWN	TOTAL
<b>NEW ENGLAND</b>	<b>2,096.1</b>	<b>3,431.6</b>	<b>219.2</b>	<b>267.8</b>	<b>302.2</b>	<b>4.7</b>	<b>6,321.6</b>
<b>CONNECTICUT</b>	<b>76.4</b>	<b>480.9</b>	<b>20.7</b>	<b>139.2</b>	<b>94.2</b>	<b>-</b>	<b>811.4</b>
<b>MASSACHUSETTS</b>	<b>123.6</b>	<b>659.4</b>	<b>193.3</b>	<b>60.4</b>	<b>57.5</b>	<b>-</b>	<b>1,094.2</b>
<b>MAINE</b>	<b>308.3</b>	<b>1,591.1</b>	<b>-</b>	<b>63.7</b>	<b>45.5</b>	<b>-</b>	<b>2,008.5</b>
<b>NEW HAMPSHIRE</b>	<b>1,448.5</b>	<b>397.4</b>	<b>2.3</b>	<b>4.5</b>	<b>83.6</b>	<b>-</b>	<b>1,936.2</b>
<b>VERMONT</b>	<b>139.4</b>	<b>302.9</b>	<b>2.9</b>	<b>-</b>	<b>21.5</b>	<b>4.7</b>	<b>471.4</b>

None of the documents supporting these strategic plans employ the words *wilderness* or *Wildland*.

### The Enduring Potential for Wildland Conservation

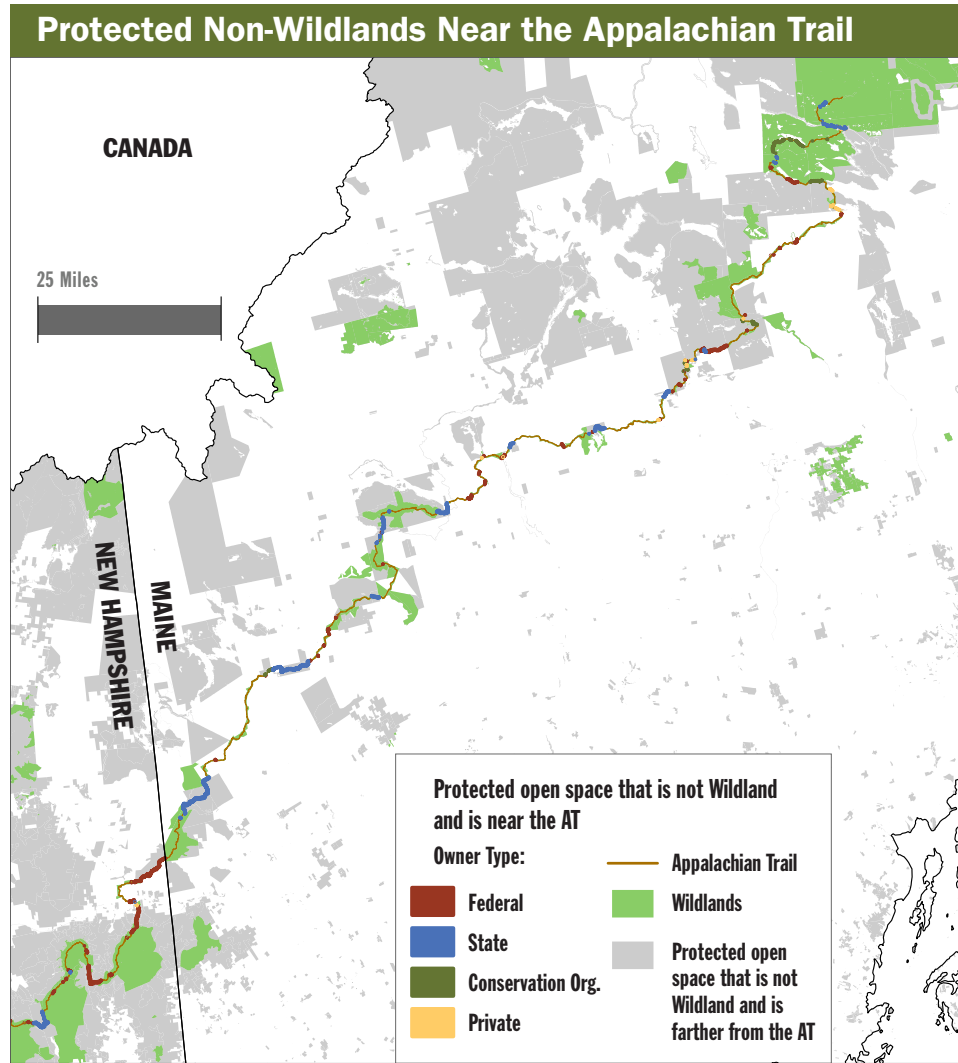
Remarkably, given the uneven embrace of wilderness by its vocal supporters, the AT emerges as a prominent Wildland feature on the conservation map for New England (see Figure 5). This incongruity is resolved, in part, by conversations with ATC staff and reference to the documents that guide their work.<sup>2</sup> Since 1938 interorganizational and agency agreements have outlined a federal management philosophy and cooperative system with partners including the ATC, 31 local and regional clubs, and all states except Maine. The 1981 Comprehensive Plan prioritizes the AT’s “primitive quality” and that “lands retaining a sense of the wild and primeval will be managed with special concern for these values.” These mandates guide ATC staff in coordination, management, and acquisition efforts with partners throughout the AT.

That said, coordinated management across federal, state, and private lands remains baffling in its complexities, including inconsistencies that allow commercial harvesting, salvage logging, controlled fire, and ATV trails in close proximity to sections of the trail. Wildland conservation by state partners is even more inconsistent, with no stipulations for Wildland management in the state memoranda of understanding and a weak history of state acquisitions along the AT. The nonprofits that embrace the AT corridor remain the brightest spot for Wildland conservation. Areas secured and managed

as Wildlands under conservation easements, management plans, and/or organizational policies are held by the Appalachian Mountain Club, Maine Appalachian Trail Club, Maine Appalachian Trail Land Trust, Northeast Wilderness Trust, Society for the Protection of New Hampshire Forests, and The Nature Conservancy.

Much could be done to reinforce Wildland commitments on public and private lands by clarifying Wildland language, intent, and parties in existing landmark acts, agreements, and plans. The 1981 Plan could be amended to clarify and strengthen language supporting natural processes in protected areas. The Forest Service could make Wildland intent the *Standard* condition in its planning framework for areas adjoining the AT. Meanwhile, the AT’s Wildland corridor would increase significantly if logging were precluded from all AT Management Areas and strict constraints were placed on prescribed fire and all-terrain vehicle (ATV) use. Memoranda of understanding with the states could reinforce these efforts by explicitly addressing Wildland management, and state agencies could add more land into existing Wildland programs such as the Maine Ecological Reserves and Vermont Natural Areas.

With more and better recognition and inclusion of the larger social and conservation goals espoused by MacKaye and other visionaries for the Appalachian realm, emerging state, regional, and federal efforts to address climate change could advance the integrated goals that the globe needs desperately (IPBES 2022, IPCC 2022). Through the efforts and focus of ATC conservation staff on Wildland conservation, the decades-long work by



**FIGURE 13.** The potential for expanding the continuous Wildland setting for the Appalachian Trail. Over 6,000 acres of conservation land immediately adjacent (within 250 feet) to the AT are not currently designated or managed as Wildland. The majority of these lands are owned by federal or state governments, especially in Maine, which owns 1,591 acres near the AT. Beyond making the AT corridor a continuous Wildland, there remains great opportunity to expand the width of that Wildland corridor.

TNC, AMC, and NEWT securing new Wildlands, and tireless advocacy by other groups, the potential remains for the completion of a wilderness way. Continental-scale conservation of an integrated wild, managed, and lived Appalachian region arose as a progressive vision one hundred years ago, but it has even greater rationale and potential today.

<sup>1</sup> Now known as the Appalachian Trail Conservancy, the ATC was founded in 1925 as the Appalachian Trail Conference. Myron Avery, trail overseer and board member of the Potomac Appalachian Trail Club, served as ATC chairman from 1932 to 1952 (King 2000, Ryan 2017).

<sup>2</sup> Hawk Metheny and Matt Stevens (personal communication). Cf., the 1981 Comprehensive Plan and Amendment No. 8 of the 1970 Cooperative Management System agreement between the NPS and ATC.



© David R. Foster

in the White Mountain National Forest by the Cog Railway, Mount Washington Auto Road, parking lot, sewage treatment plant, concessions, and communication structures), active management subunits (many federal lands supporting the Appalachian Trail), or inholdings under different ownership and management (Canaan Mountain in Connecticut). Other Wildland blocks are composed of separate Wildlands that are mapped and treated individually due to their different management prescriptions and designation by the fee owner. Such complexities abound on federal and state lands where adjoining areas may be classified differently because of their physical and biological condition (e.g., alpine versus forested areas on the national forests), management objectives (the many subunits of Baxter State Park), or type of protection and third-party oversight (setback areas on state lands along the AT).

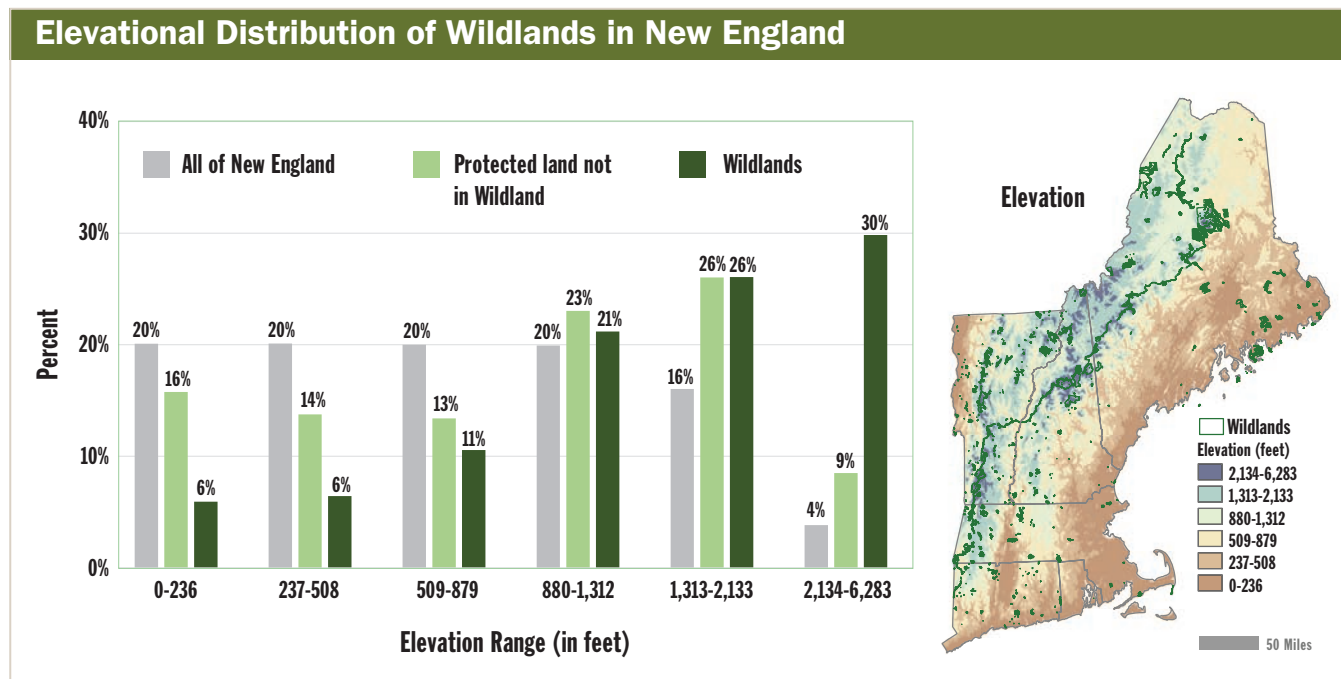
## Remoteness and Access: Legacies from the Origins of Wildland Conservation

The distribution and ecological characteristics of Wildlands differ from the region as a whole in ways that accentuate the geographical trends noted for protected lands overall (cf., Joppa and Pfaff 2009, Loeb and D'Amato 2020, Sims et al. 2022). Wildlands are more strongly skewed towards northern, elevated, and rural areas lying

distant from larger population centers. This trend emerges clearly for elevation and climate (represented by growing degree days), as more than half of all Wildland acres occupy higher elevations and colder sites in comparison to one-third of other permanently protected lands and only one-fifth of the New England region. Due to this environmental bias, the vegetation of Wildlands is dominated by northern forest types including sugar maple, beech, yellow birch, and hemlock (48 percent), spruce-fir, (27 percent), and aspen-birch forests (16 percent). In contrast, only 4 percent of Wildlands are comprised of oak-hickory forest and 3 percent of white pine forests.

The spatial distribution of Wildlands relative to the human population can be appraised from at least two distinctly different perspectives. One is that of remoteness and solitude, essential qualities that have been sought by many proponents of wilderness and which are reinforced in federal Wilderness designations (Aplet 1998, Sutter 2004, USDA 2005). However, these highly desirable traits yield a second characteristic that exemplifies a major challenge confronting land conservation and society more broadly: striking inequities in proximity and access to permanently protected lands; Sims et al. 2022).

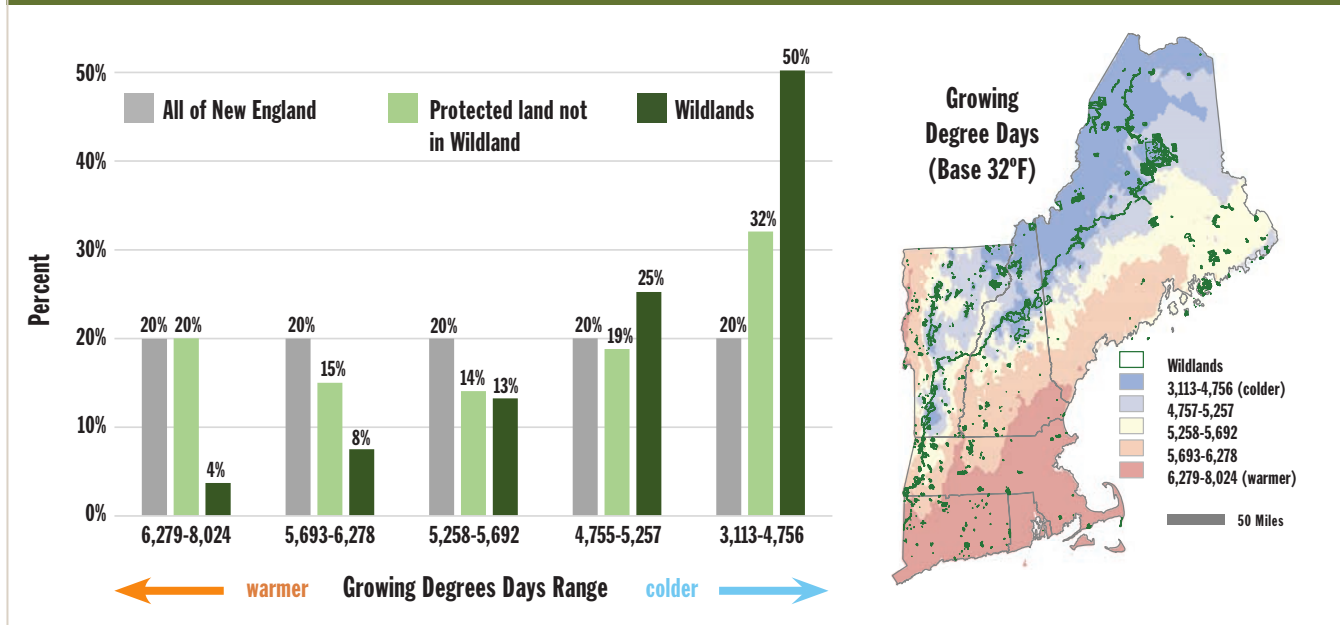
The geography of conservation lands is a product of a history of changing players (Sutter 2002, Marafioti 2006). Many early conservationists and wilderness proponents emphasized the natural and scenic qualities



**FIGURE 14. The elevational distribution of Wildlands in New England in relationship to other protected lands and the region as a whole.** Wildlands exhibit a more pronounced trend of the bias displayed by all protected lands towards greater representation of high elevation sites and poorer representation of average and low elevation sites. This distribution correlates with fewer Wildlands in southern, coastal, and more heavily populated regions.

**Note:** For this analysis the region was divided into six elevation ranges as displayed in the map at right. [Data from U.S. Geological Survey (USGS), EROS Data Center. 1999.]

## Broad Climatic Distribution for Wildlands in New England



**FIGURE 15.** The broad climatic distribution (characterized by growing degree days with a base of 32°F) for Wildlands in New England in relationship to other protected lands and the region as a whole. Wildlands exhibit a more pronounced trend of the bias displayed by protected lands overall towards greater representation of cooler sites with a shorter growing season and poorer representation of warmer, more productive areas.

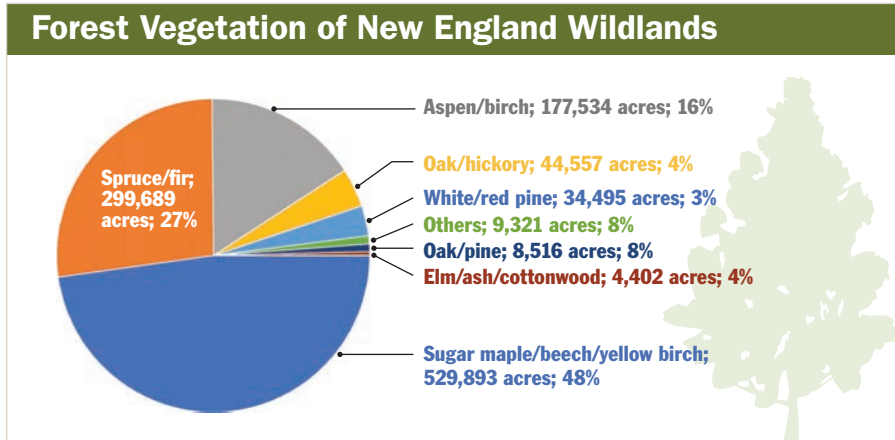
**Note:** For this analysis the region was divided into five temperature ranges of equal land area as shown in the map on the right. [Data from the USA National Phenology Network (USA-NPN). (2017).]

of lands and waters for their emotional, spiritual, and aesthetic values. Often coming from thickly settled and urbanizing landscapes, these advocates sought distant rural locales to establish large tracts of land that were free from the improvements of civilization and often rugged and majestic in appearance. Public ownership and the guarantee of protection and access that this provided to the region's citizens became a major goal (cf., Joppa and Pfaff 2009, Mahung et al. 2018, Anderson 2002, 2016). Large remote tracts were further prioritized by public and private policies that emphasized the conservation of natural resources, montane and alpine habitats, and large timberlands for their many ecological and societal values, often under strict fiscal constraints (Northern Forest Lands Council 1994, Irland 2018, Publicover et al. 2021, Sayen 2023).

Overall, that history of emphasizing more remote and large blocks of connected lands led to a socially inequitable distribution of conservation lands that favors access and benefits to more affluent white populations (Marafioti 2006, Taylor 2016, Arthur and Burns 2020, Sims et al. 2022). The current distribution of Wildlands in New England represents an extreme example of this pattern, as Wildlands tend to be concentrated in areas

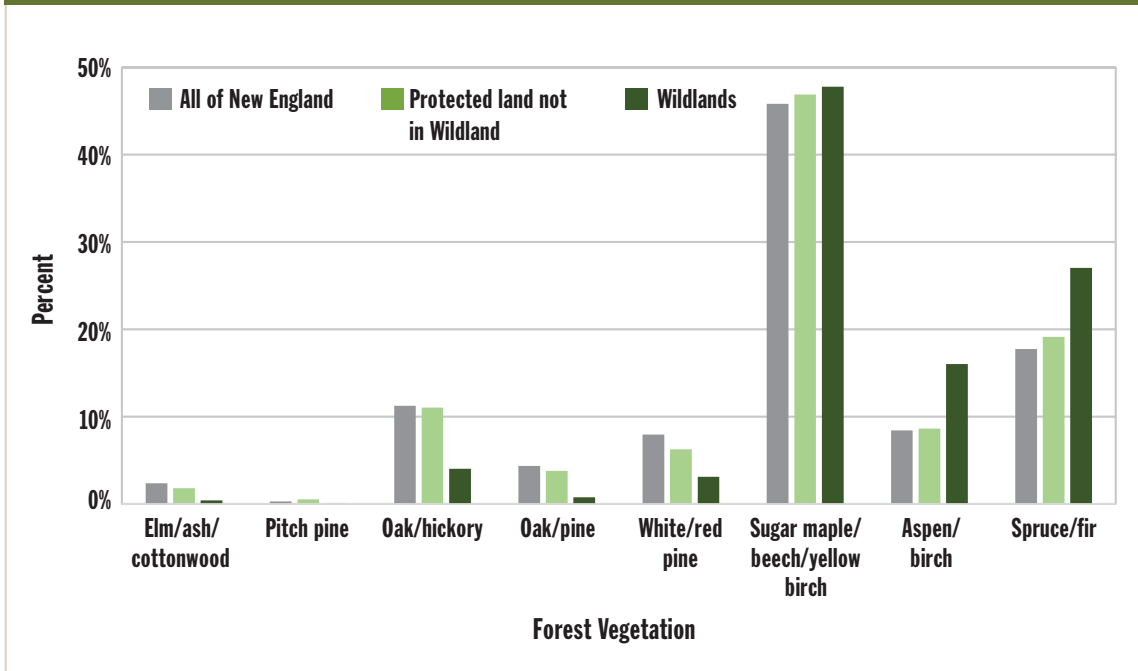
of low population density broadly distant from densely settled landscapes. This distance to major population centers increases with Wildland block size.

With increasing recognition that Wildlands convey many benefits beyond the solitude, isolation, and physical challenge that provide invaluable experiences to all people, a substantial broadening is occurring in the prioritization of lands for Wildland designation



**FIGURE 16.** The forest vegetation of New England Wildlands. Given the bias in Wildland distribution towards higher latitudes and elevations, the vegetation is dominated by northern hardwoods and spruce and fir, with little representation by more southern forest types comprised of oak and hickory. [Forest vegetation data from Duveneck et al. (2015) based on USFS Forest Inventory and Analysis data for the New England region.]

## Relative Distribution of Forest Vegetation in New England Wildlands



**FIGURE 17.** The relative distribution of forest vegetation in New England Wildlands compared to that of other protected lands and the New England region overall. Whereas the vegetation of protected lands is fairly representative of the vegetation of the entire region, Wildlands include much greater representation of northern hardwoods, spruce-fir and aspen-birch forest and fewer oak-hickory and pine forests. [Forest vegetation data from Duvoneck et al. (2015) based on USFS Forest Inventory and Analysis data for the New England region.]

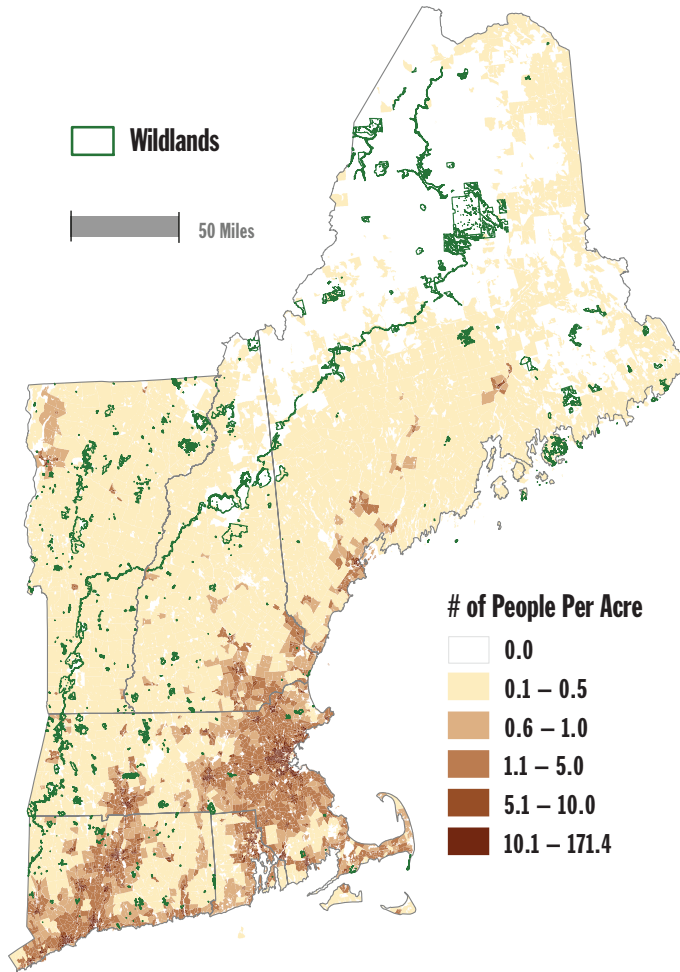
(Portner 2021, IPBES 2022). The distribution of many newer smaller Wildlands in suburbs and more densely populated areas, such as Muddy Pond Wilderness Preserve in exurban Kingston, Massachusetts, halfway between Boston and New Bedford, represents a growing emphasis on increasing accessibility for broader populations, and achieving Henry David Thoreau’s vision of a natural park in every town.

### History and Timeline of Wildland Conservation in New England

In terms of the number of properties, Wildland conservation is characterized by slow activity through the first half of the twentieth century, an increasing pace through the 1990s, and a great surge over the past two decades. The growth of Wildland acreage parallels this trend, although the large size of early-twentieth-century properties, such as Baxter State Park, yields a more variable pattern. This history embraces a notable shift in the number and nature of conservation entities advancing Wildland conservation over time. A few largely public (state and federal) entities established Wildlands up into the 1970s. Since then, an increasing number of private organizations, institutions, and families have become involved. Since the year 2000 more than 650,000 Wildland acres were protected and the number of organizations, agencies, and entities owning Wildlands or their easements exceeded one hundred.

In the early decades of Wildland conservation, the driving force was oftentimes one or a few private individuals or public employees who were empowered by wealth or position. They were typically motivated by a strong sense of public responsibility mixed with exclusivity to acquire land outright or promote governmental support for major land acquisition. Their names are forever tied to many of the region’s grand Wildlands: Percival Baxter and Maine’s largest state park; Charles Eliot, William Dorr, Peggy Rockefeller, and Tom Cabot with Acadia National Park and its Schoodic Peninsula extension; and the Vermont acquisitions by Joseph Battell of “wild lands” and “whole forest(s) to be preserved in a primeval state” that have contributed Camel’s Hump State Park, the Battell and Breadloaf Wilderness Areas in the Green Mountain National Forest, and the Bread Loaf campus at Middlebury College (Michels et al. 2019). Although motivations and mechanisms may have changed over time, the role of citizen leadership has continued. The most striking recent example is the gift by Roxanne Quimby and family of the lands and endowment for Katahdin Woods and Waters National Monument, but dozens of other magnificent Wildland tracts have been assembled by individuals and families across the region. The collective impact of these actions is great, but their individualized nature helps to explain the frequently isolated scattering of these areas. Subsequent efforts, advanced by state and federal agencies and private organizations applying conservation principles and common

## Wildlands and the New England Population



◀ **FIGURE 18. The distribution of Wildlands and the New England population.** Wildlands predominate across the rural and less populated portions of the region. [Data from U.S. Census Bureau (2020).]

