



Department of
Environmental
Conservation

New York State Forest Action Plan 2020 DRAFT

Andrew M. Cuomo, Governor | Basil Seggos, Commissioner



Contents

| | |
|---|-------------|
| Acknowledgments | iv |
| Glossary of Terms..... | viii |
| Acronyms..... | x |
| Introduction | 1 |
| Organization of the Plan..... | 1 |
| GOAL #1: Keep New York’s Forests as Forests | 3 |
| Assessment: New York’s forested landcover | 4 |
| Assessment: Private forestlands | 6 |
| Assessment: Forested state lands | 9 |
| Assessment: Urban and community forests..... | 11 |
| Assessment: Federal lands with significant forests | 12 |
| Assessment: Land use trends and drivers of forestland conversion | 13 |
| Assessment: Effects of a changing climate and environment on New York’s forests | 14 |
| Assessment: Valuing forests for carbon storage and community adaptation | 18 |
| Assessment: Open Space Conservation Plan for forest protection | 19 |
| Assessment: Public land purchases for forest protection | 20 |
| Assessment: Conservation easements for forest protection..... | 21 |
| Priority Landscapes: Forest Legacy Program | 22 |
| Priority Landscapes: Metropolitan, urban, and suburban areas | 23 |
| Focus Area: Private forestland protection and management..... | 25 |
| Focus Area: Private forest stewardship program | 26 |
| Focus Area: Indian Nations in our state | 28 |
| Strategy: Actively pursue afforestation and forest restoration efforts | 29 |
| Strategy: Maintain and restore connectivity between fragmented and parcelized forestland..... | 30 |
| Strategy: Establish buffers for existing protected forests through partnerships..... | 31 |
| Strategy: Promote more community-owned forests in urban and suburban areas..... | 32 |
| Strategy: Help private landowners keep and manage their forests sustainably | 34 |
| Strategy: Continue research and assessment efforts to document forest resources | 35 |
| Strategy: Understand and respond to negative effects of climate change on forests | 35 |
| GOAL #2: Keep New York’s Forests Healthy | 37 |
| Assessment: Forest health affected by potentially damaging agents | 37 |
| Assessment: Forest regeneration | 40 |
| Assessment: Status of New York’s forest biodiversity | 42 |
| Assessment: Connectivity of forests | 48 |
| Assessment: Soil resources in forests | 49 |
| Assessment: Forest health monitoring..... | 51 |
| Focus Area: Urban forest health | 52 |
| Strategy: Foster diversity of native plants and animals in forests | 53 |
| Strategy: Boost forest regeneration and healthy forest structure..... | 53 |
| Strategy: Protect from, remove, or mitigate impacts of invasive species and pests..... | 55 |
| Strategy: Manage forest fires for the benefit of forests | 57 |
| Strategy: Cooperatively implement indigenous knowledge for forest health | 58 |
| Strategy: Help private forest owners keep their forests healthy | 59 |
| Strategy: Continue forest health-related research initiatives | 60 |

| | |
|--|------------|
| GOAL #3: Ensure Forests Benefit Humans and All Living Creatures | 61 |
| Assessment: Forest protection for drinking water quality and supply | 61 |
| Assessment: Benefits of urban tree canopy and green infrastructure | 63 |
| Assessment: Health, safety, and other benefits from forests..... | 64 |
| Assessment: Productive capacity of timberlands..... | 66 |
| Assessment: Costs of forest management | 68 |
| Assessment: Economic impact of New York's forests | 69 |
| Assessment: Forest product manufacturing..... | 70 |
| Assessment: Forest-based public outdoor recreation opportunities | 73 |
| Assessment: Economic benefits of outdoor recreation | 75 |
| Priority Landscapes: Recreational hotspots and long distance trails | 76 |
| Focus Area: Urban areas and urban forests | 77 |
| Focus Area: Forests and cultural resources | 78 |
| Focus Area: Resources and tenure rights of indigenous peoples | 79 |
| Focus Area: Managing wildfires and communities at wildfire risk..... | 80 |
| Strategy: Manage forest fires for public safety and benefit..... | 84 |
| Strategy: Conserve and manage working forests for multiple values and uses | 85 |
| Strategy: Manage forests for sustainable recreation opportunities..... | 86 |
| Strategy: Support forest management as a mitigation and adaptation strategy | 86 |
| Strategy: Enhance forest contributions to ecosystem benefits | 88 |
| Strategy: Maintain sustainable markets for sustainable forest products..... | 90 |
| Strategy: Recognize indigenous peoples' use of and care for forests..... | 91 |
| GOAL #4: Appreciate, Support, and Protect New York's Forests..... | 92 |
| Assessment: Planning, zoning, and policies for resilience and forest protection | 92 |
| Assessment: Economic framework for sustainable private forestry | 94 |
| Assessment: Unsustainable or exploitative harvesting practices | 95 |
| Assessment: Legal and institutional framework for state-owned forest protection | 96 |
| Focus Area: Sustainable forestry and BMPs | 97 |
| Strategy: Enhance legal protections and policy frameworks in support of forestry | 98 |
| Strategy: Increase incentives to use the latest science in forest management | 99 |
| Strategy: Increase technical expertise among forest owners and managers | 100 |
| Strategy: Provide access to forest data for cooperative stewardship | 101 |
| Strategy: Cultivate stewardship ethic among landowners | 102 |
| Strategy: Support local planning and zoning efforts to advance forest conservation | 103 |
| Strategy: Foster public literacy about forest health and sustainable forestry | 104 |
| Strategy: Manage recreational user impacts in New York's state-owned forests..... | 105 |
| Strategy: Engage communities about the importance of urban forestry | 105 |
| Strategy: Develop cultural sensitivity training from indigenous peoples | 106 |
| Strategy: Increase institutional capacity, knowledge, and information exchange..... | 107 |
| Multi-State Priority Areas | 108 |
| Northern Forest | 108 |
| Highlands Region | 109 |
| Berkshire-Taconic Landscape..... | 111 |
| Lake Champlain Basin | 113 |
| Chesapeake Bay Area | 114 |
| Great Lakes Restoration Initiative | 115 |
| References | 117 |

| | |
|---|------------|
| Appendix A: Forest Legacy Program’s Assessment of Need | 118 |
| Appendix B: Partner and Stakeholder Outreach and Participation | 184 |
| Appendix C: Survey of Stakeholders and DEC’s Division of Lands and Forests Staff | 186 |
| Appendix D: New York’s Forest and Woodland Community Types | 195 |

Acknowledgments

Many people contributed to New York's State Forest Action Plan in a variety of ways, and we gratefully acknowledge their efforts. Their joint hard work resulted in a comprehensive, forward-looking strategy to keep New York's forests as forests and thriving in the future.

Thanks go to the extensive volunteer efforts of the SFAP Stewardship Committee, whose contributions and support, in partnership with DEC's hardworking staff, made this Plan possible. The list of the SFAP Stewardship Committee members can be found on the following page.

Thanks also go to DEC staff for their contributions and their efforts in bringing the Forest Action Plan together.

Planning team, DEC:

- Sara Hart, lead planner
- Jason Drobnack, Stewardship Committee coordinator
- Barbara Lucas-Wilson
- Dan Gaidasz
- Jeffrey Mapes
- Jerry Carlson
- Josh Clague
- Julianna DiBiase
- Peter Innes

We also want to thank:

- Governor Andrew M. Cuomo
- DEC Commissioner Basil Seggos
- New York State Forester Rob Davies
- DEC's Division of Fish and Wildlife
- DEC's Climate Office
- DEC's Division of Forest Protection
- The New York State Natural Heritage Program
- The SUNY College of Environmental Science and Forestry (ESF)
- The Center for Indigenous Cultures
- The New York State Office of Parks, Recreation and Historic Preservation

And other organizations and individuals who support Forest Health

New York State Forest Stewardship Coordinating Committee

Forest Legacy Sub-Committee (In Green), Federal Agencies (In Orange)

| Last Name | First Name | Title | Affiliation | Email |
|-------------|------------------|--------------------------------------|---|--------------------------------------|
| Aguirre | Rocci | Director of Conservation | Adirondack Council | raguirre@adirondackcouncil.org |
| Bartow | John | Executive Director | ESFPA Empire State Forest Products Assoc. | jbartow@esfpa.org |
| Benedict | Les | Assistant Director, Environment Div. | Saint Regis Mohawk Tribe | les.benedict@srmt-nsn.gov |
| Beringer | Peter | Forest Stewardship Coordinator | USFS Northeastern Area | pberinger@fs.fed.us |
| Burger | Mike | Executive Director | Audubon New York | mburger@audubon.org |
| Chase | Helen | Co-chair | Forest Preserve Advisory Committee | hkchase@isp.com |
| Connors | William | Chair | New York State F&W Management Board | connors@billconnors.net |
| Davies | Robert | State Forester and Division Director | New York State DEC, Division of Lands and Forests | robert.davies@dec.ny.gov |
| Evans | Dorothy | Director | Natural Heritage Program | dorothy.evans@dec.ny.gov |
| Fournier | Michael | New York NRCS State staff forester | NRCS Natural Resources Conservation Service | michael.fournier@ny.usda.gov |
| Galusha | Randy | Owner, Toad Hill Maple Farm | New York Maple Producers | toadhillmaple@gmail.com |
| Hanley | Meme | New York State Program Manager | Land Trust Alliance | mhanley@lta.org |
| Howard | Josh | Chief Operating Officer | NY NJ Trail Conference | josh@nynjtc.org |
| Keister | Susan | Consulting Forester; Principal | Keister Consulting, Inc. | susanjkeister@frontiernet.net |
| LaMonte | Alexandra (Alex) | Research Analyst | New York State Association of Counties | alamonte@nysac.org |
| Logue | Christopher | Division Director | New York State Soil and Water Cons. Commission, New York State Ag & Markets, Div. of Plant Industry | christopher.logue@agriculture.ny.gov |
| Malinowski | Katie | Executive Director | Tug Hill Commission | katie@tughill.org |
| McLeod, PhD | Brett | Department Chair | Paul Smith Univ., Environment & Society | bmcLeod@paulsmiths.edu |
| Meade | Jonathan | Associate Regional Director | NPS, Resource Stewardship & Science | jonathan_meade@nps.gov |

| Last Name | First Name | Title | Affiliation | Email |
|-------------|-------------|---|--|--------------------------------------|
| Miller | Kate | Forest Ecologist | NPS, Inventory & Monitoring Program | Kathryn_miller@nps.gov |
| Newman, PhD | David | Professor of Resource Economics and Policy | SUNY ESF, Department of Forest and Natural Resources Management | dnewman@esf.edu |
| Nichols | Allen | Director | New York Chapter of the American Chestnut Foundation | fajknichols.75@gmail.com |
| Parker | Chuck | President | New York State Conservation Council | aparker@twcny.rr.com |
| Paul | Walt | Chair | Fish and Wildlife Management Board, Region 6 | waltpaul@twc.com |
| Pavlesich | Tom | Forestry Program Manager | New York City Watershed Agricultural Council | tpavlesich@nycwatershed.org |
| Prentis | Chris | Chair | NY Tree Farm | chris@lowerhudsonforestry.com |
| Racette | Joe | Wildlife Biologist | New York State DEC, Division of Fish and Wildlife | joe.racette@dec.ny.gov |
| Senterman | Jeff | Executive Director | Catskill Center for Conservation | jsenterman@catskillcenter.org |
| Smallidge | Peter | State Extension Forester | Cornell University Extension Service | pjs23@cornell.edu |
| Steinmuller | Brian | Assistant Director | New York State A&M, Div. of Land & Water Resources, New York State Soil & Water Conservation Comm. | brian.steinmuller@agriculture.ny.gov |
| Thomas | Helen | Executive Director | New York State Maple Producers' Association | office@nysmaple.com |
| Thompson | John | CRISP Coordinator | Catskill Center for Conservation | jthompson@catskillcenter.org |
| Tidball | Keith | Senior Extension Associate & Assistant Director | Cornell Univ., Dept of Natural Resources, Cornell Cooperative Extension | kgtidball@cornell.edu |
| Trapani | Ryan | Director of Forest Services | Catskill Forest Association | ryan@catskillforest.org |
| Tcimpidis | Christopher | Policy & Legislative Affairs Committee Chair; Consulting Forester | New York Society of American Foresters | chris@bevanforestry.com |
| Voss | Rodger | Installation Forester | Fort Drum, Public Works, Division of Natural Resources | rodger.h.voss.civ@mail.mil |
| Wagner | Art | President | New York Forest Owners Association | awagbx@aol.com; president@nyfoa.org |

| Last Name | First Name | Title | Affiliation | Email |
|-----------|------------|-----------------------------------|---|---------------------|
| Weldy | Troy | Director of Ecological Management | The Nature Conservancy New York (TNC NY) | tweldy@tnc.org |
| Wolters | Elizabeth | Deputy Director of Public Policy | NY Farm Bureau | ewolters@nyfb.org |
| Woodworth | Neil | Executive Director & Counsel | Adirondack Mountain Club | neilwoody@gmail.com |
| Zimmerman | Chris | Conservation Ecologist | The Nature Conservancy New York (TNC NY) | czimmerman@tnc.org |

Glossary of Terms

Abiotic – Pertaining to the nonliving parts of an ecosystem, such as soil, bedrock, air, and water.

Acid rain – The deposition of a variety of acidic pollutants in either wet (e.g., rain, fog, or snow) or dry forms (e.g., gas or dust particles).

Adaptation to climate change – Adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects; changes in processes, practices, and structures to moderate potential damages or to benefit from opportunities associated with climate change.

Afforestation – Planting trees where there have not been any for decades or longer.

Aquifer – A saturated, permeable geologic unit of sediment or rock that can transmit significant quantities of water under ordinary hydraulic gradients.

Basal area – The amount of land occupied by the cross-sectional area of all tree trunks, including the bark, measured at breast height (4.5 ft above the ground) for a given area of land.

Best Management Practice – Practice designed to be the most effective and practicable means to prevent or minimize environmental degradation, particularly nonpoint source water pollution.
<http://www.dec.ny.gov/lands/37845.html>

Biodiversity – The variety and variability of all living organisms.

Biotic – Pertaining to living organisms and their ecological and physiological relations.

Carbon Storage – The long-term isolation of carbon from the atmosphere.

Carbon sequestration – The process of uptaking or removing carbon dioxide from the atmosphere so that the carbon is stored in a carbon pool other than the atmosphere.

Clearcut – A harvest in which all or almost all of the trees are removed in one cutting.

Connectivity – The degree to which the landscape facilitates or impedes movement among resource patches.

Ecosystem – A natural community (or group of communities) plus its physical surroundings, including atmosphere, soil, sunlight, and water.

Exurban sprawl – Expanding development, parcelization, and forest fragmentation occurring beyond the suburbs of an urban area.

Forest management – Manipulation of the forest to achieve desired outcomes.

