



NEW ENGLAND
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State of New England's Native Plants

>>> Of Forests and Trees

From the top of a hill or mountain—or in the satellite view on our computer screens—our region seems a lush expanse of forest that stretches until the land meets the bountiful sea. Zoom in, however, and the scene changes dramatically: the coast, bays, and major rivers are highly developed, and all but the most remote areas are crisscrossed with roads, fragmented by clearings, and dotted with structures. *For the first time in 200 years, every state in New England is losing forest*, and the conservation community has issued the call for increased land and habitat protection.

But what's on the land we seek to protect? Our forests bear little resemblance to those the pilgrims encountered. The mix of trees and understory plants has changed due to the enduring legacy of settlers' clearcutting and farming, which altered soils and microclimates; to a history of management favoring useful or commercial species; and, more recently, to diseases and pests. The understory vegetation is comparatively species-poor, and non-native plants have a strong foothold. The tale is similar for other habitats in the region, which face a constellation of threats and are losing the plant diversity that makes nature resilient.

Saving acreage from development is an important first step, but conserving native plants on those parcels and private land is critical for sustaining healthy, biologically diverse landscapes. Native plants are the backbone of habitat, for us and for insects, birds, mammals, and other organisms. Plants supply the oxygen we breathe, regulate the climate, and clean the water. They are the base of the food chain that leads to

our own dinner table, and the loss of a single plant species can disrupt an intricate web supporting myriad plants and animals. When native plants are imperiled, the entire ecosystem is at risk. 🌱

The loss of a single native plant species can disrupt an intricate web supporting myriad plants and animals.



Organisms from the tiniest insects to birds, bears, and humans depend upon plants for food, homes, and the oxygen they breathe. Here, caterpillar of Cecropia moth. *Photo: Dan Jaffe*

Plant Diversity Matters

Plants do not occur in isolation, but form relatively predictable communities largely determined by a combination of geology and climate; they are highly sensitive to the chemistry, depth, and water-holding capacity of soils weathered from bedrock. Research indicates that each plant in a community plays a unique role, and only together can they efficiently capture light and the nutrients from soil and water necessary to sustain them. Declining plant diversity also reduces the ability of plants to adapt to changing local conditions and of ecosystems to produce oxygen and remove carbon dioxide from the atmosphere. 🌱



White Mountain avens (*Geum peckii*) is one of nearly 600 plant species listed as rare in New England. *Photo: Arthur Haines*

>>> Plants in Peril



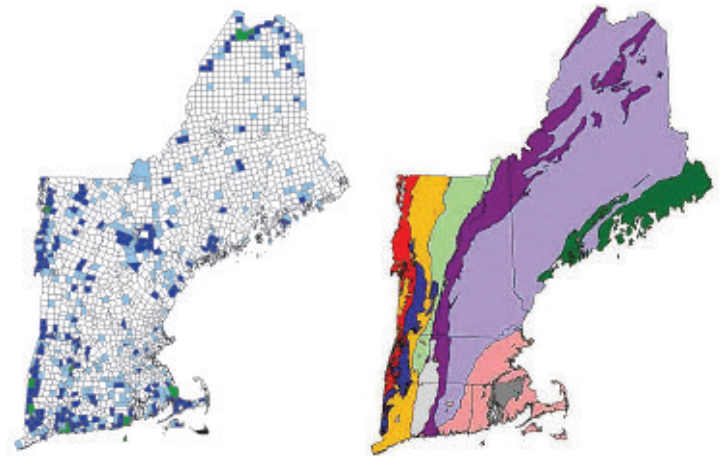
Rare plants: northern blazing star (*Liatrix novae-angliae*), which occurs only in New England sandplains; purple milkweed (*Asclepias purpurascens*); and showy lady's-slipper (*Cypripedium reginae*). Photos: Paul Somers, Arthur Haines, William Cullina

Today 22% of New England's native plants are rare or deemed historic, 31% of the 3,514 documented plants are not native, and 10% of those are invasive and directly threaten native species. On average, rare plant species have lost 67% of their known range in the region and are also rare in 38% of states and provinces outside New England in which they occur.