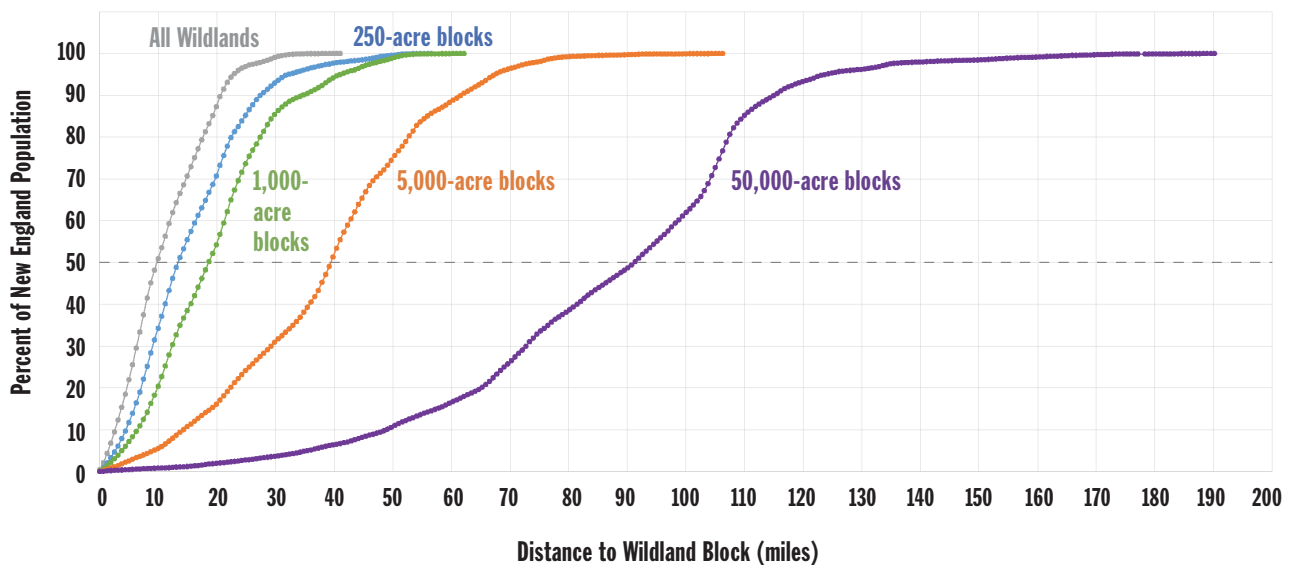


© Photo and caption Susan C. Morse

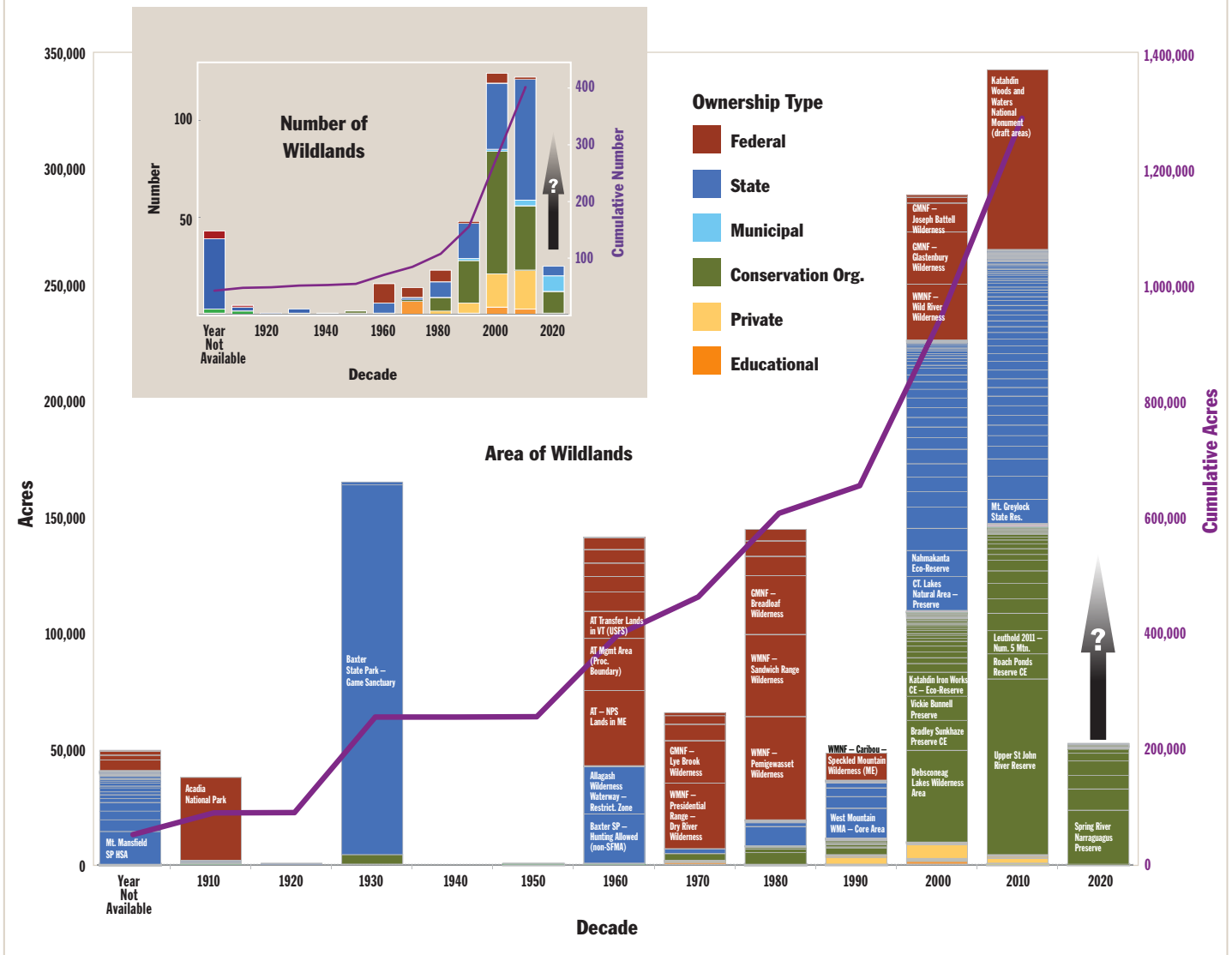
The phenomenal expansion of the northeastern coyote over the last 90 years, resulting in part from the earlier eradication of eastern timber wolves, has changed the region's wildlife dynamic. Coyotes are omnivores and serve many functions in our ecosystems.

▶ **FIGURE 19. Geographical access to Wildlands in New England represented by distance from the region's population.** With the largest Wildlands located in northern New England and the population concentrated in southern New England, the curves of distance to Wildlands flatten for progressively larger Wildland areas. The large number of small Wildlands in southern and more populated areas produces the steep curve for the distance to all Wildlands. Half of New Englanders reside within 10 miles of a Wildland and all New Englanders reside within 41 miles of a New England Wildland.

## Geographical Access to Wildlands in New England



## Timeline of Wildland Establishment in New England



**FIGURE 20. Timeline of Wildland establishment in New England since 1900.** Cumulative totals are represented by the purple line. Both the total acres (main graph) and number (inset) of Wildlands established display a large increase in the past two decades. Firm dates for Wildland establishment are unavailable for 10.1 percent of the Wildlands representing 3.7 percent of the total Wildland area in the region. Wildlands of more than 20,000 acres are labeled. Totals for the current decade are incomplete.

sense, have sought to weave these individual tracts into connected mosaics of Wildlands.

Public agencies became positioned to emerge as signature players in Wildland conservation through their broader mission of conserving natural resources, principally timber, wildlife, and water. Some of these efforts were focused on specific geographies, such as the acquisition of the headwaters of major rivers under the Weeks Act (1911) to form the White Mountain and Green Mountain National Forests. Many others, however, were opportunistic and governed by the availability of inexpensive lands that held promise for natural resource production or wildlife habitat protection. Those lands that met the price criteria established by state or federal

legislatures often bore heavy scars from repeated and intensive harvests and fire (Judd 2014, Irland 2018). Over time, with growing emphasis on management for multiple uses, including resources, recreation, and research, and then the national embrace of wild and untrammelled nature, sections of these public lands were designated as Wilderness or large reserves. The selection process generally prioritized areas that were scenic, roadless, unproductive, challenging for resource production, or inaccessible and therefore reinforced the trend towards previously unsettled and higher elevation lands. However, as land planners, conservation biologists, and landscape ecologists increasingly espoused landscape-scale and regional thinking, Wildland conservation focused on





© David R. Foster

Looking north from White Head towards Black Head on Monhegan Island, Maine. Approximately two-thirds of the island is designated as Wildland.

forging better connections along the natural corridors formed by mountain chains, streams, and major landforms and on capturing a greater range of the region's natural variability (Soule and Terborgh 1999, Anderson et al. 2016).

Beginning in the 1950s, a new emphasis, championed by academics and private conservation organizations, emerged to select natural areas with important habitats and high biodiversity (Goodwin 1952, Noss 1983, Soule and Noss 1998, Goodwin and Dreyer 1991, Vogelmann 2011). This movement helped spawn the establishment of conservation organizations like The Nature Conservancy, initiatives such as the Natural Areas programs, and the emergence and growth of land trusts. All expanded the engagement of individual private landowners and smaller properties covering a broader array of landscapes and population settings.

This dynamic history has produced the huge diversity of players documented in this study: from federal to local public entities; international conservation organizations to local land trusts; and many small to large private landowners. Nonetheless, most of this activity has engaged a narrow segment of society, largely white, frequently affluent, and well educated, and predominantly residents

of urban and suburban communities (Taylor 2016). Despite a few notable historical examples urging the establishment of wilderness for the benefit of Indigenous people and those oppressed by industrializing society (Marshall 1933, MacKaye 1933, Sayen 1995a,b), only recently has Wilderness conservation, like all land conservation, embraced the inclusion of rural and socially and economically marginalized communities in the planning of regional conservation so that a greater segment of society can participate in the establishment, ownership, and benefits of Wildlands (Marafioti 2006).

### Ownership

Across New England, Wildland ownership is strongly skewed to public control (75 percent), and is rather evenly distributed between state (39 percent) and federal (36 percent) agencies. The 25 percent of Wildlands in private hands is found mostly in many different conservation organizations and nonprofit organizations. Private families play a minor but distinctive role, having secured slightly more than 15,188 acres (1.1 percent of Wildlands), largely in northern New England. The fact that many of the largest and earliest Wildlands ultimately came into public ownership obscures the critical role that individuals in the

**TABLE 4: Wildland Ownership across New England**

	STATE		FEDERAL		CONSERVATION ORGANIZATION	
	Acres	% of all Wildlands in State / New England	Acres	% of all Wildlands in State / New England	Acres	% of all Wildlands in State / New England
<b>NEW ENGLAND</b>	<b>513,587</b>	<b>39%</b>	<b>473,781</b>	<b>36%</b>	<b>312,641</b>	<b>24%</b>
<b>CONNECTICUT</b>	<b>15,728</b>	<b>55%</b>	<b>5,580</b>	<b>20%</b>	<b>5,671</b>	<b>20%</b>
<b>MASSACHUSETTS</b>	<b>104,722</b>	<b>90%</b>	<b>6,760</b>	<b>6%</b>	<b>3,390</b>	<b>3%</b>
<b>MAINE</b>	<b>296,502</b>	<b>41%</b>	<b>165,215</b>	<b>23%</b>	<b>251,382</b>	<b>35%</b>
<b>NEW HAMPSHIRE</b>	<b>27,381</b>	<b>12%</b>	<b>175,796</b>	<b>75%</b>	<b>24,910</b>	<b>11%</b>
<b>RHODE ISLAND</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>21</b>	<b>100%</b>
<b>VERMONT</b>	<b>69,254</b>	<b>31%</b>	<b>120,429</b>	<b>54%</b>	<b>27,267</b>	<b>12%</b>

	PRIVATE (individual or business)		EDUCATIONAL		MUNICIPAL	
	Acres	% of All Wildlands in State / New England	Acres	% of All Wildlands in State / New England	Acres	% of All Wildlands in State / New England
<b>NEW ENGLAND</b>	<b>15,188</b>	<b>1.1%</b>	<b>4,715</b>	<b>0.4%</b>	<b>1,967</b>	<b>0.1%</b>
<b>CONNECTICUT</b>	<b>741</b>	<b>2.6%</b>	<b>198</b>	<b>0.7%</b>	<b>695</b>	<b>2.4%</b>
<b>MASSACHUSETTS</b>	<b>160</b>	<b>0.1%</b>	<b>1,100</b>	<b>0.9%</b>	<b>143</b>	<b>0.1%</b>
<b>MAINE</b>	<b>9,001</b>	<b>1.2%</b>	<b>–</b>	<b>0%</b>	<b>395</b>	<b>0.1%</b>
<b>NEW HAMPSHIRE</b>	<b>3,211</b>	<b>1.4%</b>	<b>1,211</b>	<b>0.5%</b>	<b>657</b>	<b>0.3%</b>
<b>RHODE ISLAND</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>
<b>VERMONT</b>	<b>2,075</b>	<b>0.9%</b>	<b>2,206</b>	<b>1%</b>	<b>76</b>	<b>0%</b>

private and public sphere played in leading, motivating, and financing Wildland conservation.

The pattern of public and private ownership differs radically across the states and regionally within New England. Similarly, the role of specific public agencies and private organizations is quite varied geographically and involves many different players.

Massachusetts stands out among the states in the dominant role that state agencies play in Wildland conservation, with 90 percent of all Wildland area owned by the Commonwealth. The Department of Conservation and Recreation (responsible for forests, parks, state water supply lands, and considerable urban parkland) manages 95,988 Wildland acres (reserves); the Division of Fish and Wildlife oversees another 7,616 Wildland acres; and

the two agencies jointly manage the 776-acre Jug End Wildlife Management Area. Connecticut’s Wildlands are also dominated by state ownership (55 percent of Wildlands; Division of Forestry), with another 20 percent owned by federal agencies and 20 percent by conservation organizations.

Maine has nearly 300,000 acres (41 percent) of Wildlands under state control, principally in Baxter State Park (182,450 acres of the approximately 209,500 acres under the control of Baxter State Park Authority) and the Maine Ecological Reserve System (MERS; 89,045 acres of its 175,000 acres). Slightly more than 250,000 acres in the state are owned by conservation organizations. The Nature Conservancy (188,402 acres) has led these efforts through the acquisition of several large tracts



© John Burk

Acadia National Park received 4 million visitors in 2022, many of whom hiked or drove to its highest point atop Cadillac Mountain. Despite the intense visitation, the majority of the park is managed in a manner consistent with Wildland criteria, and large areas support natural process and offer valuable habitat, quiet retreats, and spectacular vistas.

in the past decade, followed by Appalachian Mountain Club (27,166 acres), Northeast Wilderness Trust (18,217 acres), Downeast Lakes Land Trust (10,626 acres) and other groups. Historically, Maine has seen relatively little federal conservation ownership, with federal Wildlands concentrated in parts of Acadia National Park (35,321 acres of Wildland), NPS land along the Appalachian Trail (32,230 acres), the Caribou-Speckled Mountain Wilderness Area (11,324 acres) of the White Mountain National Forest, and smaller areas in the Maine Coastal Islands National Wildlife Refuge (2,635 acres) and Moosehorn National Wildlife Refuge (7,073 acres). Federal ownership increased significantly in 2016 through presidential proclamation when the National Park Service added the 87,563-acre Katahdin Woods and Waters National Monument. A total of 76,633 acres of the monument are Wildlands, which doubles the federal share to 23 percent of Maine's total.

Vermont's portfolio of Wildlands is spread across federal ownership (54 percent; U.S. Forest Service), state agencies (31 percent; primarily Department of Forests, Parks and Recreation) and the nearly 27,300 acres (12 percent) owned by conservation organizations, principally The Nature Conservancy and Northeast Wilderness Trust.

New Hampshire is more strongly dominated by federal ownership (75 percent; largely U.S. Forest Service), with roughly equal contributions by nonprofit groups (totaling

11 percent; Society for the Protection of New Hampshire Forests, The Nature Conservancy, New England Forestry Foundation) and the state (12 percent; Division of Forests and Lands).

Within this array of landowners several distinctive arrangements stand out.

**Public lands** are owned and managed for the benefit of the region's residents by a variety of municipal, state, and federal entities and agencies. Local town ownership of Wildlands covers 13 properties and 1,967 acres and occurs in all New England states except Rhode Island. The town of Simsbury, Connecticut, has seven municipal Wildlands totaling 695 acres that are secured solely by municipal administrative decision or policy. Five town-owned properties in other states are secured with a conservation easement or deed restriction. One, the Violette Brook Reservoir lot in Cyr Plantation, Maine, is specifically protected for public water supply.

Many state lands are under the oversight of agencies responsible for the management of forests, parks, and recreation. Other state entities include state universities (Vermont) and fish and wildlife agencies. In Maine and Connecticut, Wildlands are managed by one department, whereas in Massachusetts, New Hampshire, and Vermont they are controlled by multiple departments or divisions.

Three federal agencies are responsible for 473,780 acres of Wildlands across all states, except Rhode Island. These include the National Park Service (NPS) and U.S. Fish and Wildlife Service (USFWS) in the Department of the Interior and the U.S. Forest Service (USFS) in the Department of Agriculture. Connecticut is represented by 5,580 acres held for the Appalachian Trail (NPS), Massachusetts has the Monomoy Wilderness in the National Wildlife Refuge (1,493 acres) and Appalachian Trail lands (5,267 acres), and Vermont and New Hampshire have the bulk of their federal ownership concentrated in the Green Mountain and White Mountain National Forests, respectively. In Vermont all 120,429 acres of federal Wildland are owned by the U.S. Forest Service, and in New Hampshire, the Forest Service controls all 175,796 acres of federal land except the 25-acre National Park Service property along the Appalachian Trail. Maine includes five federal Wildland properties: the U.S. Fish and Wildlife holds Wilderness Study Areas in the Maine Coastal Islands National Wildlife Refuge (2,635 acres) and Wilderness Areas in the Moosehorn National Wildlife



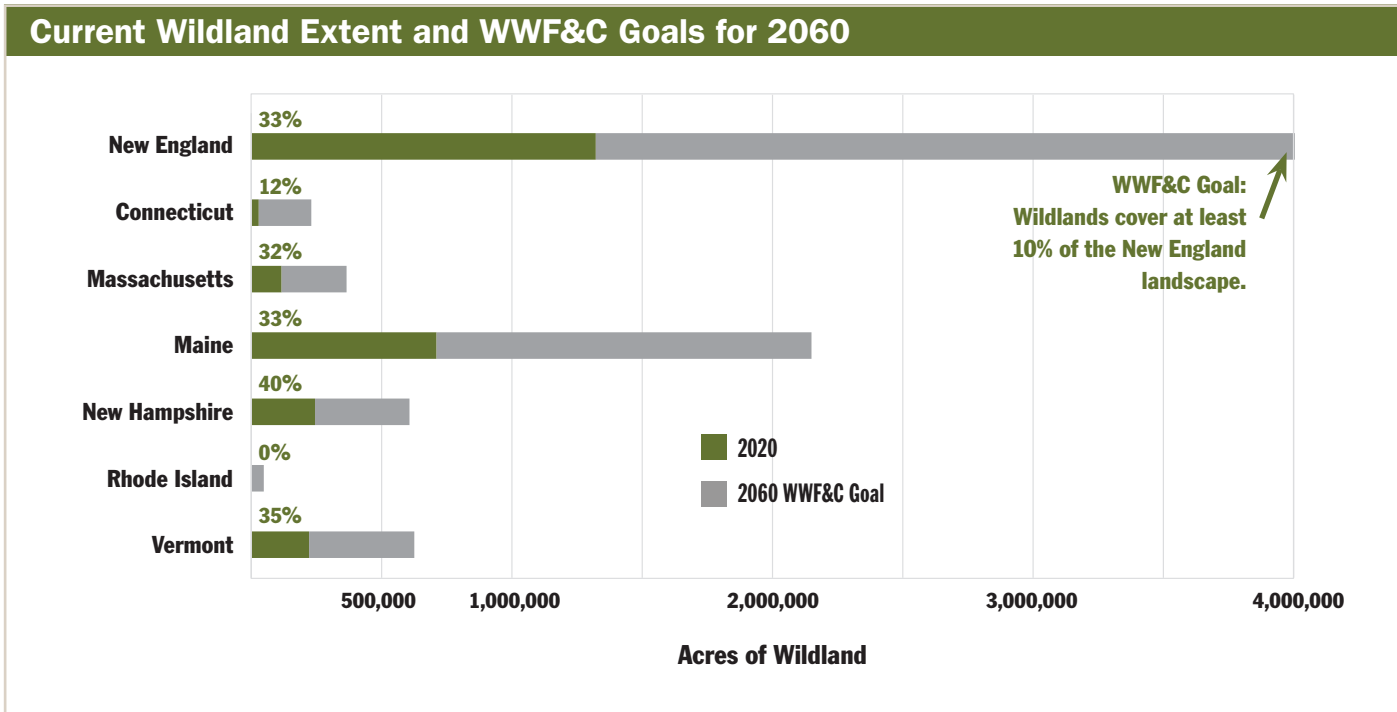
© Photo and caption Susan C. Morse

Wolverines are “first course decomposers” of large game animals, crushing bones, getting into the marrow, and using the entire animal.

Refuge (7,073 acres); the National Park Service holds 32,230 acres of AT lands, 35,321 acres in Acadia National Park, and 76,633 acres in Katahdin Woods and Waters National Monument; and the U.S. Forest Service manages the Caribou-Speckled Mountain Wilderness Area (11,324 acres) of the White Mountain National Forest.

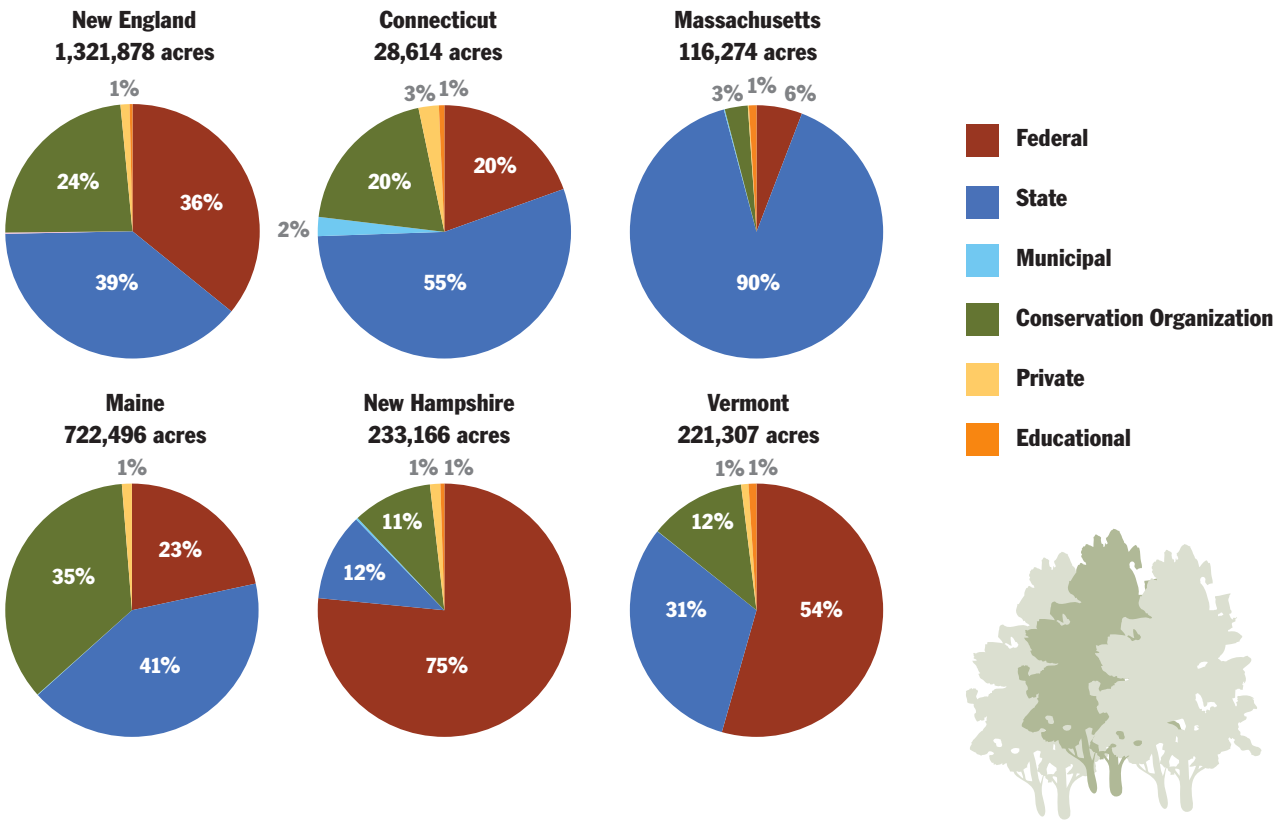
**Baxter State Park** comprises a unique conservation landscape, as the land was largely acquired and donated by former governor Percival Baxter over a four-decade period beginning in the 1930s, and is held in Public Trust for the citizens of the state. It is overseen by the legislatively designated Baxter State Park Authority. The resulting property

nonetheless epitomizes the complexity of conservation landscapes as it is a mosaic of parcels purchased at different dates through a series of complicated transactions, secured by different legal and administrative mechanisms, and assigned to subunits with varying management guidelines and restrictions. These include numerous sections that are not Wildlands and four that are: Game Sanctuary, Hunting Areas, Boody Brook Natural Area, and Webster Ledge Reserve. The Baxter Wildlands also include a setback buffer associated with the federally managed Appalachian Trail (NPS 2006, 2008).



**FIGURE 21.** The current status of Wildlands in New England relative to the Wildlands, Woodlands, Farmlands & Communities goal for Wildlands to cover at least 10 percent of the New England landscape, or approximately 4 million acres, by 2060. Wildlands currently cover about 3.3 percent of the New England region, or one-third of the goal. State-level goals are based on the simplifying assumption that the WWF&C goal will be allocated evenly across the six states in relationship to the extent of forest land in each state. To date, no state has established a goal for Wildlands.

## Wildland Extent and Fee Ownership



**FIGURE 22. Wildland extent and fee ownership across New England and the individual states.** Whereas public ownership of Wildlands prevails across the region, the relative contribution of federal versus state land varies greatly across the states. Rhode Island (not shown) has a single Wildland (21 acres) owned by a conservation organization.

**Educational institutions** play a small but surprisingly longstanding role in Wildland ownership, comprising a total of 4,715 acres in 17 properties. This ownership includes one elementary/secondary school (Hampshire Country School) that owns the 1,194-acre Wapack Wilderness in the towns of New Ipswich and Rindge, New Hampshire, and five colleges and universities: University of Vermont (10 properties; 2,006 acres); Harvard University (portions of three Harvard Forest tracts and the Pisgah Forest; 649 acres); University of Massachusetts (Cadwell Forest and Arnold Rhodes Natural Area; 468 acres); Middlebury College (Bread Loaf Campus; 200 acres); and Connecticut College, which owns the Mamacoke Island, Goodwin, and Bolleswood Natural Areas comprising 198 acres on three sides of the campus. Most of these academic lands are secured as Wildlands through administrative designations, but a third of the acreage is protected through conservation easements (Middlebury College, Hampshire Country School, and four easements on University of Vermont Wildlands; easements on other lands, including those of Harvard University do not explicitly secure their Wildland status).