Forest Matrix Blocks – Large contiguous areas whose size and natural condition allow for the maintenance of ecological processes, viable occurrences of matrix forest communities, embedded large and small patch communities, and embedded species populations. (NHP)

Forestland – Land at least 10 percent stocked by forest trees of any size, including land that formerly had such tree cover and that will be naturally or artificially regenerated.

Forests – An ecosystem characterized by a more or less dense and extensive tree cover, often consisting of stands varying in characteristics such as species, composition, structure, age class, and associated processes, and commonly including meadows, streams, fish, and wildlife.

Fragmentation – A process in which the landscape occupied by a natural community or group of communities is reduced in area, subdivided into smaller units, or partitioned by barriers to movement.

Haudenosaunee – Literally “people living in a longhouse,” the six nations of Seneca, Cayuga, Onondaga, Oneida, Mohawk, and Tuscarora (also known as Iroquois).

High-grading – The removal of the most commercially valuable trees (by reason of size, quality, or species) at the expense of future growth or financial return, often leaving a residual stand composed of trees of poor condition or species composition.

Interfering vegetation – Invasive or native vegetation that inhibits the establishment or growth of tree regeneration.

Invertebrates – Animals without a backbone, such as insects and snails.

Limits of Acceptable Change – A visitor-use management framework based on the idea that management should be based on constant monitoring of a site as well as the objectives established for it.

Mitigation for climate change – Action taken to reduce the severity of climate change by reducing greenhouse gas emissions.

Natural community – Also known as ecological community. A group of species that occur together in a particular habitat.

Natural community type – The name applied to a natural community that occurs repeatedly throughout the landscape, such as “beech-maple mesic forest” or “dwarf shrub bog.”

Parcelization – The subdivision of single forest tracts in single ownership into multiple parcels with different individual owners.

Poletimber – A growing-stock tree at least 5.0 inches dbh, but smaller than sawtimber size.

Recreational Opportunity Spectrum – A system for classifying and managing recreation opportunities based on the following criteria: physical, social, and managerial settings. The settings can be divided into six (or fewer) categories, including urban, rural, roaded natural, semi-primitive motorized, semi-primitive non-motorized, and primitive categories.

Regeneration – 1) Tree seedlings or saplings existing in the stand; 2) The act of renewing tree cover by establishing young trees naturally or artificially.

Resilience – The capacity for a community and its ecosystem to withstand extreme events and other forces or risks, quickly recover in the aftermath of a disaster, and develop ongoing adaptability to rapidly changing environmental conditions and forces.

Silviculture – The science-based tending and regenerating of forest stands to realize property owner-desired benefits and to sustain them over time.

Stewardship – The careful and responsible administration and management of land and associated resources to ensure their availability for future generations in a healthy condition.

Understory – Vegetation below the forest canopy. For example, wildflowers that grow in a forest under the trees are understory plants.

Wildfire – An uncontrolled fire spreading through natural or unnatural vegetation.

Working Forests – Forests that are capable of producing crops of timber or wood products, and are not withdrawn or precluded from commercial production by law, regulation, or policy. These forests are, or can be, sustainably managed and harvested to produce wood products, often under direct voluntary third-party or regulatory management control, supervision, or certification.

Acronyms

| | |
|----------|--|
| ALB | Asian Longhorned Beetle |
| APA | Adirondack Park Agency |
| AVID | Assessing Vegetation Impacts from Deer |
| BMP | Best Management Practice |
| CLCPA | Climate Leadership and Community Protection Act |
| DBH | Diameter at breast height |
| DEC | New York State Department of Environmental Conservation |
| EAB | Emerald Ash Borer |
| ECL | Environmental Conservation Law |
| EPF | Environmental Protection Fund |
| HWA | Hemlock Woolly Adelgid |
| ISCMP | Invasive Species Comprehensive Management Plan |
| NRCS | Natural Resources Conservation Service |
| (NY)NHP | New York Natural Heritage Program |
| NYS | New York State |
| OPRHP | New York State Office of Parks, Recreation and Historic Preservation |
| PRISMs | Partnerships for Regional Invasive Species Management |
| SFAP | State Forest Action Plan |
| SGCN | Species of Greatest Conservation Need |
| SPSFM | Strategic Plan for State Forest Management |
| SUNY ESF | State University of New York College of Environmental Science and Forestry |
| SWAP | State Wildlife Action Plan |
| UAV | Unmanned Aerial Vehicle |
| UMP | Unit Management Plan |
| USDA | United States Department of Agriculture |
| WAVE | Water Assessments by Volunteer Evaluators |

Introduction

Three centuries ago, forests dominated the landscape that would one day become the State of New York. As early American settlers cleared the land for timber and agriculture, the amount of forests rapidly dwindled to 25 percent of the state's area. As early as the late 1800s, however, concerned citizens recognized the importance of forests to the state's economy and health of its residents, and began a movement to preserve and re-establish forests across the state. Today over 60 percent of our state is forested.

The existence and health of New York's forests today are once again at a pivotal moment, according to a 2019 survey of forestry stakeholders (Appendix C) conducted by the New York State Department of Environmental Conservation (DEC). Excessive forest clearing and fragmentation remain concerns, particularly in suburban areas. In many parts of the state, forest regeneration continues to worsen, leaving tracts of forests without young trees to continue the forest life cycle. Defending our forests from invasive plants and insects requires constant vigilance to ensure these pests don't gain a foothold in New York.

New York's forests are poised to realize their full potential as part of the climate change solution. It is possible that forestry regulations and initiatives that are developed to meet the state's climate goals may be different from the recommendations suggested in this State Forest Action Plan (Plan or SFAP). However, the Plan does provide actions to be taken to ensure New York's forests are prepared to face challenges and opportunities for the next 10 years. These actions could provide the framework for discussion about how to reach the state's goals using our forests and forest resources.

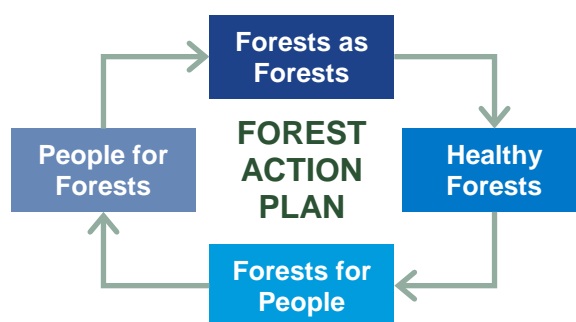
Managing our forests for the long-term future will ensure that the citizens of our state, and the entire global community, continue to experience the vital benefits of forests, including the protection of our water and air, the conservation of wildlife habitat, and the employment of thousands of people in the forest products, outdoor recreation, and tourism industries.

New York State's Climate Goals

Under the 2019 Climate Leadership and Community Protection Act, New York State is committed to all but eliminating greenhouse gas emissions in the state and to ultimately achieve net zero emissions.

Forests and forest products are a critically vital resource for reducing total emission levels through carbon sequestration. In addition, state agencies are committed to making sure all programs consider the future physical risks from climate change in order to protect New Yorkers and our environment.

Organization of the Plan



This New York State Forest Action Plan is a 10-year strategic plan for DEC and New York's forestry community. The purpose of the Plan is to provide long-term, comprehensive, coordinated strategies for addressing the challenges facing New York's forests today, and to identify ways to invest state, federal, and leveraged partner resources in major management and landscape priorities.

The Plan also reflects a growing partnership with the Indian Nations of this region. In recent years, DEC has dedicated additional resources to improving the dialogue with indigenous people, including gaining a better understanding of how

their traditions, cultures, and rights are impacted by the state's land management policies. The SFAP takes the next step of proposing that future management and policy decisions incorporate these indigenous values and commit to an increased level of engagement.

The impetus for the SFAP lies in the federal Cooperative Forestry Assistance Act (CFAA)—amended by the 2008 Farm Bill—which requires each state forestry agency to develop “Statewide Assessment and Strategies for Forest Resources,” collectively referred to as the State Forest Action Plan. The U.S. Forest Service established three national priorities to be addressed by each state's Plan:

1. Conserve and manage working forest landscapes for multiple values and uses;
2. Protect forests from threats; and
3. Enhance public benefits from trees and forests.

New York's Plan builds on these three national priorities and identifies four primary goals for our forests (see diagram above):

1. Keep New York's forests as forests (“Forests as Forests”)
2. Keep New York's forests healthy (“Healthy Forests”)
3. Ensure forests benefit humans and all living creatures (“Forests for People”)
4. Support, protect, and appreciate New York's forests (“People for Forests”)

The Plan is dedicated to these four goals, with the following subsections under each goal:

- **Assessment** of current conditions, trends, and threats related to various aspects of forests and forestry programs in New York;
- **Priority Landscapes** or geographic areas of the state where resources will be focused;
- **Priority Focus Areas** or programs that will be administered and where resources will be focused; and
- **Strategies** for achieving the goals for New York's forests.

The Plan also includes multistate priorities, and incorporates the New York State Wildlife Action Plan and Community Wildfire Protection Plans.

GOAL #1:

Keep New York's Forests as Forests

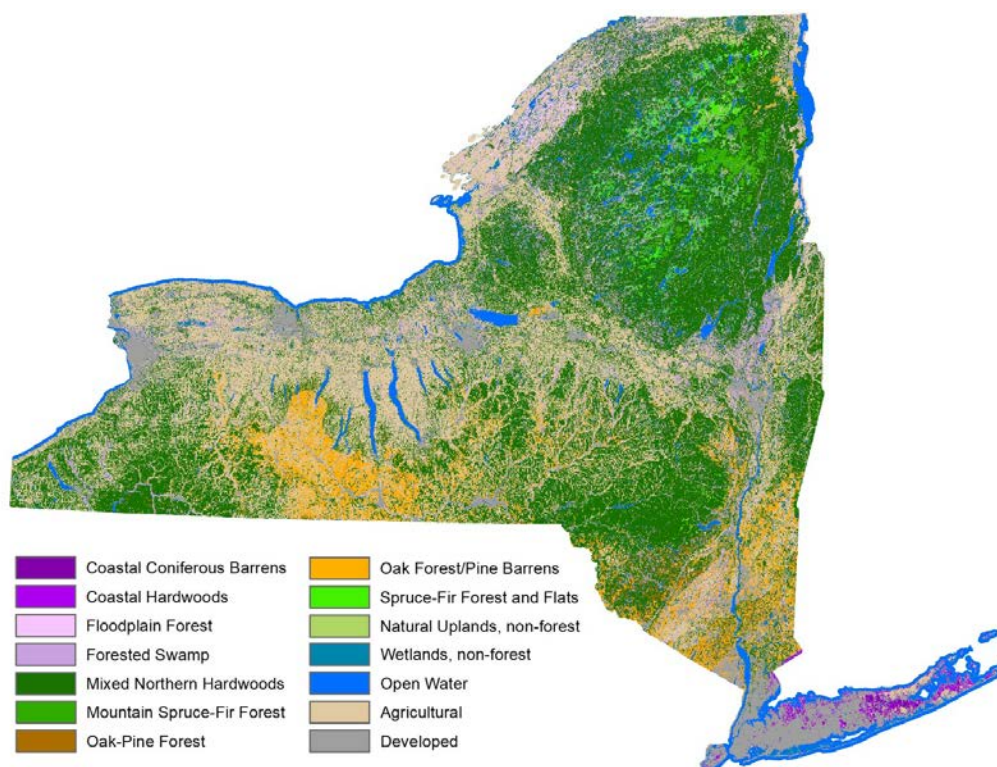
New York State is fortunate to have more than 18.7 million acres of forestland—almost one acre for every state resident—covering 63 percent of our state. In part, due to its size, New York continues to have the most total forestland in the Northeast. Unfortunately, even though the state has 1 million more acres of forest than Maine, New York is the least forested in the northeast if you consider the total area of the state. New York has 63 percent forest cover, compared to Maine's 83 percent, New Hampshire's 80 percent, and Vermont's 73 percent.

According to recent data released by the Forest Inventory and Analysis Program, Forest Service, U.S. Department of Agriculture, there was a slight net forest loss in New York State of about 1 percent from 2012 to 2017. This marks the first decline in forest cover since the turn of the twentieth century. The strategies outlined in this goal are designed to maintain a no net loss of forests in New York.

"Don't let forests be the forgotten solution."

JANE GOODALL

The Plan's first overarching goal – keep New York's forests as forests – supports all three National State & Private Forestry (S&PF) Priorities. Our strategies to enhance New York's stewardship program for sustainable forest management and to regenerate forests all help New York to *"conserve and manage working forest landscapes for multiple values and uses."* Our efforts to protect forests through a variety of tools (purchase of lands and easements, partnerships, research, community forestry, etc.) all *"protect forests from threats"* such as fragmentation, conversion, and loss of native biodiversity. *"Enhancing public benefits from trees and forests"* is inherent in every strategy, and is explicitly developed in the subsequent three goals of this Plan.



Map of New York State's forested habitat types

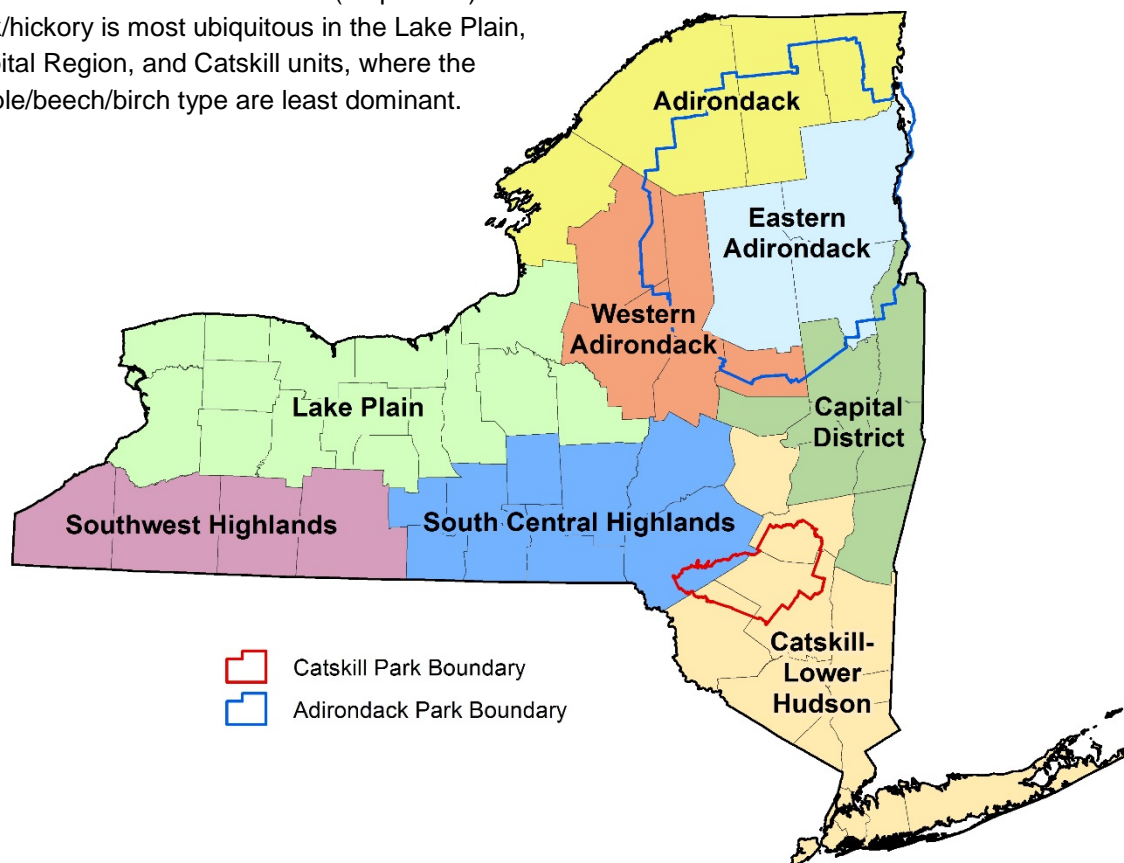
Assessment: New York's forested landcover

The most heavily forested parts of the state remain the Western Adirondack, Eastern Adirondack, and Northern Adirondack/St. Lawrence regions. Other large forest blocks include the Catskills and Allegheny areas.