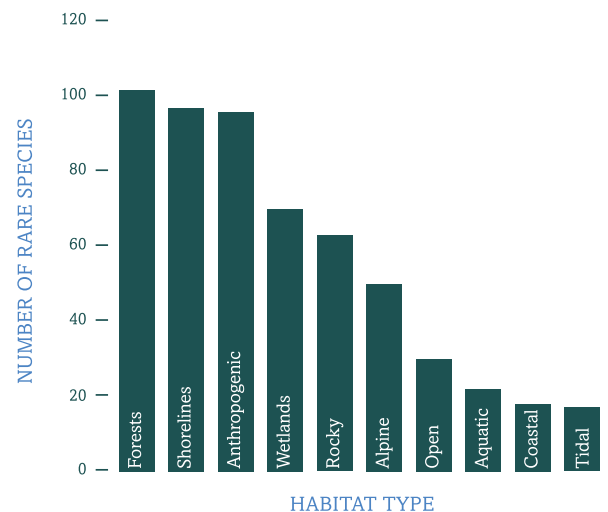
New England has 540 documented rare or historic plant species, plus 53 requiring more research. Among them are 62 species that are globally rare, 325 that are regionally rare, 10 that are found nowhere else in the world (3 are now extinct), and 96 that no longer exist in the region. Some species have always been rare here and have remained stable over time in relatively small populations.

Behind the numbers are compelling patterns. The Sedge, Grass, and Aster families have large numbers of rare species, although they represent a relatively small percentage of the 898 different species in those families in New England. Other families have a disproportionately high percentage of rare or declining species: 60% of the species in the Adder's Tongue family, 43% of Saxifrages, 41% of Broom-rapes, 36% of Orchids, and 32% of Gentians are endangered.

Many rare plant populations now cluster at the edges of their former regional range, and there are clear hotspots of rare plant diversity, generally correlated with rare types of bedrock. *A disproportionately high percentage of declining species requires insect pollination* (and pollinators are themselves in jeopardy), have limited seed dispersal, or reach their northern range boundary in New England. 🌱



Hot spots of rare plant diversity (dark colors, left), often occur on rare bedrock types, such as marble (red on the bedrock map, right)



Number of rare plant species occurring in ten general habitat types

>>> Habitats in Trouble

New England has dozens of habitats. These five broad habitat types, which span from the highest mountains to the coast, contain the majority of the globally and regionally rare plant species and effectively represent the array of challenges we must address.