Active involvement by academic organizations in New England Wildland conservation began at least as early as 1903 with studies of the old-growth Pisgah forest

in southwestern New Hampshire led by Professor Richard Fisher with students from Harvard University, as they began to lay the foundation for an ecological approach to forest management (Spurr and Cline 1942, D'Amato et al. 2017, Foster 2020). The 17-acre Pisgah tract was acquired in 1922 to protect it from imminent logging and “to be kept forever in its natural state” (Harvard Forest Archives, Foster 1988). Despite being blown down and uprooted by the 1938 hurricane, and subsequently threatened by salvage logging, the forest has been managed and studied intensively in a hands-off fashion and now comprises a small inholding in the nearly 4,600-acre state-designated Wildland in the 13,300-acre Pisgah State Park. Elsewhere, early leadership in land conservation in The Nature Conservancy by Professors Richard Goodwin at Connecticut College and Hubert “Hub” Vogelmann at University of Vermont led to the establishment of Natural Areas at these schools beginning in 1952 and 1974 respectively (Goodwin 1952, Lin 2021, Vogelmann 2011, Paradis 2021).

Over thirty **private land conservation organizations** own more than 140 properties comprising more than 310,000 acres of Wildlands. These range from small local and regional land trusts such as Mount Grace Land Conservation Trust, Passumpsic Valley Land Trust,

**TABLE 5: The Leading 50 Organizations and Agencies Engaged in Wildland Conservation in New England**

			FEE OWNER		THIRD-PARTY ROLE TOTAL		ACRES TOTAL
	State	Owner Type	# of Properties	Acres	# of Properties	Acres	Fee (Plus Third-Party Role)
US Forest Service	Multiple	Federal	24	307,523			307,523
The Nature Conservancy (ME)	ME	Conservation Org.	10	188,402	3	17,203	205,605
Baxter State Park Authority	ME	State	6	182,450			182,450
National Park Service	Multiple	Federal	6	155,056			155,056
State of Maine – BPL	ME	State	24	113,843			113,843
Commonwealth of Massachusetts – DCR	MA	State	42	95,987	1	385	96,372
Forest Society of Maine	ME	Conservation Org.	2	954	20	91,657	92,611
Northeast Wilderness Trust	Multiple	Conservation Org.	16	26,217	20	32,673	58,890
State of Vermont – FPR	VT	State	51	45,485			45,485
The Nature Conservancy (VT)	VT	Conservation Org.	35	19,258	1	12,440	31,697
AMC MWI LLC	ME	Conservation Org.	4	27,166			27,166
The Nature Conservancy (NH)	NH	Conservation Org.	2	11,044	4	15,549	26,593
State of Vermont – VFWD	VT	State	15	18,131			18,131
State of Connecticut – DEEP	CT	State	25	15,728			15,728
State of Maine	ME	State	1	209	4	14,990	15,199
State of New Hampshire – F & G	NH	State	1	14,785			14,785
US Fish & Wildlife Service	Multiple	Federal	3	11,202			11,202
Downeast Lakes Land Trust	ME	Conservation Org.	2	10,626			10,626
Society for the Protection of New Hampshire Forests	NH	Conservation Org.	39	9,284	3	740	10,024
Private (family)	Multiple	Private	32	8,494			8,494
State of New Hampshire – DNCR/DFL	NH	State	1	8,002			8,002
Commonwealth of Massachusetts – DFW	MA	State	4	7,958			7,958
Maine Appalachian Trail Land Trust	ME	Conservation Org.	2	2,161	4	4,632	6,793
Harris Center for Conservation Education	NH	Conservation Org.			3	5,904	5,904
State of Vermont – VFWD & FPR	VT	State	2	5,638			5,638
Vermont Land Trust	VT	Conservation Org.	1	204	26	4,677	4,881
State of New Hampshire – DNCR/DFL & DPR	NH	State	1	4,594			4,594
McLean Affiliates	CT	Conservation Org.	1	4,281			4,281
Whetstone Wood Trust (Mass Audubon)	MA	Conservation Org.	1	2,703			2,703
Andorra Forest Limited Partnership	NH	Private	1	2,663			2,663
Weyerhaeuser Company	ME	Private	2	2,578			2,578
Vermont Housing & Conservation Board	VT	State			3	2,552	2,552
New England Forestry Foundation	NH	Conservation Org.	1	2,163			2,163
University of Vermont	VT	Educational	10	2,006			2,006
Frenchman Bay Conservancy	ME	Conservation Org.	1	1,434			1,434
Midcoast Conservancy	ME	Conservation Org.	4	1,291			1,291
Lake Champlain Land Trust	VT	Conservation Org.			1	1,234	1,234
Hampshire Country School	NH	Educational	1	1,194			1,194
Upper Valley Land Trust	NH	Conservation Org.	1	866			866
Commonwealth of Massachusetts – DCR & DFW	MA	State	1	776			776
Town of Simsbury (CT)	CT	Municipal	8	695			695
Vermont Family Forests	VT	Conservation Org.	3	662			662
Town of Stoddard (NH)	NH	Municipal	1	657			657
White Memorial Foundation	CT	Conservation Org.	1	653			653
Equinox Resort Associates	VT	Private	1	650			650
Harvard University – Harvard Forest	Multiple	Educational	2	649			649
Appalachian Trail Mountain Club	ME	Conservation Org.	1	598			598
Northwest Connecticut Land Conservancy	CT	Conservation Org.			12	581	581
Pond Mountain Trust	CT	Conservation Org.	1	562			562
Mount Grace Land Conservation Trust	MA	Conservation Org.	1	385	1	160	545

Upper Valley Land Trust, Midcoast Conservancy, Frenchman Bay Conservancy, and Maine Appalachian Trail Club to regional conservation organizations including Appalachian Mountain Club and Northeast Wilderness Trust and the globally active Nature Conservancy. Many groups strongly associated with forest conservation and natural resource management also play an active role in Wildland conservation, including the Society for the Protection of New Hampshire Forests, New England Forestry Foundation, Forest Society of Maine, Vermont Land Trust, and Vermont Family Forests.

A few organizations play a dominant role in Wildland acquisition and management. The Nature Conservancy (TNC) owns 47 properties in the three northern New England states comprising nearly 220,000 acres and characterized by distinctly different state portfolios. TNC Maine owns 188,402 acres in ten Wildlands that range from 1,880 to 75,173 acres, TNC Vermont owns 19,258 acres in thirty-five Wildlands that span from 9 to 5,680 acres, and TNC New Hampshire has two Wildlands of 595 and 10,450 acres.

We are currently working with The Nature Conservancy to review additional properties that may be Wildlands, but which were not brought to our attention in time to be included in this report. Through its Maine Woods Initiative LLC the Appalachian Mountain Club owns four Wildlands of 27,166 acres and The Society for the Protection of New Hampshire Forests owns thirty-nine properties comprising 9,284 acres that range from 15 to 2,646 acres in size. Northeast Wilderness Trust owns sixteen properties comprising 26,217 acres across every New England state except Rhode Island.

Locally significant wildlands have been established by a **diverse array of individuals, families, companies**, and other entities that provide interesting models for private Wildland conservation. Disentangling specific ownership responsibilities is often challenging for properties held as limited liability companies and trusts, but notable examples include Alder Stream Wilderness Preserve (6,069 acres) in Maine, McLean Game Refuge (4,281 acres) in Connecticut, the Wildcat Hollow Wilderness Area in the Andorra Forest (2,663 acres) in New Hampshire, and Whetstone Wood Wildlife Sanctuary (2,703 acres) in more than a dozen parcels acquired by Mason and Ina Phelps around Wendell, Massachusetts. These and other properties assembled by individuals and families represent lifelong dedication to wildland conservation that rivals that of more widely recognized national figures.

## Mechanisms for Securing the Protection of Wildlands

The mechanisms that landowners and managing entities utilize to ensure that Wildland intention and management are secured in an enduring fashion can be reduced to a few broad categories: legislative (statute), legal, and self-oversight. These mechanisms involve

some level of overlap and exhibit significant individual variation. For example, legislative approaches differ widely across the different levels of government and among and within individual states and federal agencies. Legal mechanisms such as easements can vary tremendously. Many Wildland parcels are covered by multiple levels of protection that may be enforced by a range of third parties.

The prevailing **federal statutes** are the *Wilderness Act of 1964*, which allows Congress to establish Wilderness Areas in the National Wilderness Preservation System on federal lands managed by the Departments of the Interior and Agriculture and the Bureau of Land Management (not relevant

in New England); the *Eastern Wilderness Areas Act of 1975*; the federal *Vermont Wilderness Act of 1984* that designated four new Wilderness Areas in the Green Mountain National Forest; the *New Hampshire Wilderness Act of 1984*; the *Maine Wilderness Act of 1990*; the *New England Wilderness Act of 2006*, which designated 76,152 acres in three new Wilderness Areas in New Hampshire and Vermont while expanding five existing Wilderness Areas; and the *Antiquities Act* (1906) which was used by former presidents to establish national monuments in Maine—Sieur de Monts National Monument (which became Acadia National Park) by Woodrow Wilson, and, more recently, the Katahdin Woods and Waters Monument by Barack Obama.

Various **state statutes** are operative, notably Maine's 12 M.R.S. § 211 from 1955 pertaining to the Conveyance of Trust of Baxter State Park to the State of Maine; Maine's 12 M.R.S.A. § 1805, which in August 2000 established a system of Ecological Reserves on state lands managed by the Maine Department of Agriculture, Conservation & Forestry (DACF) (updated in 2022 by LD 736); Vermont's 10 V.S.A. § 2607, which established the Natural Areas statute within the Department of Forests, Parks and Recreation (1991); and seldom-used legislation in Massachusetts and Connecticut enabling the establishment of Nature Preserves and Natural Area Preserves, respectively.

**Legal mechanisms** include a variety of approaches that are grouped in this report as “deed restrictions” because they travel in perpetuity with a property and its deed. These include “forever-wild” conservation easements



© Shelby Perry

**TABLE 6: The Principal Land-Protection Mechanisms Securing State-Owned Wildland Areas in New England**

**Deed Restrictions** include conservation easements and declarations of trust. **Self-oversight** indicates properties for which there are no stronger mechanisms of protection, such as statutes or deed restrictions. Many properties secured by deed restrictions or statutes also have management plans and administrative designations.

	STATE STATUTE		FEDERAL STATUTE		DEED RESTRICTION		SELF-OVERSIGHT		TOTAL STATE-OWNED
	Acres	% of State-Owned	Acres	% of State-Owned	Acres	% of State-Owned	Acres	% of State-Owned	Acres
<b>NEW ENGLAND</b>	<b>296,490</b>	<b>58%</b>	<b>8,543</b>	<b>2%</b>	<b>205,735</b>	<b>40%</b>	<b>183,791</b>	<b>36%</b>	<b>513,587</b>
<b>CONNECTICUT</b>	<b>2,302</b>	<b>15%</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>13,426</b>	<b>85%</b>	<b>15,728</b>
<b>MASSACHUSETTS</b>	<b>211</b>	<b>0%</b>	<b>4,412</b>	<b>4%</b>	<b>–</b>	<b>–</b>	<b>100,099</b>	<b>96%</b>	<b>104,722</b>
<b>MAINE</b>	<b>272,774</b>	<b>92%</b>	<b>4,131</b>	<b>1%</b>	<b>174,540</b>	<b>59%</b>	<b>22,870</b>	<b>8%</b>	<b>296,502</b>
<b>NEW HAMPSHIRE</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>14,785</b>	<b>54%</b>	<b>12,596</b>	<b>46%</b>	<b>27,381</b>
<b>RHODE ISLAND</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>
<b>VERMONT</b>	<b>21,203</b>	<b>31%</b>	<b>–</b>	<b>–</b>	<b>16,410</b>	<b>24%</b>	<b>34,801</b>	<b>50%</b>	<b>69,254</b>

(conservation restrictions in Massachusetts), declarations of trust, and actual deed restrictions.

**Self-oversight** is provided by organization or agency policy, administrative decision, or management plans. These represent the weakest level of protection because they are readily subject to future change. *Organization or agency policy* includes the mission of the entity and policies enacted to ensure the protection and consistent management of its properties. For example, many conservation organizations and agencies cite their nonprofit or public status and mission as reasons for not establishing conservation easements on their properties. *Administrative decision* represents decisions and programs established to advance specific management regimes on designated lands. These may be agency-wide land-use designations such as those established by the Massachusetts Department of Conservation and Recreation (MA DCR 2012) following a three-year public Forest Futures Visioning Process, or parcel-specific policies established with the acquisition of the land, such as the Harvard Forest Pisgah tract. *Management plans* are long-term planning documents that may be subject to future revision. In many cases, lands secured firmly through legislative or legal mechanisms have management plans that support the Wildland intent. But, in several cases, such as the Highly Sensitive Management Areas in Vermont, the Old Forest Management Sites in Connecticut, or the Reserve Forest Areas in Massachusetts, management plans may represent the only place where the Wildland management commitment is clearly stated. In these and a limited number of specific cases in which additional administrative assurance and history support the Wildland

commitment for the foreseeable future, management plans have been accepted in this study as securing Wildland status.

Among these, legislative and legal mechanisms are stronger forms of Wildland security than self-oversight, as the latter group lacks outside or third-party oversight and enforcement and may be subject to change with administrative or staffing changes. That said, each mechanism is only as strong as the support of the owning and managing entity upholding it, and as it is overseen and defended within and from outside of that entity. Notable examples exist of properties held with weak protection, such as Harvard’s Pisgah Forest, which have been strongly defended in the face of extreme pressure, as with the regional demand for timber salvage that arose following the 1938 hurricane (Cline and Spurr 1942, Foster et al. 2010). Third-party and public oversight have been extremely effective in improving management and strengthening protection on federal Wilderness areas and state Wildlands.

### **Prevalence of the Different Protection Mechanisms across New England Wildlands**

Differences in ownership patterns, legislative activity, and conservation history have led to considerable variation in the geography of Wildland protection across the region. In the following discussion, the existence of multiple protection mechanisms on many properties leads some totals to differ from or exceed 100 percent.

Across New England 65 percent of the Wildland area is covered by strong forms of protection including statutes (27 percent federal; 22 percent state) or deed restrictions (29 percent) or both. The importance of deed restrictions



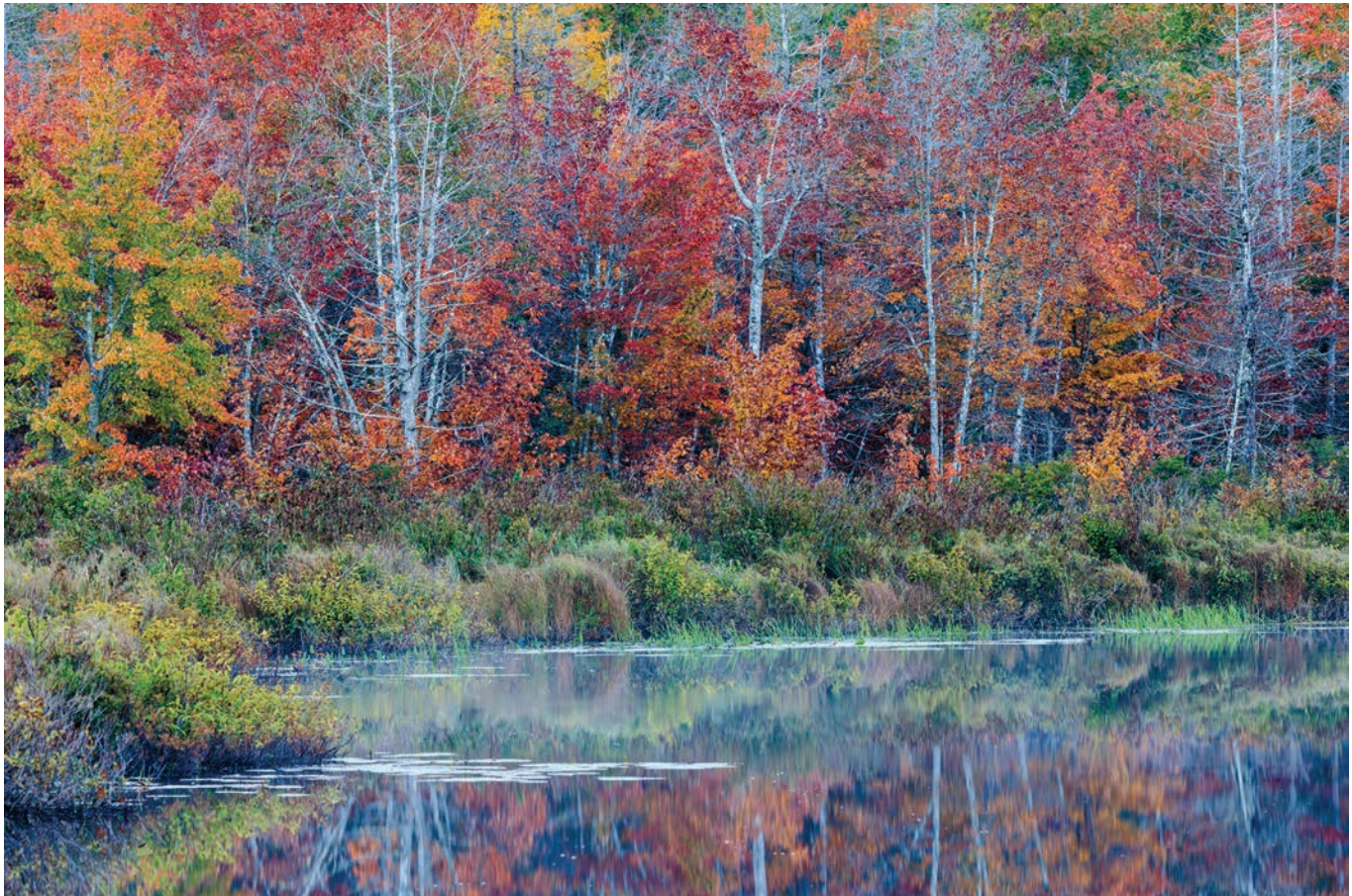
is heavily skewed by the Game Sanctuary at Baxter State Park, which comprises 40 percent of all deed-restricted land. Conservation easements occur predominantly on lands owned by conservation organizations, private families, and institutions, but also appear on some state and municipal lands. Management plans cover 81 percent of the Wildland area, oftentimes in conjunction with other forms of protection.

Maine is distinctive in numerous ways. Leading the region in private and state Wildland conservation, Maine contains 81 percent of the area under Wildland deed restrictions, whereas 92 percent of Maine Wildlands are covered by state statute. Federal Wilderness protection is heavily skewed towards New Hampshire and Vermont, which hold, respectively, 47 percent and 34 percent of the Wildland acreage in the region covered by federal statute.

Lands that are protected principally through self-oversight comprise 465,103 acres, or 35 percent of all Wildland area. These occur in 205 Wildlands accounting for nearly half (48 percent) of the Wildland properties. These include 78 properties (58,203 acres) covered solely by property management plans, 76 properties (155,183 acres) overseen by administrative decision, some of which also have management plans, and 22 Wildlands (244,952 acres) secured by organizational or agency policy, some of which also have management plans.

Although Massachusetts leads states in terms of the proportion of state-owned Wildlands covered solely by self-oversight (39 reserves on State Forests and State Parks totaling 100,099 acres, or 96 percent of self-overseen Wildland acreage statewide), it is far surpassed by Maine in total area (261,265 acres) under self-oversight. Together these two states comprise 78 percent of New England's total area of self-overseen lands. Vermont contributes another 55,086 acres or about 11 percent of New England's self-overseen lands, whereas New Hampshire contributes 26,391 or 5 percent. In all three of the northern states, self-oversight takes the form of management plans. In Maine, many of these are also supported by organizational or agency policy. In Vermont, 58 percent of the self-overseen Wildland area is also secured by administrative decision.

There are many examples of entire programs or categories of Wildlands that are secured only through self-oversight and therefore susceptible to changes in the future. These include the Massachusetts State Forest Reserves (100,099 acres), secured through administrative policy; the Highly Sensitive Management Areas in Vermont, managed according to Long Range Management Plans (25 areas totaling 29,690 acres); Connecticut's Old Forest Management Sites (23 areas totaling 13,426 acres), secured through management plans by Connecticut State Parks & State Forests; seven municipal forest



© Jerry Monkman / EcoPhotography

areas in Simsbury, Connecticut (695 acres), protected by Administrative Policy; and the majority of Wildlands owned by colleges and universities across the region. Notable areas reliant solely on management plans include the Monomoy National Wildlife Refuge wilderness area (1,493 acres), Nash Stream Forest Natural Area (8,002 acres; a separate conservation easement does not confer Wildland status), Pisgah State Park Criteria 1 lands (4,594 acres), and Baxter State Park's Hunting Allowed Area, outside of the Scientific Forest Management Area (SFMA: 21,057 acres).

## The Precarious Status of Many State-Owned Wildlands

Further examination of state Wildland ownership is warranted given the strong differences among the states in the approach to Wildland protection (Table 4).

The state-owned Wildlands of Maine are the most secure in the region as more than 90 percent of the total acreage is conserved by state statute (e.g., Ecological Reserve System and much of Baxter State Park). Almost 60 percent of that area has an additional level of security established through a conservation easement or deed restriction. Three areas in Baxter State Park (Boody Brook Natural Area, Webster Ledge Reserve, and the 21,000-acre Hunting Allowed Area outside of the SFMA) are secured only by administrative decisions and as guided by property management plans.

The Ecological Reserve System (MNAP 2022), established by statute in 2000 (Maine Legislature 2000) is limited in extent by statute, which severely restricts its application as a tool for ecosystem-scale rewilding and wildland restoration. The 2000 legislation capped Ecological Reserves at 15 percent of all Maine state lands or 100,000 acres (MNAP 2022). A 2022 revision to the statute (Maine Legislature 2022) raised the total to 115,000 acres, but retains the broader constraint imposed by the original legislation: "The designation of land as an ecological reserve may not result in a decline in the sustainable harvest level on land under the jurisdiction of the bureau to less than the average annual harvest for the preceding 10 years."

At the other extreme, Massachusetts is unique in its reliance on weak protection measures for its state ownership, which also comprise the bulk of Wildlands in the Commonwealth (90 percent). Most state Wildlands (96 percent; 100,099 acres) are secured simply by administrative designation made in 2012. Given the possibility of administrative changes to the Landscape Designation program, which at the time of publication is currently under a publicly engaged, decadal review, we examined these lands in great detail. Two large reserves in the southeastern part of the Commonwealth were rejected as Wildlands (the 5,300-acre Manuel F. Correllus State Forest and the 12,400-acre Myles Standish State Forest) because of active management for early successional, open, and grassland habitat that employs prescribed fire, tree harvesting, other mechanical treatment, and



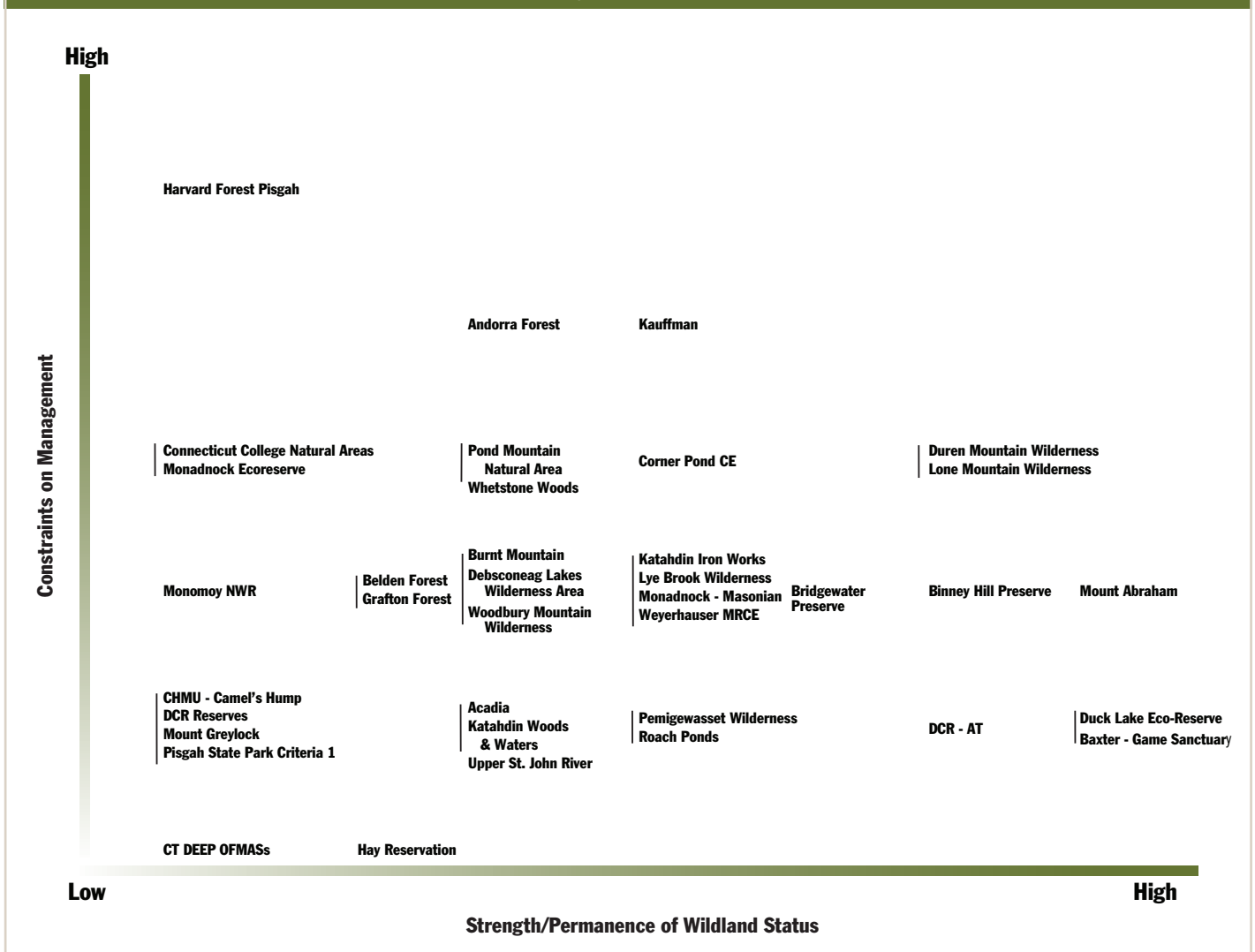
© Elizabeth H. Thompson

The Winooski River Valley—with its narrow strip of farmland, town, state, and interstate highways, a railroad, and a major power line—divides two large state holdings, each possessing large areas of wildland. Vermont's Long Trail and its conserved corridor offer access to these Wildlands.

herbicide application (Neill et al. 2007). The rationale for including the rest of the Commonwealth's Reserves as Wildlands included the lengthy review and public process leading to the designation of state forestlands into three categories (Forests, Parks, and Reserves); the long history of restrained harvesting and other active management on the majority of these lands; the perspective of senior officials in the Department of Conservation and Recreation and the Division of Fisheries and Wildlife (MassWildlife) that these designations and approaches to hands-off management would prevail into the foreseeable future; the existence of a Forest Reserve Scientific Advisory Committee (FRSAC) comprised of leading forest experts; and the vigilant (although informal) oversight of these Reserves by private groups and citizens. Further strengthening of these safeguards is being actively pursued by nonprofit organizations through the introduction of legislation and public review of the 2012 Landscape Designations.

Connecticut's approach to state-owned Wildlands represents a marginal strengthening over Massachusetts, as two of the 25 properties, representing approximately 15 percent of state Wildlands, are secured by state statute. However, the Canaan Mountain Wilderness Natural Area Preserve (2,260 acres), designated in 1972 and expanded in 1997, represents 98 percent of this area and is the sole Wildland representative of a state system of natural area preserves established by the legislature in 1969. The other 85 percent of state-owned Wildlands are only weakly protected through management plans dating from the 2000s that designate Old Forest Management Sites within large state forests that exclude active forest management.

