



# EXECUTIVE SUMMARY



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## Overview

*Conserving Plant Diversity in New England* is a groundbreaking new report resulting from a two-year collaboration between Native Plant Trust and The Nature Conservancy. The report provides a scientific framework and detailed roadmap for conservation action and land protection at the species, habitat, and parcel scales that will effectively save plant diversity—and thus overall biodiversity—in New England as the climate changes.

The genesis of the study was a desire to know whether a century or more of land conservation has protected enough land in the right places to save the region's plant diversity. Our goal was to assess the region's status in meeting targets in the Global Strategy for Plant Conservation, which is part of the United Nations' Convention on Biological Diversity (CBD). The CBD partners recently extended their targets to encompass goals recommended by the Global Deal for Nature (Dinerstein et al. 2019), and thus the 2021 update calls for protecting 30% of the world's ecosystems by 2030. To determine progress toward both the original and expanded goals, the team:

- delineated the regional distribution of 43 unique habitats
- identified 234 Important Plant Areas (IPAs)—climate-resilient areas with a relative abundance of rare and endangered plant species, containing 212 of our rarest species
- assessed the current protection status of those habitats and IPAs and likely losses to development by 2050
- evaluated their ability to effectively adapt to a changing climate.

Recently, the Biden administration announced its “Conserving and Restoring America the Beautiful” initiative, which calls for locally led campaigns to conserve and restore 30% of the nation's lands and waters by 2030 (Executive Order 14008). ***This report and the accompanying interactive mapping tool give policy makers, federal and state agencies, and land trusts in each state the detailed information needed to most effectively spend conservation dollars to achieve that goal by protecting resilient, biologically diverse landscapes across New England.***

Finally, we want to acknowledge other important reports assessing habitat conservation in New England, including “Wildlands and Woodlands” (Foster 2012), “Losing Ground” (Lautzenheiser et al. 2014), “Resilient Sites for Terrestrial Conservation in the Northeast and Mid-Atlantic Region” (Anderson et al. 2012), and “The vulnerabilities of fish and wildlife habitats in the Northeast to climate change” (Manomet 2012). To our knowledge, however, this is the first analysis to identify the specific sites throughout New England to protect to ensure the survival of plant assemblages and their inherent diversity.



Michael Plantadosi © Native Plant Trust

## Targets and Approach

Plants are the basis for life on Earth. Plant communities translate the geophysical variation of the land, such as soil and topography, into the living habitats that sustain life. Conserving multiple intact examples of every habitat is a strategy for sustaining the natural benefits plants provide and maintaining the full diversity of species that depend on them (Beier et al. 2010). This report is thus the first to focus on regional plant diversity and resilience as the foundation for conservation policy and action.



Plants and plant communities face a host of immediate threats, from development to invasive species, as discussed in this report and more thoroughly in Native Plant Trust’s “State of the Plants: Challenges and Opportunities for Conserving New England’s Native Flora” (Farnsworth 2015). The altered temperature and precipitation patterns brought by a changing climate pose long-term challenges for ecosystems, as the composition and location of plants and plant communities shift in response. Thus, the research team took as a fundamental premise that the conservation targets must be grounded in an analysis of **resilience**—places where the land provides many microclimates or natural strongholds for current plant populations that will enable them to endure under different climate scenarios. Thus, for each habitat and Important Plant Area (IPA), we mapped the location of its most resilient land and measured the achievements of a century of collaborative conservation efforts toward permanently protecting those sites from conversion.

Our classification of conservation lands follows the U.S. Fish and Wildlife Service GAP program terminology (Crist et al. 1998), in which:

- “**Secured**” refers to land that is permanently secured against conversion to development through public or private fee ownership, easement, or other legal means.
- “**Protected**” refers to the subset of secured land explicitly dedicated to conserving nature and natural processes (GAP 1) or managed for a primarily natural state (GAP 2)
- “**Multiple Use**” refers to the subset of secured land that is open to many types of uses including recreation, resource extraction, and management (GAP 3)
- “**Unsecured**” refers to privately owned land or public land with no conservation restrictions.

With that data, we then determined how much of each resilient habitat or IPA needs protection to meet the goals of the two international benchmarks.