Forest composition and structure

New York's forests are almost entirely of natural origin, meaning that they developed from seed dispersed by surrounding mature forest or from seed sources stored in the soil. Over 100 species of trees (commercial and non-commercial) populate New York's forests. New York forestland continues to be dominated by the maple/beech/birch group (55 percent), followed by the oak/hickory group (17 percent), with the remaining types each having less than 10 percent of the remaining area. The maple/beech/birch type can be found in all inventory units across the state, but it is most prevalent in the Adirondack unit (71 percent). Oak/hickory is most ubiquitous in the Lake Plain, Capital Region, and Catskill units, where the maple/beech/birch type are least dominant.

Approximately 66 percent of New York's forests are in a large diameter size class (minimum 11.0 inch dbh for hardwoods and 9.0 inch dbh for softwoods); 25 percent are classified as medium diameter size class; (5.0 to 10.9 inch dbh. for hardwoods and 5.0 to 8.9 inch dbh for softwoods); only 8 percent are in a stage where seedling and sapling size trees (less than 5.0 inch dbh) predominate. This indicates that New York's forests are growing and maturing. The low percentage of seedling and sapling size trees can affect the balance of other forest attributes, such as wildlife populations. Specifically, the lack of early successional stages has led to the decline in bird populations such as the golden-winged warbler, whip-poor-will, Canada warbler, yellow-breasted chat, American woodcock, and ruffed grouse.



Map of New York State's Inventory Units, U.S. Forest Service, Forest Inventory and Analysis Program

This condition can be due to the prevailing timber management methods utilized in the state, the slowdown in acres reverting from an idle condition into a forested condition, and the high value of agricultural land remaining in cultivation.

Timberland is defined by the Forest Inventory and Analysis (FIA) Program of the Forest Service, U.S. Department of Agriculture as forestland producing or capable of producing crops of industrial wood (more than 20 cubic feet per acre per year) and not withdrawn from timber utilization (i.e., not in reserved forest status). Approximately 83 percent of all forestland in New York is currently considered timberland. This is an important distinction to make for policymakers, landowners, and land managers, as this is the percentage of forest resource that potentially could be under active forest management.

Privately owned forestlands cover 13.9 million acres and represent 74 percent of New York's forests. 10.4 million acres are considered family-owned or non-corporate forests. Nearly 700,000 private forest landowners provide the public with the benefits of clean air and water, carbon sequestration, wildlife habitat, and a forest-based economy. Around 197,000 landowners own 10 acres of forestland or more. It is most practical to conduct forest management and conservation practices on these lands.

State-owned forestlands. Since 1885, New York State has invested in acquiring and managing a significant amount of forested land in all regions of the state. These state lands are

held as state forests, wildlife management areas, forest preserves, and state parks—each designation providing its own unique and complementary benefits, values, and public good. The Adirondack and Catskill Forest Preserves (managed by the DEC) and the New York State Park System (managed by OPRHP) provide nearly 3.1 million acres of mostly forested open space on which timber harvesting is not allowed. Forest preserve lands are constitutionally protected from harvesting, and State Park lands in New York are protected by policy from commercial tree cutting.

DEC manages more than 787,000 acres of state forests. State forests are located throughout New York State—excluding the Adirondack and Catskill Preserves—and include reforestation areas, multiple-use areas, unique areas, nature preserves, and historic preserves. On some of these lands, timber management is used as a tool to enhance biodiversity and to create habitat features that might be lacking in the landscape. Managed state forests provide timber for various markets and jobs ranging from logging to finish carpentry to finish carpenters. Timber harvesting also creates additional financial opportunities.

Less than 1 million acres of forests originated as plantations, mostly from the 1930s through 1970s, planted by various landowners. Approximately 350,000 acres of these plantations exist on state reforestation, unique, and wildlife management areas. The number of acres planted has waned substantially in recent decades, and some older plantations are being converted back to a natural forest condition.

Assessment: Private forestlands

Family forest owners hold 75 percent of all private forestland and 56 percent of all forestland in state. Other private owners, including corporations and conservation organizations, as well as unincorporated clubs and partnerships, own the remaining 25 percent of private land in the state. The amount of acreage classified as family forest decreased by 880,000 acres from 2006 through 2017, representing a 6 percent decline. The number of family ownerships also fell by an estimated 11.9 percent. Conversely, corporately owned forest acreage increased by 700,000 acres.

Family forest owners find it increasingly difficult to keep their forests as forests. The reasons for these difficulties are numerous. There are many economic factors related to the costs of buying, holding, and managing forestland. Property values, mortgage interest rates, taxes, costs of management, and management services are all important drivers. Local, national, and global market factors also affect the returns from direct investments in forestlands. Availability and viability of buyers and consumer trends for all manner of forest products, market preferences, and housing starts all influence wood markets and economic returns.

Many landowners created limited liability corporations (LLCs) as legal protection for their assets, including forestland. This could explain some of the rise in the number of acres categorized as corporate. These LLCs essentially operate as “family forests”; however, it is difficult to differentiate between this category and true corporate ownership, such as a Timber Investment Management Organization or Lumber Company.

Regulatory factors can affect what family forest owners can and cannot do with their forests, and the benefits they might receive from them. Societal factors come into play as the attitudes of neighbors and others who do not own forestland weigh in on whether they support or even accept tree cutting within their sight or knowledge. Ultimately, some factors are

Clearly, the future of New York’s forests and the benefits they provide lies primarily in the hands of private forest landowners.

individual, related to the age of the forest owners, their personal and financial situations, and the interest of their heirs in owning the family forests and keeping them as forested open spaces.

Threats

Increasing property ownership burdens, especially the traditional practice of assessing land for “highest and best use.” This makes buying and holding onto forestland expensive for private citizens, and can pressure current owners to sell their forestland to capture that value and reallocate the assets into other investments or uses.

When forests are valued or assessed for their “highest and best use,” that use is generally not considered to be as forest. New York’s Forest Tax Law seeks to address this issue; however, not all forest landowners are eligible, and many have different goals for their forestland than the law currently provides. Other ownership costs, including maintaining boundary lines and property security, preparing and following management plans, timber stand improvement, and invasive species control, as well as developing and maintaining forest infrastructure, also add up and increase over time.

Timber management is not a top reason why most landowners own land, but decisions about harvesting are often made when opportunity arises without the assistance of a forester (NWOS, 2013). Only 30 percent of private landowners have used a forester. Having a professional forester involved in forest management activities on private land increases the likelihood of deliberate forest management with long-term goals that are addressed with the landowner.

State and federal income tax policies that favor or support development and change of land use away from forested open space often influence or drive behaviors and investments in ways that conflict with forest retention, especially the retention of large, unfragmented forest blocks.

Federal capital gains tax policies affecting timber assets, income, and timber investment tax treatment have also been cited as potential threats to long-term private forest ownership.

An aging landowner population is illustrated in U.S. Forest Service Forest Landowner Survey data, and it largely follows overall demographic trends. Recent statistics indicate that the average New York private forest owner is 61 years old. Similar to demographic issues facing farmers and agriculture, our state is rapidly approaching a significant “intergenerational transfer” of forestland ownership. As estates pass to heirs or are sold off to cover increased medical expenses of aging owners, the descendants of forest owners do not share the interest in holding onto the family forest or practicing sustainable management.

The cost of owning and managing private forestland can be prohibitive. Development pressure can entice landowners to sell and fragment their forestland for economic benefit. This is often due to financial stress, complex family dynamics, or the lack of a plan for the land after a landowner passes away. All these pressures are counterproductive to private forest landowners keeping their forests as forests and managing them in a healthy, productive way.

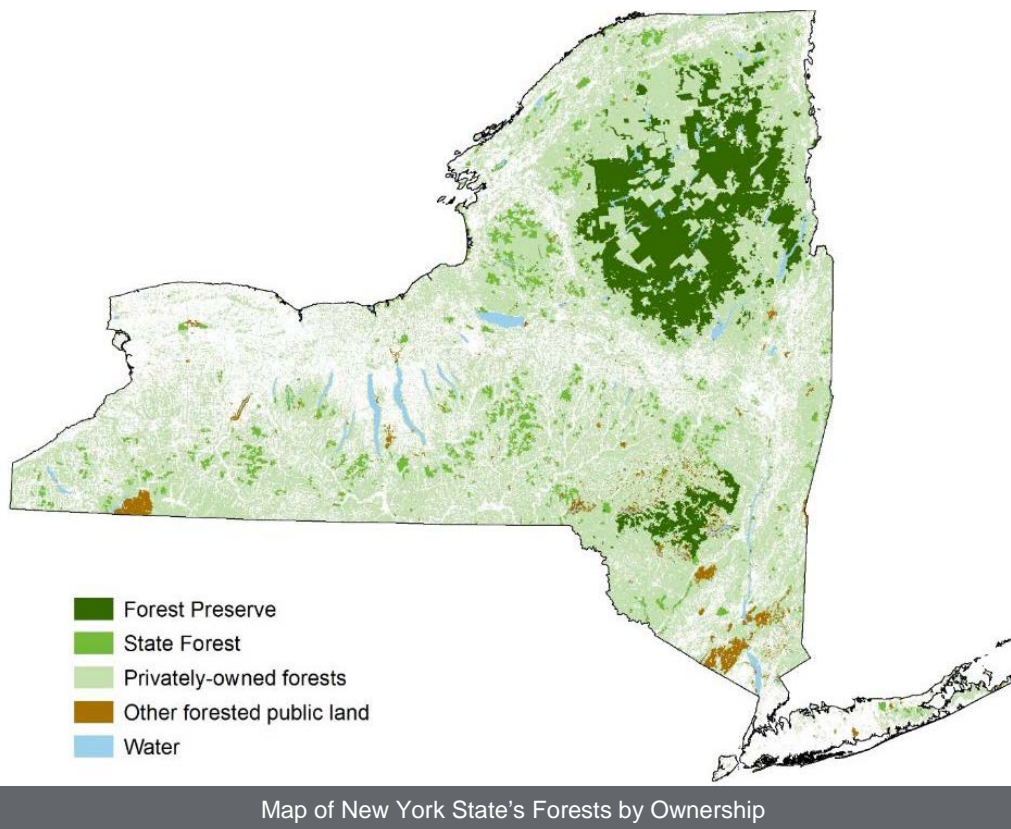
Invasive forest pests also pose significant threats to forest retention and other forest values articulated elsewhere in this report. In urban forests especially, pests like the emerald ash borer or Asian longhorned beetle can cause extensive losses of trees and forest canopy. Rural forests are also threatened economically and ecologically by invasives, which have the potential to wipe out entire tree species.

Competing and incompatible land uses are also increasing threats to forest retention and the perpetuation of forest benefits and values. Various types of energy production installations and support infrastructure are often placed in forested areas. Oil and gas exploration and extraction have been common across parts of New York State, and have been impacting forest stands for decades. Exploration and extraction, with their associated road construction, well-site clearing, and transportation pipeline development, can impact the integrity of forests and lead to direct loss in some cases. Finally, surface mineral extraction and the expansion of existing mines for sand, gravel, bluestone, or other mineral resources may also affect forest retention and integrity through long-term land use change.

Lack of public awareness and support. The public relies on the ecosystem services that private forests provide but may be unaware of what it takes to keep private forests as forests or of the critical role that sustainable management plays. The pressures and threats identified above mean that privately owned forests won’t always just stay as forests unless landowners can afford to keep them as such. Laws or local regulations that limit the ability of owners to practice sustainable forest management, or significantly increase the costs of doing so, can have the opposite result from what was intended.

Potential adverse impacts

The threats articulated by New York forest stakeholders all have the potential, at their core, to change land use away from forested open space. Even if forests remain, they may be impacted in a variety of ways that reduce their ability or capacity to sustainably provide benefits and services. Forested open spaces may be parcelized (namely, single large ownerships are broken up through subdivision and sale into multiple parcels with individual owners), fragmented (solid blocks are broken apart by deforested areas, such as farm fields, roads, or developments), or perforated (where smaller holes are punched in a contiguous forest canopy for dispersed house lots).



Loss of forestland or changes within forests can have a wide variety of impacts. New York stakeholders have identified the following imminent impacts of concern to New York's forest:

- Poorer water quality and altered hydrology (quantity and flow issues);
- Long-term modifications to and reductions in water quality, hydrology, and aquatic diversity;
- Alterations in forest structure and function that can derail ecological processes on which forests and forest dwellers depend;
- Decreased native fish and wildlife populations and habitats;
- Increased tree mortality;
- Increased fire risk because increased housing densities in forested landscapes generate more potential for ignitions; make firefighting and fire preparedness in such areas more difficult, dangerous, and expensive; and restrict available management options for mitigating threats to forestlands;
- Increased wildfire impacts and associated losses (ecological, social and economic);
- Increased risk of introduction and spread of invasive species;
- Decreases in timber production and associated direct and multiplier economic activity;
- Changes in scenic qualities and related social and economic benefits;
- Changes in quantity, quality, diversity, and cost of forest-based recreational opportunities; and
- Landowners selling their forestland for development.

Assessment: Forested state lands

In New York, the majority of state land is in the following four categories: state forests, forest preserves, wildlife management areas, and state parks. The first three are managed by DEC while state parks, including historic sites, are managed by the New York State Office of Parks, Recreation and Historic Preservation (OPRHP). In addition, DEC owns/manages working forest conservation easements on private forestland and OPRHP owns/manages conservation easements on private land for public recreation.

The Forest Preserve: Adirondack and Catskill Parks

Of the 4.5 million acres of land managed by DEC, nearly 3 million acres, or 63 percent, are classified as forest preserve. New York's forest preserve is the largest state-designated wilderness in the country. Comprised of over 2.6 million acres in the Adirondack Forest Preserve and 287,000 acres in the Catskill Forest Preserve, these lands represent the majority of all state-owned property in the Adirondack and Catskill Parks.