## Gradient of Wildland Status in This Study



**FIGURE 23. The gradient of Wildland status recognized in this study for selected Wildlands.** Wildlands vary in their management and permanence, two out of three criteria applied in identifying Wildlands in this research (the third is intent). This illustrative graph seeks to capture this gradient by using legal documents and management plans to assess management in terms of the number and types of prohibitions against specific management activities and the number and characteristics of Wildland declaration and protection mechanisms. Properties towards the upper right of the graph have strong restrictions over management and strong protection mechanisms in place. Full property names and information are listed online in Appendix 1.

The area secured in New Hampshire's three state Wildlands (27,381 acres) is about evenly split between deed restrictions (54 percent) and management plans (46 percent). The Connecticut Lakes Natural Area (14,785 acres) is secured by a conservation easement held by The Nature Conservancy.

Encompassing 69,254 acres, a total of 68 state Wildland areas occur in Vermont, with nearly one-third of this area secured through the 1991 [Natural Areas statute](#) now incorporating 32 Wildlands (21,203 acres). Though authorized legislatively, these areas are designated administratively under a [Natural Areas Policy](#) that focuses protection on "important natural communities, sites for rare plants and animals, or areas of geologic interest." This interpretation would appear to limit the application of Natural Areas as a tool for broader Wildland protection.

Six of the 68 parcels (16,410 acres) are secured with easements, deed restrictions, or declarations of trust; 32 are self-overseen, the vast majority as Highly Sensitive Management Areas designated through administrative decision in property management plans.

### Conservation Characteristics of Wildland Areas

#### Resilience and Connectivity

Given the increasing application of The Nature Conservancy's climate-resilience research products for strategic land-conservation planning and parcel evaluation, we utilized this assessment of climate resilience to compare Wildlands and other protected lands to the rest of the New England landscape. Our analysis was based



Fisher are solitary and secretive predators, feeding on a variety of animals including hare, porcupine, and grouse.

**TABLE 7: Acres of Overlap between Wildlands as Defined in This Study and the Gap Analysis Program (GAP) Categories from The Nature Conservancy’s (TNC) 2018 Secured Areas Database**

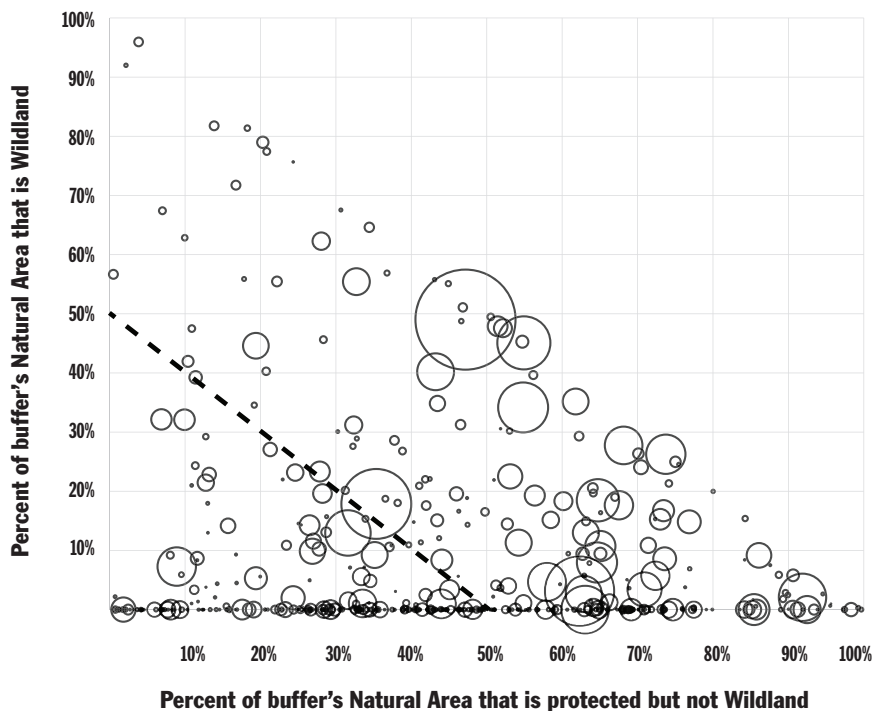
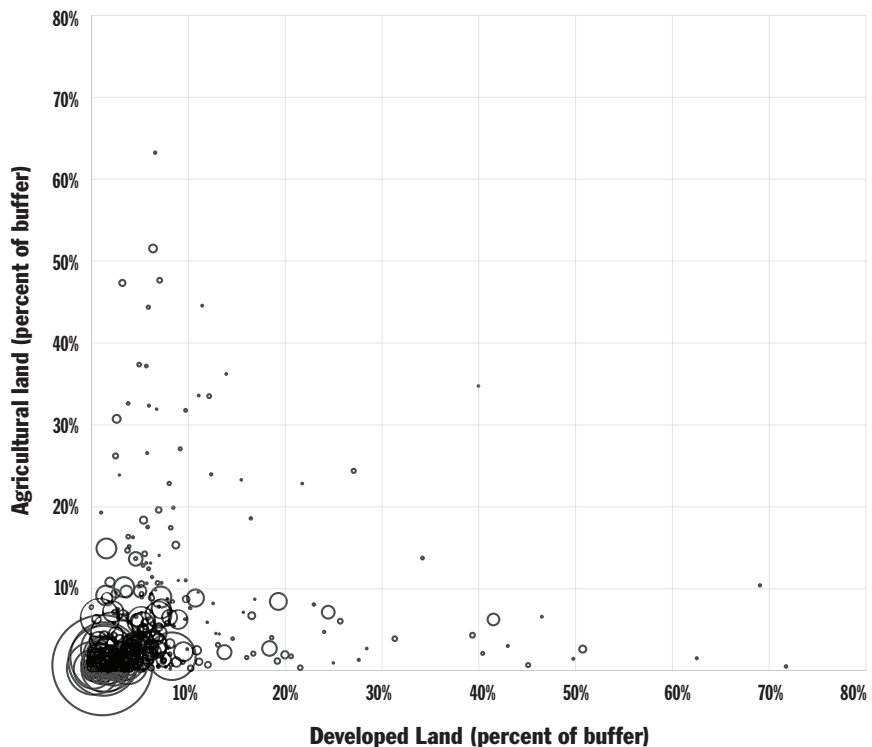
	GAP 1	GAP 2	GAP 3	GAP 4	GAP 39 (farmland)	GAP 9 (unknown)	WILDLAND NOT IN TNC DATA	TOTAL
<b>WILDLAND</b>	<b>821,726</b>	<b>311,059</b>	<b>124,167</b>	<b>1,319</b>	<b>1,016</b>	<b>–</b>	<b>62,592</b>	<b>1,321,878</b>
<b>NOT WILDLAND</b>	<b>218,694</b>	<b>845,123</b>	<b>6,304,358</b>	<b>382,201</b>	<b>436,988</b>	<b>20,500</b>		<b>8,207,863</b>
<b>TOTAL</b>	<b>1,040,419</b>	<b>1,156,182</b>	<b>6,428,525</b>	<b>383,520</b>	<b>438,003</b>	<b>–</b>	<b>–</b>	<b>9,529,741</b>

on the TNC Eastern Conservation Science report *Resilient and Connected Landscapes for Terrestrial Conservation* (Anderson et al. 2016) and associated data layers. This approach “identifies areas best able to support plants and animals in a changing climate” and highlights climate-resilient areas important for plant and animal movement across the region (connectivity or “flow”) and those areas supporting high biodiversity.

According to this assessment, New England Wildlands are highly climate resilient: 92 percent of Wildland acres are considered resilient compared to 67 percent of other

protected lands and 47 percent of unprotected areas. Wildlands lie within intact forested landscapes and appear quite conducive to plant and animal movement: 75 percent of Wildland acres occupy “climate flow zones” versus 46 percent of other protected open spaces, and 28 percent of unprotected land. Similarly, Wildland areas have a high “confirmed biodiversity value” at 82 percent versus 38 percent for other protected land, and 18 percent for unprotected acres. Locations with confirmed biodiversity value include areas with rare species occurrences; high numbers of rare species; rare to uncommon natural

## Landscape Buffering of Wildlands



**FIGURE 24. The landscape buffering of Wildlands in relationship to the size of individual Wildlands (size of bubbles).** To be most effective in delivering their natural and societal benefits and being resilient to human and natural disturbances and stresses, Wildlands should be buffered by other Wildlands and by protected lands that are ecologically managed. Currently, such buffering is highly uneven.

- (a) Many, especially small Wildlands, abut directly on non-forested agriculture or developed areas. Wildlands that are buffered by forest are clustered in the lower left.
- (b) Although the conservation status of the forest that surrounds Wildlands varies greatly, it does not exhibit any obvious trend with Wildland size. Note that for all of the Wildlands that fall below and to the left of the dashed line more than 50 percent of the surrounding forest is not protected from development.



© David R. Foster



Levi Pond Wildlife Management Area in Groton, Vermont.

communities; large, roadless patches of resilient land with high numbers of *element occurrences* (NatureServe terminology for rare or significant species and natural communities); large contiguous areas of a geophysical setting; and geophysical settings that are otherwise not well protected.

### Buffering and Connectivity of Wildland Areas

The theory and practice of landscape ecology, conservation biology, and conservation planning place strong emphasis on the size, continuity, and neighborhood context of conservation lands (Noss 1983, Anderson et al. 2002, 2016, McMahon 2018). In general, large, intact, and continuous areas are prioritized, whether the intent be on supporting the development of natural patterns of disturbance and recovery, providing habitat to wide-ranging organisms, or managing the land for timber or agricultural resources. Although a detailed analysis of the landscape metrics of Wildlands was beyond the scope of this study, we did examine their broad characteristics and undertook a rudimentary analysis of their size, continuity, and buffering across the region. These results warrant further investigation and highlight the exposure of many Wildlands to external pressures, including invasive organisms, incompatible human activity, and fire.

Two major issues emerged from this review. First, inadequate buffering from incompatible and intensive land-use activity is noted for many smaller Wildlands and Wildland corridors associated with streams and rivers that have long boundaries relative to their acreages. A second concern is the fragmentation of Wildlands by linear features that support intensive human activity, including transportation (roads and railroads) and energy corridors (power lines and gas lines) and their associated activity areas.

## Comparisons of Wildlands with Other Classifications of Land Protection and Management

In the absence of any established database of Wildlands in the United States, researchers and conservationists have referenced the Gap Status (Anderson and Olivero Sheldon 2011; USGS GAP 2018, 2022) of conserved land as one of the best approximations of Wildlands (cf., Long et al. 2002, Irland 2018). A separate approach, advanced in a recent paper that relies extensively on USFS Forest Inventory and Analysis (FIA) data to assess the climate benefits of forests in New England, utilized the distribution of reserve plots (i.e., explicitly non-harvested plots in FIA) to estimate the extent and characteristics of Wildlands (Meyer et al. 2022). Here, we assess the congruence between these two nationally established classifications of land management with the 426 Wildlands identified in this study and explore some of the reasons for their striking differences.

### GAP – Gap Analysis Project

The Secured Areas data compiled by the Eastern Conservation Science Office of The Nature Conservancy strives to include all lands that are permanently secured against conversion to development in the 18 eastern U.S. states (Anderson and Olivero Sheldon 2011). Data are sourced largely from public land information maintained by each state along with private conservation land information compiled by The Nature Conservancy's state field offices, which assign a securement status to each tract (A. Olivero Sheldon and M. Anderson, pers. comm.). The resulting classification distinguishes lands "secured primarily for nature" that are managed for the conservation of nature and biodiversity (GAP 1 and 2) and

those “secured for multiple uses,” including forestry and agriculture (GAP 3), that may also provide considerable environmental and biodiversity benefits.

A summary of the classification is provided by Anderson and Olivero Sheldon (2011):

**GAP 1:** Permanent protection for biodiversity. Examples: nature reserves, research natural areas, wilderness areas, Forever Wild easements.

**GAP 2:** Permanent protection to maintain a primarily natural state. Examples: national wildlife refuges, many state parks, high-use national parks.

**GAP 3:** Permanent protection for multiple uses, typically retaining natural cover but often subject to extractive uses such as logging. Examples: state or town forest managed for timber, land protected from development by easements.

Following these definitions, most studies seeking to characterize the extent of wildland and wilderness area in a region utilize GAP 1 or a combination of GAP 1 and 2 properties (Long et al. 2002, E. Endicott pers. comm.).

While there was broad overlap between Wildland status and GAP status with, for example, federal Wilderness Areas, large TNC and AMC reserves, and numerous state properties classified both as GAP 1 and as Wildlands in this study, there were notable areas of disagreement covering a substantial percentage of the land in both classification systems. Results are reported for total acreages rather than parcel numbers due to differences in mapping units and parcel boundaries. Overall, in contrast to the 1,321,878 acres of Wildlands identified in this study, New England is characterized as having 1,040,419 acres of land in GAP 1 and 1,156,182 acres of land in GAP 2. Slightly more than one-fifth of the area classified as GAP 1 was rejected by the Wildland criteria in this study, whereas about one-third of the area (435,226 acres) designated as Wildland was assigned to GAP 2 (71 percent) or GAP 3 (29 percent). Our study also identified 62,592 acres of recently designated Wildlands on lands that are not included in the current version of the Secured Areas data. The authors of this report are currently collaborating with scientists at The Nature Conservancy to improve the GAP status information in the Secured Areas dataset and to ensure greater compatibility with the Wildlands database as it grows. As an extension of these analyses and our work to develop and update an online Wildlands web map and database, we have shared the Wildlands data and are collaborating with the Eastern

office of TNC as they work to systematically update and revise the Secured Areas database for the region.

There were several distinct reasons that numerous properties classified as GAP 1 or GAP 2 did not meet our criteria for Wildland status:

**Lack of Wildland intent.** A few GAP 1 and 2 areas are managed in ways that allow natural processes to flourish but lack clear Wildland intent in their supporting documentation. Examples include Lake Umbagog National Wildlife Refuge, Beckley Bog, and Matunuck Hills Preserve.

**Absence of Wildland protection.** Numerous GAP 1 and 2 properties, while supported by language that suggests a Wildland intent, in fact lack a clear management history or management plan consistent with Wildland status. This includes properties for which management planning is in progress and future management is uncertain (e.g., Norcross Wildlife Reserve), or for which management plans allow activities such as downhill ski trail expansion that is incompatible with Wildland criteria (e.g., Coolidge State Forest HSMA).

**Management inconsistent with Wildlands definition.** Management with prescribed fire for savanna, early successional, and open-land vegetation, often supported by mechanical and other treatment including herbicide applications, led to the rejection of two large state reserves in Massachusetts (Myles Standish State Forest, Manuel F. Correllus State Forest and the adjoining Pohogonot Tract). Other sites actively managed to maintain barrens, heath, or pitch pine and scrub oak vegetation such as Waterboro Barrens were similarly excluded.

**Inadequate information.** Despite persistent outreach to agency and organizational staff, we were unable to obtain complete information for numerous areas, including Green Hills Preserve, Ossipee Lake Natural Area, Sawyer Mountain Highlands, and Connecticut Lakes Nature Preserve.



© Elizabeth H. Thompson

**Absence of landowner support for Wildland status.**

In all cases, our selection process deferred to agency and organization staff and only considered properties that they supported for consideration. This led to numerous GAP 1 and 2 properties not being examined in our review, including numerous properties of Mass Audubon (most of which are classified as GAP 1), TNC Maine (Great Wass Island Preserve, The Basin Preserve, Trout Mountain Preserve, Crystal Bog Preserve), and some state lands in Vermont, including Long Trail State Forest and Jay State Forest.

In many cases, specific action by the agency or organization owning properties that did not qualify would enable them to be considered Wildlands, such as changes to guiding documents, clarifications or modest changes in management, or the sharing of full documentation for the property. On the other hand, conversations with staff at many of these organizations and agencies confirmed that our criteria were applied correctly and that many of the excluded properties are not intended to be managed in a manner consistent with our criteria for Wildland status.

Conversely, there were numerous instances in which properties determined as Wildlands were not classified as GAP 1, including a surprisingly large number classified as GAP 3. These fell into some specific patterns:

**Portions of federal properties often with complicated subunit management patterns.**

Many of these included substantial Wildland areas: Katahdin Woods and Waters National Monument,<sup>4</sup> Acadia National Park, the Green Mountain and White Mountain National Forests, and Appalachian Trail lands under management by the National Park Service and U.S. Forest Service.

**Maine Ecological Reserves.** Many of the Wildland properties in the State of Maine's Ecological Reserve System are classified as GAP 2, including Deboullie, Mahoosucs Unit, The Horns/Bigelow Preserve, Nahmakanta, Great Heath, Chamberlain Lake, Donnel Pond, Cutler Preserve, Gero Island, Rocky Lake, Salmon Brook Lake, and Wassataquoik Stream. A handful of properties in the Ecological Reserve System are classified as Wildlands and GAP 1 (e.g., Big Spencer Mountain, Number Five Bog, Mt. Abraham, Upper St. John River Reserve, Fourth Machias Lake, Duck Lake).

**National Wildlife Refuges (NWRs).** Within the NWR program only a portion of the Moosehorn National Wildlife Refuge Wilderness Area is designated as GAP 1, whereas a large portion is GAP 2, as are the Maine Coastal Islands National Wildlife Refuge–Wilderness Study Areas and Monomoy National Wildlife Refuge Wilderness Area.



© David R. Foster

Although much of unincorporated northern Maine is thinly settled, the vast forested region is highly dissected by logging roads. The Golden Road, a major east-west haul road for logs, equipment, and travelers, bisects the 100-Mile Wilderness region that stretches from Baxter State Park and Moosehead Lake in northern Maine.



**Others.** Some substantial Wildland areas are classified as GAP 2, including the Allagash Wilderness Waterway State Park (20,221 acres), the Reserve portion of Katahdin Iron Works (10,225 acres), Downeast Lakes Community Forest-Amazon-Musquash Reserve and Special Management Area (7,021 acres), the McLean Game Refuge (3,987 acres), Alder Stream-Fitzgerald Wildlands (1,723 acres), and many of the small Wildland areas owned by colleges and universities and land trusts.

### **FIA – Forest Inventory and Analysis Reserves**

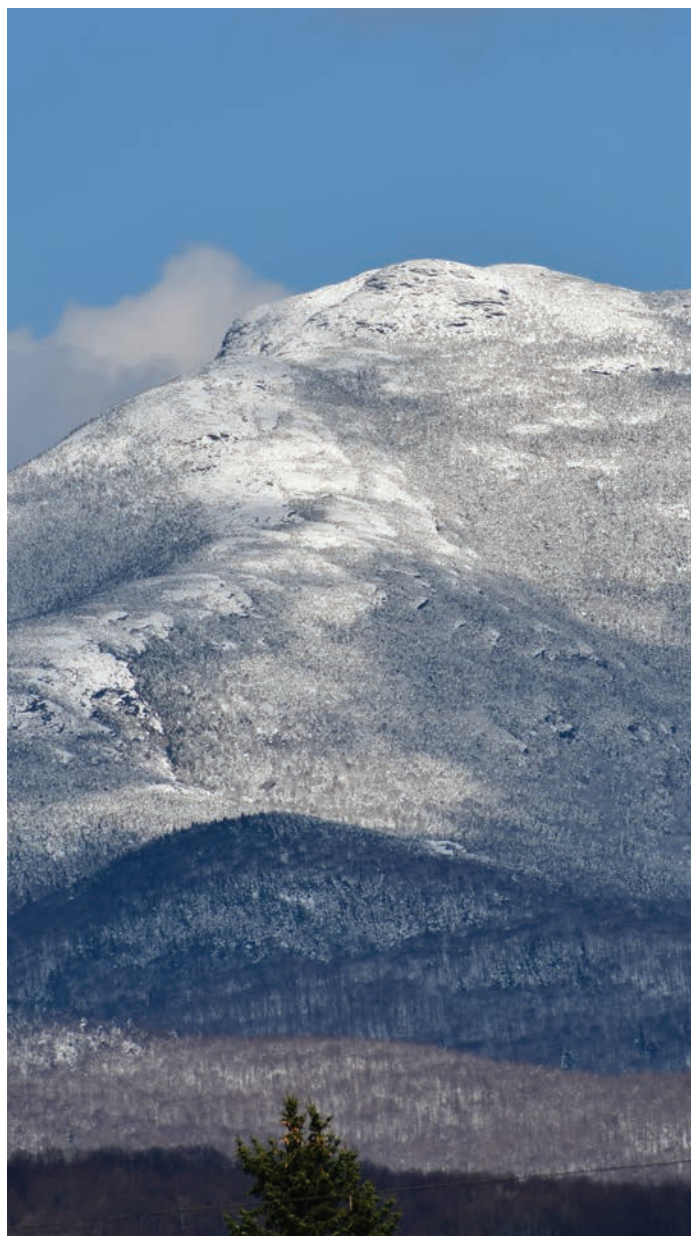
The study by Meyer et al. (2022) employed the “reserved forest” category in the Forest Inventory and Analysis (FIA, USDA Forest Service; Bechtold and Patterson 2005) as a proxy for wildlands in a larger evaluation of the role of forests in meeting the climate goals of New England states. The rationale for this approach was the absence of other data on Wildlands, the reliance on FIA data for other parts of that study, and the FIA characterization of “reserved forests” as “land permanently reserved from wood products utilization through statute or administrative designation.” Given the potential for that approach to be adopted more broadly, we evaluated it by examining the subset of FIA “reserved forest plots” and compared their distribution to the Wildland properties in this study. This analysis was conducted by researchers at the Harvard Forest and takes advantage of the spatially explicit location of FIA plots.

Initial review of FIA documents revealed major inconsistencies between the FIA reserve forest criteria and Wildland criteria. The fundamental deficiency in the FIA designation of “reserved forests” is its limitation to public lands and exclusion of private lands, which are otherwise included in FIA data and represent one-quarter of New England’s Wildlands. A second deficiency arises from the inclusive approach that FIA takes to the lands of individual agencies, for example classifying as “reserved forest” all plots on National Park Service, U.S. Fish and Wildlife Service, and state park and state reserve lands. Some portion of each of these land types is actively managed and therefore excluded by our criteria. Finally, FIA includes broad allowance for harvesting in reserve forests for purposes of “restoration, safety and recreation.”

Given the disparity in the FIA reserved forest and Wildland criteria, the general congruence in the total area estimates by the two approaches represents a matter of coincidence rather than methodical agreement. Employing FIA, Meyer et al. (2022) identified 1.2 million acres of reserve forest in New England, which is close to the 1.32 million acres of Wildlands and 1.28 million acres of forested Wildlands in this study. However, disparity in the geographical distribution of the lands receiving these two designations underscores the significant lack of agreement on specific lands. Fully one-third (34 percent) of the Wildlands in this study are not designated “reserved forests” by FIA and nearly one-third (30 percent) of FIA reserved forests do not meet the Wildland criteria.

Given this striking mismatch between these two approaches, great care should be taken in the interpretation of FIA reserved forest plots and they should not be used as proxies for Wildland forests. Given the widespread use and utility of FIA data for many types of regional and national forest analyses it would be beneficial for FIA to include private lands in the reserved forest category and modify that classification to align better with Wildland conservation.

<sup>4</sup> The first management plan for Katahdin Woods and Waters National Monument remains under development and so our assessment is based on the draft management plan supported by input from NPS staff and advisory board members. Areas excluded as Wildlands included those with significant roads, structures, and intensive recreational use.



© Elizabeth H. Thompson



## Conclusions



**M**uch has been accomplished in the protection of New England Wildlands, yet there is great need and opportunity to accomplish much more.

Motivated by a passion for untamed landscapes that stretches back to Henry Thoreau's appreciation of the region's deep history as a peopled wilderness, conservationists have protected a remarkable diversity of Wildlands in New England. Nearly 1.5 million acres, comprised of over 425 distinct properties, are secured through diverse mechanisms by three federal departments, more than a dozen state agencies, and over a hundred private and nonprofit organizations, trusts, and corporations. These Wildlands range from rocky coastlines and ancient forests to recent clear-cuts and alpine meadows on the region's highest summit, and from expansive remote tracts of Wilderness to small natural areas adjoining urban neighborhoods and college campuses. Free-willed and allowed to develop without human constraint, each of these Wildland areas offers great benefit to nature and society. Each also embodies the promise of future changes that will unfold in unanticipated, undirected, and fascinating ways. Collectively, these Wildlands will allow a small portion of New England to continue unabated the astonishing trajectory of rewilding that has enabled forest to reclaim

80 percent of the region and much of its native wildlife—bear, moose, bobcat, beaver, turkey, eagle and osprey, and more—to recover.