The Global Strategy for Plant Conservation (GSPC) has three targets relevant to this analysis:

- Target 4: At least 15% of each vegetation type secured through effective management or restoration (i.e., “protected”)
- Target 5: At least 75% of the most important areas for plant diversity (IPAs) of each ecological region protected with effective management in place for conserving plants and their genetic diversity
- Target 7: At least 75% of known threatened plant species conserved in their natural place in the wild.

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We tailored the area-based goals of the Global Deal for Nature (incorporated into Biden’s “America the Beautiful” initiative) to the character of the New England landscape, the varieties of legal protection available here, and the impact of climate change. Thus, we set New England targets to parallel the GSPC targets, both with a timeframe of 2030:

- NE Target: At least 5-15% of each habitat protected and at least 30% secured against conversion. At least 75% of the securement on climate resilient land.
- NE Target: At least 30% of each climate-resilient area with the highest rare plant diversity (IPA) protected and at least 75% of each IPA secured against conversion across habitats and states.

The first NE target sets the protected level (conserved to protect nature and natural processes) needed based on habitat scale: dominant matrix forests 5%, wetlands 10%, patch-forming habitats 15%. Similarly, the resilience criterion is adjusted downward to 50% for wetlands to include some vulnerable but already protected examples of these critical habitats.

While this report focuses on protecting resilient and representative land, that approach is not always sufficient to sustain diversity. Protection of resilient land is most effective where the threat is habitat loss, conversion, or climate change; but other threats—like altered processes, trampling, overharvesting, and invasive species—need monitoring and management. Land protection also needs to go hand-in-hand with conservation strategies like seed banking, reintroduction, and assisted migration that ensure sources of biotic renewal are available and viable. The GSPC has a goal (Target 8 below) specifically related to ensuring that 75% of threatened plant species are in *ex situ* collections (seed banks and living collections at botanic gardens).



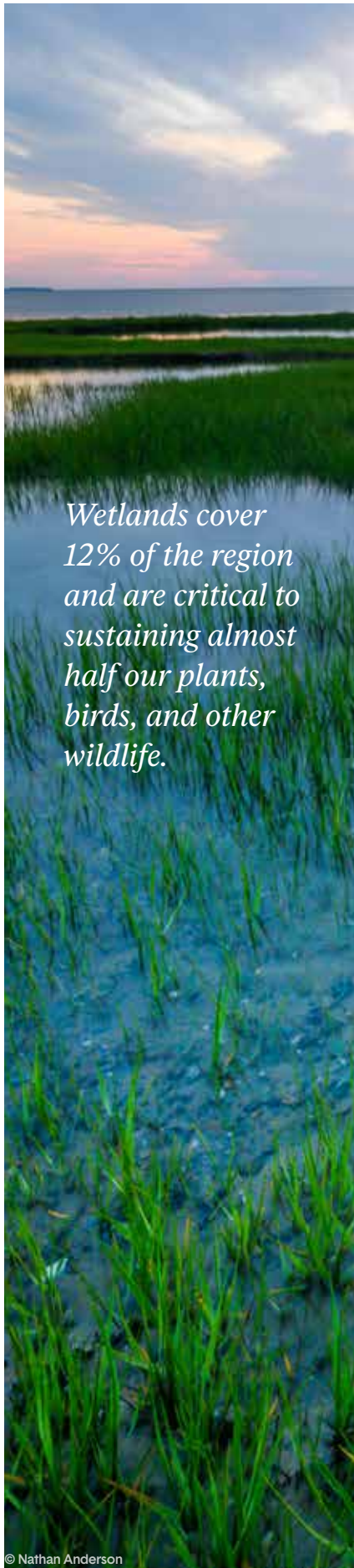
Eastern red cedar  
(*Juniperus virginiana* var. *virginiana*)  
Dan Jaffe © Native Plant Trust

*Plants are the basis  
for life on Earth.*

## Results

Conservation of New England's plant diversity under a changing climate is an achievable goal, but it requires significant increases in the securement and protection of resilient habitat. This will require securing large, multiple-use areas against conversion and managing them to retain essential functions, as well as protecting smaller areas for natural processes that ensure plant populations and communities thrive. As much as possible, securement should be focused on climate-resilient land. **To achieve the NE target of 30% secured will require the protection of 2.3 million acres of additional resilient land in specific habitats.** In addition, we must ensure the effective management of the existing 5.3 million acres of multiple-use forest land that is central to wildlife habitat and carbon storage but open to logging and mineral extraction.