The Adirondack and Catskill Parks were designated by the New York State legislature near the turn of the 20th century, and originally included only the state-owned forest preserve lands. The description of each park was revised in 1912 to include ALL lands, both public and private, within the "Blue Line." Today, the Adirondack Park is a 6-million-acre patchwork of public and private lands, while the Catskill Park is a mountainous region of 705,500 acres comprised of public and private lands in Southeastern New York. The two parks are a thriving mix of forests, wetlands, waterways, and human settlement.

Protected as "forever wild" by Article XIV of the New York State Constitution, New York's forest preserves have exceptional scenic, recreational, and ecological value. Rugged mountain peaks, remote lakes and ponds, millions of acres of unfragmented forests, and nearly 2,000 miles of trails provide ample opportunity for many types

New York's forest preserve is the largest state-designated wilderness in the country.

of recreation while providing a variety of habitats for plants and wildlife. Striking a balance between recreational use and resource protection in the forest preserve is achieved through a park-wide land classification system and individual unit management plans. Additional discussion about the recreational value of forest preserve lands can be found under Goal #3.

Forest preserve lands are further broken down into categories based on their capacity to withstand use. These categories are defined in the 1987 Adirondack Park State Land Master Plan, updated in 2019 (https://www.apa.ny.gov/Documents/Laws_Regs/APSLMP.pdf), and the 1985 Catskill Park State Land Master Plan, updated in 2014 (https://www.dec.ny.gov/docs/lands_forests_pdf/cpslmp.pdf). These plans are designed to guide the preservation, management, and use of state lands within the Adirondack and Catskill Parks. They also cover such topics as legislative mandate, acquisition policy recommendations, unit management plan development, classification guidelines, and area descriptions and delineations (wilderness areas, primitive areas, canoe areas, etc.)

The land classifications outlined in each plan include:

Both parks:

- Wilderness
- Wild Forest
- Intensive Use
- State Administrative

Catskills only:

- Primitive Bicycle Corridor

Adirondacks only:

- Canoe
- Primitive
- Wild, Scenic and Recreational Rivers
- Travel Corridors
- Historic

State Forests

The 2010 Strategic Plan for State Forest Management (SPSFM) outlines ecosystem management, resource protection, land acquisition and infrastructure, public/permitted use, forest management and health, as well as recreational opportunities. The plan can be found here: <https://www.dec.ny.gov/lands/64567.html>. The SPSFM is currently under review for updating, with anticipated completion date in 2020.

State Forests are located throughout New York and their classification is based on different priorities for land usage and is defined in many pieces of legislation (see page 12-14, SPSFM). They include:

- Reforestation Areas
- Multiple Use Areas
- Unique Areas
- State Nature and Historical Preserves
- Miscellaneous

The 1929 State Reforestation Act and the 1931 Hewitt Amendment provided for the acquisition of abandoned farmland and overharvested woodlands outside of the forest preserves. These acres were then planted with seedlings from New York State nurseries, often by crews from the Civilian Conservation Corps.

State Forests are currently dual Green Certified by The Forest Stewardship Council (FSC) and Sustainable Forestry Initiative (SFI) to be sustainably managed, except for Long Island

and New York City, where the state does not hold working forests. The methods used in the management of these lands are designed to respond to today's complex issues and ecological threats, such as shifting land use trends, invasive species, and climate change.

Over 798,375 acres play a unique role in the landscape because they are managed under public ownership by professional foresters, allow for the sustainable use of natural resources, are open to recreational use, provide watershed protection, and cover large land areas across the state.

State Forest Unit Management Plans (UMPs) are developed for all State Forests. These plans address timber management, wildlife habitat, open space acquisition, outdoor recreation, recreational use and demand, infrastructure, resource protection, funding, and staffing.

State Parks and State Historic Sites

180 state parks and 35 historic sites throughout the state comprise 335,000 acres. Parks and historic sites provide many benefits in the form of recreation, environmental education, habitat and biodiversity protection, and many ecosystem benefits. Although not traditional working forests (logging is not allowed on Parks properties), they provide many environmental, social, and economic benefits, and they complement DEC's state forests. Forests, both mature and emerging, are the dominant vegetative cover on OPRHP properties.

Economic benefits of State Parks lands can be found at: <https://www.ptny.org/application/files/6515/0903/5031/Economic-benefits-of-NYS-parks.pdf>.

Parks update: parks.ny.gov/publications/documents/NYParks2020UpdateReport.pdf.

Wildlife Management Areas

The wildlife management area (WMA) system consists of nearly 260,000 acres managed by DEC's Division of Fish and Wildlife. <https://www.dec.ny.gov/outdoor/8295.html>.

These public lands include 125 wildlife management areas and 72 multiple use, unique, and cooperative hunting areas throughout the state. DEC's Division of Fish and Wildlife manages the WMA system to provide quality wildlife habitat; promote increased productivity of wildlife populations; provide ample opportunities for hunting, wildlife observation, trapping, and fishing; and protect soil and water quality.

Forests cover about 65 percent of the WMA system. Management strives to provide a mosaic of forest age types and classes, including a sizable young forest component that provides habitat for a diversity of wildlife that includes ruffed grouse, American woodcock, whip-poor-will, golden-winged warbler, New England cottontail, and wild turkey. Older forest types are a home for migratory songbirds and raptors, including eagles and various buteos, falcons, and accipiters. All forest habitat types provide excellent opportunities for wildlife-

dependent recreation. Providing habitat for wildlife and public access requires a careful analysis and balance. DEC's Division of Fish and Wildlife is currently preparing habitat and public use plans to guide management of these areas in the future.

Public use of these areas is regulated by Title 6, Chapter I, Part 51 of the New York State Codes, Rules, and Regulations. Activities not compatible with the primary management goals are not allowed. Prohibited activities include any use of motorized vehicles except on town, county, or on state highway roads, use of boats with motors, and overnight mooring or boat storage. Snowmobiles are allowed only on designated routes. Swimming is prohibited, and fires are only allowed for cooking, warmth, or smudge. These and other regulations and restrictions protect habitat and wildlife, and preclude conflicts with legitimate public use.

Assessment: Urban and community forests

The term "urban forest" may sound contradictory to some people, yet our streets, local parks, yards, and greenspaces are where most people are exposed to trees and their many benefits. This connection with the urban forest is how many residents learn to appreciate the benefits of forests outside their urban setting.

All of the trees within a town, village, or city make up the community forest. The community forest can include street and yard trees, parks, cemeteries, golf courses, school grounds, and undeveloped green spaces. Urban and community forestry is the management of community forests to establish and maintain healthy trees for air and water quality benefits, energy savings, and environmental health, as well as to enhance the quality of life in our urban areas where a majority of our state's residents live and work.

We understand urban land as attaining minimum population density, while community land is defined by political boundaries. "US Urban Forest Statistics, Values, and Projections"

We understand urban land as attaining minimum population density, while community land is defined by political boundaries. Unfortunately, tree canopy cover has been declining in both.

(Nowak et al., 2018), provides detailed data for New York State. Urban and community land comprises 10.3 percent of New York State. Between 2000-2010, the urban and community area increased 7.2 percent. New York's total urban and/or human community area comprises 3.53 million acres.

According to "Declining Urban and Community Tree Cover in the United State" (Nowak et al. 2018), tree canopy cover averages 48.6 percent in our state's urban and community areas, totaling 1.315 million acres. Unfortunately, between 2008 and 2013, the urban canopy cover dropped from 53.4 percent to 52.4 percent, an average statewide loss of 6,720 acres of canopy each year.

Assessment: Federal lands with significant forests

The list below includes federal lands in New York with significant forest cover, not all federal lands. There are additional smaller Wildlife Refuges, National Historic Sites, etc. that have forested lands. However, they are small or have minor forest cover (Roosevelt, Vanderbilt, Tonawanda NWR, Oak Orchard NWR, etc.).

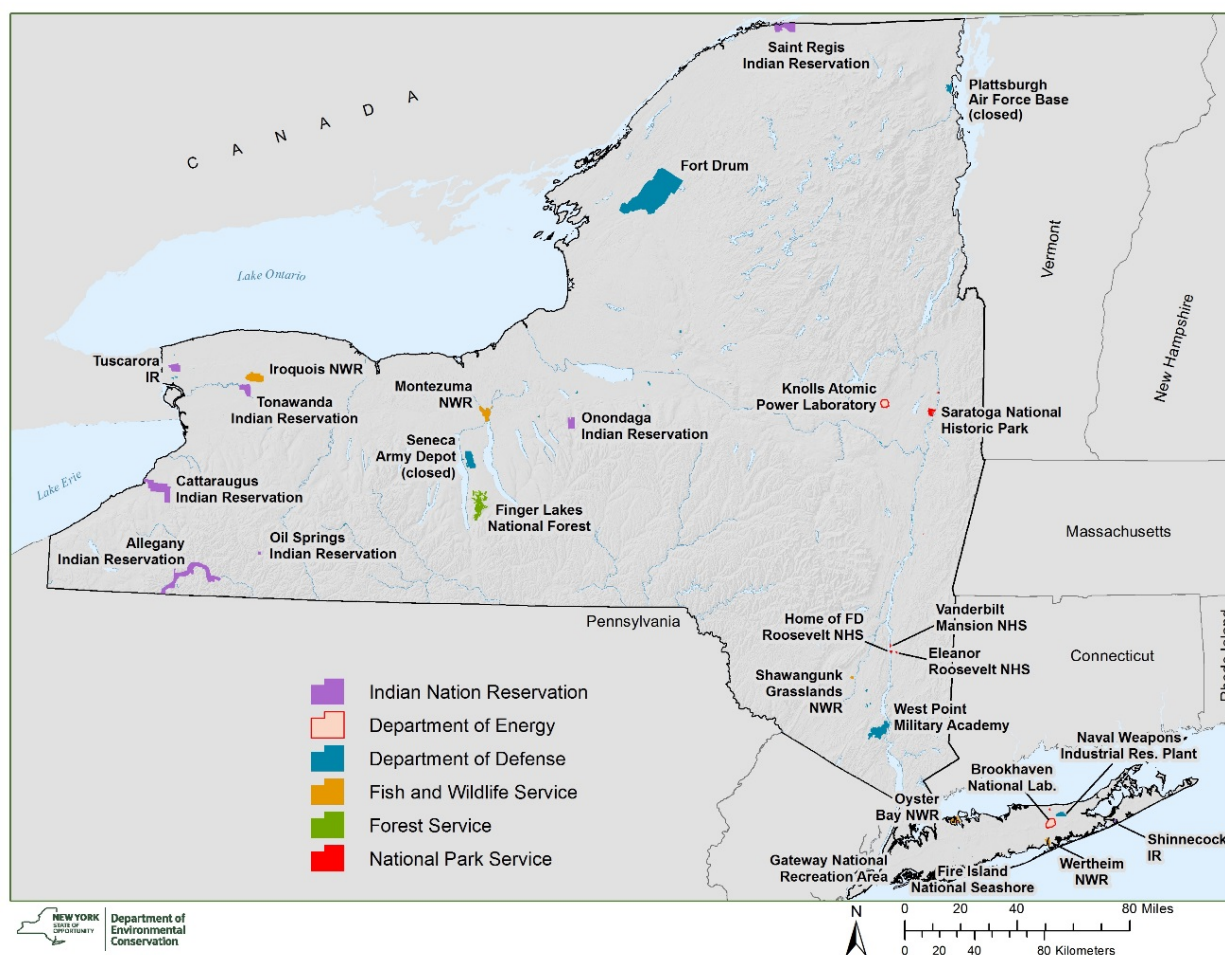
Forest Service: National Forests

The Finger Lakes National Forest's Land and Resource Management Plan was last revised in 2006 and will guide the management of the Forest for the current planning period (2006 to 2021). The purpose of the Plan is to provide management direction to ensure that

ecosystems can provide a sustainable flow of beneficial goods and services to the public.

Fish and Wildlife Service: National Wildlife Refuges

Montezuma National Wildlife Refuge was established on September 12, 1938 as a refuge and breeding ground for migratory birds and other wildlife. The refuge provides resting, feeding, and nesting habitat for waterfowl and other migratory birds. Montezuma is situated in the middle of one of the most active flight lanes in the Atlantic Flyway, at the north end of Cayuga Lake in the Finger Lakes Region. The Refuge contains 7,068 acres and is situated in Seneca, Wayne, and Cayuga counties.



Map of New York State's Federal Lands and Indian Reservations

Department of Defense: Military Facilities

West Point has about 12,736 acres of forestland. It is the first and currently the only Army installation certified by the American Tree Farm System to have and maintain a tree farm, which has been going strong for 22 years. West Point is also a Tree City U.S.A.

Fort Drum contains 107,265 total acres. The primary purpose of the Fort Drum Forest Management Program is to manage the installation's 74,000 forested lands to support

the Army training mission and to enhance ecosystem integrity through sound forest management practices. Additional objectives include the annual production of commercial forest products, enhancement of forested habitats to benefit wildlife, protection of watersheds, and increased opportunities for outdoor recreation. Forest management on Fort Drum is concerned with maintaining and enhancing the diversity of the forested ecosystem. This diversity allows the trainers access to different types of land formations and vegetative structures in order to provide optimal conditions for all training scenarios.

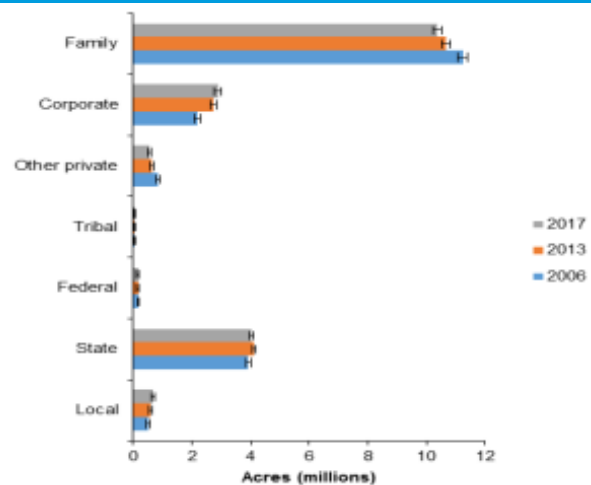
Assessment: Land use trends and drivers of forestland conversion

Forest parcelization and fragmentation are two land use trends that cause several problems, and result in degraded forest health.

Unfortunately, we expect these trends to continue in New York State, at least in the next ten years. These fragmented landscapes support higher deer populations and also make the forest more susceptible to invasive species, which further undermine forest health.

Parcelization occurs when large parcels of land are divided up into smaller ones. Parcelization results in an increase in the number of owners. Fragmentation occurs when continuous forest is broken up by development of roads and homes, commercial uses, and agricultural purposes.

The consequences include the spread of invasive plant species, which tend to establish around forest edges, often out-competing native plants and disrupting entire forest ecosystems. Parcelization can—and fragmentation does—result in less interior forest for plants and animals that require this specific habitat. Parcelization also increases the number of forest landowners, and can make the task of managing the forest resources of the state more difficult overall. Stewardship efforts must be of sufficient scale to target the large number of landowners responsible for managing these small woodlots. For the forest industry,



Area of forestland by ownership group, 2006, 2013, and 2017 (New York Forest, 2017)

parcelization increases costs and the complexity of doing business with private forest owners. For example, instead of negotiating for a timber sale on 200 acres with one owner, they may have to work with 5 different owners to access the same timber resource.