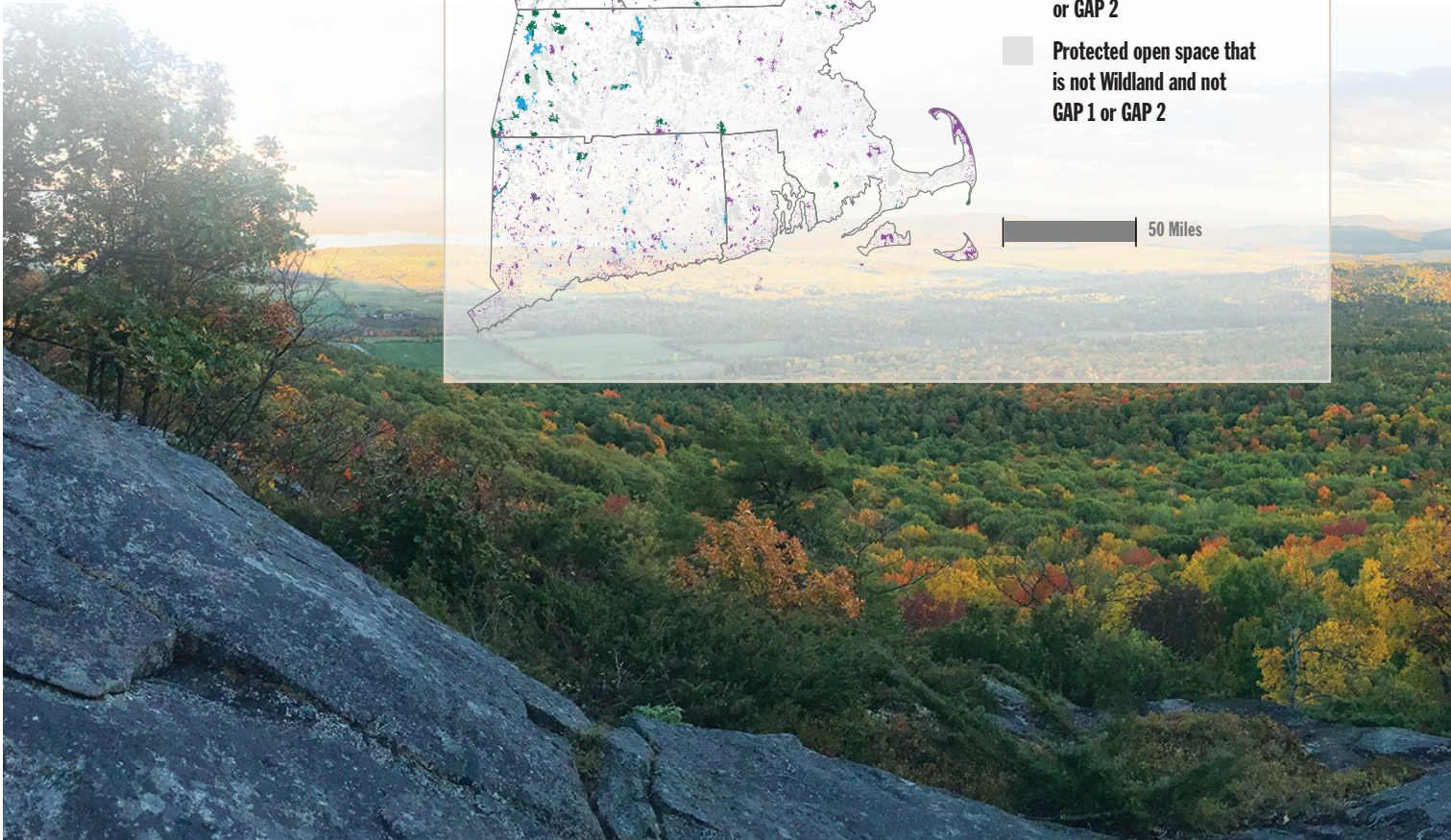
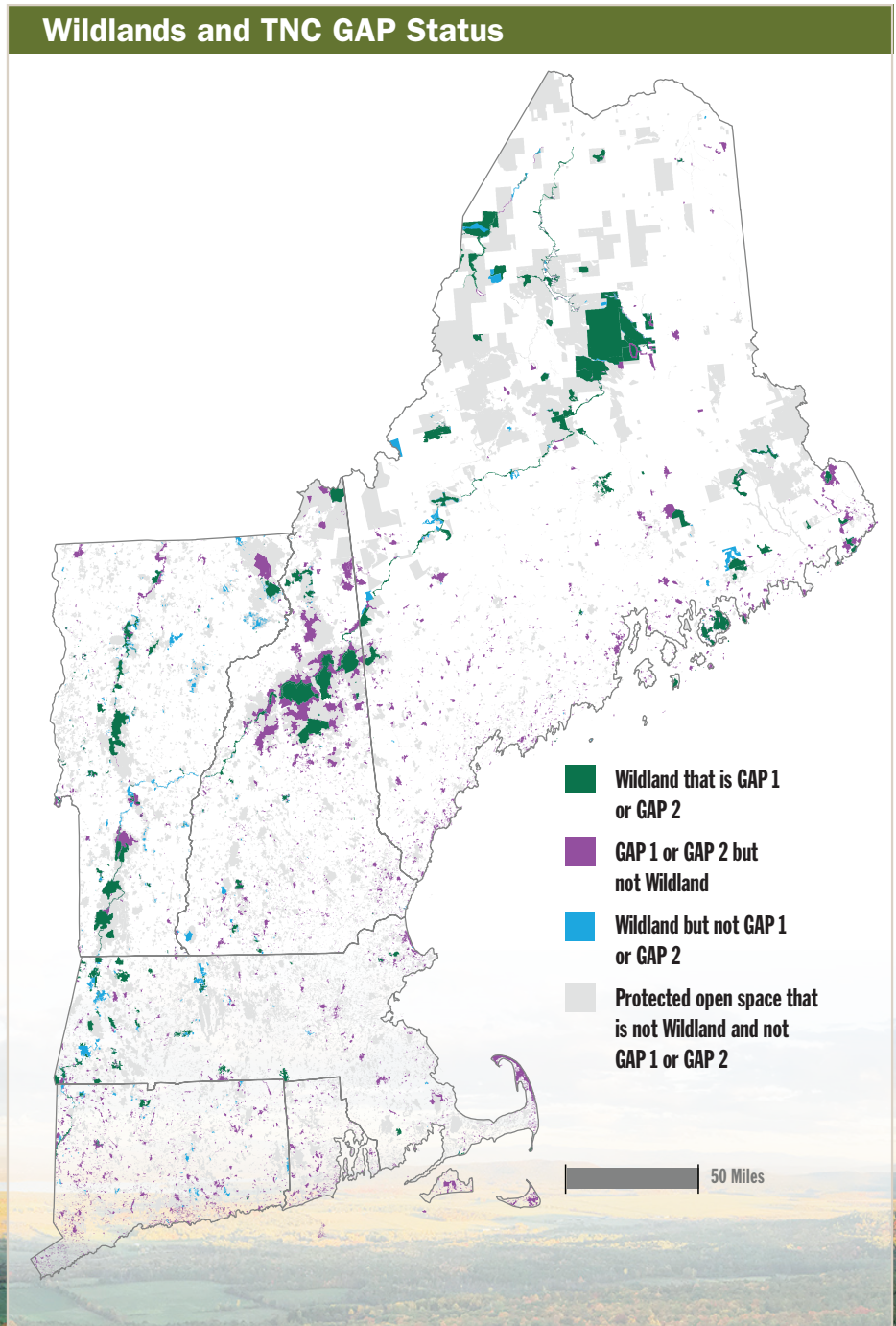
And yet, this great accomplishment falls short when judged by key metrics of Wildland conservation: tract size and percent of the region's land and waters; connectivity and buffering by compatible conservation lands; representation of the region's natural variation of ecosystems, biological diversity, and geophysical diversity; secure protection in perpetuity; and benefit to all of the region's human population. The achievements of two centuries of Wildland conservation capture only a small fraction—slightly more than 3 percent—of the land area of New England. We can and must strive to preserve more and to set it on a course to become old-growth forest. Wildlands range greatly in size and yet none encompass entire landscapes capable of supporting the full range of natural processes and human experience recommended by conservation science and envisioned by Wildland proponents. None can support the full extent of natural disturbances and mosaics of ecosystems that have naturally reigned in this region since glacial times. All are missing key species, including the region's largest native predators. Few are readily accessible to those reliant on foot, bicycle, or public transportation. Even fewer



© David R. Foster

Though dwarfed by exposure and scant soils on the mountain ridges in Mount Everett State Park, these two-century old pitch pines are thriving and reproducing with no evidence of past fires.

**FIGURE 25. Comparison between Wildland status determined in this study and Gap Analysis Project (GAP) status from the 2018 Secured Lands database of The Nature Conservancy.** Although the total land area in Wildlands (1.32 million acres) is of a similar magnitude to that categorized as GAP 1 (1.04 million acres) there are great differences in the specific areas included in each. Nearly 40 percent of Wildland acres are mapped as other than GAP 1, whereas approximately 20 percent of the area mapped as GAP 1 did not meet the criteria for Wildlands in this study. The map highlights the geographical distribution of these differences, which is largely due to more stringent criteria for Wildlands.



benefit in their oversight and design from the engagement and ownership of Indigenous groups who have called this land home for millennia. And, none can yield the solitude of the two-week trek that defined wilderness to Aldo Leopold (1921) and other founders of the Wilderness Society. Though great progress at landscape connectivity is witnessed in some corners of New England, viable Wildland corridors and the buffering of wild landscapes by compatibly managed protected lands remains a conceptual ideal. The promise of Wildland conservation in New England remains a work in progress.

The geography of New England Wildlands is scattershot. The patterns we document in this study are the result of many valiant but uncoordinated efforts that unfolded opportunistically, and most often independently, across the region. They are dominated in number by relatively small private landholdings that lack coherency and are collectively incomplete in their capacity to ensure the survival of the region's natural diversity, and of society itself. Though many visionaries have sketched an integrated pattern of Wildlands for the region, our collective failure in advancing those visions is starkly reflected when we look a few miles west of New England to the large and cohesive Wildland landscape protected more than 120 years ago in New York's [Adirondack Park](#) and [State Forest Preserve](#). There, in a landscape greater than the Everglades, Yellowstone, Grand Canyon, and Glacier National Parks combined, the 6-million-acre park includes nearly 3 million acres that belong to the public and is guaranteed by the state's constitution to be forever wild.

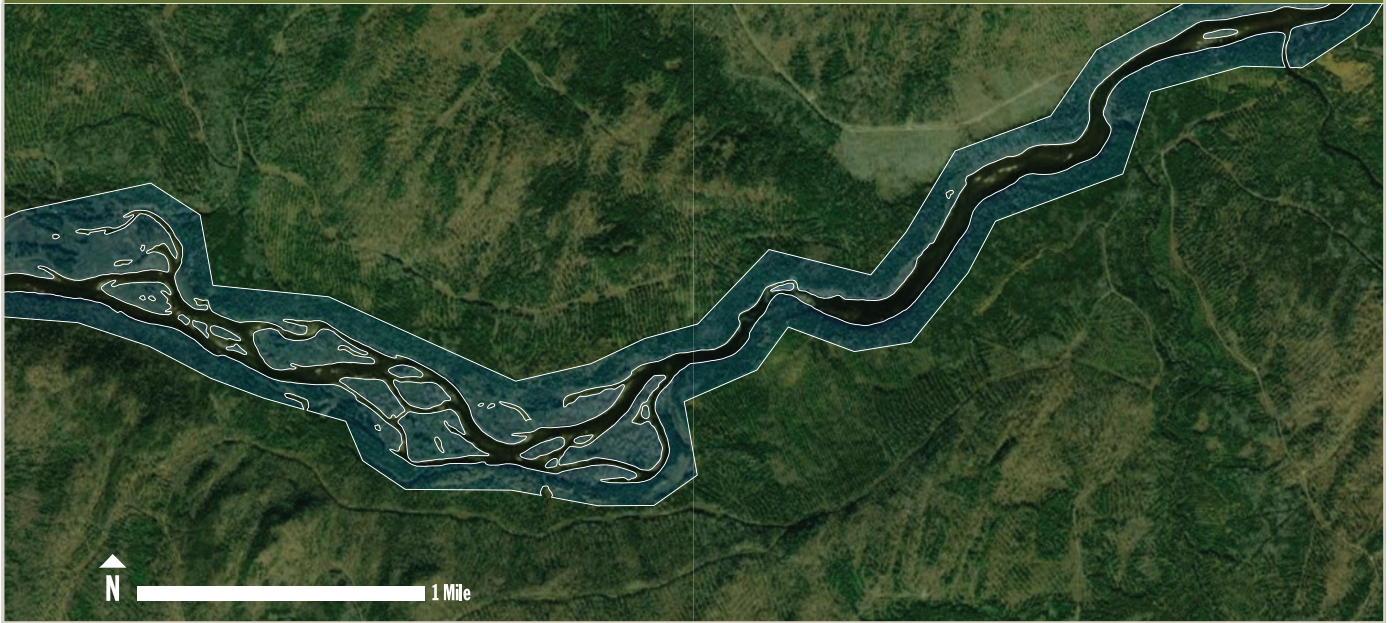
Looking forward, there is pressing need and great opportunity to accomplish something rivaling that effort in the six-state New England region. It remains possible to achieve the goal of Benton MacKaye and other visionaries to assemble a robust network of Wildlands, integrated with managed Woodlands and farmlands that produce our resources and food, and supporting diverse human communities that benefit as nature and natural communities thrive. That future is possible because Wildland conservation is at a historic peak of support and is expanding with a diversity of advocates among landowners, citizens, policy makers, educators, and researchers. That future is necessary because of the extreme crises that confront nature and society. With growing recognition of the role of nature in addressing the global crises of climate change, biodiversity loss, and threats to human well-being, the setting in New England for Wildland conservation has never been stronger.

To advance this future, it will be necessary to improve the security of the Wildlands that currently exist; establish many more permanently protected Wildlands as a complementary strategy to the continued conservation of Woodlands and farmlands; increase the involvement of more landowners, private organizations, agencies, and policy makers; diversify the conservation movement; commit and redirect many more public and private resources; and enhance the integration of nature and society.



© Nina Mirabile

## The Precarious Landscape Context for Wildland Conservation

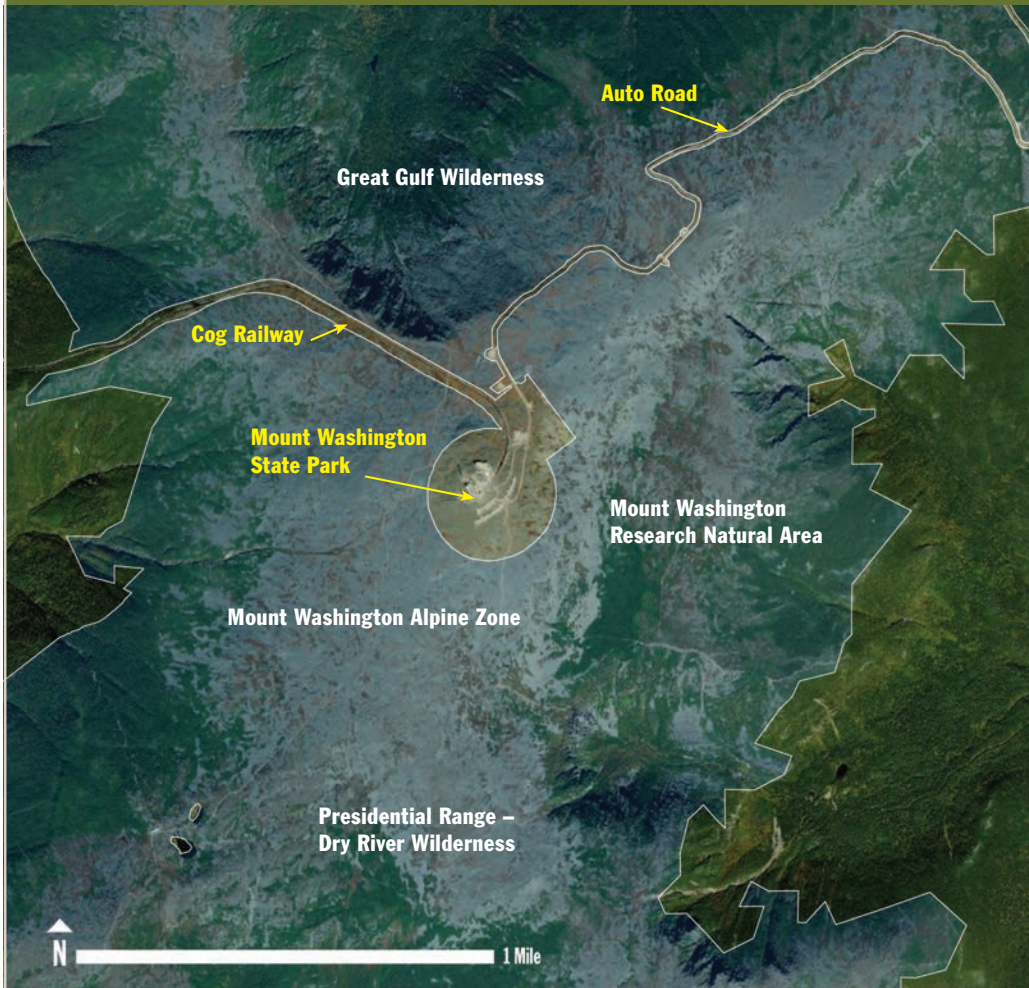


**FIGURE 26a.** The precarious landscape context for Wildland conservation. The Allagash Wilderness Waterway, north-central Maine. The Allagash Wilderness Waterway provides a narrow (500-foot-wide) buffer of Wildland on either side of the river, which is embedded in industrial forests subject to intensive harvesting and supporting a dense system of logging roads, log landings, and log-processing areas that impact the tributary streams. Less than 25 percent of the surrounding landscape supports continuous forest cover. [See St. Pierre (2022) for a more complete description of the beauty of and intrusions into the Allagash Wilderness.] Aerial photo source: Esri, Maxar, Earthstar Geographics, and the GIS User Community.



© Scot Miller / ScotMiller.com (aerial support from LightHawk)

## The Precarious Landscape Context for Wildland Conservation



**FIGURE 26b. The precarious landscape context for Wildland conservation. The Alpine Zone of Mount Washington, northern New Hampshire.** Mount Washington, the highest peak in New England, supports nearly 5,000 acres of fragile alpine vegetation above tree line that is protected by a series of Wildland areas stretching from north to south in the White Mountain National Forest, including: the Great Gulf Wilderness, Mount Washington Alpine Zone, Mount Washington Research Natural Area, the Presidential Range–Dry River Wilderness, and the Appalachian Trail Management Area. This expansive complex of federal Wildlands is bisected and strongly impacted by intensively developed and commercial areas supported by two major tourist transportation corridors—the Mount Washington Cog Railway to the west and Mount Washington Auto Road to the east—and by the Mount Washington State Park. The 60-acre state park hosts a visitor center, cafeteria, restrooms, a gift shop, museum, the Mount Washington Observatory, a sizeable paved parking lot, and significant communications equipment, including broadcasting towers that can be seen from 50 miles away. It receives over 300,000 motorized visitors annually and an unknown but significant number of hikers. The coal- and biodiesel-burning railway, which is exempt from New Hampshire’s air-pollution-control law, has proposed a major expansion that would include overnight lodging, restaurant facilities, and improved access to the trails through the alpine area and Wildlands (Sayen 2022). Aerial photo source: Esri, Maxar, Earthstar Geographics, and the GIS User Community.



© Harry White





# Recommendations



## Center Wildlands in an Integrated Approach to Land Planning

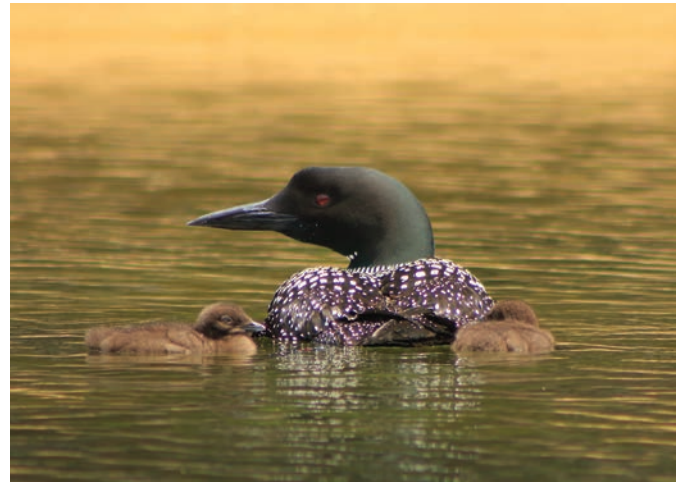
Historically, Wildland conservation has occupied a limited niche in land management and conservation, confined mostly to the margins in societies where other resource and food production needs have been met. As such, it has oftentimes been viewed as a luxury that serves a small portion of society who can afford the time and resources to enjoy it. Increasingly, science is showing us what many advocates for wild nature have been claiming for decades: Albeit inequitably, natural areas serve a fundamental role for the health of the planet overall, and they deliver important benefits of value to all people. The conclusions from recent reports, like the 2022 IPBES–IPCC (Intergovernmental Science–Policy Platform on Biodiversity and Ecosystem Services–Intergovernmental Panel on Climate Change) joint workshop on climate change, biodiversity, and human health, cast Wildlands as a critical part of land planning alongside the conservation and stewardship of Woodlands and farmlands and the development of livable communities. This perspective greatly reaffirms the place—economically, ecologically, and culturally—of Wildlands in nearly all landscapes, with the potential to benefit all communities. These insights on global sustainability highlight Wildlands as part of an integrated approach to mitigating climate change, supporting landscapes in adapting to stresses and disturbances, enhancing biodiversity, and supporting human well-being.

## Strengthen Existing Wildlands

Wildland conservation is advanced with diverse motivations, leading each Wildland to be established in a unique cultural and environmental setting. The approach to Wildland conservation therefore needs to be flexible, and yet adhere to broad standards that embrace clear intent, enduring management consistent with this intent, and strong permanent protection. As we look to the future of Wildland conservation in New England, the first important step is to ensure that all existing Wildlands meet these standards.

## Develop Clear Intent

Owners should examine their Wildland holdings to ensure that each property is supported by plainly stated intent that clearly articulates the Wildland conservation objectives in language that is readily understood. The intent should be consistent with the entity’s mission and based on an understanding of Wildland conservation and history. Many examples, resources, and invaluable experience are available from organizations, agencies, and properties to assist these efforts.



© John Burk

Clearly stated intent will help inform equally clear management guidelines, better enabling landowners to identify mechanisms and third parties to help oversee the development of the legal documents, legislation, or other mechanisms needed to secure properties appropriately. Clear and consistent intent, management guidelines, and enforcement protocols will also ease the task of informing the public and neighbors concerning the land and will help future generations adapt to novel threats and conditions. Greater consistency in structure and approach across public and private lands will make it easier to advance land planning and Wildland conservation effectively at landscape and regional scales.

## Reinforce the Unique Qualities of Wildland Management

Moving forward, we recommend that much more attention be given to distinguishing Wildland properties from other conservation lands and that the management practices and ecological condition of all lands be made much clearer. To support the unique qualities of Wildlands we recommend the standard embraced by Northeast Wilderness Trust, which calls for Wildlands to be “as free from human manipulation and disturbance as possible.” This approach is consistent with Howard Zahniser’s (1961, 1963a) admonishment:

*With regard to areas of wilderness we should be guardians not gardeners.*

**Opposite:** Established in 2018 by Northeast Wilderness Trust, the Muddy Pond Wilderness Preserve offers a wild refuge for nature, wildlife, and people in the suburban landscape of Kingston, Massachusetts, about a half hour south of Boston.



Under this approach, any proposals for active management on Wildlands should be examined closely, with all activities geographically restricted, limited in intensity and frequency, and based on scientific evidence that they are necessary to maintain ecological values or processes (Landres et al. 2015). Wherever specific goals for a property lead to a regular pattern of active management, consideration should be given to designating the area as a “Woodland” managed for those purposes, rather than as a Wildland (cf., Foster et al. 2005, 2010, 2017).

The type of management determines a property’s ecological condition and the benefits it yields to nature and society. Despite this clearly recognized fact, many maps, lists, and discussions of “conservation lands” do not differentiate Wildlands from adjoining lands that experience significantly more intensive management (Ibisch et al. 2016). The varied interpretation and application of “30x30”, which seeks to address climate change and biodiversity loss by conserving 30 percent of the world’s land area by 2030, provides a striking example of this lack of clarity (Marris 2022, Dudley and Stolton 2022). In the United States, the 2021 presidential proclamation committing the country to 30x30 is notably ambiguous in its definition of “conserved” and suggests that farmlands, timberlands, natural areas, and tribal lands may qualify, with few details regarding the criteria for management or protection (Yachnin 2021a). This contrasts starkly with international pronouncements on 30x30 that call for securing “natural or near-natural ecosystems” (Dudley 2008, Dinerstein et al. 2019, Dudley and Stolton 2022) and exclude most managed agricultural and forest land (Hiss 2021, 2022; Yachnin 2021b).

The Gap Analysis Program has been developed to discriminate across these different levels of management among conservation lands. Discussions initiated through this research project are helping to inform the current update by The Nature Conservancy of the secured lands database that comprises the GAP data for the northeastern United States. This should ensure greater consistency with the Wildland criteria and greater clarity concerning the level of land management.

## Increase the Protection of Wildlands in Perpetuity

This study revealed that fully one-third of the Wildland area in New England is secured by weak mechanisms and self-oversight. The vulnerability of these properties to future change in agency or organizational policy and objectives prompted several collaborators to argue for more stringent criteria and the removal of these properties from our list. The ownership of the lands in question is diverse, but our collaborators were most concerned about federal and state lands where the Wildland status is secured largely by administrative designation or management plans. A second concern was private conservation organizations whose lands are not secured by easements and third-party oversight. Numerous critics referenced our citation of Howard Zahniser’s words that we cited earlier: *No areas will persist as wilderness except as they are deliberately so preserved. Except as we manage them to be unmanaged they will certainly come under management.* The prevailing view, which we support, is that Wildlands should be secured in perpetuity through enforceable independent oversight.

Nonetheless, we included these contested Wildlands in this report in order to focus attention on them and generate discussion that we hope will strengthen their protection and that of all future Wildlands. We strongly recommend increasing the security of both public and private Wildlands that are self-enforced. For state public lands, one approach is the development of legislatively commissioned state Wilderness, Natural Area, or Wildland programs. This may be an appropriate step for lands including the Highly Sensitive Management Areas in Vermont, Old Forest Management Sites in Connecticut, and Reserves in the Landscape Designation system in Massachusetts. Another option is improvement and more active use of existing legislatively designated programs that currently suffer from a range of problems, including severe caps on program size and total acreage (Maine Ecological Reserve System), undefined management guidelines (Vermont Natural Areas Program), underutilization (Connecticut Natural Area Program), and a moribund status (Massachusetts Wildlands Program). New England would also benefit from looking outside the region for legislative models for wilderness and reserve programs (Dawson and Thorndike 2002). New York’s system of constitutionally protected Wildlands is a national model with two categories—Wilderness and Wild Forests—that is applied to the Adirondack and Catskill Forest Preserves. Elsewhere, Maryland supports a state-based Wildland program that closely approximates the federal Wilderness Act.

Private organizations, including land trusts and conservation organizations, should consider establishing Wildland easements on their properties. This “belt-and-suspenders strategy,” which involves a third party and two mechanisms of protection, is well illustrated by the [Wildlands Partnership](#) at Northeast Wilderness Trust (NEWT). In this program, NEWT partners with land trusts across New England and New York to fund and ultimately



© Photo and caption Susan C. Morse

Canada lynx are secretive creatures of spruce-fir forests, where they hunt and capture prey in a mosaic of habitats created by natural disturbance events.

hold a forever-wild easement on lands owned by partner organizations, such as the 1,434-acre Community Forest owned by Frenchman Bay Conservancy, and more recently, three properties totaling 375 acres owned by the Cornwall Conservation Trust in Connecticut (not included in the analyses in this report). In other cases, NEWT holds a forever-wild easement on privately owned forests that are conserved with a partner land trust. In both scenarios, beyond the perpetual legal status of the wildlands that this relationship provides, the Wildlands partnership forges an enduring collaboration between the organizations and establishes a growing network of land trusts with shared interests in Wildland conservation.

Greater application of robust legal and legislative mechanisms to secure public and private lands will greatly strengthen Wildland conservation.

### **Enhance the Landscape Setting for Existing Wildlands**

The landscape features and setting for Wildlands strongly influence their effectiveness in supporting natural processes and human experiences, their exposure to external disturbances and stresses, and their ability to resist or recover from these pressures when they do occur. Many of the management challenges for Wildlands result from incompatible uses and activities on adjoining

properties. Wherever possible, Wildland size (and area-to-boundary ratio) should be maximized, fragmentation and incursions should be reduced, and Wildlands should be buffered effectively by lands with compatible management that support and extend their benefits (Noss 2003). Striking examples where many improvements could be made include poor buffering of many parts of the Appalachian Trail and the Allagash Wilderness Waterway, and the fragmentation of Wilderness Areas on Mount Washington by the Cog Railway and Auto Road (Sayen 2022). The benefits from improvements in these landscape settings would be great.

For many Wildlands these goals could be accomplished through the increased conservation, reclassification (including designating additional Wildlands), and stricter oversight of management on adjoining parcels. Oftentimes, there may be opportunities to collaborate with abutters on management approaches. The U.S. Forest Service through its forest planning process could expand existing Wildlands and create new ones by extending the protections afforded by the 2001 Roadless Area Conservation Rule to Inventoried Roadless Areas that were inventoried after 2001 as a part of the revisions of the Forest Plans for the White Mountain (USDA 2005) and Green Mountain National Forests (USDA 2006). Congress should act to protect these Inventoried Roadless



1930 view of the old-growth forest.

## Insights from the long-term study and dynamics of Wildlands...

Studies of old-growth forests in southeastern New Hampshire beginning in 1907 led Richard Fisher, first director of the Harvard Forest, to conserve a small tract for long-term research of natural processes as the basis for an ecological approach to forestry. The subsequent dynamics of and insights from the tract exceeded Fisher's expectations due to its enduring preservation within the 13,361-acre Pisgah State Park.



▲ 1938 hurricane damage leveled most of the 300-year-old white pine and hemlock.

▼ Today the forest supports a rare array of snags, downed boles, uproot mounds, and other features that were once common in New England forests centuries ago.

© Harvard Forest Archives (both)



© Elizabeth H. Thompson

Areas as Wilderness. States have similar flexibility to alter the management and designation of extensive areas of managed forestland and parks in order to expand the size of existing Wildlands and connect Wildlands to form larger intact blocks.

Although Wildlands of any size are valuable, the smaller and more isolated they are, the more vulnerable and challenging they may be to manage and maintain.