- **Forests cover 86% of the natural landscape, but only one of New England's ten dominant forest types meets GSPC target 4 and only two meet the NE target.** Reaching the NE target will require securing an additional 2 million acres of climate-resilient forest. To reach the GSPC goal of 15% protection across all forest habitats requires investing in 3 million acres, including increasing the GAP level on land that is already secured. Urgently in need of conservation are resilient examples of oak-pine and coastal hardwood forests of southern New England that are already challenged by fragmentation and predicted to lose up to 18% of their current distribution to development by 2050.
- **Wetlands cover 12% of the region and are critical to sustaining almost half our plants, birds, and other wildlife, but are less conserved than we expected.** Of New England's eighteen types of bogs, swamps, floodplains, and marshes, only six meet the GSPC and three the NE targets, and these are predominantly small, unique bogs and peatlands. None of our five most common wetland types meet either target, although many unprotected examples occur on resilient land, and at least 20% of each habitat is secured against conversion. Reaching the NE target will require conservation of an additional 253,902 acres of resilient wetland and for the GSPC target 405,083 acres protected for nature.
- **Patch-forming terrestrial habitats are hotspots of plant diversity and often critical habitat for rare and endangered plant species.** Covering only 2% of New England's landscape, these summits, cliffs, barrens, and dunes sustain densities of rare species ten times higher than wetlands and forty times higher than upland forests. These unusual habitats are more often on secured land than their widespread counterparts, and seven out of fourteen types meet the GSPC target. However, only four meet the NE target because sites supporting sand-based habitats like pine barrens and coastal grasslands occur on flat and fragmented land that is vulnerable to climate change. Many of these habitats are also under high threat of conversion, with 15-18% of their current extent predicted to be lost by 2050. Meeting the 30% NE target requires securing only 17,726 acres, but it will take 88,620 acres of targeted resilient land to bring the silt- and sand-based systems to the standard for climate resilience.
- **Important Plant Areas (IPAs) are patches of resilient land that contain an exceptionally high density of rare plant species.** We identified 234 IPAs for New England that in aggregate cover 2.6 million acres and contain multiple examples of 212 rare plant species and resilient examples of 92% of the habitats. Each IPA's rare plant diversity ranges from 2 to 26 taxa depending on the site's size and location. By acreage, the IPAs are 29% protected, with another 23% secured on multiple-use lands. By site, 10 IPAs (4%) are more than 75% protected (GSPC target) and 32 (14%) have more than 75% securement in a combination of protected and multiple-use land. Conserving the unsecured IPAs (1.3 million acres) would go a long way toward sustaining the region's floristic and habitat diversity.



*Wetlands cover 12% of the region and are critical to sustaining almost half our plants, birds, and other wildlife.*

© Nathan Anderson



Elizabeth Farnsworth © Native Plant Trust

- **New England has 388 globally and regionally rare taxa in need of conservation, as documented in Native Plant Trust’s “*Flora Conservanda: New England*” (Brumback and Gerke 2013).** State Natural Heritage program inventories provide high-quality spatial records on 245 of them. Of those, 226 (92%) have occurrences on secured land (GAP 1-3), and of those 42% have more than 50% of their known locations are on secured land. However, only 16% of these occurrences are on protected land (GAP 1-2). The majority of the mapped locations are on resilient lands, although many taxa occur on a mix of resilient and vulnerable sites. Of the 245 well-mapped taxa, 19 have no permanent protection.
- **Conserving rare plants also requires *ex situ* strategies, as captured by GSPC Target 8:** “At least 75% of threatened plant species in *ex situ* collections, preferably in the country of origin, and at least 20% available for recovery and restoration programs.” In New England, Native Plant Trust manages the primary seed bank of rare and endangered species. Currently the seed bank holds collections of 43% of globally and regionally rare plant species. However, the collections are from only 7% of the populations.