HABITAT	CHARACTERISTICS	STATUS
Alpine and Subalpine 	<p>On high peaks with wind-exposed, rocky summits, harsh winters, poor soil. Alpine: above 4,900 feet; plants have climate adaptations such as cushion or prostrate growth forms and hairy or leathery leaves that resist desiccation. Subalpine: at 3,000-4,900 feet, with open rocky balds and krummholz (stunted spruce, fir, and birch trees).</p>	<p>Less than 1% of total land area in region; especially vulnerable to climate change, with evidence already of shrubs and trees increasing and forbs and grasses declining.</p>
Mixed Northern Hardwoods Forest 	<p>Our emblematic forest, with lush canopy and brilliant fall color. In some, moist, nutrient-rich soils support diverse trees and herb cover, with high growth rates and productivity. Most widespread in Vermont, but occurs in all New England states at elevations lower than 2,600 feet.</p>	<p>Overall area of forest declining, especially in southern New England; understory is species-poor due to historical clearing and ongoing deer browse; invasive pests and diseases threatening dominant species of hardwoods and some understory species.</p>
Rivers and Streams 	<p>River channels, with sand bars and rocky banks: plants adapted to flooding, scour, and drier periods that expose plants to desiccation; plants can disappear and re-establish downstream via water-borne seeds or fragments. Floodplains: lush, with canopy of flood-tolerant trees, plus carpets of ferns and other wetland herbaceous species.</p>	<p>Natural systems highly altered by development and infrastructure, especially dams—there are 3,070 active dams in NH; 2,892 in MA; 1,304 in CT; 1,200+ in VT; 1,168 in ME; 618 in RI</p> <p>In last decade, ~100 dams breached or removed; New England leads nation in dam removal.</p>
Sandplain Grasslands and Heathlands 	<p>Both inland and maritime, with well-drained, sandy, acidic, nutrient-poor soils. “Barrens” vegetation adapted to low moisture: sparse trees with tough needles or leaves and a ground layer of drought-resistant grasses, forbs, and shrubs. Many plants adapted to fire and will re-sprout after a burn or release seeds when stimulated by burning.</p>	<p>More than 50% of the historical area in New England lost to development; in MA and RI now occur mostly in remnant patches of 12 acres or less. Encroachment of trees, due to fire-suppression, has reduced heathland on Cape Cod by 62% since 1962.</p>
Estuarine Marshes 	<p>At land-sea interface, highly productive ecosystems that fix carbon, trap and build sediments, filter pollutants, buffer uplands from tidal surges, and provide habitat for many aquatic species. Low marshes grade into mudflats and eelgrass beds; high marshes have salt pannes and pools. Specialized plants are able to withstand flooding, sequester or exclude salt, and conserve fresh water in their leaves.</p>	<p>Estimated 37% of marshes in New England lost. In RI, 53% filled for development; 20% of marsh area of Gulf of Maine (from Nova Scotia to Cape Cod) exhibits reduced tidal flow due to manmade controls; 80% of Cape Cod’s marshes exhibit die-back.</p>

REPRESENTATIVE PLANTS

Globally rare species (4 of 4)

Boott's rattlesnake-root (*Nabalus boottii*)
 Mountain avens (*Geum peckii*)
 Robbins' cinquefoil (*Potentilla robbinsiana*)
 Wavy blue grass (*Poa laxa* ssp. *fernaldiana*)

Regionally rare species (5 of 48)

Arctic hair grass (*Vahlodea atropurpurea*)
 Canadian single-spike sedge (*Carex scirpoidea*)
 Cutler's goldenrod (*Solidago leiocarpa*)
 Glandular birch (*Betula glandulosa*)
 Northern painted-cup (*Castilleja septentrionalis*)

Common or indicator species

Alpine bilberry (*Vaccinium uliginosum*)
 Balsam fir (*Abies balsamea*)
 Bigelow's sedge (*Carex bigelowii*)
 Black crowberry (*Empetrum nigrum*)
 Black spruce (*Picea mariana*)
 Highland rush (*Juncus trifidus*)
 Labrador tea (*Ledum groenlandicum*)
 Mountain cranberry (*Vaccinium vitis-idaea*)
 Mountain sandwort (*Minuartia groenlandica*)
 Three-toothed cinquefoil (*Sibbaldiopsis tridentata*)

Globally rare species (5 of 5)

American ginseng (*Panax quinquefolius*)
 Ram's-head lady's-slipper (*Cypripedium arietinum*)
 Small whorled pogonia (*Isotria medeoloides*)
 Three-bird's orchid (*Triphora trianthophora* ssp. *trianthophora*)
 Torrey's mountain-mint (*Pycnanthemum torrei*)

Lily-leaved orchid (*Liparis liliifolia*)
 Male fern (*Dryopteris filix-mas*)
 Wild hound's tongue (*Cynoglossum virginianum* ssp. *boreale*)

Common or indicator species

Beech (*Fagus grandifolia*)
 Bloodroot (*Sanguinaria canadensis*)
 Blue cohosh (*Caulophyllum thalictroides*)
 Bunchberry (*Chamaepericlymenum canadense*)
 Maidenhair fern (*Adiantum pedatum*)