## **Advance Wildland Conservation**

As Wildland conservation advances in New England, it would benefit greatly from an increased historical understanding of changing landscape condition over time, greater consideration of passive management approaches, less hubris in management policy and practice, focused effort to incorporate a greater diversity of perspectives and players, and a stronger appreciation for landowner interest.

## **Recognize the Region's History When Establishing Conservation Goals**

Five hundred years ago the New England landscape was dominated by old-growth forests and supported Indigenous populations who adapted effectively to the dynamic landscape without managing it widely for human ends (Chilton 2002, Lorimer and White 2003, Oswald et al. 2020, Cachat-Schilling 2021). Today, old-growth forest covers a fraction of 1 percent of the landscape, evidence of human impacts is everywhere, and the Indigenous perspective is largely ignored in conservation. Many critical species, processes, and structures that were once widespread are absent or rare: towering trees, standing dead snags, and massive downed wood that provide structure to forests, wetlands, streams, and lakeshores; mound and pit topography that diversifies soils and the ground surface; and extensive wetlands, wet meadows, salt marshes, and estuaries that are free of drainage or endless reworking. While once-common habitats and species are scarce, the land supports an abundance of anthropogenic land cover: pasture, hay fields, and meadows maintained for food, conservation, and aesthetics; clear-felled forest patches, scrub, shrublands, and early successional forests; and especially aggrading and maturing forest, between 50 and 125 years old (Kellett et al. 2023). While these landforms play important societal and conservation goals, in the face of the magnitude of historical land transformation, the mere 3.3 percent of the current landscape in Wildlands warrants vigorous expansion towards the Wildlands and Woodlands goal of at least 10 percent of the New England landscape.

## **Embrace Humility in Conservation**

Two lessons emerge from this history of the New England landscape that will help support the ambitious goals for Wildland conservation in the region. The first lesson is the phenomenal resilience of natural ecosystems both to past changing climates and to natural and anthropogenic disturbance and stress. This argues for placing greater confidence in nature, even in the face

of additional novel stresses imposed by humans, leaving a greater share of the land alone, embracing the concept of self-willed land, and accepting the new ecosystems, surprises, and unruliness that may come through this approach. In many situations in which we want natural ecosystems to thrive and support humans “doing nothing is a viable alternative” (Foster and Orwig 2008). Much restoration activity and intervention is grounded in the belief that nature somehow needs help, whether in recovering from the impacts of past human management or in coping with future environmental change (Lindenmeyer et al. 2004). In fact, land stewardship should embrace humility and be grounded in working with and allowing nature and ecological processes to prevail. A first rule for all managers is to pause to consider the benefits of passive management as an alternative to active management, even in the face of novel processes like invasive organisms and unprecedented environmental change. After all, the past five centuries of New England history have witnessed a continuous series of novel physical, chemical, and climatic stresses and disturbances to the region's ecosystems (Foster et al. 1997).

A second lesson is the great benefit that may be gained by examining alternatives to established management approaches, including rewilding and actions grounded in Indigenous values, thinking, and knowledge (Woods and Welcker 2008, Dana-Saco 2020, Kaye et al. 2021, IPBES 2022, Sams 2022). Engaging with Indigenous groups on land sovereignty, ownership, and management would incorporate the long-overdue inclusion of the land's original inhabitants into the conservation movement and enrich it immensely (Moola and Roth 2019, M's-it No'kmaq et al. 2021, First Light 2022). In the western United States, examples of alternative management approaches—which we can learn from and model upon—already exist, such as the InterTribal Sinkyone Wilderness and the Mission Mountains Tribal Wilderness (Confederated Salish and Kootenai Tribes 2005, Rosales 2010, Sams 2022).

This would reinforce the understanding of Wildlands not as nature without people but rather as including peopled wilderness in which natural processes predominate, alongside more actively managed conservation and tribal Woodlands and other lands where a larger range of natural products and foods are obtained (Demientieff 2021, Dudley and Stolton 2022).

## **Realize the Vision for Landscape-Scale Wildlands**

Conservation strategies must reflect local and regional conditions. While there is need to establish small local wild areas in strongly humanized landscape, and integrated complexes of Wildlands, Woodlands, and farmlands across much of southern New England, the 8-million-plus acres of undeveloped and largely uninhabited former paper company lands of northern New England offer an unparalleled opportunity for rewilding vast expanses of land. This Acadian Forest region is the largest forest expanse in the eastern United States. The region encompasses entire landscapes capable of supporting the full range of natural

disturbances and mosaics of ecosystems and could sustain the reestablishment of breeding populations of the region's largest native predators.

As climate change threatens the survival of the Acadian Forest in New England, an unfragmented, Wildland reserve encompassing several million acres would act as a migration corridor and flow zone for climate-stressed species. At a critical moment in our struggle to reverse alarming climate trends, the young, heavily cut forests that dominate this northern region are poised to become major carbon sinks, withdrawing carbon from the atmosphere and storing it for centuries to come in old-growth forests of the future (Duvencek and Thompson 2019, Anderson 2022, Meyer et al. 2022, Sayen 2023).

A vast Acadian Wildland would also provide economic benefits to the region through low-impact recreation and tourism (cf., Power 2001a,b). It would also benefit small woodlot owners in northern and central New England who have been trapped by global commodity markets that benefitted the largely absentee owners of immense tracts, but stifled the development of local, high-value-adding manufacturing opportunities (Sayen 2023). High-paying markets for quality sawlogs will reward smaller landowners for practicing low-impact forestry that emphasizes ecological benefits including carbon storage (Lansky 1995b, NEFF 2014, Keeton et al. 2018, Giffen et

al. 2022). They will be able to reduce their cutting and earn greater returns than were realized by selling pulp and chips.

### **Address the Interests of Diverse Landowners and Groups in Wildland Conservation**

Outreach during this study revealed that many landowners, conservation organizations, and state and federal agencies expressed strong interest in the extent and diversity of Wildlands in the region and a need to learn more about Wildland conservation and practice in order to incorporate it more strongly in their own efforts. There also emerged a particular opportunity to better understand the interests and needs of private landowners, land trusts, municipalities, and Indigenous groups participating in Wildland conservation. As larger conservation organizations and state and federal agencies increase their own capacity to advance Wildlands they should become well positioned to address and support the interests of these other groups.

A large gap in regional understanding will be addressed by the 2023 survey conducted by the Family Forest Research Center at the University of Massachusetts (UMass) to determine the interest and informational needs of private forestland owners in New England in Wildland conservation. This first-in-the-nation survey will gauge landowner interest in advancing Wildland management on their property and will be invaluable to conservation organizations and public agencies in clarifying the needs and opportunities for outreach, programming, and services on Wildland



© David A. Orwig

conservation. Survey results should help inform public agencies and state and federal lawmakers in developing programs for landowner assistance concerning the management and long-term protection of Wildland areas on their property and may reveal opportunities to reduce the costs of private Wildland conservation.

Owning and conserving Wildlands is currently a minor aspect of land conservation for most land trusts represented in this study, but many indicated strong interest in increasing their understanding and capacity in this area. Through collaboration with leading Wildland groups, the results from the UMass survey might be used to develop an effective tool kit for Wildland conservation that would enable more small land trusts to add this capacity to their portfolio. Groups can already expand in this direction through collaboration with Northeast Wilderness Trust and the Wildland Partnership. Land trusts can also partner with local municipalities, citizens, and engaged landowners in establishing Wildland tracts in existing or new town and community forests or the designation of new permanently preserved sites in the [Old-Growth Forest Network](#).

### **Advance Wildland Policy at Local, State, and Federal Levels**

Significant opportunities exist for engaging policy makers at local, state, and federal levels to increase the understanding of the value of Wildlands, and to advance measures to support their expansion on private and public lands as a complementary strategy to well-managed Woodlands. One significant step would be to decrease the emphasis on managing for young forests (Kellett et al. 2023) and increase the embrace of rewilding approaches to land management and the protection of young and mature forests with the potential to grow into magnificent old-growth forests. Additional Wildlands across New England would support important natural qualities, offer more equitable educational, recreational, and spiritual experience, and yield powerful natural solutions to climate change and the mitigation of the stresses resulting from environmental extremes.

At the state level, the single greatest means of supporting private landowners would be to allow the inclusion of passively managed areas, including those with forever-wild easements, under existing Use Value Appraisal (Current Use) programs that decrease property taxes on lands that yield public benefit (Fidel 2021, Roe and Roe 2021). State support for these programs should embrace the benefits of Wildlands in equal measure to actively managed Woodlands and farmland. They should also incentivize conservation easements to better guarantee that all lands and their benefits will persist in perpetuity.

State land acquisition programs should support Wildlands as part of statewide efforts to increase the area of protected old and old-growth forests across all forest types. The status of these lands should be made permanent through partnerships with third parties to



© John Burk

secure easements, or through other mechanisms, including legislatively designated programs. Coordinated federal and state action could follow the same approach for the acquisition of new lands and conservation easements. Federal programs such as Forest Legacy should embrace the conservation of Wildlands, along with a commensurate embrace by state agencies which facilitate such transactions.

### **Increase Philanthropy for Integrated Approaches to Land Planning and Conservation**

Local, regional, and national philanthropies should engage in supporting Wildlands as one critical solution to intersecting crises in climate change, biodiversity loss, and declining human well-being. Together, Wildlands, Woodlands, and farmlands can form an integrated approach that balances ecological values with the local consumption of regionally produced food and other natural resources. Private foundations have a particularly critical role to play in influencing how conservation is implemented across New England to ensure more balance than currently exists between Wildlands, Woodlands, farmlands, and recreation areas. Often more nimble than federal or state funding sources, philanthropies have immense influence on the outcomes of conservation projects and can encourage private conservation to consider Wildlands conservation as a larger percentage of future land-protection projects.





# Wildlands, Woodlands, Farmlands & Communities: Actions to Advance Wildland Conservation



**T**he motivation for this study goes back two decades to the recognition of the importance of a full understanding of the extent of Wildlands in New England to the work of the “Wildlands and Woodlands” initiative (Foster et al. 2005). With these results finally in hand, that initiative can now share this information widely, reevaluate its Wildland goals for the region, and develop and maintain a database, map, and dashboard that effectively convey progress towards those goals and the status of all conserved lands across New England.

## **Increase Wildlands Outreach, Education, Conservation Action, and Policy Development**

The authors of this study will collaborate with partner organizations and institutions (Harvard Forest, Highstead Foundation, Northeast Wilderness Trust, UMass Amherst, Lincoln Institute of Land Policy, New England Forestry Foundation, University of New Hampshire and University of Vermont) and many other collaborators to disseminate these results widely with landowners, land trusts, Indigenous groups, public agencies, policy makers, and the public. In addition, we plan to identify and elicit ways in which these findings can be packaged to assist all stakeholders to advance their own conservation efforts more broadly (cf., Thompson et al. 2014, 2020).

## **Evaluate Elevating the Goal for Wildlands in the Region to As Much As 20 Percent**

We will evaluate increasing the goal for Wildlands in the region to as much as 20 percent of the land in light of the findings in this report, parallel studies by the WWF&C group examining the potential for New England to produce a greater proportion of the wood resources and food consumed in the region, and other national and international goals for Wildlands to address the crises of climate, biodiversity, and human well-being.

## **Integrate Wildlands Conservation, Local Food and Resource Production, and Community Development**

In parallel to this study, collaborators have been working on other region-wide studies examining effective ways of integrating land conservation, local food and resource production, and community development across

the region to advance the broad objectives of Wildlands, Woodlands, Farmlands & Communities and the New England Food Vision (Donahue et al. 2016, Littlefield et al. 2023, NEFNE 2023).

These studies share assumptions including reducing the overall consumption of natural resources in ways that are socially and racially just and equitable, adopting healthier diets, and increasing the share of locally sourced food and wood resources. They identify sustainable ways of meeting the great bulk of the region’s wood resource needs, meeting approximately 50 percent of its food production needs, and conserving more than 70 percent of the New England region by 2060. At some point, there are clearly choices to be made among the benefits of resource conservation, regional wood production, food production, and Wildlands, but we have ample room to begin working towards all of these goals together before we encounter those trade-offs. Within this framework, we envision that the original goal of designating at least 10 percent of the region to Wildlands is highly feasible, and, depending on the choices we make, it is possible to devote a much higher amount of the region to Wildlands.

## **Enhance and Maintain the New England Protected Areas and Wildlands Database and Web Map**

Accurate and current data are critical for documenting progress towards these goals and for supporting the efforts of all stakeholders in land planning, conservation, and policy development. The Harvard Forest and Highstead have worked to develop an openly accessible set of data archives, web-based maps, and tools to share current information on all protected open space and Wildlands for the six-state region. This work has relied on strong collaboration with many partners, especially the Appalachian Mountain Club, Appalachian Trail Conservancy, eastern office of The Nature Conservancy, many state offices and agencies, and hundreds of conservation organizations. We plan to improve the accessibility of these data for online use and downloading, and to make them available through the [WWF&C website](#). This effort will include all additional properties that we become aware of, and new properties as they are conserved.

# Online APPENDIXES & RESOURCES

found at [wildlandsandwoodlands.org/wildlands-in-new-england](http://wildlandsandwoodlands.org/wildlands-in-new-england)

**Appendix 1: Wildlands in New England: Attributes and Characteristics**

**Appendix 2: Conservation Properties Screened in the Course of This Study**

**Appendix 3: Detailed Map of Wildlands in New England**

**Interactive Web Map of Wildlands in New England**

**All Figures and Tables from the Report**

**Downloadable GIS and Tabular Data Used in the Report**

## REFERENCES

- ALCAG (Appalachian Landscape Climate Advisory Group). 2022. *Conserving an Intact and Enduring Appalachian Landscape. Designing a Corridor in Response to Climate Change.*
- American Chestnut Foundation. 2022. Using science to save the American Chestnut. <https://acf.org/science-strategies/3bur/>
- Anderson, L. 2000. Benton MacKaye and the path to the first Appalachian Trail Conference. *Appalachian Trailways News*, July 2000: 17–21.
- Anderson, L. 2002. First steps along the Appalachian Trail. Benton MacKaye's progressive vision. *Wild Earth*, Fall: 56–61.
- Anderson, L. 2008. *Benton MacKaye: Conservationist, Planner, and Creator of the Appalachian Trail.* Johns Hopkins University Press. Baltimore, MD.
- Anderson, M.G. 2021. *Wild Carbon—A Synthesis of Recent Findings and Wild Carbon Supplement—Analysis of Sequestration in Old Forests.* Northeast Wilderness Trust. *Wild Works* 1 and 1.1.
- Anderson, M.G. and A. Olivero Sheldon. 2011. *Conservation Status of Fish, Wildlife, and Natural Habitats in the Northeast Landscape: Implementation of the Northeast Monitoring Framework.* The Nature Conservancy, Eastern Conservation Science, Eastern Regional Office. Boston, MA.
- Anderson, M.G., S. Bernstein, F. Lowenstein, N. Smith, and S. Pickering. 2002. *Determining the size of Eastern Forest Reserves.* The Nature Conservancy and Sweet Water Trust.
- Anderson, M.G., A. Barnett, M. Clark, J. Prince, A. Olivero Sheldon, and B. Vickery. 2016. *Resilient and Connected Landscapes for Terrestrial Conservation.* The Nature Conservancy, Eastern Conservation Science, Eastern Regional Office. Boston, MA.
- Aplet, G.H., 1998. *On the nature of wildness: exploring what wilderness really protects.* *Denver University Law Review*, 76: 347–367.
- Aplet, G.H., J. Thomson, and M. Wilbert. 2000. Indicators of wildness: using attributes of the land to assess the context of wilderness. In McCool, S.F., D.N. Cole, W.T. Borrie, and J. O'Loughlin comps. 2000. *Wilderness Science in a Time of Change.* Volume 2: *Wilderness within the context of larger systems.* U.S. Department of Agriculture, Forest Service. Proceedings RMRS-P-15-VOL-2. Ogden, UT. pp. 89–98.
- Arthur, E. and P. Burns. 2020. A call for repairing the harms of colonization: Maine's bicentennial as an opportunity for truth, acknowledgment, resistance, and healing. *Maine Policy Review*, 29: 17–22.
- Askins, R.A. 2001. Sustaining biological diversity in early successional communities: The challenge of managing unpopular habitats. *Wildlife Society Bulletin*, 29: 407–412.
- ATC. 1981. Comprehensive Plan. Appalachian Trail Conservancy. Harpers Ferry, WV.
- ATC. 2012. Policy on Evaluating and Selecting ATC Managed Fee and Easement Land Parcels. Appalachian Trail Conservancy. Harpers Ferry, WV.
- ATC. 2014. Strategic Plan. Appalachian Trail Conservancy. Harpers Ferry, WV.
- ATLP. 2022. Appalachian Trail Landscape Partnership. Three-year Strategic Plan.
- Baldwin, R.F. and K.F. Beazley. 2019. Emerging paradigms for biodiversity and protected areas. *Land*, 8: 1–12. doi:10.3390/land8030043.
- Baldwin, R.F., S.C. Trombulak, P.B. Leonard, R.F. Noss, J.A. Hilty, H.P. Possingham, L. Scarlett, and M.G. Anderson. 2018. *The future of landscape conservation.* *BioScience*, 68: 60–63.
- Barton, A.W. and W.S. Keeton (eds.). 2018. *Ecology and Recovery of Eastern Old-Growth Forests.* Island Press. Washington, D.C.
- Barton, A.W., A.S. White, and C.V. Cogbill. 2012. *The Changing Nature of the Maine Woods.* University of New Hampshire Press. Durham, NH.
- Bateson, E. and N. Smith. 2001. Making it happen: Protecting Wilderness on the ground. In *Wilderness Comes Home: Rewilding the Northeast*, edited by C.M. Klyza. Middlebury College Press. Middlebury, VT.

- Bechtold, W.A. and P.L. Patterson. 2005. The enhanced Forest Inventory and Analysis Program – National Sampling Design and Estimation Procedures. U.S. Department of Agriculture Forest Service. General Technical Report SRS-80 Southern Research Station. p. 85.
- Belote, R.T. and G. Aplet. 2016. 80-year-old roadless assessment provides important context for recent global evaluation. Manuscript.
- Begović, K., J.S. Schurman, M. Svitok, J. Pavlin, T. Langbehn, K. Svobodová, M. Mikoláš, P. Janda, M. Synek, W. Marchand, L. Vitková, D. Kozák, O. Vostarek, V. Čada, R. Bače, and M. Svoboda. 2022. Large old trees increase growth under shifting climatic constraints: Aligning tree longevity and individual growth dynamics in primary mountain spruce forests. *Global Change Biology*. <https://doi.org/10.1111/gcb.16461>
- Cachat-Schilling, N. 2021. [Fire and Myths about Northeast Native Land Stewardship](#). Massachusetts Ethical Archaeology Society. March 31, 2021.
- Čada, V., V. Trotsiuk, P. Janda, M. Mikoláš, R. Bače, T.A. Nagel, R.C. Morrissey, A.J. Tepley, O. Vostarek, K. Begović, O. Chaskovskyy, M. Dušátko, O. Kameniar, D. Kozák, J. Lábusová, J. Málek, P. Meyer, J.L. Pettit, J.S. Schurman, K. Svobodová, M. Synek, M. Teodosiu, K. Ujházy, M. Svoboda. 2020. [Quantifying Natural disturbances using a large-scale reconstruction to guide forest management](#). *Bulletin of the Ecological Society of America*, 101: 4.
- Carver, S., I. Convery, S. Hawkins, R. Beyers, A. Eagle, Z. Kun, E. Van Maanen, Y. Cao, M. Fisher, S.R. Edwards, C. Nelson, G.D. Gann, S. Shurter, K. Aguilar, A. Andrade, W.J. Ripple, J. Davis, A. Sinclair, M. Bekoff, R. Noss, D. Foreman, H. Pettersson, M. Root-Bernstein, J.C. Svenning, P. Taylor, S. Wynne-Jones, A. Watson Featherstone, C. Fløjgaard, M. Stanley-Price, L.M. Navarro, T. Aykroyd, A. Parfitt, and M. Soulé. 2021. Guiding principles for rewilding. *Conservation Biology*, 35: 1882–1893.
- Catanzaro, P. and A. D'Amato. 2019. *Forest Carbon: An Essential Natural Solution for Climate Change*. University of Massachusetts, Amherst, MA, and University of Vermont, Burlington, VT.
- Catton, T. 1997. *Inhabited Wilderness: Indians, Eskimos, and National Parks In Alaska*. Albuquerque: University of New Mexico Press. Albuquerque, NM.
- Chilton, E.S. 2002. Towns they have none. Diverse subsistence and settlement strategies in Native New England. Pp. 289–300. In *Northeast Subsistence–Settlement Change A.D. 700–1300*, edited by J.P. Hart and C. Reith. New York State Museum. Albany, NY.
- Chilton, E.S. 2010. The origin and spread of maize (*Zea Mays*) in New England. Pp. 159–180. In *Nantucket & Other Native Places: The Legacy of Elizabeth Alden Little*, edited by E.S. Chilton and M.R. Rainey. State University of New York Press. Albany, NY.
- Chilton, E.S. and D.L. Doucette. 2002. The archaeology of coastal New England: The view from Martha's Vineyard. *Northeast Anthropology*, 64: 55–66.
- CLCC. 2019. Connecticut model forever-wild conservation easement option. Connecticut Land Conservation Council, Hartford, CT.
- Cline, A.C. and S.H. Spurr. 1942. The virgin upland forest of central New England. A study of old growth stands in the Pisgah mountain section of southwestern New Hampshire. *Harvard Forest Bulletin* No. 21.
- Cogbill, C.V. 1985. Evaluation of the forest history and old-growth nature of Big Reed Pond Preserve. T8R10 and T8R11 W.E.L.S. Maine. Maine Chapter of the Nature Conservancy, Brunswick, ME.
- Cogbill, C.V. 1995. An assessment of the historical ecology of the forests on the northeast slope of Wachusett Mountain, Massachusetts. Report prepared by Vanasse Hangen Brustlin, Inc. for Wachusett Mountain Associates. Princeton, MA.
- Cogbill, C.V., J. Burk, and G. Motzkin. 2003. The forests of pre-settlement New England, USA: spatial and compositional patterns based on town proprietor surveys. *Journal of Biogeography*, 29: 10–11
- Cole, D.N. 2001. Management dilemmas that will shape wilderness in the 21<sup>st</sup> Century. *Journal of Forestry*, 99: 4–8.
- Cole, D.N. 2012. Beyond naturalness. Adapting wilderness stewardship to an era of rapid global change. *International Journal of Wilderness*, 18: 9–14.
- Colwell, R., S. Avery, J. Berger, G.E. Davis, H. Hamilton, T. Lovejoy, S. Malcom, A. McMullen, M. Novacek, R.J. Roberts, R. Tapia, and G. Machlis. 2014. [Revisiting Leopold: Resource stewardship in the National Parks](#). *Parks*, 20: 15–24.
- Confederated Salish and Kootenai Tribes. 2005. [Mission Mountains Tribal Wilderness. A Case Study](#). Native Lands and Wilderness Council. Pablo, MT.
- Cordell, H.K., J.C. Bergstrom, and J.M. Bowker. 2005. *The Multiple Values of Wilderness*. Venture Publishing. State College, PA.
- Cordell, K., C. Barns, D. Brownlie, T. Carlson, C. Dawson, W. Koch, G. Oye, and C. Ryan. 2015. Wilderness stewardship in America today and what we can do to improve it. *Journal of Forestry*, 114: 292–297.
- Cowley, J., P. Landres, M. Memory, D. Scott, and A. Lindholm. 2012. Integrating cultural resources and wilderness. *Park Science*, 28: 29–33, 38.
- Crist, E., H. Kopnina, P. Cafaro, J. Gray, W.J. Ripple, C. Safina, J. Davis, D.A. DellaSala, R.F. Noss, H. Washington, H. Rolston, B. Taylor, E.H. Orlikowski, A. Heister, W.S. Lynn, and J.J. Piccolo. 2021. [Protecting Half the Planet and Transforming Human Systems Are Complementary Goals](#). *Frontiers in Conservation Science*, 2: 1–9.
- Crist, P.J., B. Thompson, T.C. Edwards, C.J. Homer, and S.D. Bassett. 1998. *Mapping and Categorizing Land Stewardship: A Handbook for Conducting Gap Analysis*. USGS Gap Analysis. In Anderson and Olivero (2011).
- Cronon, W. 2013. Foreword in S. Mittlefehldt. *Tangled Roots. The Appalachian Trail and American Environmental Politics*. University of Washington Press. Seattle, WA.