Forest Loss in New York

According to recent data released by the U.S. Forest Service FIA Program, there was a slight net forest loss in New York State of about 1 percent from 2012 to 2017. Around 390,000 acres of gross loss of forestland changed classification to non-forest. Conversely, 250,000 acres reverted back to forestland. Almost half of

this gross loss can be explained by conversion to agriculture, while a third is attributed to development. However, most of the land classified as agriculture was defined as idle agriculture and may not yet meet the U.S. Forest Service definition of forestland under the FIA sampling regime.

In New York State, parcelization and fragmentation due to development are concentrated around rural-suburban interfaces in the Hudson Valley bedroom communities and Long Island, as well as around some upstate cities. These forests are generally less healthy or productive than unfragmented forests and face a variety of threats from invasive plants and pests to overbrowsing by white-tailed deer.

What this means

The net loss of forestland reported in this inventory is small, with gross loss of forest partially offset by gross gain. Since the previous inventory, New York has seen a statistically significant loss of forestland, with a 0.29 percent average annual rate of decline, and a statistically significant gain in non-forest, with a 0.05 percent average annual rate of increase.

These changes have more than offset the gains that culminated in the maximum extent of forestland seen in the 2012 inventory, resulting in a 1 percent net loss over the past decade. Gains and losses from multiple causes are driving land-use change dynamics in New York. Movement between forest and non-forest classifications may be a result of land meeting or not meeting FIA's definition of forestland, due to small changes in understory disturbance, forest extent, or forest cover. Such changes are generally not permanent and may be more prevalent in stands of small diameter trees. Additionally, the definition of forestland changed in 2013 from a minimum of 10 percent stocking to a minimum of 10 percent canopy cover. Over half of the forestland acreage lost to agricultural land uses (112,000 acres) was classified in the latest inventory as idle farmland, defined as areas taken out of agricultural production but not yet reverted to forestland. It is likely that much of the change was due in part to procedural changes in forestland classifications rather than true, on the ground land conversion. Monitoring this issue into the next inventory cycle should bring clarity to the question about what the true trend is in forest extent.

Assessment: Effects of a changing climate and environment on New York's forests

The New York State ClimAID assessment provides an authoritative source of information on climate change for our state, while the U.S. National Climate Assessment provides additional information for the Northeastern region. The Forest Service Northern Institute of Applied Climate Science developed two assessments of the specific vulnerabilities facing forest types in our state: the Mid-Atlantic Forest Ecosystem Vulnerability Assessment and Synthesis (<https://www.nrs.fs.fed.us/pubs/57325>), as well as the New England and Northern New York Forest Ecosystem Vulnerability Assessment and Synthesis (https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs173.pdf).

A warming climate brings additional threats and challenges for forest management and conservation that are expected to amplify almost all stressors discussed in this Plan (See under Goal #2, *Keeping New York's Forests Healthy*).

Threats and challenges to forest management due to changing climate

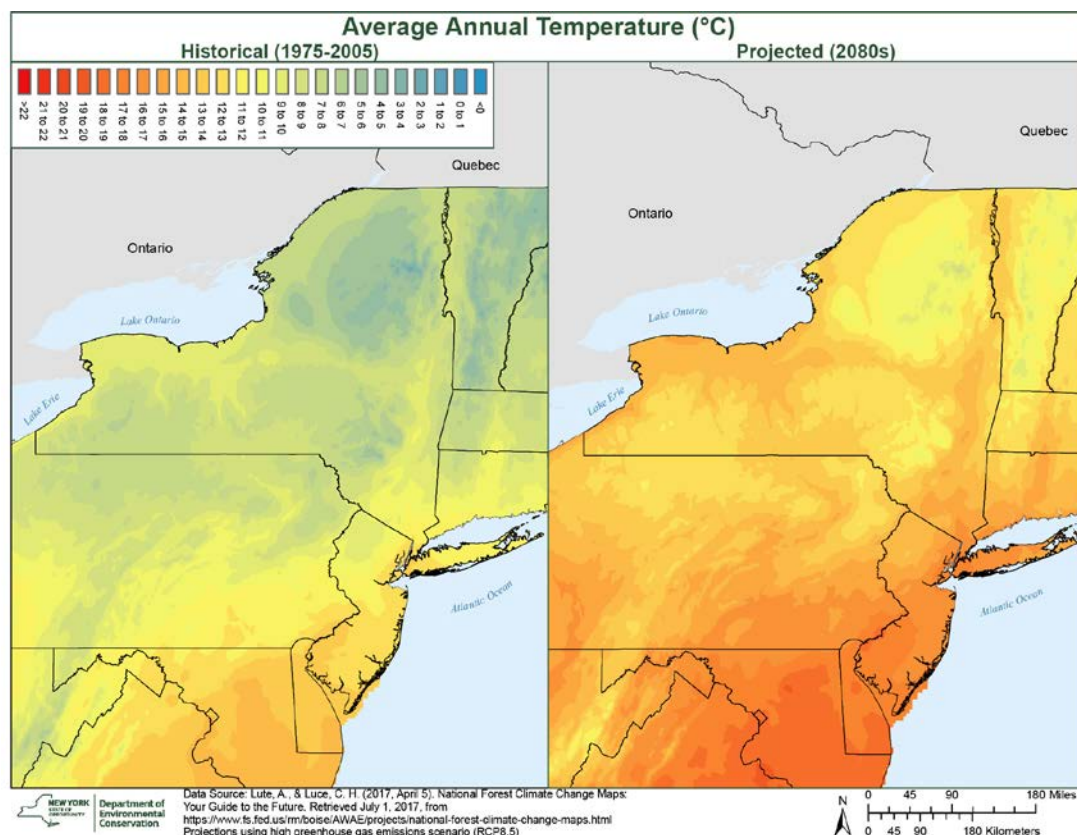
- Extreme heat and droughts will limit available water for photosynthesis, so carbon sequestration will be restricted, reducing plant productivity. Plus, these conditions increase the threat of wildfires, which release a significant amount of carbon.
- Frequent heavy rain events will saturate roots and prevent efficient photosynthesis, also limiting carbon sequestration.
- On average, winter temperatures have risen more than 4.4°F since 1970.² New York is expected to experience winter precipitation more as rain than snow. In some areas of the state, the number of snow-covered days has already decreased as much as 20.¹ A lack of snow cover exposes soil and roots to freezing temperatures.
- By 2100, a warming climate is projected to have increased the growing season by 1 month², which may increase the total amount of carbon sequestered. Yet, earlier budburst puts trees at greater risk of damage from spring frosts.
- An earlier budburst misaligns flowering with the phenology of spring pollinators. This may stunt regeneration and forest productivity of certain tree species.
- Changes in climatic conditions are projected to shift species ranges and alter forest composition:
 - Many northern and boreal tree species will face increasing stress from climate change. Boreal species of cold climates and high elevation (i.e., balsam fir, red spruce, and black spruce) are at greatest risk for decline as they are projected to lose suitable habitat over the next century.³ Ecosystem models agree that northern and boreal tree species may be less able to take advantage of longer growing seasons and warmer temperatures than warm-adapted, temperate forest species.
 - Populations in isolated and fragmented landscapes will have limited ability to migrate in response to a changing climate.
 - Common New York forest species, including American beech, eastern hemlock, white pine, and yellow birch, are expected to experience reduced habitat and growing potential. On the other hand, species with southern ranges, such as red maple, northern red oak, black cherry, and American basswood, may expand their suitable range northward.⁵
- Invasive pests and pathogens are a growing threat to the productivity of New York's forests. Warmer temperatures and milder winters allow for faster spread of forest pests. Specifically, forests of low species diversity are at greatest risk of disturbance.

¹ New York State Open Space Conservation Plan 2016 is a statewide plan that aims to conserve public and private natural lands.

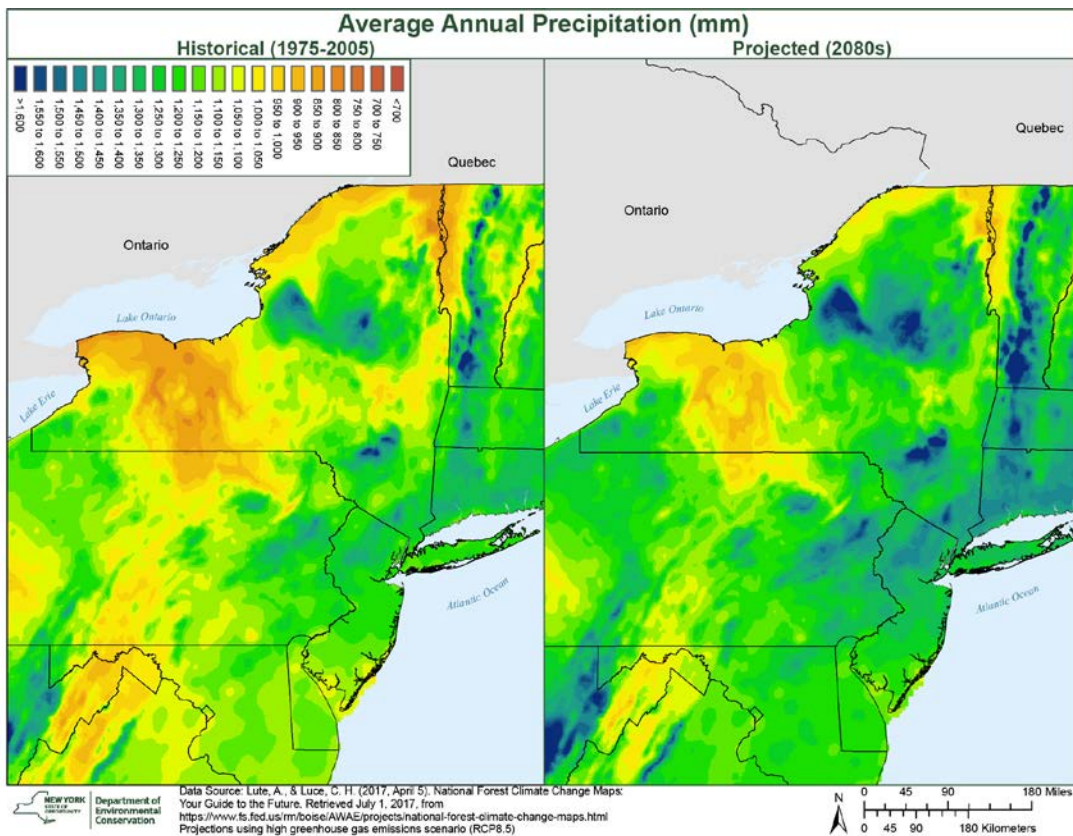
² Mid-Atlantic Forest Ecosystem Vulnerability Assessment and Synthesis: A Report from the Mid-Atlantic Climate Change Response Framework Project identifies the vulnerabilities of forest ecosystems in the Mid-Atlantic region.

³ New England and Northern New York Forest Ecosystem Vulnerability Assessment and Synthesis: A Report from the New England Climate Change Response Framework Project identifies forest ecosystem vulnerabilities in New England and northern NY region.

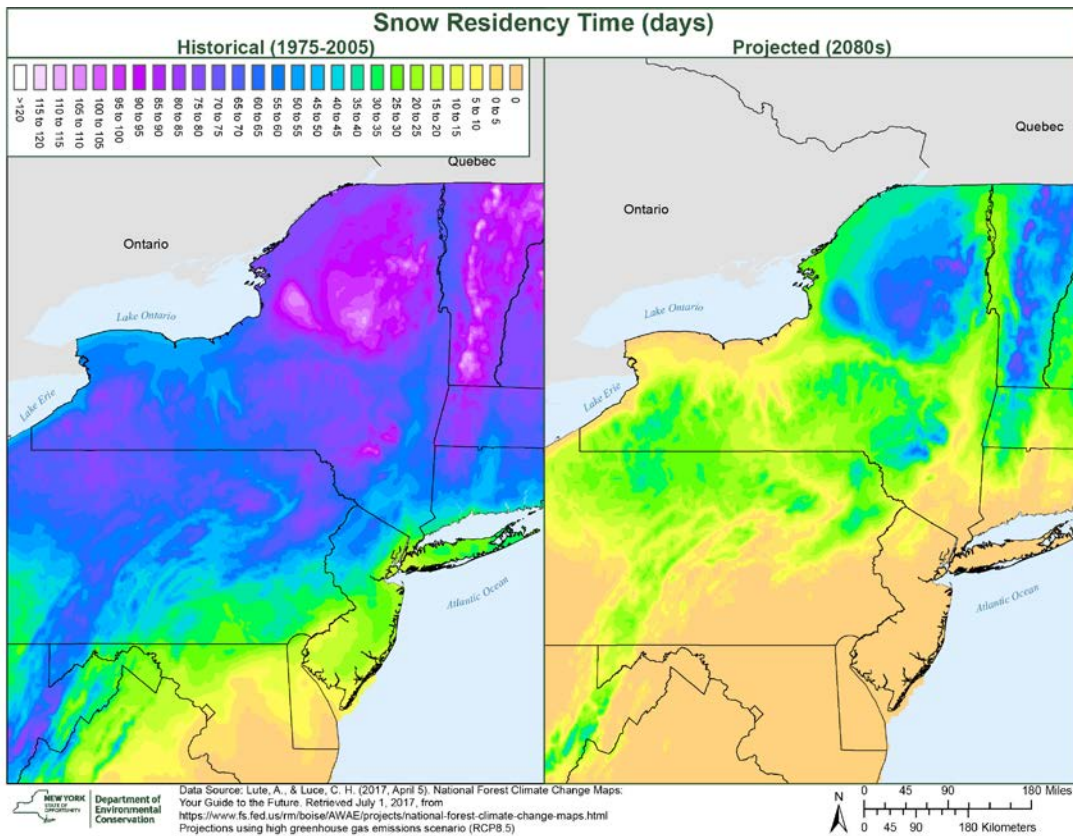
- Temperatures have risen on average 0.25°F per decade over the past century and are expected to rise across New York by up to 10.1°F by 2080, with the greatest warming in the northern regions of the state. This warming includes an increase in the number of extreme hot days (days at or above 90°F) and a decrease in the number of cold days (days at or below 32°F).
- Annual average precipitation in New York is projected to increase by up to 15 percent by the 2080s, with the greatest increases in the northern part of the state. The increased precipitation will not be evenly distributed over the course of the year; much of it is likely to occur during the winter months, while slightly reduced precipitation is possible for late summer and early fall. The recent trend of increased heavy downpours and less light precipitation is expected to continue.
- Conditions affecting tree regeneration and recruitment will change. Seedlings are more vulnerable than mature trees to changes in temperature, moisture, and other seedbed and early growth requirements; they are also expected to be more responsive to favorable conditions.
- Studies have examined the impact of climate change on forest productivity within the Mid-Atlantic region, but they disagree on how other factors such as species composition, stand age, disturbance, or pollution may interact to influence productivity. Changes are not expected to be consistent within a species, and the diversity of forest site conditions across the landscape suggests that changes will be spatially variable.