Partridge-berry (*Mitchella repens*)
 Pennsylvania sedge (*Carex pensylvanica*)
 Starflower (*Lysimachia borealis*)
 Sugar maple (*Acer saccharum*)
 Trilliums (*Trillium* spp.)
 White ash (*Fraxinus americana*)
 Wild ginger (*Asarum canadense*)
 Wild sarsaparilla (*Aralia nudicaulis*)
 Yellow birch (*Betula alleghaniensis*)

Regionally rare species (5 of 43)

Davis' sedge (*Carex davisii*)
 Early wild-rye (*Elymus macgregorii*)

Globally rare species (9 of 9)

Alpine milk-vetch (*Astragalus alpinus* var. *brunetianus*)
 Anticosti American-aster (*Symphotrichum anticostense*)
 Auricled twayblade (*Neottia auriculata*)
 Creeping St. John's-wort (*Hypericum adpressum*)
 Eaton's beggar's-ticks (*Bidens eatonii*)
 Furbish's lousewort (*Pedicularis furbishiae*)
 Jesup's milk-vetch (*Astragalus robbinsii* var. *jesupii*)
 Parker's pipewort (*Eriocaulon parkeri*)
 Wright's spikesedge (*Eleocharis diandra*)

Regionally rare species (5 of 35)

Fox-tail sedge (*Carex alopecoidea*)
 Needle beaksedge (*Rhynchospora capillacea*)
 Swamp lousewort (*Pedicularis lanceolata*)
 Winged loosestrife (*Lythrum alatum* ssp. *alatum*)
 Yellow lady's-slipper (*Cypripedium parviflorum* var. *makasin*)

Common or indicator species

Balsam fir (*Abies balsamea*)
 Balsam poplar (*Populus balsamifera*)
 Basswood (*Tilia americana*)
 Black cherry (*Prunus serotina*)

Broad-leaved Enchanter's nightshade (*Circaea canadensis*)
 Cardinal-flower (*Lobelia cardinalis*)
 Eastern cottonwood (*Populus deltoides*)
 Poison ivy (*Toxicodendron radicans*)
 Rice cut grass (*Leersia oryzoides*)
 Sensitive fern (*Onoclea sensibilis*)
 Silver maple (*Acer saccharinum*)
 Speckled alder (*Alnus incana*)
 Stinging nettle (*Urtica dioica*)
 Sycamore (*Platanus occidentalis*)
 Trout lily (*Erythronium americanum*)

Globally rare species (12 of 12)

Bushy frostweed (*Crocianthemum dumosum*)
 Nantucket serviceberry (*Amelanchier nantucketensis*)
 New England thoroughwort (*Eupatorium novae-angliae*)
 Northern blazing star (*Liatris novae-angliae* var. *novae-angliae*)
 Pale moonwort (*Botrychium pallidum*)
 Pink tickseed (*Coreopsis rosea*)
 Plymouth gentian (*Sabatia kennedyana*)
 Prairie moonwort (*Botrychium campestre*)
 Sandplain gerardia (*Agalinis acuta*)

Sickle-leaved golden aster (*Pityopsis falcata*)
 St. Lawrence grapefern (*Botrychium rugulosum*)
 Upswept moonwort (*Botrychium ascendens*)

Regionally rare species (5 of 40)

Houghton's flatsedge (*Cyperus houghtonii*)
 Low bindweed (*Calystegia spithamea* ssp. *spithamea*)
 Orange-fringed bog-orchid (*Platanthera ciliaris*)
 Purple milkweed (*Asclepias purpurascens*)
 Yellow thistle (*Cirsium horridulum*)