- D'Amato, A.W. and P. Catanzaro. 2022. [Restoring old-growth forest characteristics to New England's and New York's forests](#). University of Vermont and University of Massachusetts. Burlington, VT, and Amherst, MA.
- D'Amato, A.W. and D.A. Orwig. 2008. [Stand and Landscape-Level Disturbance Dynamics in Old-Growth Forests in Western Massachusetts](#). *Ecological Monographs*, 78: 507–522.
- D'Amato, A.W., D.A. Orwig, and D.R. Foster. 2006. [New estimates of Massachusetts old-growth forests: useful data for regional conservation and forest reserve planning](#). *Northeastern Naturalist*, 13: 495–506.
- D'Amato, A.W., B.J. Palik, J.F. Franklin, and D.R. Foster. 2017. [Exploring the origins of ecological forestry in North America](#). *Journal of Forestry*, 115: 126–127.
- D'Amato, A.W., D.A. Orwig, D.R. Foster, A. Barker Plotkin, P.K. Schoonmaker, and M.R. Wagner. 2017. [Long-term structural and biomass dynamics of virgin \*Tsuga canadensis\*-\*Pinus strobus\* forests after hurricane disturbance](#). *Ecology*, 98: 721–733.
- Dana-Saco, G. 2020. Indigenous voices charting a course beyond the bicentennial: Eba gwedji jik-sow-dul-din-e wedji gizi nan-ul-dool-tehigw (Let's try to listen to each other so that we can get to know each other). *Maine Policy Review*, 29: 7–16.
- Davis, M.B. 1993. *Old Growth in the East: A Survey*. The Cenozoic Society, Richmond, VT.
- Dawson, C.P. and P. Thorndike. 2002. State-designated wilderness programs in the United States. *International Journal of Wilderness*, 8: 21–26.
- Deboer, K. 1998. The importance of Yellowstone's wolves to the North Woods. Wolf restoration revives ecosystems. *Northern Forest Forum*, 6(3): 29.
- Del Tredici, P. 2021. *Wild Urban Plants of the Northeast: A Field Guide*. Cornell University Press. Ithaca, NY.
- Demientieff, B. 2021. A Gwich'in Perspective. In Kaye, R., P.N. Andrews, and B. Demientieff. 2021. [Wilderness and traditional Indigenous beliefs. Conflicting or intersecting perspectives on the human-nature relationship?](#) Arctic National Wildlife Refuge. U.S. Fish and Wildlife Service. Rewilding Blog. December 8, 2021.
- Dincauze, D. 2010. *Environmental Archaeology*. Cambridge University Press. New York, NY.
- Dinerstein, E., C. Vynne, E. Sala, A.R. Joshi, S. Fernando, T.E. Lovejoy, J. Mayorga, D. Olson, G.P. Asner, J.E.M. Baillie, N.D. Burgess, K. Burkart, R.F. Noss, Y.P. Zhang, A. Baccini, T. Birch, N. Hahn, L.N. Joppa, and E. Wikramanayake. 2019. A Global Deal for Nature: Guiding principles, milestones, and targets. *Science Advances*, 5:1–17.
- Donahue, B.M, J. Burke, M. Anderson, A. Beal, T. Kelly, M. Lapping, H. Ramer, R. Libby, and L. Berlin 2014. [A New England Food Vision](#). Food Solutions New England. University of New Hampshire. Durham, NH.
- Donlan, J., J. Berger, C. Bock, J. Bock, D. Burney, J. Estes, and D. Foreman. 2006. Pleistocene rewilding: An optimistic agenda for twenty-first century conservation. *The American Naturalist*, 168: 660–81. <https://doi.org/10.1086/508027>.
- Dudley, N. (ed.). 2008. *Guidelines for Applying Protected Area Management Categories*. Gland, Switzerland. IUCN. 86 pp. With S. Stolton, P. Shadie, and N. Dudley. IUCN WCPA Best Practice Guidance on Recognising Protected Areas and Assigning Management Categories and Governance Types, Best Practice Protected Area Guidelines Series No. 21, Gland, Switzerland.
- Dudley, N. and S. Stolton (eds.). 2022. Best Practice in Delivering the 30x30 Target. Protected areas and other effective area-based conservation measures. The Nature Conservancy and Equilibrium Research. Washington, D.C.
- Dunwiddie, P.W. and R.T. Leverett. 1996. Survey of old-growth forests in Massachusetts. *Rhodora*, 98: 419–444.
- Dunwiddie, P.W., D. Foster, D. Leopold, and R.T. Leverett. 1996. Old-growth forests of southern New England, New York, and Pennsylvania. In *Eastern Old-growth Forests: Prospects for Rediscovery and Recovery*, edited by M.B. Davis, 126–143. Island Press. Washington, D.C.
- Duranleau, D.L. 2009. *Flexible Sedentism: The Subsistence and Settlement of Coastal New England and New York*. Ph.D. Thesis, Harvard University.
- Duveneck M., J. Thompson, and B. Wilson. 2015. Imputed forest composition map for New England screened by species range boundaries, 2001–2006. Harvard Forest Data Archive: HF234 (v.5). Environmental Data Initiative: <https://doi.org/10.6073/pasta/29411e633e695b962a59d03887af90d2>. Accessed 2 Feb 2022.
- Duveneck, M. and J. Thompson. 2019. Social and biophysical determinants of future forest conditions in New England: Effects of a modern land-use regime. *Global Environmental Change*, 55: 115–129.
- Engstrom, B. and D. Mann. 2011. Fire ecology of red pine (*Pinus resinosa*) in northern Vermont, USA. *Canadian Journal of Forest Research*, 21: 882–889. doi:10.1139/x91-123
- Fidel, J. 2021. How other states in New England treat privately owned Wildland/Open Space through Use Value Appraisal. Vermont Natural Resources Council. Unpublished slide presentation.
- Finzi, A.C., M.-A. Giasson, A. Barker Plotkin, J.D. Aber, E.R. Boose, E.A. Davidson, M.C. Dietze, A.M. Ellison, S.D. Frey, E. Goldman, T.F. Keenan, J.M. Melillo, J.W. Munger, K.J. Nadelhoffer, S. Ollinger, D.A. Orwig, N. Pederson, A.D. Richardson, K. Savage, J. Tang, J.R. Thompson, C.A. Williams, S.C. Wofsy, Z. Zhou, and D.R. Foster. 2020. [Carbon budget of the Harvard Forest Long-Term Ecological Research site: pattern, process, and response to global change](#). *Ecological Monographs*, 90: e01423, 37 pp.
- First Light 2022. [First Light Learning Journey. Relearning, recentering, returning at the speed of trust](#). A bridge between conservation organizations and Penobscot, Passamaquoddy, Maliseet, and Mi'kmaq Communities who seek to expand Wabanaki stewardship of land.

- Fisher, M. 2019. [Natural Science and Spatial Approach of Rewilding: Evolution in the Meaning of Rewilding in Wild Earth and The Wildlands Project](#). Published privately.
- Fisher, R.T. 1927. [A museum of forest antiquity](#). *American Forests and Forest Life*, 33: 348.
- Fisher, R.T. 1933. [New England Forests: Biological Factors](#). *New England's Prospect*. American Geographical Society Special Publication, 16: 213–223.
- Fletcher, M-S., R. Hamilton, W. Dressler, and L. Palmer. 2021. Indigenous knowledge and the shackles of wilderness. *Proceedings of the National Academy of Science*, 118: e2022218118. <https://doi.org/10.1073/pnas.2022218118>
- Fløjgaard, C., P.B. Pedersen, C.J. Sandom, J.C. Svenning, and R. Ejrnæs. 2022. Exploring a natural baseline for large-herbivore biomass in ecological restoration. *Journal of Applied Ecology*, 59: 18–24.
- Foreman, D. 1999. The Wildlands Project and the Rewilding of North America. *Denver University Law Review*, 76: 535–576.
- Foreman, D. 1999. Will-of-the-Land. *Wild Earth*, 25: 2–4.
- Foreman, D. 2001. The pristine myths. *Wild Earth*, 11: 1–5
- Foreman, D. and H. Wolke. 1992. *The Big Outside*. Revised Edition. Harmony Books. New York, NY.
- Foster, C.H.W. and G. Abbott. 1986. *A Land Conservation Strategy for the New England Region*. Lincoln Institute, Cambridge, MA.
- Foster, D.R. 1988. [Species and stand response to catastrophic wind in central New England, USA](#). *Journal of Ecology*, 76: 135–151.
- Foster, D.R. 1999. *Thoreau's Country: Journey through a Transformed Landscape*. Harvard University Press. Cambridge, MA.
- Foster, D.R. 2017. *A Meeting of Land and Sea: Nature and the Future of Martha's Vineyard*. Yale University Press. New Haven, CT.
- Foster, D.R. 2020. [Harvard Forest, Harvard University](#). ALPINE Academic Conservation Briefs. Highstead and Lincoln Institute. Redding, CT, and Cambridge, MA.
- Foster, D.R. and J.D. Aber. 2004. *Forests in Time: The Environmental Consequences of 1,000 Years of Change in New England*. Yale University Press. New Haven, CT.
- Foster, D.R., J.D. Aber, J.M. Melillo, R.D. Bowden, and F.A. Bazzaz. 1997. [Forest response to disturbance and anthropogenic stress. Rethinking the 1938 Hurricane and the impact of physical disturbance vs. chemical and climate stress on forest ecosystems](#). *BioScience*, 47: 437–445.
- Foster, D.R. (ed.), A. D'Amato, B. Baiser, A. Ellison, D. Orwig, W. Oswald, A. Barker Plotkin, and J. Thompson. 2010. *Hemlock: A Forest Giant on the Edge*. Yale University Press. New Haven, CT.
- Foster, D.R., G. Motzkin, D. Bernardos, and J. Cardoza. 2002. [Wildlife dynamics in the changing New England landscape](#). *Journal of Biogeography*, 29: 1337–1357.
- Foster, D.R. and D.A. Orwig. 2006. [Preemptive and salvage harvesting of New England forests: When doing nothing is a viable alternative](#). *Conservation Biology*, 20: 959–970.
- Foster, D.R., B. Donahue, D.B. Kittredge, G. Motzkin, B.R. Hall, B.L. Turner, and E. Chilton. 2008. [New England's forest landscape: Ecological legacies and conservation patterns shaped by agrarian history](#). In *Agrarian Landscapes in Transition*, edited by C.L. Redman and D.R. Foster. Oxford University Press. New York, NY.
- Foster, D.R., B.M. Donahue, D.B. Kittredge, K.F. Lambert, M.L. Hunter, B.R. Hall, L.C. Irland, R.J. Lillieholm, D.A. Orwig, A.W. D'Amato, E.A. Colburn, J.R. Thompson, J.N. Levitt, E.M. Ellison, W.S. Keeton, J.D. Aber, C.V. Cogbill, C.T. Driscoll, T.J. Fahey, and C.M. Hart. 2010. *Wildlands and Woodlands: A Vision for the New England Landscape*. Harvard University Press. Cambridge, MA.
- Foster, D.R., D.B. Kittredge, B.M. Donahue, G. Motzkin, D.A. Orwig, A.M. Ellison, B.R. Hall, E.A. Colburn, and A. D'Amato. 2005. *Wildlands and Woodlands: A Vision for the Forests of Massachusetts*. Harvard Forest Paper No. 27.
- Foster, D.R., K.F. Lambert, D.B. Kittredge, B.M. Donahue, C.M. Hart, W.G. Labich, S. Meyer, J.R. Thompson, M. Buchanan, J.N. Levitt, R. Perschel, K. Ross, G. Elkins, C. Daigle, B.R. Hall, E.K. Faison, A.W. D'Amato, R.T. Forman, P. Del Tredici, L.C. Irland, B.A. Colburn, D.A. Orwig, J.D. Aber, A. Berger, C.T. Driscoll, W.S. Keeton, R.J. Lillieholm, N. Pederson, A.M. Ellison, M.L. Hunter, and T.J. Fahey. 2017. *Wildlands and Woodlands, Farmlands and Communities: Broadening the Vision for New England*. Harvard University Press. Cambridge, MA.
- Giffen, R.A., C.M. Ryan, E.P. Belair, M.A. Pouch, and S. Brown. 2022. Storing More Carbon by Improving Forest Management in the Acadian Forest of New England, USA. *Forests*, 13: 2031–2050.
- Gill, J.L., J.W. Williams, S.T. Jackson, K.B. Lininger, and G.S. Robinson. 2009. Pleistocene megafaunal collapse, novel plant communities, and enhanced fire regimes in North America. *Science*, 326(5956): 1100–1103.
- Glover, J. 1986. *A Wilderness Original: The Life of Bob Marshall*. The Mountaineers. Seattle, WA.
- Goodby, R.G. 2021. *A Deep Presence: 13,000 Years of Native American History*. Peter Randall Publisher, Portsmouth, NH.
- Goodwin, R.H. 1952. [The Connecticut Arboretum: Its History and the Establishment of the Natural Area](#). Connecticut College Arboretum Bulletin, No. 7.
- Goodwin, R.H. and G. Dreyer. 1991. [The Connecticut College Arboretum: Its sixth decade and a detailed history of the land](#). Connecticut College Arboretum Bulletin, No. 32.
- Goold, V. and M.E. Abdo. 2018. [How to Save a Forest Toolkit](#). Old-Growth Forest Network, Easton, MD.

- Hall, B., G. Motzkin., D.R. Foster, M. Syfert, and J. Burk. 2002. Three hundred years of forest and land-use change in Massachusetts, USA. *Journal of Biogeography*, 29: 1319–1335.
- Hall Hansen, G.F. 2007. First steps to meaningful and lasting relationships with Native peoples. *International Journal of Wilderness*, 13: 19–20.
- Haney, J.C. and C.P. Schaadt. 1996. Functional roles of eastern old growth in promoting forest bird diversity. Pages 76–88 in M.B. Davis, editor. *Eastern Old-Growth Forests: Prospects for Rediscovery and Recovery*. Island Press. Washington, D.C.
- Harvard Forest. 2020. New England protected open space. <https://zenodo.org/record/3606763#.X4ys0dR7mM8/>. Accessed 11 August, 2021.
- Harvey, M. 1998. Howard Zahniser: A Legacy of Wilderness. *Wild Earth*, Summer: 62–66.
- Harvey, M. (ed.). 2014. *The Wilderness Writings of Howard Zahniser*. University of Washington Press. Seattle, WA.
- Healy, W.M. 1997. Influence of deer on the structure and composition of oak forests in central Massachusetts. Pages 249–266 in W.J. McShea, H.B. Underwood, and J.H. Rappole, editors. *The Science of Overabundance*. Smithsonian Institution, Washington, D.C.
- Hessami, M.A., E. Bowles, J.N. Popp, and A.T. Ford. 2021. Indigenizing the North American Model of Wildlife Conservation. *FACETS*, 6: 1285–1306.
- Hiss, T. 2021. A planetary feeling. *ATJournays*, Fall: 76–84.
- Hiss, T. 2022. *Rescuing the Planet: Protecting Half the Land to Heal the Earth*. Vintage, New York, NY.
- Hollinger, D., E. Davidson, S. Praver, H. Hughes, J. Lee, A. Richardson, K. Savage, D. Sihi, and A. Teets. 2021. Multi-Decadal Carbon Cycle Measurements Indicate Resistance to External Drivers of Change at the Howland Forest AmeriFlux Site. *Journal of Geophysical Research: Biogeosciences*, 126: e2021JG006276. 21 p.
- Ibisch, P.L., M.T. Hoffman, S. Kreft, G. Pe'er, V. Kati, L. Biber-Freudenberger, D.A. DellaSala, M.M. Vale, P.R. Hobson, and N. Selva. 2016. A global map of roadless areas and their conservation status. *Science*, 354: 1423–1427.
- IPBES 2022. Methodological assessment regarding the diverse conceptualization of multiple values of nature and its benefits, including biodiversity and ecosystem functions and services. Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Bonn, Germany, 3–9 July 2022, Agenda item 7 (b). IPBES 9L.13. United Nations.
- IPCC. 2022. *Climate Change 2022. Impacts, Adaptation and Vulnerability*. Summary for Policymakers. Working Group II contribution to the Sixth Assessment of the Intergovernmental Panel on Climate Change. IPCC Switzerland.
- Irland, L.C. 1979. *Wilderness Economics and Policy*. D.C. Heath and Company. Lexington, MA.
- Irland, L.C. 1999. *The Northeast's Changing Forest*. Harvard Forest and Harvard University Press. Cambridge, MA.
- Irland, L.C. 2013. Extreme value analysis of forest fires from New York to Nova Scotia, 1950–2010. *Forest Ecology and Management*, 294: 150–157.
- Irland, L.C. 2014. What happened to Southern New England fires? They virtually disappeared over a few decades in the mid-20th century. *The Northern Logger & Timber Processor*, September 2013: 12–17.
- Irland, L.C. 2018. Maine's public estate and conservation lands: Brief history and assessment. *Maine Policy Review*, 27(2): 11–29.
- Irland, L.C. 2020. From Wilderness to Timberland to Vacationland to Ecosystem: Maine's Forests, 1820–2020. *Maine Policy Review*, 29: 45–56.
- IUCN 2021. The benefits and risks of rewilding. International Union for Conservation of Nature Issues brief. 2 pp. June, 2021.
- Janssen, W., B. Labich, and D. Shaffer. 2019. Fulfilling Benton MacKaye's Vision: Transforming the Appalachian Trail into a Legacy of Landscape Conservation and Stewardship. Appalachian Trail Landscape Partnership Team. Case Statement. Unpublished.
- Jenner, J. 2000. Stan Murray and the push for Federal A.T. Protection. *Appalachian Trailways News*, July 2000: 31–32.
- Johnson, T. 2021. From Dream to Reality: History of the Appalachian Trail. Appalachian Trail Conservancy.
- Joppa, L.N. and A. Pfaff. 2009. High and far: Biases in the location of protected areas. *PLoS ONE*, 4: e8273.
- Judd, R. 2014. *Second Nature: An Environmental History of New England*. University of Massachusetts Press. Amherst, MA.
- Kaye, R. 2014. What future for the wildness of wilderness in the Anthropocene? *Alaska Park Science*, 13: 41–45.
- Kaye, R., P.N. Andrews, and B. Demientieff. 2021. Wilderness and traditional Indigenous beliefs. Conflicting or intersecting perspectives on the human-nature relationship? Arctic National Wildlife Refuge. U.S. Fish and Wildlife Service. Rewilding Blog. December 8, 2021.
- Keeton, W.S. 2018. Source or sink? Carbon dynamics in eastern old-growth forests and their role in climate change mitigation. Pages 267–288 in *Ecology and Recovery of Eastern Old-Growth Forests*. Island Press. Washington, D.C.
- Keeton, W.S., A.A. Whitman, G.G. McGee, and C.L. Goodale. 2011. Late-successional biomass development in northern hardwood-conifer forests of the northeastern United States. *Forest Science*, 57: 489–505.
- Keeton, W.S., C. Lorimer, B. Palik, and F. Doyon. 2018. Silviculture for old-growth in the context of global change. Pages 237–265. In Barton, A. and W.S. Keeton (eds.). *Ecology and Recovery of Eastern Old-Growth Forests*. Island Press. Washington, D.C. 340 pp.
- Kellett, M.J. 1994. Maine Woods National Park and Preserve: A Vision of What Could Be (brochure). RESTORE: The North Woods.

- Kellett, M.J. 2000. Maine Woods National Park: The Best Way to Restore the Wild. pp. 60–64. In Butler, T. (ed.), *Wild Earth*, 10, no. 2 (Summer 2000). Republished by the Environment & Society Portal, Multimedia Library. <http://www.environmentandsociety.org/node/6095>. <https://www.environmentandsociety.org/mml/wild-earth-10-no-2>
- Kellett, M.J. 2014 (2nd printing). Maine Woods National Park and Preserve: A Vision of What Could Be (brochure). RESTORE: The North Woods. <https://tinyurl.com/y3767257>(Kellett)
- Kellett, M.J., J.E. Maloof, S.A. Masino, L.E. Frelich, E.K. Faison, S.L. Brosi, and D.R. Foster. 2023. Forest-clearing to create early-successional habitats: Questionable benefits, significant costs. *Frontiers in Forests and Global Change*. In Press.
- King, B.B. 2000. Trail years: A history of the Appalachian Trail Conservancy. *Appalachian Trailways News*, July 2000: 2–52.
- Klyza, C.M. 2001a. An eastern turn for wilderness. *Wild Earth*, 2001: 10–15.
- Klyza, C.M. (ed.). 2001b. *Wilderness Comes Home: Rewilding the Northeast*. Middlebury College Press. Middlebury, VT.
- Knapp, R.A., P.S. Corn, and D.E. Schindler. 2001. The introduction of nonnative fish into wilderness lakes: Good intentions, conflicting mandates, and unintended consequences. *Ecosystems*, 4: 275–278.
- Kuehne C, J.J. Puhlick, and A.R. Weiskittel. 2018. Ecological reserves in Maine: Initial results of long-term monitoring. General Technical Report. Maine-ERM-GTR-2018
- Kuijper, D.P., J.P. Cromsigt, B. Jedrzejewska, S. Miscicki, M. Churski, W. Jedrzejewski, and I. Kweczlich. 2010. Bottom-up versus top-down control of tree regeneration in the Białowieża Primeval Forest, Poland. *Journal of Ecology*, 98: 888–899.
- Labich, B., S. Rucker, D. Shaffer, and B. Hall. 2021. Northern Appalachian Trail Landscape Partnership Strategic Plan 2021–2026. Highstead Foundation. Redding, CT.
- Landres, P.C. Barnes J.G. Dennis, T. Devine, P. Geissler, C.S. McCasland, L. Merigliano, J. Seastrand, and R. Swain. 2008. Keeping it wild: An interagency strategy to monitor trends in wilderness character across the National Wilderness Preservation System. General Technical Report RMRS-GTR-212. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Fort Collins, CO.
- Landres, P., C. Barnes, S. Boutcher, T. Devine, P. Dratch, A. Lindholm, L. Merigliano, N. Roeper, and E. Simpson. 2015. Keeping it wild 2: An updated interagency strategy to monitor trends in wilderness character across the National Wilderness Preservation System. General Technical Report RMRS-GTR-340. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Fort Collins, CO.
- Lansky, M. 1995a. Inside the Beauty Strip: Research reveals riparian buffers don't support full range of native bird species. *The Northern Forest Forum*, Mud Season: 20.
- Lansky, M. 1995b. Principles of Low Impact Forestry. *The Northern Forest Forum*, 3(5): 12.
- Lapin, M. 2005. *Old-Growth Forests: A Literature Review of the Characteristics of Eastern North American Forests*. Vermont Natural Resources Council, Montpelier, VT.
- LaRue, M.A and C.K. Nielsen. 2011. Modelling potential habitat for cougars in midwestern North America. *Ecological Modelling*, 222: 897–900.
- Leopold, A. 1921. The wilderness and its place in forest recreational policy. *Journal of Forestry*, 19(7): 718–721.
- Leopold, A. 1949. *A Sand County Almanac*. Oxford University Press. New York, NY.
- Lesica, P., B. McCune, S.V. Cope, and W.S. Hong. 1991. Differences in lichen and bryophyte communities between old-growth and managed second-growth forests in the Swan Valley, Montana. *Canadian Journal of Botany*, 69: 1745–1755.
- Lesslie, R.G. and S.G. Taylor. 1985. The wilderness continuum concept and its implications for Australian wilderness preservation policy. *Biological Conservation*, 32: 309–333.
- Levitt, J.N. 2022. Standing on the shoulders of giants: The emerging realization of MacKaye's Vision. *Appalachian Trail Journeys*, Fall: 56–67.
- Lin, S. 2021. [Connecticut College: A Commitment to Land Conservation from the Campus to Three Large Natural Areas](#). ALPINE Academic Conservation Briefs. Highstead Foundation and Lincoln Institute.
- Lindenmayer, D.B., D.R. Foster, J.F. Franklin, M.L. Hunter, R.F. Noss, F.A. Schmiegelow, and D. Perry. 2004. Salvage harvesting policies after natural disturbance. *Science*, 303: 1303.
- Littlefield, C., B. Donahue, A. D'Amato, P. Catanzaro, and D.R. Foster. 2023. *The Illusion of Preservation Revisited for New England*. University of Vermont, University of New Hampshire and Harvard University. In production.
- Loeb, C.D. and A.W. D'Amato. 2020. Large landscape conservation in a mixed ownership region. Opportunities and barriers for putting the pieces together. *Biological Conservation*, 243: 108462.
- Long, R., P. McKay, C. Reining, B. Dugelby, and K. Daly. 2002. Maine Wildlands Network Vision: A Scientific Approach to Conservation Planning in Maine. Wildlands Project. Richmond, VT.
- Lorimer, C.G. 1977. The presettlement forest and natural disturbance cycle of northeastern Maine. *Ecology*, 58: 139–148.
- Lorimer, C. and A. White. 2003. Scale and frequency of natural disturbances in the northeastern US: Implications for early successional forest habitats and regional age distributions. *Forest Ecology and Management*, 185: 41–64.

- Lovett, G.M., M. Weiss, A.M. Liebhold, T.P. Holmes, B. Leung, K.F. Lambert, D.A. Orwig, F.T. Campbell, J. Rosenthal, D.G. McCullough, R. Wildova, M.P. Ayres, C.D. Canham, D.R. Foster, S.L. LaDeau, and T. Weldy. 2016. [Nonnative forest insects and pathogens in the United States: Impacts and policy options](#). *Ecological Applications*, 26: 1437–1455.
- M's-it No'kmaq, A. Marshall, K. F. Beazley, J. Hum, s. joudry, A. Papadopoulos, S. Pictou, J. Rabesca, L. Young, and M. Zurba. 2021. ["Awakening the sleeping giant": Re-Indigenization principles for transforming biodiversity conservation in Canada and beyond](#). *FACETS*, 6: 839–869. doi:10.1139/facets-2020-0083
- MA DEM. 1989. *Massachusetts Wildlands: A Guidebook to the Commonwealth's Natural Areas*. Massachusetts Department of Environmental Management.
- MA DCR. 2012. *Landscape Designations for DCR Parks & Forests. Selection Criteria and Management Guidelines*
- Macias-Fauria, M., P. Jepson, N. Zimov, and Y. Malhi. 2020. [Pleistocene Arctic megafaunal ecological engineering as a natural climate solution?](#) *Philosophical Transactions of the Royal Society B—Biological Sciences*, 375: 20190122.
- MacKaye, B. 1921. An Appalachian trail: A project in regional planning. *The Journal of the American Institute of Architects*, 9: 325–30.
- MacKaye, B. 1929. Wilderness Ways. *Landscape Architecture*, 19: 1–11.
- MacKaye, B. 1933. Memorandum to the Commissioner of Indian Affairs. MacKaye Papers, Box 184 Special Collections, Dartmouth College, Hanover, NH. Referenced in Sutter (2002).
- Mahung, K., I. Gambill, J. Levitt and J. Sobrinho-Wheeler. 2018. [Landscape-scale conservation in the Schoodic to Schoodic region of Downeast Maine](#). Occasional Paper of the Program on Conservation Innovation. Harvard Forest, Harvard University.
- Maine Land Conservation Task Force. 2019. [Shaping the next generation of land conservation in Maine. Final report of the Land Conservation Task Force](#). 22 pages.
- Maine Legislature. 2000. [An Act to Establish Standards and Conditions for Designation of Ecological reserves on Lands Managed by the Bureau of Parks and Lands](#). S.P. 157 – L.D. 477. Chapter 592 of the Public Law, State of Maine.
- Maine Legislature. 2022. [An Act to Enhance the Ecological Reserve System](#). H.P. 541-L.D. 743. Chapter 516 of the Public Law, State of Maine.
- Marafioti, T. 2006. *Gender, Race, and Nature. A Cultural History of the Wilderness Society and the Wilderness Act of 1964*. Ph.D. Thesis. University of Utah. Salt Lake City, UT.
- Marris, E. 2022. In a warming climate we need to radically rethink how we conserve nature. *National Geographic*, August 16: 1–11.
- Marshall, R. 1930. [The problem of wilderness](#). *The Scientific Monthly*, 30: 141–148.
- Marshall, R. 1933. *The People's Forest*. University of Iowa Press. Iowa City, IA.
- Marshall, R. and A. Dobbins. 1936. Largest roadless areas in the United States. *The Living Wilderness*, 2: 11–13.
- Martin, P.S. (1984). Pleistocene overkill: The global model. Pages 354–403. In P.S. Martin and R.G. Klein (eds.) *Quaternary Extinctions*. University of Arizona Press. Tucson, AZ.
- Martin, P. 1992. The last entire Earth. *Wild Earth*, Winter: 29–32.
- McInnes, P.F., J. Naiman, J. Pastor, and Y. Cohen. 1992. Effects of moose browsing on vegetation and litter of the boreal forest, Isle Royale, Michigan, USA. *Ecology*, 73: 2059–2075.
- McKibben, B. 1995. [An explosion of green](#). *The Atlantic*, April.
- McMahon, J. 2018. *The Environmental Consequences of Forest Fragmentation in the Western Maine Mountains*. Occasional Paper 22. Maine Mountain Collaborative, Phillips, ME.
- Meigs, G.W. and W.S. Keeton. 2018. Intermediate-severity wind disturbance in mature temperate forests: Effects on legacy structure, carbon storage, and stand dynamics. *Ecological Applications*, 28: 798–815.
- Meyer, S., K. MacLeod, J. Thompson, D.R. Foster, R.T. Perschel, N. St. Clair Knobloch, J. Leibowitz, B. Donahue, A. Giffen, T. Vaughn, T. Whalen, B. Labich, A. Colnes, and J. Ammermuller. 2022. *New England's Climate Imperative: Our Forests as a Natural Climate Solution*. Highstead Foundation. Redding, CT.
- Michels, K., K. Fleming, and I. Gambill. 2019. [Middlebury College: A Creative Approach to Conservation Leads to the Protection of an Iconic Campus](#). Alpine Academic Conservation Briefs. Highstead Foundation and Lincoln Institute. Redding, CT, and Cambridge, MA.
- Michels, K. and D. Hindin. 2023. Building collaboration among community land trusts providing affordable housing and conservation land trusts protecting land for ecological value. Lincoln Institute. Cambridge, MA.
- Minteer, B.A. 2001. Wilderness and the wise province: Benton MacKaye's pragmatic vision. *Philosophy and Geography*, 4: 185–202.
- Mittlefehldt, S. 2010. The People's Path: Conflict and cooperation in the acquisition of the Appalachian Trail. *American Society of Environmental History*, 15: 643–669.
- Mittlefehldt, S. 2013. *Tangled Roots: The Appalachian Trail and American Environmental Politics*. University of Washington Press. Seattle, WA.
- MNAP 2022. [Maine Natural Areas Program, Ecological Reserve System](#). Fact Sheets, Maps, Reports, and Monitoring. Maine Department of Agriculture, Conservation, and Forestry. Augusta, ME.