## Recommendations

We recommend an approach to land conservation that focuses **on more proportional representation of the region's habitats across their ranges**, rather than on securing more acres of habitat types that are abundantly conserved already. While securing 30% of each habitat from conversion to another land use is important for maintaining resiliency and biodiversity in a changing climate, we also recommend each state aim for 15% of each habitat protected (conserved for nature and natural processes), with a minimum of 5% for dominant forest types. Prioritizing the IPAs will ensure that habitat protection also captures rare plant species.



sugar maple  
(*Acer saccharum* var. *saccharum*)  
Uli Lorimer © Native Plant Trust

The report's interactive maps and state-specific data will enable policy makers, federal and state agencies, and the land trusts in each state to effectively target the most significant areas for protecting New England's plant diversity and the biodiversity it supports. Examples include:

- Habitats that are rare within New England, such as coastal plain habitat primarily in Massachusetts and Rhode Island, warrant greater protection efforts, with a higher proportion secured for nature within the states where they occur.
- States with relatively large areas of a common habitat lacking conservation protection should also increase the amount of that habitat secured. For example, 90% of the regional habitat area of *Laurentian-Acadian Alkaline Conifer-Hardwood Swamp* is found in Maine, yet 84% of this habitat is unsecured in the state.
- Habitats facing significant losses to development by 2050, such as the coastal hardwood forests of southern New England, are also high priority.

A recommended starting point is **conserving the IPAs in each state**, which saves rare species across multiple habitats. The two primary strategies are focusing on IPAs that are unsecured and increasing the amount of protection within IPAs that are partially secured, either by conserving more acres or raising the level of securement to GAP 1 or GAP 2, depending upon the density of rare species.

While most of the 43 habitats need additional securement, we highlight several, and their IPAs, that need urgent conservation action.

### Matrix Forests

- Mid-elevation *Laurentian-Acadian Pine-Hemlock-Hardwood Forest* in Maine and Vermont has relatively high resilience but the lowest protection (2%) and securement (14%) of any forest type.
  - In Maine, there are eight unsecured IPAs within this habitat, totaling 22,980 acres.
  - New Hampshire has a single unsecured IPA of 5,537 acres.
  - Vermont has two unsecured IPAs totaling 3,515 acres.

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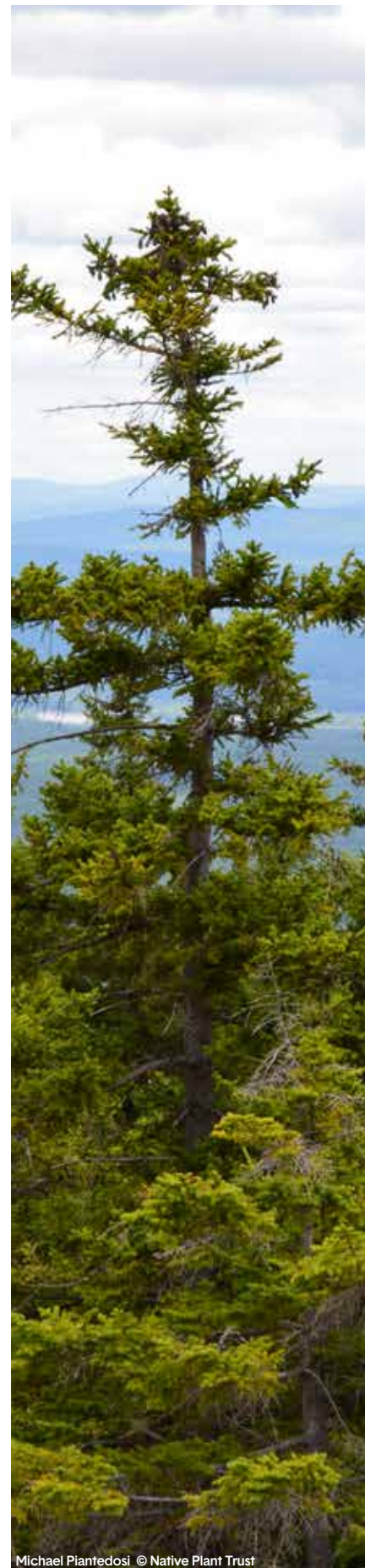
- *North Atlantic Coastal Plain Hardwood Forest* (in all states but Vermont) meets the NE target of 5% protected, but less than half of that is on resilient land; it is also only 19% secured and highly threatened by development. All states should focus on this habitat, but Connecticut, Maine, and Rhode Island have the least securement.
  - In this habitat, there are twelve IPAs needing protection: six in Connecticut (6,402 acres), three in Massachusetts (2,085 acres), and three in Rhode Island (3,175 acres).
- *Northeastern Interior Dry-Mesic-Forest* and *Northeastern Coastal & Interior Pine-Oak Forest* have low securement, low resilience, fall short of the GSPC and NE targets, and are moderately threatened by development. The former needs securement in Connecticut, Massachusetts, and Rhode Island, and the latter is especially unsecured in southern Maine. The small IPAs will likely need to be embedded in a larger matrix of protected lands to remain viable.
  - In *Northeastern Interior Dry-Mesic Forest*, Connecticut has ten IPAs on a total of 7,754 acres, nine of which are unsecured. Massachusetts has two IPAs on 2,441 acres needing protection.
  - In *Northeastern Coastal & Interior Pine-Oak Forest*, Maine (9 acres), Massachusetts (468 acres), and New Hampshire (2,612 acres) each have a single IPA needing protection.