Common or indicator species

Bayberry (*Morella carolinensis*)
 Bearberry (*Arctostaphylos uva-ursi*)
 Black huckleberry (*Gaylussacia baccata*)
 Hazelnuts (*Corylus* spp.)
 Little bluestem grass (*Schizachyrium scoparium*)
 Low-bush blueberry (*Vaccinium angustifolium*)
 New Jersey tea (*Ceanothus americanus*)
 Oaks: scarlet, scrub, red, black (*Quercus* spp.)
 Pitch pine (*Pinus rigida*)
 Sweet-fern (*Comptonia peregrina*)
 Wintergreen (*Gaultheria procumbens*)

Globally rare species (6 of 6)

Allegheny monkey-flower (*Mimulus ringens* var. *colpophilus*)
 Caby's bulrush (*Schoenoplectus etuberculatus*)
 Gaspé Peninsula arrow-grass (*Triglochin gaspensis*)
 Herbaceous sea-blite (*Suaeda maritima* ssp. *richii*)
 Long's bittercress (*Cardamine longii*)
 Tidal spikesedge (*Eleocharis aestuum*)

Awl-leaved arrowhead (*Sagittaria subulata*)
 New England tuber-bulrush (*Bolboschoenus novae-angliae*)
 Whorled marsh-pennywort (*Hydrocotyle verticillata*)

Common or indicator species

Big cordgrass (*Spartina cynosuroides*)
 Carolina sea-lavender (*Limonium carolinianum*)
 Common Glasswort (*Salicornia depressa*)
 Eelgrass: subtidal (*Zostera marina*)
 Maritime marsh-elder (*Iva frutescens*)
 Oraches (*Atriplex* spp.)

Saltgrass (*Distichlis spicata*)
 Saltmarsh hay (*Spartina patens*)
 Saltmarsh rush (*Juncus gerardii*)
 Seaside goldenrod (*Solidago sempervirens*)
 Smooth cordgrass (*Spartina alterniflora*)

Regionally rare species (5 of 15)

American sea-blite (*Suaeda calceoliformis*)
 Annual rose-gentian (*Sabatia stellaris*)