Map of Current and Projected Average Annual Temperature in New York State



Map of Current and Projected Average Annual Temperature in New York State



Map of Current and Projected Average Annual Snow Cover in New York State

Assessment: Valuing forests for carbon storage and community adaptation

Carbon storage

Forestlands are increasing under pressure from development. The installation of infrastructure can result in forest clearing and could contribute to significant forest loss in New York State. There are many questions with regard to the impact on our forests and forest resources. As in the case of land conversion for development, the impacts of energy infrastructure could be managed if the values that forests provide are recognized fully and balanced appropriately.

Forests are the most productive terrestrial vegetation able to absorb carbon from carbon dioxide and they have the greatest potential for keeping that carbon out of the atmosphere long term. New York's forests help to control global climate change and in doing so, they are providing a critical service to all New Yorkers and the global community. Carbon sequestration in New York's forests is also vital to achieving the State's net zero carbon emissions goal. Based on Forest Inventory and Analysis (FIA) data, New York's forests are storing approximately 1,976 million metric tons of carbon. However, according to the FIA, the net amount of carbon dioxide absorbed each year by New York's forests has been steadily decreasing in recent decades. If this trend were to continue, the annual uptake of carbon dioxide would be 20 percent lower in 2050 compared to 1990. This trend could reflect both decreasing forest area and reduced productivity. The latter may be caused by various factors including invasive species and unsuccessful regeneration.

As the value of carbon sequestration for reducing greenhouse gas levels is becoming better understood, the role of forests in addressing climate change is gaining widespread attention. During photosynthesis, plants use carbon sequestered from the air to grow new tissue, effectively storing carbon. That carbon stays locked up in the plants as they grow, and in the case of wood products, long

Importantly, the value of carbon sequestration is additive—it is a benefit that forests and forest products naturally provide, in addition to all other social, health, environmental, and economic benefits.

This means that the total value of healthy forests is that much higher. It also means that the same strategies that are described throughout this Plan to preserve healthy forests are also strategies for maintaining carbon sequestration.

after the plants have been harvested. When forest biomass is combusted, such as in a wildfire or as a fuel source, this releases the carbon that had been stored. The proper management of combustion is also a key component of maintaining carbon sequestration levels.

Forest stewardship to protect forests from land use changes and encourage productive forest growth and regeneration could increase carbon sequestration. Stewardship actions already taken by the DEC include dual certification through both the Forest Stewardship Council (FSC) and Sustainable Forestry Initiative (SFI) on public lands that are not part of the Forest Preserve.

Community adaptation

Many New Yorkers place a high value on forestlands, whether for recreation, human health, watershed protection, diversity of plants, wildlife, and habitats, or for preserving local markets for forest products such as timber. Forests also aid community adaptation and resilience to climate change. (See also Carbon markets and TNC's Working Woodlands Program. <https://www.nature.org/en-us/about-us/where-we-work/united-states/new-york/stories-in-new-york/new-york-working->

woodlands/.) Sometimes the value of the land may be treated as higher than the forest that grows on it, such as when assessing the property for development or conversion to other uses. Unfortunately, this disregards the cumulative value that forests provide to local and global communities alike for centuries. For example:

- Forests stabilize the surrounding air temperatures and they alleviate extreme heat and desiccation for nearby buildings by providing shade and moisture from evapotranspiration.

- Heavy precipitation and extreme weather events are projected to become more frequent in New York.⁴ For communities, forests are buffers because they absorb stormwater, reduce flooding, and create windbreaks against damaging gusts.
- If sea-level rises 0.33 to 0.63 m between 2080 and 2100, as it is projected to increase under the RCP 6.0 scenario, there will be approximately 1,886,000 people living under the high-tide lines in New York⁵, using 2010 census data. Forests reduce coastline flooding and erosion by anchoring soil and absorbing water, thus they protect threatened communities.

Assessment: Open Space Conservation Plan for forest protection

New York's 2016 Open Space Conservation Plan (OSP) (<https://www.dec.ny.gov/lands/317.html>) identifies priority open space conservation projects that represent unique and irreplaceable open space resources warranting special conservation efforts due to their exceptional ecological, wildlife, recreational, scenic, and/or historical values.

While the Plan focuses on New York's forested landscape, the OSP guides protection of all landscapes in our state: From small pocket parks and community gardens in New York City and other urban areas to large forested tracts in the Adirondacks, to the two remaining Finger Lakes with undeveloped shorelines, all the way to the state's prime agricultural lands. Additionally, the OSP includes an extensive policy discussion covering many topics, including recommendations relating to climate adaptation and mitigation strategies, many involving sustainable forest management and urban forestry. The OSP takes many priorities into account in addition to protecting forests. Moving

forward, the Plan will inform the next revision of the OSP just as the OSP informs the development of the Plan.

The map below represents the priority open space conservation projects as points. However, the project areas vary in size from small parcels to state-wide priorities such as working forest conservation easements (*see more under 'private land easements for forest protection' below*).

Forest-related planning, assessment, policy & law

New York's open space conservation program began in 1990 and was designed to ensure citizen input into the land acquisition decisions made by the Department of Environmental Conservation (DEC) and the State Office of Parks, Recreation and Historic Preservation (OPRHP). Since its beginning, the program developed a comprehensive statewide Open Space Conservation Plan that represents current open space conservation actions, tools,

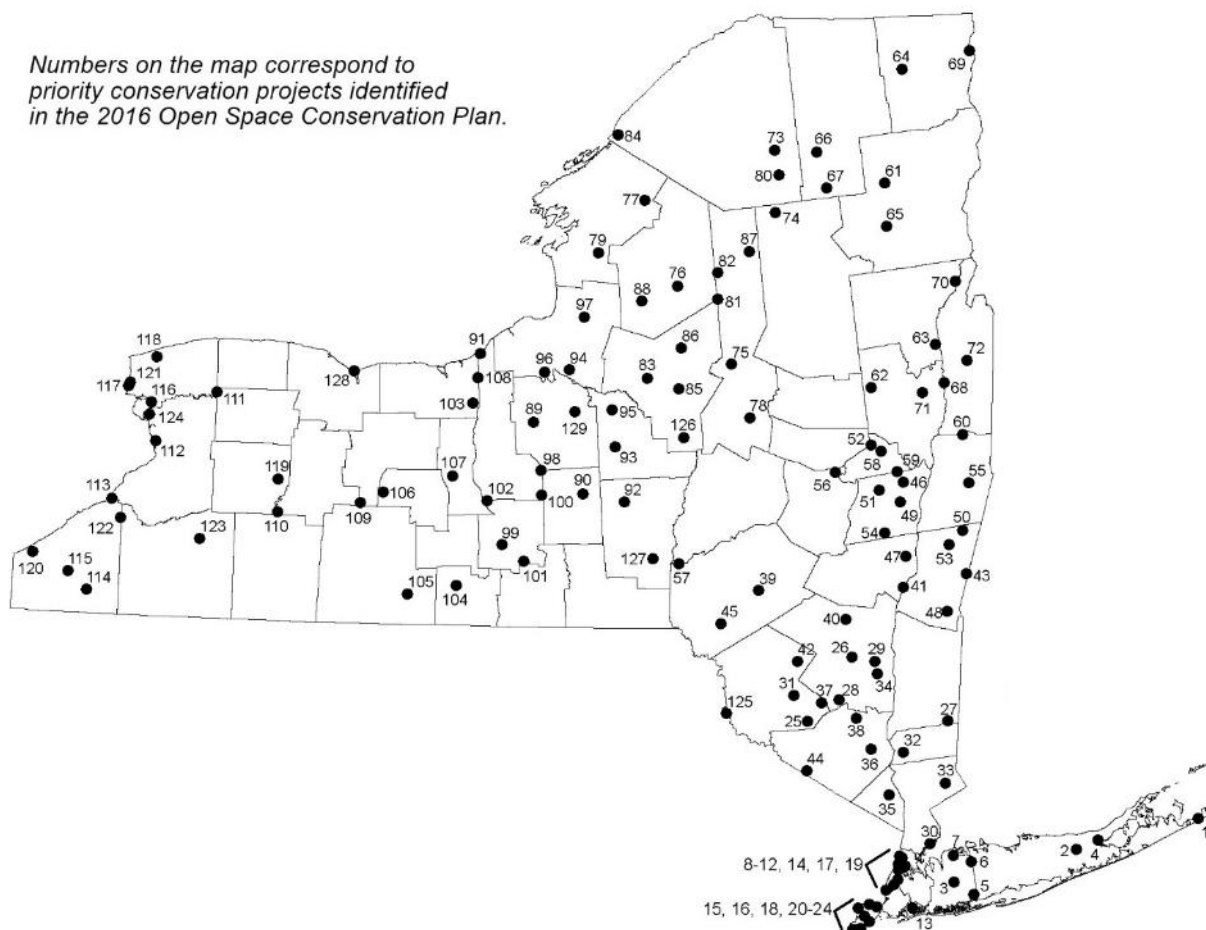
⁴ New York State's 'ClimAID' report is the authoritative resources for observed and projected climate change in the state and is updated based on the global models produced by the Intergovernmental Panel on Climate Change.

⁵ Strauss, B. H., Kulp, S., & Levermann, A. 2015. Carbon choices determine US cities committed to futures below sea level. *Proceedings of the National Academy of Sciences*, 112(44), 13508-13513. doi:10.1073/pnas.1511186112

and programs administered by DEC, OPRHP, the Department of State (DOS), the Adirondack Park Agency (APA), the Department of Agriculture & Markets (DAM), and the Department of Transportation. The OSP has become an important and popular advocacy voice for conserving our state's open spaces—and the quality of life which they provide us.

OSP projects are identified by nine regional advisory committees, in consultation with DEC and OPRHP staff and with comments from the general public. Each project is vetted through a wide spectrum of professional expertise found among committee members and through a consensus-based process.

Numbers on the map correspond to priority conservation projects identified in the 2016 Open Space Conservation Plan.



Map of New York State's Open Space Conservation Plan, 2016

Assessment: Public land purchases for forest protection

New York State has actively purchased land for conservation since 1885. Today, purchased lands must qualify under the OSP and represent a regional conservation benefit such as helping to reduce fragmentation of state lands, protecting water resources, or improving climate resilience. Since the last Forest Action Plan in 2010, New York State has purchased 244,100 acres of forested land. The process to determine what land to purchase will continue to evolve

with the OSP. It is also driven by the public's desire to sell. Landowners interested in selling their land work directly with one of the DEC's 9 regional offices or OPRHP's 12 regional offices where local knowledge of conservation needs is greatest. When a project is first considered, the region will assess how important the acquisition of the project is to the region and will consider the management cost of acquiring the project.

The main funding for land acquisitions by the New York State is the Environmental Protection Fund. There are additional federal funding sources such as Forest Legacy Program (see *below*) and the Pittman-Robertson Act. The latter is used by the DEC to purchase land that is classified as Wildlife Management Area (WMA) and is managed by the DEC's Division of Fish and Wildlife (see *above*, under 'forested state lands'). While not all WMAs are forested, many are. There are a few other funding sources that are employed for land purchases on a smaller scale.

Trends and threats

Due primarily to limited resources, DEC is currently not able to survey all new acquisitions. Sometimes sections of new acquisitions are surveyed, or surveys occur after the land is purchased. This creates a backlog that is constantly expanding as more properties are acquired but do not get surveyed.

Projects acquired by the DEC since 2010 resulted in an additional 2,400 miles of boundary line. Boundaries on forested land are required to be maintained every 7 years. This entails walking the length of boundaries, repainting the blazes, and putting up new signs. The lack of staffing also affects boundary maintenance. When the boundary lines are not maintained, they can be lost. When a boundary line cannot be found, it needs to be resurveyed to locate the line, which is a much more time-intensive and costly endeavor. Unfortunately, projects that need to be resurveyed get added to the backlog of projects.

Another challenge in acquiring land is pushback from municipalities that do not want the state to own more land in their area. This is because the state sometimes pays less or no taxes on land it owns, as well as the municipality's perceived loss of income, or opportunity cost, as the purchased land can no longer be developed or have a higher assessed value. While appreciated, the recreational, human health, water filtration, and other ecological benefits of conserved land do not directly translate to municipal revenue.

Assessment: Conservation easements for forest protection

Conservation easements are another tool to keep forests as forests. They keep land in private ownership and on local tax rolls, while cost-effectively achieving tremendous environmental and outdoor recreation benefits. There are more than 900,000 acres of New York State conservation easement lands in New York State. 90 percent of these easements, i.e., nearly 807,000 acres, are DEC's working forest conservation easements, primarily in the Adirondacks and Tug Hill Plateau. <https://www.dec.ny.gov/lands/41156.html>.

New York State's working forest conservation easements require the landowner to professionally manage their property's forest resources so that the land permanently remains available for sustainable forestry. Most working forest conservation easements provide the landowner the choice of two management options: forest certification program or forest management plan approved by DEC.



Case study: Boreas Ponds. The 20,000-acre parcel was acquired by New York State and added to the Adirondack Forest Preserve in 2016. This parcel was the final piece of a multi-phased acquisition from the Nature Conservancy of 69,000 acres of former Finch Pruyn timberlands.

Just over 710,500 acres of DEC-held conservation easements are certified to the forest management standards of either the Forest Stewardship Council (FSC) or Sustainable Forestry Initiative (SFI), while nearly 482,000 acres are dually certified to both FSC and SFI program standards. About 96,000 acres of DEC-held conservation easement lands are managed under a DEC-approved forest management plan. Under the forest management plan option, the landowner works with a professional forester to create a forest management plan that is then approved by and filed with DEC forestry staff. DEC forestry staff conduct onsite audits to ensure the plan is being followed.

Similar to land acquisitions, conservation easements must be regionally important and fall into one of the categories in the OSP. The combination of the conservation easement tool and the Environmental Protection Fund (EPF) have delivered the most successful conservation results in decades in New York, ensuring that our forests continue to provide environmental and economic benefits.

Threats to conservation easements are similar to challenges of public land purchases for conservation (*see above*), particularly insufficient boundary survey and maintenance due to lack of resources.

Priority Landscapes: Forest Legacy Program

The Forest Legacy Program (FLP) protects environmentally important, privately owned forest areas threatened by conversion to non-forest uses. In New York, the FLP is a partnership between the DEC and the U.S. Forest Service.

The FLP is an entirely voluntary program that encourages and supports acquisition of conservation easements. The FLP requires that all managed forest resources follow a multi-resource management plan. FLP conservation easements restrict building development, protect natural resource values, and provide for public recreation opportunities. The FLP also supports fee-title land purchases in a limited number of situations where state ownership is necessary to accomplish the program's objectives.