- Moola, F. and R. Roth. 2019. Moving beyond colonial conservation models: Indigenous protected and conserved areas offer hope for biodiversity and advancing reconciliation in the Canadian boreal forest. *Environmental Review*, 27: 200–201. dx.doi.org/10.1139/er-2018-0091
- Moon Stumpff, L. 2000. In Wilderness there is life: An American Indian perspective on theory and action for wildlands. In: Watson, A.E., G.H. Aplet, and J.C. Hendee, compilers. 2000. *Sixth World Wilderness Congress Proceedings on Research, Management, and Allocation. Personal, societal, and ecological values of wilderness*. RMRS-P-14. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Ogden, UT.
- Moore, K.D. 2007. In the shadow of the cedars: The spiritual values of old-growth forests. *Conservation Biology*, 21: 1120–1123.
- Morse, S.C. 2021. *Wildlife and Habitats: A Collection of Natural History Essays with Photographs*. Keeping Track, Inc.
- Mrozowski, S., H. Pezzarossi, H. Herbster, and D.R. Gould. 2019. *Historical Archaeology and Indigenous Collaboration: Discovering Histories that Have Futures*. University Press of Florida. Gainesville, FL.
- NARP 1992–2022. The [Northern Forest Forum](#). A newsmagazine produced by the Northern Appalachian Restoration Project from 1992–2002. Harvard Forest Archive, Harvard University.
- National Park Service. 2006. [Management Policies 2006](#). U.S. Department of the Interior.
- National Park Service. 2008. [Appalachian National Scenic Trail Resource Plan](#). U.S. Department of the Interior.
- NEFF 2014. *New England Forest: The Path to Sustainability*. New England Forestry Foundation. Littleton, MA.
- NEFNE 2023. *New England Feeding New England. A Six-state Strategy for Food and Land Justice and Sustainability*. NEFNE Partners.
- Neill, C., B. Von Holle, K. Kleese, K.D. Ivy, A.R. Collins, C. Treat, and M. Dean. 2007. Historical influences on the vegetation and soils of the Martha's Vineyard, Massachusetts coastal sandplain: Implications for conservation and restoration. *Biological Conservation*, 136: 17–32.
- NEWT. 2018. *Forever Wild Conservation Easement*. Northeast Wilderness Trust, Montpelier, VT.
- NFA. 1997. *Wildlands. A Conservation Strategy for the Northern Forest. A proposal*. Northern Forest Alliance. Montpelier, VT.
- NFF. 2002. [Northern Forest Forum 1992–2002. Working for Sustainable Natural and Human Communities](#). Northern Appalachian Restoration Project. Stratford, NH.
- Northern Forest Lands Council. 1994. *Finding Common Ground*.
- Noss, R.F. 1983. A regional landscape approach to maintain diversity. *BioScience*, 33: 700–707.
- Noss, R.F. 1992. The Wildlands Project: Land conservation strategy. *Wild Earth*, (special issue): 10–25.
- Noss, R.F. 2003. A checklist for Wildlands Network Design. *Conservation Biology*, 17: 1271–1275.
- Noss, R.F. and A.Y. Cooperrider. 1994. *Saving Nature's Legacy: Protecting and Restoring Biodiversity*. Island Press. Washington, D.C.
- NTSA 1968. SEC. 5. (16USC1244). Public Law 90-543. National Trails System Act: 82 Stat. 919; 16 U.S.C. 1241.
- Nunery, J.S. and W.S. Keeton. 2010. Forest carbon storage in the northeastern United States: Net effects of harvesting frequency, post-harvest retention, and wood products. *Forest Ecology and Management*, 259: 1363–1375.
- Orr, D.W. 2002. *The Nature of Design: Ecology, Culture, and Human Intention*. Oxford University Press. New York, NY.
- Oswald, W.W., D.R. Foster, B.N. Shuman, E.S. Chilton, D.L. Doucette, and D.L. Duranleau. 2020. Conservation implications of limited Native American impacts in pre-contact New England. *Nature Sustainability*, 3: 241–246.
- Oswald, W.W., E.K. Faison, E.D. Doughty, B. Hall, and B.C.S. Hansen. 2007. [Post-glacial changes in spatial patterns of vegetation across southern New England](#). *Journal of Biogeography*, 34: 900–913.
- Paradis, R. 2020. [University of Vermont: Conserving Natural Areas and Research Forests](#). ALPINE Academic Conservation Briefs. Highstead and Lincoln Institute. Redding, CT, and Cambridge, MA.
- Perschel, R.T., R.A. Giffen, and F. Lowenstein. 2014. [New England Forests: The Path to Sustainability](#). New England Forestry Foundation. Littleton, MA.
- Portner, H.O. et al. 2021. [Scientific outcome of the IPBES-IPCC co-sponsored workshop on biodiversity and climate change](#). IPBES secretariat, Bonn, Germany.
- Potvin, M.J., T.D. Drummer, J.A. Vucetich, and D.E. Beyer. 2005. Monitoring and habitat analysis for wolves in upper Michigan. *Journal of Wildlife Management*, 69: 1660–1669.
- Power, T.M. 2001a. [The economic impact of the proposed Maine Woods National Park & Preserve](#). RESTORE: The North Woods. Hallowell, ME.
- Power, T.M. 2001b. [The socio-economic impact of the proposed Maine Woods National Park and Preserve. Summary](#). RESTORE: The North Woods. Hallowell, ME.
- Publicover, D. 2013. [Appalachian Mountain Club Maine Woods Initiative Forest Management Plan](#). Appalachian Mountain Club. Boston, MA.
- Publicover, D. 2016. A decade of change in the Maine Woods. *Appalachia*, Winter/Spring.
- Publicover, D. and T. Steinbach. 1995. Public land acquisition. A greater bargain than ever. *The Northern Forest Forum*, 3(5): 15.

- Publicover, D.A., K.D. Kimball, and C.J. Poppenwiner. 2021. Northeastern high-elevation areas: Ecological values and conservation priorities. *Northeastern Naturalist*, 28: 129–155.
- Reining, C. 2002. The Southern Canadian Shield and Northern Appalachians Wildlands Network. *The Northern Forest Forum*, 9(4): 19.
- Reining, C., K. Beazley, P. Doran, and C. Bettigole. 2006. [From the Adirondacks to Acadia: A Wildlands Network Design for the Greater Northern Appalachians](#). Special Paper No. 7. Wildlands Project. Richmond, VT.
- RESTORE: The North Woods. 1999. America's Next Great National Park: Preserving our Maine Woods Legacy. <https://tinyurl.com/2tde2tk3>
- RESTORE: The North Woods. 2000. Proposed. Maine Woods National Park & Preserve. Special Issue with articles by J. St. Pierre, K. DeBoer, G. Wuerthner, M. Kellett, J. Luoma, B. Wheatley, B. Evans, and R. Engholm. *The Northern Forest Forum*, 8(4): 1–25.
- RESTORE. 2022. [RESTORE: The North Woods](#). Website.
- Revive and Restore. 2022. [The Heath Hen Project](#). Website.
- Ripple, W.J., C. Wolf, M.K. Phillips, R.L. Beschta, J.A. Vucetich, J.B. Kauffman, B.E. Law, A.J. Wirsing, J.E. Lambert, E. Leslie, and C. Vynne. 2022. Rewilding the American West. *BioScience*.
- Roe, J.H. and L. Roe. 2021. Overview of Incorporating Wild Forests into Vermont's UVA Program. Wild Forests Vermont.
- Rosales, H. 2010. [The InterTribal Sinkyone Wilderness](#). *International Journal of Wilderness*, 16: 8–12.
- Rubin, R.A. 2000a. Murray Stevens. A time for transitions. *Appalachian Trailways News*, July 2000: 30–31.
- Rubin, R.A. 2000b. Where now? Survey of [ATC] board members highlights protection, education as priorities for next decade. *Appalachian Trailways News*, July 2000: 39.
- Ryan, J.H. 2017. *Blazing Ahead: Benton MacKaye, Myron Avery, and the Rivalry that Built the Appalachian Trail*. Appalachian Mountain Club Books. Boston, MA.
- Sams, C.F. 2022. Tribal co-management of Federal lands: Acknowledging the history and considering the path forward. Director, National Park Service Statement before the House Committee on Natural resources. March 8, 2022. <https://www.doi.gov/ocl/tribal-co-management-federal-lands>.
- Sarkar, S. 1999. Wilderness preservation and biodiversity conservation—keeping divergent goals distinct. *BioScience*, 49: 405–412.
- Satherthwaite, A. 1974. An Appalachian Greenway: Purposes, Prospects and Programs. Appalachian Trail Conference. Washington, D.C.
- Sayen, J. 1987. The Appalachian Mountains vision and wilderness. *Earth First!*, May: 26–30.
- Sayen, J. 1990. Notes toward a restoration ethic. *Restoration & Management Notes*, 7(2): 57–59.
- Sayen, J. 1995a. A proposal to establish a Headwaters Regional Wilderness Reserve System. *The Northern Forest Forum*, 3(5): 4–10.
- Sayen, J. 1995b. A 75-year blueprint to sustainable natural & human communities. A summary of The Northern Forest Headwaters Community Restoration Proposal. *The Northern Forest Forum*, 3(5): 3.
- Sayen, J. 1995c. A new wild land ethic. *The Northern Forest Forum*, 3(5): 3.
- Sayen, J. 2022. [Op-Ed: Cog Railway Proposes Railroad Hotel Near Congested Mt. Washington Summit](#). *InDepth New Hampshire*, August 12.
- Sayen, J. 2023. *Children of the Northern Forest*. Yale University Press. New Haven, CT.
- Scott, D.W. 2002. “Untrammeled,” “Wilderness Character,” and the challenges of Wilderness Preservation. *Wild Earth*, Fall/Winter 2001–2002: 72–79.
- Seymour, R.S., A.S. White, P.G. deMaynadier. 2002. Natural disturbance regimes in northeastern North America—evaluating silvicultural systems using natural scales and frequencies. *Forest Ecology and Management*, 155: 357–367.
- Simard, S.W. and D.M. Durall. 2004. Mycorrhizal networks: a review of their extent, function, and importance. *Canadian Journal of Botany*, 82: 1140–1165.
- Sims, K., L.G. Lee, N. Estrella-Luna, M. Lurie, and J.R. Thompson. 2022. Environmental justice criteria for new land protection can inform efforts to address disparities in access to nearby open space. *Environmental Research Letters*, 17: 064014.
- Smith, J.E., R. Molina, M.M.P. Huso, D.L. Luoma, D. McKay, M.A. Castellano, T. Lebel, and Y. Valachovic. 2002. Species richness, abundance, and composition of hypogeous and epigeous ectomycorrhizal fungal sporocarps in young, rotation-age, and old-growth stands of Douglas-fir (*Pseudotsuga menziesii*) in the Cascade Range of Oregon, U.S.A. *Canadian Journal of Botany*, 80: 186–204.
- Smith, N. and E. Bateson. 2001. How much protected land do we have in the Northern Forest? *Wild Earth*, Spring: 16–18.
- Snyder, M. 2021. Considerations for a reserve forestland subcategory in Vermont's Use Value Appraisal Program. Vermont Department of Forests, Parks and Recreation. Agency of Natural Resources.
- Soulé, M. 1999. Networks of people for networks of wildlands. *Wild Earth*, 1999/2000: 38–46.
- Soulé, M.E. and R.F. Noss. 1998. Rewilding and biodiversity: Complementary goals for continental conservation. *Wild Earth*, 3: 18–28.
- Soulé, M.E. and J. Terborgh (eds.) 1999. *Continental Conservation: Scientific Foundations of Regional Reserve Networks*. Island Press. Washington, D.C.

- Spence, M.D. 2000. *Dispossessing the Wilderness: Indian Removal and the Making of the National Parks*. Oxford University Press. New York, NY.
- Spurr, S.H. and A.C. Cline. 1942. [Ecological forestry in central New England](#). *Journal of Forestry*, 40: 418–420.
- St. Pierre, J. 2022. [Revisiting rewilding in the Allagash](#). RESTORE: The North Woods. North Woods Report. June 2022.
- St. Pierre, J. and M. Kellett. 1995. Maine Woods Watch: Proposed Maine Woods National Park. *The Northern Forest Forum*, 3(3): 19–21.
- Stephenson, N.L. and C.I. Millar. 2014. Climate change: Wilderness's greatest challenge. In *Forest Conservation and Management in the Anthropocene: Adaptation of Science, Policy, and Practices*, edited by V. Sample and R. Bixler. Conference Proceedings. Proceedings. RMRS-P-71. U.S. Department of Agriculture, Forest Service. Rocky Mountain Research Station. Fort Collins, CO.
- Stevens, S. 2014. *Indigenous Peoples, National Parks, and Protected Areas: A New Paradigm Linking Conservation, Culture, and Rights*. University of Arizona Press. Phoenix, AZ.
- Sutter, P. 1999. "A Retreat from Profit": Colonization, the Appalachian Trail, and Benton MacKaye's Wilderness Advocacy. *Environmental History*, 4: 553–557.
- Sutter, P. 2004. *Driven Wild: How the Fight against Automobiles Launched the Modern Wilderness Movement*. University of Washington Press. Seattle, WA.
- Sutter, P. 2002. Driven Wild: The problem with Wilderness. *Forest History Today*, Spring: 2–9.
- SWT. 2019. Conservation Easement for Wildlands. Sweet Water Trust.
- Taylor, D. 2016. *The Rise of the American Conservation Movement: Power, Privilege, and Environmental Protection*. Duke University Press. Durham, NC.
- Terborgh, J., J. Estes, P. Paquet, K. Ralls, D. Boyd-Heger, B. Miller, and R. Noss. 1999. Role of top carnivores in regulating terrestrial ecosystems. In *Continental Conservation: Design and Management Principles for Long-term, Regional Conservation Networks*, edited by M.E. Soulé and J. Terborgh. Island Press. Washington, D.C.
- The Nature Conservancy. 2018. Eastern U.S. Secured Lands. The Nature Conservancy. <https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/terrestrial/secured/Pages/default.aspx>
- Thom, D., M. Golivets, L. Edling, G.W. Meigs, J.D. Gourevitch, L.J. Sonter, G.L. Galford, and W.S. Keeton. Climate sensitivity of carbon, timber, and species richness in the boreal-temperate ecotone co-varies with forest development. 2019. *Global Change Biology*, 25: 2446–2458.
- Thomsen, J.M., R.B. Powell, and C. Monz. 2018. A systematic review of the physical and mental health benefits of wildland recreation. *Journal of Park and Recreation Administration*, 36: 123–148.
- Thompson, E.H., E.R. Sorenson, and R.J. Zaino. 2019. *Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont*. Vermont Fish and Wildlife Department. Montpelier, VT.
- Thompson, J.R., D. Laflower, J. Plisinski, and M. MacLean 2020. [Land Sector Report: A Technical Report of the Massachusetts 2050 Decarbonization Roadmap Study](#). From Massachusetts Global Warming Solutions. Massachusetts Executive Office of Environmental Affairs. Boston, MA.
- Thompson, J.R., K. Lambert, D.R. Foster, M. Blumstein, B. Broadbent, and A. Almeyda Zambrano 2014. [Changes to the Land: Four Scenarios for the Future of the Massachusetts Landscape](#). Harvard Forest Paper. Petersham, MA.
- Thompson, J.R., D.N. Carpenter, C. Cogbill, and D.R. Foster 2013. [Four Centuries of Change in Northeastern United States Forests](#). *PLoS ONE*, 8: e72540.
- Thoreau, H.D. 1862. *Huckleberries*. An Essay. Reprinted 1970, Windhover Press of the University of Iowa. Iowa City, IA.
- Thoreau, H.D. 1864. *The Maine Woods*. Ticknor & Fields. Boston, MA.
- Tomao, A., J. Antonio Bonet, C. Castano, and S. De-Miguel. 2020. How does forest management affect fungal diversity and community composition? Current knowledge and future perspectives for the conservation of forest fungi. *Forest Ecology and Management*, 457: 1176–1178.
- Trombulak, S. 1998. [Wild forests are working forests](#). *Wild Earth*, 3: 73–76.
- Turner, J.M. 2001. Wilderness east: Reclaiming history. *Wild Earth*, Spring: 19–26.
- UNESCO. 1974. Program on Man and the Biosphere (MAB) Task Force on: Criteria and guidelines for the choice and establishment of biosphere reserves. MAB Report Series No. 22. 61 pp. UNESCO and UNEP.
- USA National Phenology Network. 2017. Daily Temperature Accumulations - 30-year Average Region: 49.9375,-66.4791667,24.0625,-125.0208333. [https://data.usanpn.org/geoserver-request-builder?service=wcs&layer=gdd:30yr\\_avg\\_agdd&doy=365&format=geotiff&projection=4269](https://data.usanpn.org/geoserver-request-builder?service=wcs&layer=gdd:30yr_avg_agdd&doy=365&format=geotiff&projection=4269). USA-NPN, Tucson, Arizona, USA. Accessed 25 November, 2019. <http://dx.doi.org/10.5066/F7SN0723>
- U.S. Census Bureau. 2020. 2020 TIGER/Line Shapefiles: Blocks. <https://www.census.gov/cgi-bin/geo/shapefiles/index.php?year=2020&layergroup=Blocks+%282020%29>. Accessed 2 Mar 2022.
- U.S. Congress. 1964. Wilderness Act. [An act to establish a National Wilderness Preservation System for the permanent good of the whole people, and for other purposes](#). Public Law 88-577 88th Congress. September 3, 1964.

- USDA. 2005. White Mountain National Forest Final Environmental Impact Statement. Appendix C. Inventoried Roadless Area Evaluations. U.S. Department of Agriculture.
- USDA. 2006. Green Mountain National Forest Land and Resource Management Plan.
- USGS. 1999. USGS 30 Meter Resolution, One-Sixtieth Degree National Elevation Dataset for CONUS, Alaska, Hawaii, Puerto Rico, and the U.S. Virgin Islands, Edition 1. <http://gisdata.usgs.net/ned/>. U.S. Geological Survey EROS Data Center Accessed 7 Oct 2016.
- USGS Gap Analysis Project (GAP). 2018. Protected Areas Database of the United States (PAD-US). <https://doi.org/10.5066/P955KPLE>
- USGS. 2021. National Land Cover Database (NLCD) 2019 Products (ver. 2.0, June 2021): U.S. Geological Survey data release, <https://doi.org/10.5066/P9KZCM54>
- USGS. 2022. Gap Analysis Program. <https://www.usgs.gov/programs/gap-analysis-project>
- Vail, D. 2016. *AMC's Contributions to the Maine Woods Economy. A Baseline Analysis*. Appalachian Mountain Club. Boston, MA.
- Vellak, K., and J. Paal. 1999. Diversity of bryophyte vegetation in some forest types in Estonia: A comparison of old unmanaged and managed forests. *Biodiversity and Conservation* 8: 1595–1620.
- Vera, F.W.M., E.S. Barker, and H. Olf. 2006. Large herbivores: missing partners of western European light-demanding tree and shrub species? Pages 203–231 in K. Danell, R. Bergstrom, P. Duncan, and J. Pastor, editors. *Large herbivore ecology, ecosystem dynamics and conservation*. Cambridge University Press. Cambridge, UK.
- Vest, J.H.C. 1984. "Wilderness solitude: The sacred will-of-the-land." Graduate Student Theses, Dissertations, & Professional Papers. 5013. <https://scholarworks.umt.edu/etd/5013>
- Vest, J.H.C. 1985. *Will-of-the-Land: Wilderness among Primal Indo-Europeans*. *Environmental Review*, 9(4): 323–29. <https://doi.org/10.2307/3984462>.
- Vogelmann, H. 2011. *On Schillhammer Road: The Life of a Botanist*. Tamarac Press. Jericho, VT.
- Whittaker, A. 1995. Wildlands create context for a new economic direction. *The Northern Forest Forum*, Volume 3, Number 5: 11–13.
- Wildlands Network. 2022. <https://wildlandsnetwork.org>
- Williams, T.T. 2014. *The Glorious Indifference of Wilderness*. *Orion*, September.
- Wood, M.C. and Z. Welcker, 2008. Tribes as Trustees Again (Part I): The Emerging Tribal Role in the Conservation Trust Movement. *Harvard Environmental Law Review*, 32: 373–432.
- Wood, M.C. and M. O'Brien. 2008. Tribes as Trustees Again (Part II): Evaluating Four Models of Tribal Participation in the Conservation Trust Movement. *Stanford Environmental Law Journal*, 27: 477–546.
- Yachnin, J. 2021a. Does Biden's '30x30' plan trade science for popularity? *E&E News*, June 2.
- Yachnin, J. 2021b. Biden officials: Grazing lands count for conservation goals. September 28, 2021. <https://www.eenews.net/articles/biden-officials-grazing-lands-should-count-for-conservation-goals/>
- Zahniser, H. 1956. The need for wilderness areas. *The Living Wilderness*, 59 (Winter to Spring): 37–43.
- Zahniser, H. 1957. Remarks to Society of American Foresters.
- Zahniser, H. 1961. Editorial: Managed to be left unmanaged. *The Living Wilderness*, 76 (Spring to Summer): 2.
- Zahniser, H. 1962. Hearings before the Subcommittee on Public Lands of the Committee on Interior Affairs, House of Representatives, 87th Congress, 2nd session, May 7–11, serial no. 12, part IV.
- Zahniser, H. 1963a. Editorial: Guardians not gardeners. *The Living Wilderness*, 83 (Spring to Summer): 2.
- Zahniser, H. 1963b. Hearings before the Committee on Interior and Insular Affairs, United States Senate, 88th Congress, 1st session on S. 4, February 28 and March 1, 1963.
- Zahniser, H. 1963c. *Yearbook for Agriculture*. p.184.
- Zahniser, E. 1992. *Where Wilderness Preservation Began: Adirondack Writings of Howard Zahniser*. North Country Books. Utica, NY. 88 p.
- Zurba, M., K.F. Beazley, E. English, and J. Buchmann-Duck. 2019. Indigenous Protected and Conserved Areas (IPCAs), Aichi Target 11 and Canada's Pathway to Target 1: Focusing Conservation on Reconciliation. *Land* 8(1), 10: 1–10. doi:10.3390/land8010010



## Roles and Responsibilities

The project was centered at the Harvard Forest under the direction of David Foster, with Emily Johnson responsible for leading and managing data collection and review, and Brian Hall responsible for mapping, analyses, and data presentation. Lillie Howell at Northeast Wilderness Trust and Ed Faison at the Highstead Foundation contributed significantly to the outreach and data collection from public and private partners in northern and southern New England respectively. Jon Leibowitz at the Northeast Wilderness Trust provided guidance and support to all aspects of the project and Liz Thompson at the Vermont Land Trust played a critical role in outreach and data collection in Vermont and offered insightful advice and effort throughout the study. Jamie Sayen, David Publicover, and Nancy Sferra provided essential insights into the history of land conservation in the Northern Forest region and critical improvements to the study. Brian Donahue contributed to the regional analysis of Wildlands, Woodlands, and farmlands, and to the writing of the manuscript, which was led by Foster with assistance from all authors. Jonathan Thompson, Danelle LaFlower, and Josh Plisinski at the Harvard Forest contributed essential data and analysis for evaluating FIA data and Mark Anderson and Arlene Olivero at The Nature Conservancy contributed their insights and understanding to the evaluation of the GAP data. Funding was provided by the Harvard Forest, Highstead Foundation, Northeast Wilderness Trust, and the National Science Foundation through the Long Term Ecological Research program at the Harvard Forest.

## Acknowledgments

Unraveling the legal, historical, and cartographical details among the many hundreds of properties reviewed in this study required considerable assistance from many people and organizations. Extraordinary support was provided by Hawk Metheny (Appalachian Trail Conservancy), Bob Zaino (Vermont Fish and Wildlife Department), Hannah Phillips and Jason Nerenberg (Vermont Department of Forests, Parks and Recreation), Jamey Fidel (Vermont Natural Resources Council), Gabe Roxby (Society for the Protection of New Hampshire Forests), Jake Metzler (Forest Society of Maine), Justin Schlawin (Maine Natural Areas Program), John Scanlon (Massachusetts Wildlife), Peter Church (Massachusetts Department of Conservation and Recreation), Michael Kellett (RESTORE), Harry White (Connecticut), Zack Porter (Standing Trees), and Eve Endicott (Sweet Water Trust). Important leads and insights were offered on elusive properties and issues by Mitch Lansky (Witopitlok), Jay Espy (Percy Summer Club), Jym St. Pierre (RESTORE), Bob Leverett, Heidi Ricci (Mass Audubon), and Lucas St. Clair. Barry Logan (Bowdoin College), Jennifer Melville (Open Space Institute), Clarisse Hart (Harvard Forest), Jon Binhammer (TNC-Vermont), Hank Art (Williams College), Chris Schorn (Mid-Coast Conservancy), Karen Nordstrom (Food Solutions New England), and Eric Sorenson provided helpful comments on the draft manuscript. We greatly appreciate the insights to the work and importance of Benton MacKaye in the context of this study and the history of U.S. conservation provided by Larry Anderson, Tony Hiss, Al French, and Wes Ward. Nearly one hundred and fifty individuals and organizations contributed data and feedback to the study and are acknowledged in the list of contributors. Finally, none of the research and writing in this project would have been effectively conveyed without the tireless effort and creative insight of Linda Mirabile at Raven Mark. Marissa Latshaw contributed in countless ways to improve the quality and effect outreach of the report.



© John Burk



© Jerry Monkman / EcoPhotography

**Production Credits:**

**Report design/production:** RavenMark

**Copy editor:** Mary Elder Jacobsen

**Maps & graphics:** Brian Hall

**Printing:** L. Brown & Sons Printing, Inc.



### Authors:

David Foster, Harvard Forest, Harvard University  
Emily E. Johnson, Harvard Forest, Harvard University  
Brian R. Hall, Harvard Forest, Harvard University  
Jonathan Leibowitz, Northeast Wilderness Trust  
Elizabeth H. Thompson, Ecologist  
Brian Donahue, Brandeis University  
Edward K. Faison, Highstead Foundation  
Jamie Sayen, Author, *Children of the Northern Forest*  
David Publicover, Appalachian Mountain Club  
Nancy Sferra, The Nature Conservancy in Maine  
Lloyd C. Irland, The Irland Group  
Jonathan R. Thompson, Harvard Forest, Harvard University  
Robert Perschel, New England Forestry Foundation  
David A. Orwig, Harvard Forest, Harvard University  
William S. Keeton, University of Vermont  
Malcolm L. Hunter Jr., University of Maine  
Susan A. Masino, Trinity College  
Lillian Howell, Northeast Wilderness Trust

**Harvard Forest, Harvard University**  
**Northeast Wilderness Trust**  
**Highstead Foundation**



Copies of this report, the Wildlands web map, and additional information are available on the website of Wildlands, Woodlands, Farmlands & Communities:  
[wildlandsandwoodlands.org/wildlands-in-new-england](http://wildlandsandwoodlands.org/wildlands-in-new-england)

To learn more about ways to directly support Wildlands conservation throughout New England, visit  
[newildernesstrust.org/](http://newildernesstrust.org/)

### Citation for the full report:

Foster, D., E. E. Johnson, B. R. Hall, J. Leibowitz, E. H. Thompson, B. Donahue, E. K. Faison, J. Sayen, D. Publicover, N. Sferra, L. C. Irland, J. R. Thompson, R. Perschel, D. A. Orwig, W. S. Keeton, M. L. Hunter Jr., S. A. Masino, and L. Howell. 2023. *Wildlands in New England. Past, Present, and Future*. Harvard Forest Paper 34. Harvard University.

Cover photo: Woodbury Mountain Wilderness Preserve