SOME SPECIES SUPPORTED		PRIMARY THREATS	CONSERVATION ACTION
<p>Rare birds American pipit Bicknell's thrush</p> <p>Endemic butterflies White Mountain Arctic White Mountain fritillary</p>	<p>Mammals Black bear Bog lemming Lynx Moose Rock vole Snowshoe hare</p>	<p>Climate change: warming favors tree invasion; premature bloom disrupts pollinator activity</p> <p>Air pollution (ozone, acid rain): stresses plants</p> <p>Human disturbance: trampling; construction of wind turbines, railway, tourist facilities</p>	<p>Collect and bank seeds; track plant responses to climate change</p> <p>Reduce emissions of pollutants and greenhouse gases</p> <p>Restrict trails to resilient areas and educate public; encourage land protection; advocate for low-impact development</p>
<p>Birds Hermit thrush Rose-breasted grosbeak Scarlet tanager Warbler species</p> <p>Rare butterfly Early hairstreak</p> <p>Mammals Black bear Flying squirrel</p>	<p>Marten Porcupine Red-backed vole White-tailed deer</p> <p>Amphibians Eastern newt Salamanders (blue-spotted, red-backed, dusky) Wood frog</p>	<p>Clearing: legacy effects from historical clearing, even in recovered forests; increases in clearing for biomass and development</p> <p>Invasive species: insects and pathogens killing trees; non-natives outcompeting native plants</p> <p>Deer overbrowse: herbaceous plants and tree seedlings destroyed, affecting forest regeneration, species diversity, and habitat; creates openings for invasive plants</p>	<p>Protect large matrix forests, with some areas left intact for old-growth, others in sustainable forestry</p> <p>Cultivate naturally pest-resistant lineages of plants; prevent spread of invasive invertebrates and plants</p> <p>Reduce deer abundance/fecundity</p>
<p>Rare birds American woodcock Cerulean warbler Grasshopper sparrow Prairie warbler Saltmarsh sharp-tailed sparrow Wood thrush</p> <p>Rare insects Dragonflies, damselflies (14) Tiger beetle</p>	<p>Rare turtles Blanding's Spotted Wood</p> <p>Rare mussels Brook floater (MA) Dwarf wedge-mussel Yellow lampmussel (MA)</p>	<p>Dams, channelization, and riprap on banks: alter flood cycle and nutrients, thus species composition; reduce scour that removes non-native competitors; create low-oxygen impoundments favorable to invasive species</p> <p>Conversion to agriculture and houses</p> <p>Dumping and water pollution: contribute to declining soil quality and plant and animal mortality</p>	<p>Remove aging structures and restore habitat to ensure health of native plant populations, protect water quality, reduce run-off, and provide habitat</p> <p>Protect remaining floodplain forests; limit logging and trail-clearing activities, which create opportunities for invasive plants</p> <p>Discourage dumping; engage volunteers in clean-up/monitoring; advocate for reduced use of pesticides and fertilizers; eliminate contamination by sewage overflow</p>
<p>Birds Grasshopper sparrow American kestrel Savannah sparrow Snowy owl</p> <p>Insects 360+ species (including at least 19 rare)</p> <p>Mammals Eastern cottontail Jumping mouse Meadow voles</p>	<p>Short-tailed shrew Southern flying squirrel</p> <p>Amphibians Fowler's toad Green frog Salamanders (red-backed and spotted)</p> <p>Reptiles Black racer Eastern box turtle Ring-neck snake</p>	<p>Development: more than 50% of historical area in New England developed</p> <p>Fire suppression: absence of periodic fire favors succession to closed canopy</p> <p>Invasive plant species: increasing, outcompeting rare grasses and forbs</p>	<p>Protect remaining large exemplars and augment existing communities; restore small parcels to functional grassland/heathland</p> <p>Institute fire, mowing, or grazing regimes where feasible; replant with native species before invasives move in</p> <p>Control/remove invasives; replant with native species</p>
<p>Birds Northern harrier Osprey Seaside sparrow Snow goose</p> <p>Fish <i>75% of commercial fish spend time in estuaries, including:</i> American shad Atlantic salmon Bluefish</p>	<p>Flounder (winter and summer) Striped bass</p> <p>Reptiles Northern diamondback terrapin Leatherback</p> <p>Mollusks, crustaceans American lobster Crabs Shrimps Snails (at least 3 state-listed species)</p>	<p>Altered hydrology: ditching, draining, and overharvesting of saltmarsh hay has changed water flow and reduced marsh area</p> <p>Disruption of food chain: overfishing removes controls on crabs, which kill grasses and cause large-scale die-back</p> <p>Nutrient-loading: encourages growth of invasive common reed</p> <p>Climate change: sea-level rise will inundate lower marsh; more severe storms are eroding marshes</p>	<p>Restore tidal flow and closely monitor results; restore marsh vegetation</p> <p>Regulate fishing so that natural predators of invasive crabs can rebound</p> <p>Buffer marshes from high-nutrient input; remove new invasions of common reed</p> <p>Create refuges for landward migration of marsh plants</p>

>>> Primary Threats

Both rare and common plants face multiple threats, most of which arise from human activity. Monitoring data for 820 populations of 81 rare species recorded 23 different threats. Those data indicate as many as 5 different threats affected a given population, with succession/competition, trampling, invasive species, and habitat conversion most prevalent for this set of species.

The five emblematic habitats examined here are experiencing a sobering mix of manmade stresses. Air pollution and trampling imperil alpine plants; thousands of acres of forest are cleared each year; more than 10,250 dams alter riverside plant communities; fire suppression promotes succession of grasslands to forest; and the combination of ditching, draining, and overfishing has caused a stunning loss and die-back of estuarine marshes. Human activity is implicated as well in threats that appear to be natural phenomena, such as the overabundance of deer, whose predators were eradicated long ago, and the increasing spread of invasive plants (and pests), which are adept at colonizing sites disturbed by nutrient-loading, altered hydrology, and clearing, mowing, and plowing.