Current Forest Legacy Areas (see map):

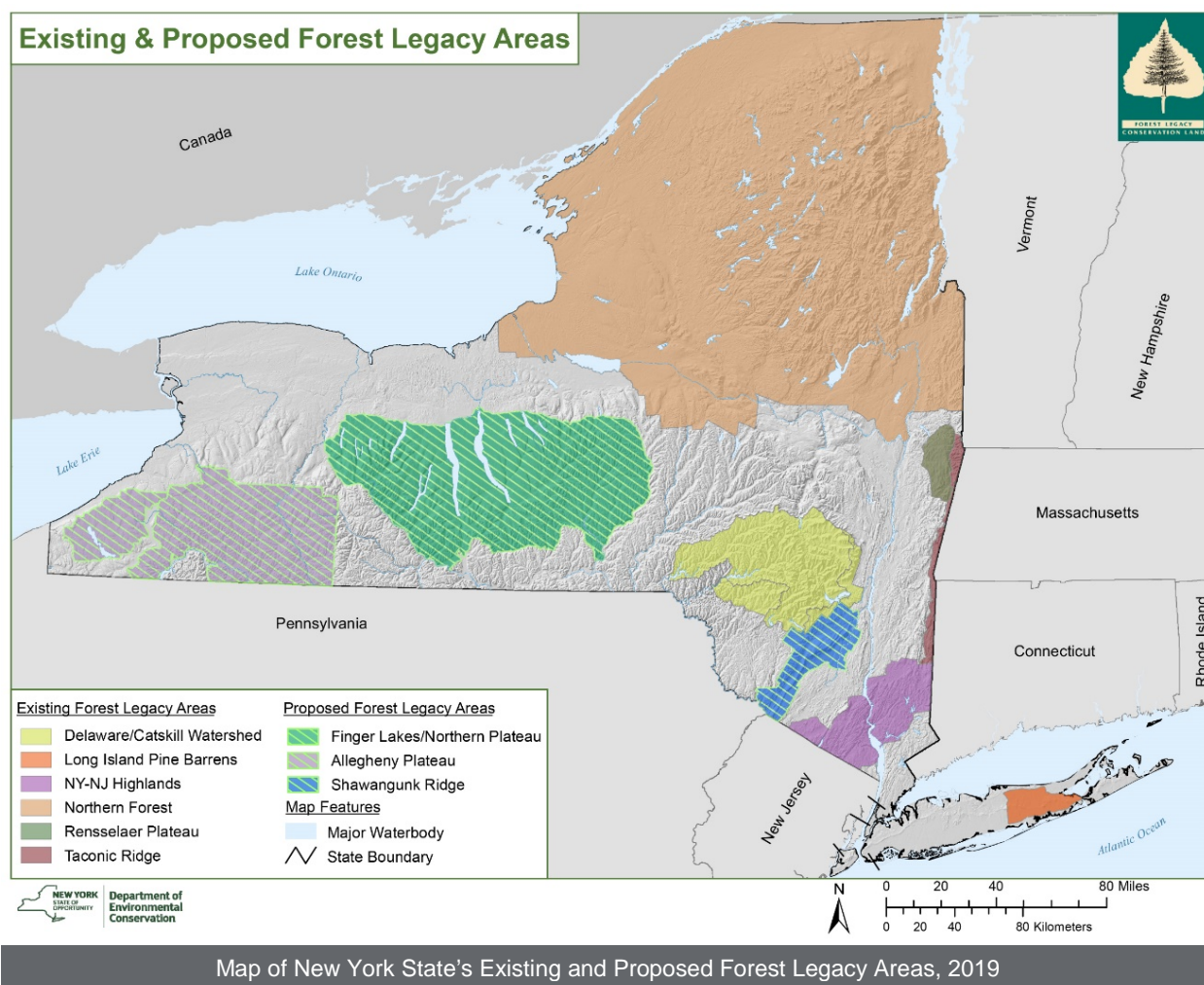
- Northern Forest Lands Study Area
- Taconic Ridge
- New York Highlands and Sterling Forest
- Central Long Island Pine Barrens

- Catskill/Delaware New York City Watershed
- Rensselaer Plateau
- Catskill Park Expansion to Catskill/Delaware New York City watershed

Each state is required to develop an Assessment of Need (AON) which includes a summary of current forest conditions, program eligibility criteria, specific goals and objectives to be accomplished by the FLP, identification of new FLAs for designation, as well as the process to evaluate and prioritize projects considered for inclusion in the FLP.

This Forest Action Plan includes the revised AON (*see Appendix A*). The AON includes new eligibility criteria to bring New York in line with the U.S. Forest Service standards. This AON also requests the addition of two proposed Forest Legacy Areas (see map):

- Allegheny Plateau
- Finger Lakes/Northern Plateau



Priority Landscapes: Metropolitan, urban, and suburban areas

Metropolitan, urban, and suburban areas make up 10.3 percent of New York State's land. Despite this relatively small percentage, these areas provide home to 87.9 percent of New Yorkers, "US Urban Forest Statistics, Values, and Projections" (Nowak et al. 2018). Contributing to more livable urban and suburban communities for our residents represents a priority for DEC.

The reasons are two-fold. On the one hand, fostering a healthy green infrastructure, i.e., the planting and care of community trees, represents a wise investment in what is perhaps the only part of a city's infrastructure that increases in value and contributions provided over time. (Collectively, community trees can be thought of as a city's green infrastructure, while a city's roads, sewers, bridges, and water

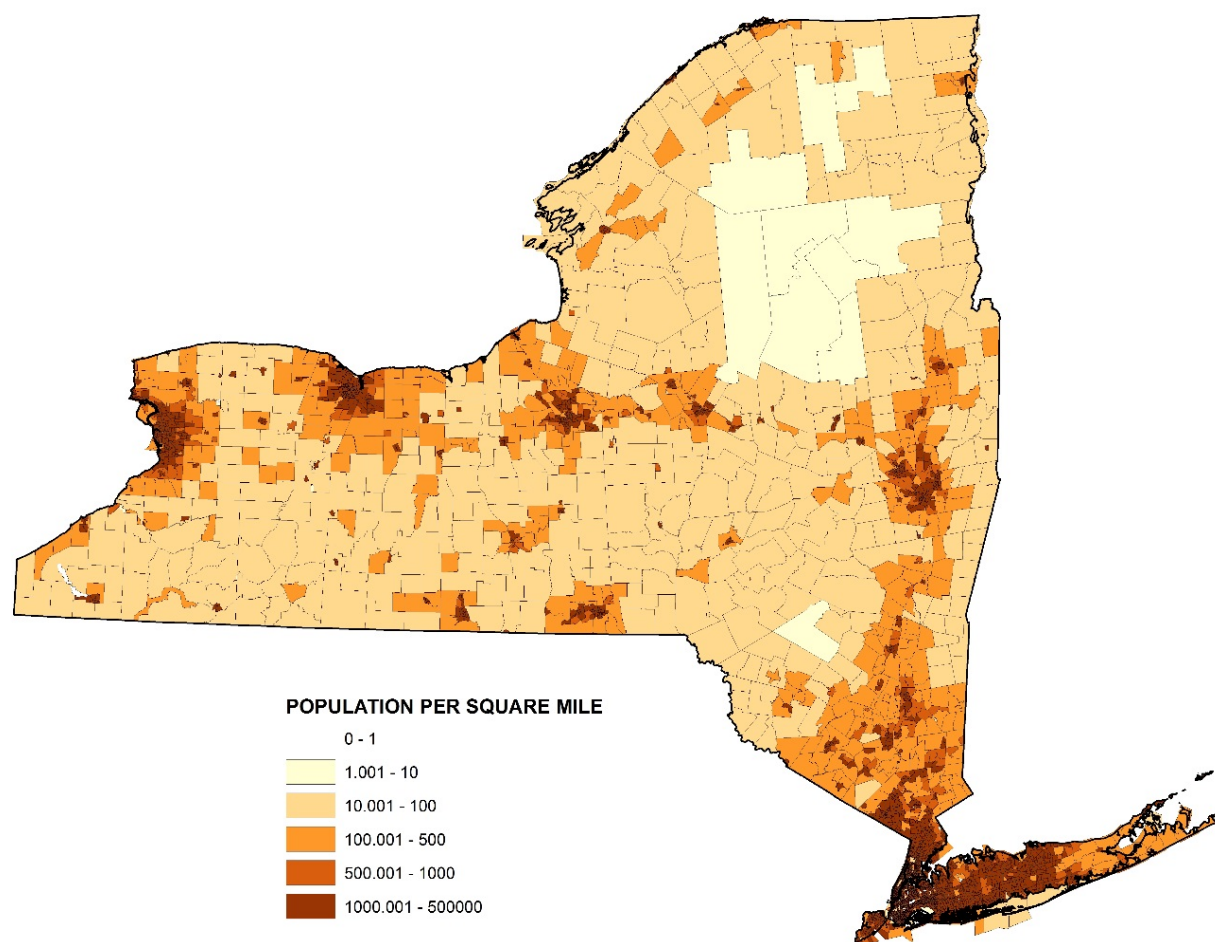
DEC recognizes that it is through this urban or suburban green infrastructure that the majority of our state's residents get introduced to the joy and benefits from trees and forests. Without this connection, we cannot foster support for New York's forests among the general public.

treatment plants comprise its gray infrastructure.) Among other benefits, this green infrastructure generates distinctive and attractive areas with a strong sense of place and walkable neighborhoods with opportunities for passive recreation, while also helping to protect the natural beauty and important environmental areas of New York's urban and suburban settings.

New York's Urban and Community Forestry Program (UCF) (<https://www.dec.ny.gov/lands/4957.html>) is a partnership between DEC forestry professionals, public and private individuals, and volunteer organizations who care about trees in urban settings. The program's priority is to enhance urban and community forests via educational workshops, forester/arborist contacts, financial assistance, and access to the latest research.

The program's goals include:

- Increase the number of communities reaching "developing" and "managing" status;
- The integration of UCF into all scales of planning;
- Promote the role of UCF in human health and wellness;
- Promote the role of UCF in mitigating the effects of climate change on communities;
- Strengthen partnerships to help improve management, maintenance, and stewardship;
- Increase funding for UCF;
- Protect urban and community forests against threats from exotic invasive pests;
- Promote and increase utilization of waste wood from urban and community forests; and
- Encourage preparation for severe storms and the recovery of damaged landscapes.



Map of New York State's Population Density, 2010

Focus Area: Private forestland protection and management

New York's Forest Tax Law, 480a, was enacted in 1974 to provide private forestland owners a tax benefit to continuously produce a merchantable forest crop under an approved forest management plan. To obtain such a plan, landowners with 50 or more eligible acres can task a private consulting forester to write a forest management plan, which is then reviewed/approved by DEC staff. As of 2018, there are over 3,400 forest landowners and 1.2 million acres of private land under professional forestry management.

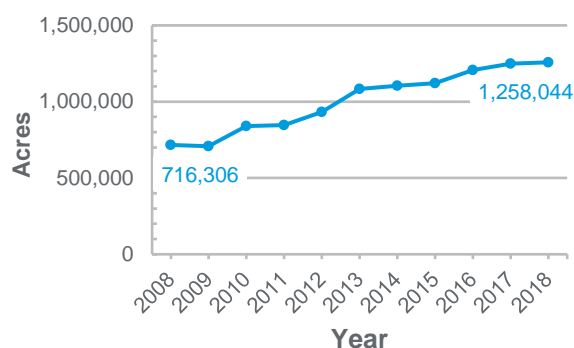
Participation in the State Forest Tax Law Program is voluntary, although it includes a rolling 10-year commitment to follow the accepted forest management plan. There are substantial penalties for failure to follow the plan or for conversion of any of the enrolled acres.

An ancillary benefit of the program is the fact that due to high penalties for conversion to a non-forestry use, properties enrolled in 480a tend to remain as intact forest tracts. Most of the forest tax enrollees are in the eastern half of the state. In the North Country, tracts enrolled in 480a tend to be larger, due to the presence of Timber Investment Management Organizations (TIMOs). Enrolled properties in the rest of the state tend to be owned by individuals or families and be smaller in size. The program is becoming increasingly popular in the western and central parts of the state as real estate tax burdens on family forest owners continue to rise in these areas.

One of the great barriers to enrollment in 480a is the need for landowners to own 50 acres of eligible forestland to qualify. This is a high minimum acreage in comparison to other states. The strict penalties and regulatory oversight of the program also can deter landowners from

Unfortunately, lands under New York State tax law represent only 8.5 percent of the total privately held forestland in New York State.

Acres Enrolled in 480a, 2008–2018



enrolling. An additional limiting factor in enrollment is the program's statutory focus on managing for timber production. Many landowners own their forestland for reasons other than timber, such as wildlife, aesthetics, and recreation.

The public also benefits from the ecosystem and economic services private forest landowner provide by holding on to intact forestland, such as clean water, clean air, carbon storage and sequestration, aesthetic beauty, wildlife habitat, and contributions to a robust rural economy. Also, the services demanded from local municipalities by undeveloped forestland are few, except for road maintenance for access.

Recognizing all the benefits private forest landowners provide and why they own forestland is paramount to designing future financial incentives to help owners keep their forests and manage them sustainably.

Focus Area: Private forest stewardship program

New York's Private Forest Stewardship Program is a partnership with the U.S. Forest Service's Forest Stewardship Program, which was established in 1991, under the authority of the Cooperative Forestry Assistance Act of 1978. Between 2010 and 2017, this program was responsible for the development of 3,744 Forest Stewardship Plans, covering 554,000 acres across our state. Since 1949, when New York's Forest Practice Act was adopted, DEC (and its predecessor, the New York State Conservation Department), has been providing forest management planning advice and assistance to private forest owners.

The goal of the Forest Stewardship Program is to provide sound, unbiased forest management advice to private forestland owners in New York State. For many landowners, contacting a DEC Forester for advice is the first step on the road to sound forest management of their woodlot. There is a large forestry education component to the program, and landowners often develop a long-term relationship with their DEC Private Lands Forester that is passed down through generations. Traditionally, DEC has delivered this program through landowner visits, forest stewardship plans, and technical assistance. The focus in the past 30 years has specifically been on management plan preparation. However, research has shown that forest management activities not paired with incentives or regulation to achieve recommended conservation practices necessarily improve with a voluntary plan (Van Brankle, 2006).