### Wetland Habitats

- *Laurentian-Acadian Alkaline Conifer-Hardwood Swamp* is well-secured in the southern part of its range, but it is predominantly in Maine, where it is largely unsecured. The habitat also needs conservation in Vermont, where only 14% of total acres and 21% of resilient acres are secured.
- *North-Central Interior Wet Flatwoods* is a rare habitat with only 25,306 acres across five states (all but Rhode Island), very little of which is protected, and most of the 16% total securement is not on resilient land. The habitat is also threatened by development. A single unsecured IPA in Massachusetts of only 67 acres should be a high priority for investigation.
- The 14,032 acres of *Glacial Marine & Wet Clayplain Forest* occur only in Vermont and are a high priority for conservation. Only 3% of total acreage is protected and 12% secured; only 14% of resilient acres are secured.
- *Laurentian-Acadian Large River Floodplain* is home to an exceptionally high density of regionally or globally rare plant species, with more than 30 rare taxa, many of which occur primarily in this habitat type. While 29% of the resilient acreage of this habitat (212,136 acres) is secured regionally, only 7% is protected (GAP 1-2). This habitat is predominantly found in Maine, where 71% of the 186,857 resilient acres are unsecured.

### Patch-forming Habitats

- Four forest habitats are so restricted that they are included in the patch-forming habitat analysis, and two are high priority for conservation. The *North Atlantic Coastal Plain Maritime Forest* is only 15% secured in Maine, and only 18% of resilient acres are secured. Vermont's *Glacial Marine & Lake Mesic Clayplain Forest*, encompassing 32,066 acres, is only 7% secured.
  - Of the two IPAs in the maritime forest, a 500-acre site in Massachusetts needs protection.
- The coastal plain sand- and silt-based habitats are especially vulnerable to climate change. While the number of acres needed to reach targets is relatively small, it may be difficult to sustain these habitats over time. A clear focus should be saving the 36 rare plant species in the beach and dune habitats and the 8 in the coastal grassland.
  - Three *North Atlantic Coastal Plain Heathland & Grassland* IPAs in Massachusetts, encompassing 2,657 acres, are priorities; only one is protected.



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While this report focuses primarily on land conservation, we also examine and recommend additional conservation strategies, such as assisted migration, restoration and augmentation of sites and populations, and seed banking to preserve genetic diversity. What is certain in a changing climate is that we need multi-layered, science-based approaches to saving plant diversity and the life it sustains. We know that a rapidly changing climate will stress the ability of individual species and entire habitats to adapt, and thus recognize that some will migrate, some will die, and some will form new assemblages. With this report and its [mapping tool](#), we aim to ensure that New England's native plants—the green foundation for functioning ecosystems—are at the forefront of conservation policy and action as climate plans develop.



American chaffseed  
(*Schwalbea americana*)  
Uli Lorimer © Native Plant Trust