Most of the threats to plants work together to impair entire ecological systems, and the threats are prevalent across the landscape. Strategies for addressing most of them are well known, if at times politically difficult and expensive to implement. But it is clear that we need to reduce, mitigate, or reverse these threats to preserve the ability of plants and plant communities to adapt and to weather a changing climate. 🌱



Estuarine marshes face multiple threats, including invasion by the exotic common reed (*Phragmites australis*). Photo: Elizabeth Farnsworth

Climate Change and Plants

Added to all these threats is climate change, which is already affecting plant communities. Early flowering, increases in pathogens and pests (such as hemlock woolly adelgid), and up-slope movement of trees and shrubs in the mountains are all evidence of a warming climate. The 2014 National Climate Assessment documents the steady rise in temperature in the Northeast over decades; notes clear effects, such as a 71% increase since 1958 in very heavy precipitation events; and includes predictions, such as sea-level rise of 1 to 4 feet by 2100 (compared to 1 foot since 1900). If trends continue, Vermont may have the climate of Connecticut by 2039 and of North Carolina by 2070.

Plants have shown the capacity to adapt to environmental stress by altering their metabolism, flowering, growth, and reproduction; and by migrating toward areas with better growing conditions. Nonetheless, models for impacts on the New England flora are sobering. They include a disproportionate loss of tree species compared to other parts of the country (including sugar maples); and, in Maine alone, high risk for losing 85% of rare riparian species, 98% of rare alpine species, 95% of open water species, 90% of rocky coastline species, 83% of estuarine marsh species, 90% of fungi and lichens, and 50% of vascular plants.

Of course, this is not the first change in climate for a region that has rocks dating back a billion years. New England has experienced periods of glaciation, warming, and cooling lasting millennia, during which waves of plants colonized, retreated, and remixed. Looking ahead, the only certainty is that plant communities will change over time. We cannot really know how plants will respond to the unprecedented combination of a climate changing in decades rather than over millennia, multiple extant threats, and the concrete barriers to migration we have built into the landscape over the last 400 years. 🌱

>>> Recommendations

Although plants are the cornerstones of Earth's ecosystems, they receive far less attention (and funding) than animals. We must recognize that conserving all the species in the spotlight—from bears to birds, from butterflies to frogs—will be possible only by conserving the plant communities on which they depend. Our study leads to four primary recommendations.

1. Research, document, and understand New England's plant diversity

The majority of research on plants focuses on crops and laboratory experiments, and even controlled field experiments tend to be short-lived, with incomplete monitoring data. Research needs range from basic ecological relationships (such as those between plants and pollinators) to restoration methods, genetic analysis of adaptability, and hundreds of other areas. The scope of research needed to inform conservation and management decisions will take significant funding.

2. Urgently conserve plant diversity

Our analysis points to an overarching conclusion: we need to act immediately to reduce, mitigate, or reverse non-climate threats that are weakening plant communities. Although it makes sense to start with diversity hotspots and ecologically resilient sites, we will need a strategy for landscape-scale conservation action. The key goals can be summarized as *save threatened species, control invasive species, and keep common plants common*. We need to:

- Protect at least 75% of threatened species in the wild and through collecting and storing their seeds
- Conserve, manage, and/or restore sufficient land to ensure plant diversity, estimated to be 15% of ecological or vegetation types
- Manage or prevent biological invasions, which are likely to increase with climate change. Strategies include a system for early detection and rapid response, prioritizing areas for management, and education about best practices for land-altering activities.
- Sustainably manage 75% of production lands, which means managing impacts on soils, water, plants, habitats, and air quality. In New England, 10% of land is in cultivation and 70% is forested, with the majority of that managed for harvesting forest products, recreation, and other uses.



New England Wild Flower Society team monitoring rare alpine plants on Mt. Washington. The Society and partners also restored populations of Robbins' cinquefoil (*Potentilla robbinsiana*) on the mountain, resulting in the first removal of a plant from the Federal Endangered Species List.

3. Promote botanical education and awareness of the importance of native plant diversity

In the last 25 years, college courses and degree programs in botany have declined by 50%, and we face the imminent retirement of half the workforce with botanical expertise. That leaves a huge knowledge gap in a country with more than 800 million acres of state and federal land, 37 million acres conserved by land trusts, and vast amounts of community and working lands to manage for both human uses and ecological values. The nonprofit sector is stepping into the educational void, but needs investment to produce the programs, online tools, and field experiences to educate the next generation.

4. Fully fund efforts to conserve plant diversity

Although the majority of endangered and threatened species in the United States are plants, they receive less than 5% of the funding allocated for recovery efforts, despite analyses indicating that bringing a bird off the endangered list costs nine times more than delisting a plant. The estimated cost of protecting *global* biodiversity, including land protection and management, is \$76 billion; by contrast, the U.S. annual gross domestic product is \$16.8 trillion. There is no economic reason for a plant to go extinct. 🌱

>>> Take Action

What We Are Doing

In core initiatives, New England Wild Flower Society:

- Leads a coordinated, region-wide program, involving 60 different agencies and organizations plus hundreds of volunteers, to set conservation priorities, conduct surveys, and undertake habitat management and restoration projects throughout New England each year
- Provides the best data on the region's plants, through research projects, publications (*Flora Novae Angliae*, *Flora Conservanda*, Go Botany website, forthcoming *Wildflowers of New England*), and conservation plans
- Collects and banks seed of the region's rare and endangered plant species, with a goal of banking most populations of all species by 2020
- Collects seed sustainably and grows native New England plants for habitat restoration and garden use
- Trains the next generation of botanists, sustainable gardeners, and plant enthusiasts in 200 classes, workshops, and field trips each year and through our award-winning Go Botany website (gobotany.newenglandwild.org).



Fostering a basic fascination with plants inside and outside the traditional classroom will attract and train the next generation of plant scientists. *Photo: Jim Sirch*

What You Can Do

In Your Daily Life

- Enjoy the great outdoors, and learn about the plants you see
- Grow plants native to New England, as the centerpiece of your garden and to replace your non-native lawn
- Minimize fertilizers and pesticides, which pollute water and kill pollinators
- Identify and control non-native invasive plants on your property
- Support and volunteer with your local land trust or conservation organization

In Your Community

- Urge your local garden centers to sell New England native plants grown from seed
- Advocate for your schools, environmental centers, and scout troops to teach botany and ecology
- Encourage local farms to use low-impact or organic methods, without the use of pesticides that harm pollinators
- Talk with town officials about the value of using native plants in public projects
- Get involved in your town's planning process, to advocate for ecologically sensitive development

At the State and National Levels

- Advocate for funding for land protection, management, and restoration
- Support strengthening laws that protect wetlands and other sensitive habitats from unwise development or use
- Advocate for laws that protect endangered species and eliminate loopholes
- Support legislation to reduce greenhouse gas and pollutant emissions

To help fund our programs,
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gifts@newenglandwild.org, or make a donation online.

To learn more about native plants: www.newenglandwild.org



HEADQUARTERS & GARDEN IN THE WOODS

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Conserving and promoting the region's native plants to ensure healthy, biologically diverse landscapes



Photo: Elizabeth Farnsworth

ABOUT THIS REPORT

This publication summarizes a comprehensive, peer-reviewed report, *State of the Plants: Challenges and Opportunities for Conserving New England's Native Flora*, available at www.newenglandwild.org/stateofplants. The report draws on historical, scientific, and cultural records; contemporary research, monitoring, and restoration activities; botanical publications; and the expertise of botanists over time and across New England.

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