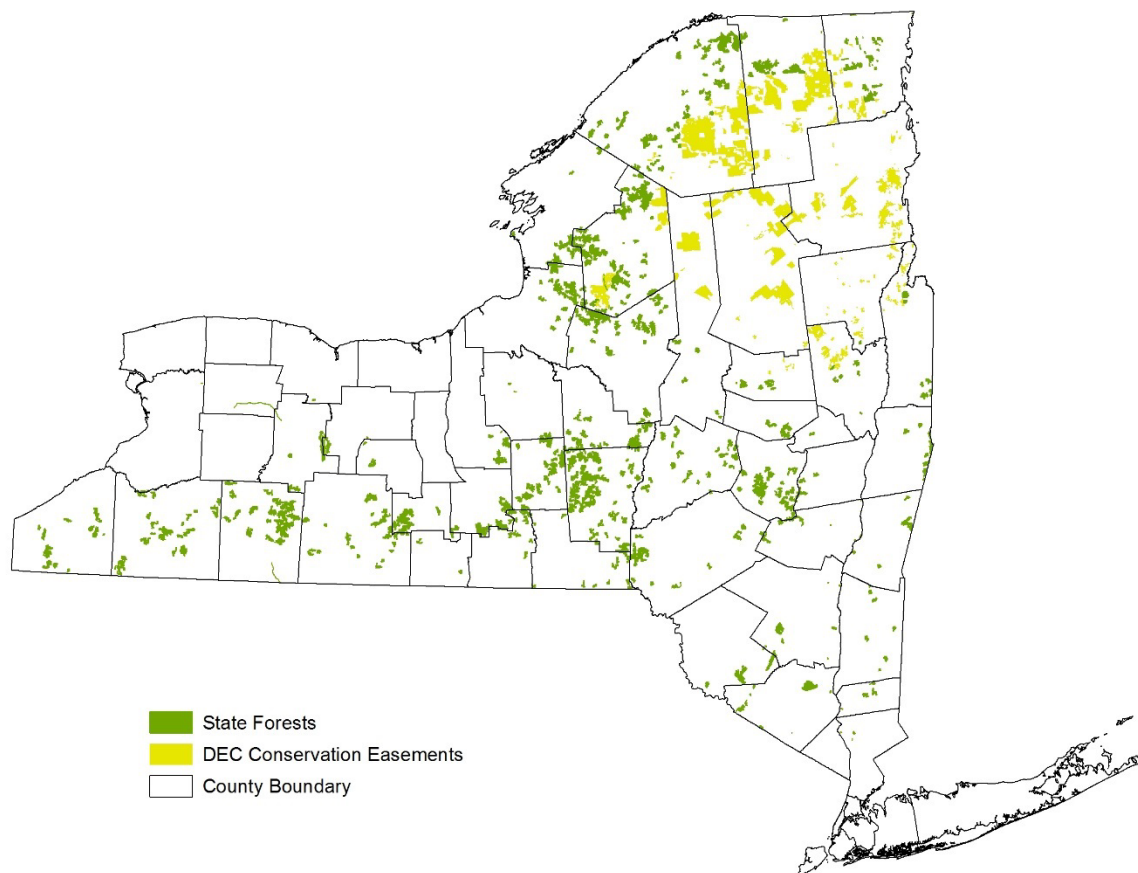
The general public continues to benefit from the ecosystem services provided by privately owned forests. Since most of the forestland in New York is owned, and will continue to be owned, by individuals, it is imperative to continue and even enhance our outreach to landowners and the general public about the importance of forest stewardship. The continuing challenge for the program moving forward is to find innovative techniques to reach as many landowners as possible, and for landowners to then perform sound forest management on their property.



The Benefits of Long-Term Forest Stewardship: On a brisk day in March 2019, DEC Region 7 senior forester Matt Swayze met with the Sykes family of Onondaga County to update their forest stewardship plan. The Sykes' forest ownership is especially significant as it is in the headwaters of Carpenter's Brook, a popular trout stream that supplies clear, cool water to the county's fish hatchery. Matt is the third DEC forester to work with Mr. Sykes, who has collaborated with DEC for nearly three decades. Over the years, DEC has provided technical guidance regarding precommercial thinnings, recreational trail layouts, wildlife habitat improvements, tree plantings, and watershed protection. The relationship between the Sykes family and DEC foresters has been mutually beneficial, with both parties learning from each other during every site visit.

Third-party certification programs on public/private forestlands

Most of the forest management standards and guidelines for privately owned/family forests are ultimately voluntary. The private sector certification programs for industrial and family forests are all voluntary in nature. In each of these programs, a landowner voluntarily enrolls and agrees to manage his/her forest to the standards of the program. The landowners can also voluntarily remove their properties from the programs with little or no penalty to the individual landowner.



Map of New York State's Certified Forest Lands, 2019

Private Certification Programs:

- American Tree Farm System (ATFS)
http://www.treefarmssystem.org/cms/pages/26_19.html
- Sustainable Forestry Initiative (SFI)
<http://www.sfiprogram.org>
- Forest Stewardship Council (FSC)
<http://www.fscus.org>
- Program for Endorsement of Forest Certification (PEFC) <http://www.pefc.org>

There is increasing interest in and promotion of third-party certification systems (SFI, FSC, ATFS, PEFC) prompted by the certifying entities, environmental non-government organizations (ENGOS), environmentally conscious consumers, and corporations that target those consumers. Government organizations and elected officials are also targeted to specify use of certified or sustainably produced wood products for publicly funded projects or purchasing.

The map above includes state-owned certified acres as well as state-held working forest conservation easements in the Adirondack Park that are certified, mostly under FSC or SFI. Throughout New York, there are many more acres of private forestlands certified under several programs, including:

- 624,922 acres are SFI-certified,
- 571,918 acres are FSC-certified,
- 508,987 acres are in the American Tree Farm Program
- 5,749 acres are certified under Green Tag

Note: These acreage figures cannot be added together as there is considerable overlap between them with numerous properties holding dual certification (SFI and FSC, ATFS and FSC, or ATFS and Green Tag). The largest single block of (dual-) certified forestland is the 764,050 acres of state forest managed by DEC.

Focus Area: Indian Nations in our state

Before New York State was established, indigenous peoples lived in, cared for, and used these forestlands. Today, there are eight (8) federally recognized Indian Nations and three (3) state-recognized Indian Nations in New York. See '*Map of New York State's Federal Lands and Indian Reservations*' under 'Federal lands with Significant Forests' above in this Assessment section. Indigenous people continue their use of and care for forests. Both on reservations and throughout aboriginal territories, forests are considered essential for indigenous culture, health, and economic well-being.

The United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), adopted by the UN in 2007, guarantees indigenous peoples rights to "lands, territories and resources which they have traditionally owned, occupied, or otherwise used or acquired," including forestlands. See "Who are indigenous people?" at https://www.un.org/esa/socdev/unpfii/documents/5session_factsheet1.pdf.

DEC is engaged in a process of understanding how to meet the requirements regarding indigenous peoples' rights, consistent with the agency's conservation responsibilities. The Center for Native Peoples and the Environment at SUNY-ESF has been working to facilitate this process through outreach and engagement with Indian Nations. See https://www.un.org/development/desa/indigenouspeoples/wp-content/uploads/sites/19/2018/11/UNDRIP_E_web.pdf.

DEC is engaged in a process of understanding how to meet the requirements regarding indigenous peoples' rights, consistent with the agency's conservation responsibilities. The Center for Native Peoples and the Environment at SUNY-ESF has been working to facilitate this process through outreach and engagement with Indian Nations.

United Nations Declaration on the Rights of Indigenous Peoples

ARTICLE 26

1. Indigenous peoples have the right to the lands, territories and resources which they have traditionally owned, occupied or otherwise used or acquired.
2. Indigenous peoples have the right to own, use, develop and control the lands, territories and resources that they possess by reason of traditional ownership or other traditional occupation or use ... or have otherwise acquired.
3. States shall give legal recognition and protection to these lands, territories and resources... with due respect to the customs, traditions and land tenure systems of the indigenous peoples concerned

ARTICLE 25

Indigenous peoples have the right to maintain and strengthen their distinctive spiritual relationship with their traditionally owned or otherwise occupied and used lands, territories, waters and coastal seas and other resources and to uphold their responsibilities to future generations...

Strategy: Actively pursue afforestation and forest restoration efforts

Maintaining or even increasing the percentage of forestland in the state, either by encouraging new areas of non-forest to revert or by planting, serves multiple benefits. It maintains young forests for wildlife habitat, helps to sequester and store more carbon, and provides storm resiliency along stream buffers, just to name a few. Known and unknown pressures on existing forests may encourage the need to establish new forests.

- Develop and grow the newly created “Regenerate NY” cost-share program to improve forest regeneration on private forestland throughout New York State. This state-funded program will be available to forest landowners by 2020, and will help defer the cost of forest regeneration practices such as interfering vegetation control, tree planting and maintenance, and site preparation. Deer fencing and tree protection are among the funded practices.
- Promote and encourage planting projects on state and private lands that use locally sourced plant material to help maintain diverse habitats for wildlife. For example, DEC’s Col. William F. Fox Memorial Saratoga Tree Nursery promotes and encourages various planting programs. Seedlings are used on many planting projects in state forests, and they are also available to the public. For more information see: <https://www.dec.ny.gov/animals/61320.html>.
- Identify old fields that have stagnated with regards to tree regeneration and promote planting and restoration efforts on these lands.
- Promote the “Trees for Tribs” program to help enhance riparian areas and restore damaged streamside and wetland areas. The goal of the program is to plant young trees and shrubs along stream corridors, also known as riparian areas, to prevent erosion, increase flood water retention, improve wildlife and stream habitat, and protect water quality. Trees for Tribs has engaged more than 8,700 volunteers in planting more than 101,400 trees and shrubs at 600+ sites across New York State. The plants are exclusively native and chosen based on location, soil type, site conditions, planting goals, etc. Diversity in plantings is a main goal of the program; some examples are red osier dogwood, wetland rose, elderberry, river birch, red oak, sand cherry, winterberry, silky dogwood, and northern white cedar. <https://www.dec.ny.gov/animals/113412.html>.



Young “Trees for Tribs” program participant

- Educate young generations about the importance of planting native trees. Partner with schools to grow, plant, and maintain trees, and continue the school seedlings program that provides free seedlings to local schools. Since 1985, 23,779 orders were placed by schools or youth programs, and DEC has provided 879,150 seedlings. <https://www.dec.ny.gov/animals/9393.html>. Consider replicating successful watershed forestry education programs by New York City's Watershed Agriculture Council.
- Complementing the Trees for Tribes program's efforts in mostly rural areas, trees in urban and suburban areas are being planted as well, with the implementation of the Buffer in a Bag program in 2019. <https://www.dec.ny.gov/animals/115903.html>.

Strategy: Maintain and restore connectivity between fragmented and parcelized forestland

- Continue the multipronged approach to conserving or restoring landscape connections between fragmented and parcelized forestland, including community-level conservation, planning, and zoning; statewide tax law; private conservation easements; and state, municipal, and non-profit land purchases.
- Continue conservation or enlargement of forest blocks through public and non-profit land acquisitions, conservation easements, and private land recruitment through tax incentives or other measures, which is essential to keeping fragmented and parcelized areas connected. These conservation efforts will also reduce the threat of subdivision and land use change. See DEC's efforts to connect New York's state forests and map of forest matrix blocks, as well as TNC's work on regional connectivity:
- https://www.dec.ny.gov/docs/lands_forests_pdf/sfconnectivity.pdf
https://www.dec.ny.gov/docs/lands_forests_pdf/sfconnectivity.pdf;
<https://databasin.org/datasets/e6c7374107624643be052c44d29ad246>.
- Strive to maintain connectivity among forested habitats to allow movement of wildlife including their migration in response to climate change, and also maintain the health of the habitat itself. Similarly, establish connections to improve the ability of tree or other plant species in isolated or fragmented landscapes to migrate in response to climate change. Public land acquisition is also a valuable tool to protect forests with vulnerable species that are under high development pressure.
- Continue DEC's targeted land and easement acquisition program, which has a list of qualified categories. Reducing fragmented and parcelized forests is a targeted acquisition category. Lands or easements that can be purchased to connect fragmented or parcelized forests are usually of high regional importance and pursued by DEC. When a land acquisition or easement project is first considered, management costs are considered as a component of the overall project cost.

- Support community-level land use planning, which is critical for maintaining and restoring forest connectivity. See our strategy to ‘*support forest-protection-minded local planning and zoning efforts*’ under Goal #4.
- Explore partnerships and creative/innovative solutions or funding sources to conserve forests.

Case Study: Hand Hollow State Forest.

Hand Hollow in New Lebanon, New York was created in 2014 with the purchase of 216 acres. Currently, Hand Hollow is 518 acres, with more acreage to be acquired in the future. This state forest includes a 10-acre lake, as well as opportunities for hiking, biking, skiing, paddling, and snowmobiling. With the adjacent 447 acres owned by the Columbia Land Conservancy, the state forest creates a large contiguous protected area.

Hand Hollow is one of the newest state reforestation areas acquired, and it exemplifies its traits: “forever devoted to reforestation and the establishment and maintenance thereon of forests for watershed protection, the production of timber, and for recreation and kindred purposes” (Article 9, Title 5, Environmental Conservation Law).



Strategy: Establish buffers for existing protected forests through partnerships

Buffers adjacent to protected forestlands serve to minimize conflicts with neighbors, avoid land use change, support and improve connectivity between forest blocks, and keep forests as forests.

- Establish buffers for already protected forestlands through partnerships, for example with municipal governments, nongovernmental organizations, or conservation-minded neighbors.
- Manage these buffers through conservation-minded land use practices.
- Establish buffers through a variety of means: engagement with private neighbors or stewardship partners, municipal zoning guidelines, easements, Critical Environmental Areas, overlays, and land acquisitions.

Case Study: Conserving critical environmental areas.

The undeveloped Rondout Valley in Wawarsing, New York connects the unfragmented forests of the Shawangunk Ridge and the Catskills. The area is a priority regional project in the New York State Open Space Conservation Plan, 2016. Wawarsing also recognized the value of the Catskills-Shawangunks corridor as an important community resource in its 2014 open space inventory, 2015 comprehensive plan, and 2018 open space plan. (The town received funding and technical assistance for the open space inventory and open space plan from the DEC's Hudson River Estuary Program.) The town recommended the designation of Critical Environmental Areas (CEAs). Two CEAs were adopted in 2019.

One was the 3,000-acre Catskill-Shawangunk Greenway Corridor, a recreational link and agricultural and tourism potential. The community also cited the corridor's biodiversity: "this may be the only remaining land complex that can provide ... habitat connection between two ... prominent conservation areas in New York." The second, 8,000-acre CEA will help to protect Cedar Swamp, one of the largest wetlands in the Catskills that was also highlighted in the town's and State's open space plans. Cedar Swamp contains rare species and more than 800 acres of forested wetlands with nearly 500-year-old trees.



Marsh in the Cedar Swamp CEA.
Photo by Laura Heady, DEC

Strategy: Promote more community-owned forests in urban and suburban areas

Encouraging municipalities to purchase, develop, or enhance current greenspaces is critical. However, since many municipalities won't know where to begin without help, providing technical assistance to local planning efforts is essential. Municipalities will also need help to ensure their forests are sustainable in the long run, as they address challenges such as deer browse or opposition to hunting in suburban areas.

With a large portion of the state's population residing in metropolitan, urban, and suburban areas, it is important that DEC's Urban and Community Forest Program not only works with municipalities but also with the general public. Education is a key component to connecting people with trees and recognizing their benefits. Simply getting the public outside, walking amongst the trees along a street or in parks, is an essential step. It is key in securing the public's support for government funding of community-owned forests. In addition, engaging students, from k-12 and colleges, to assist with these efforts will benefit current and future generations.

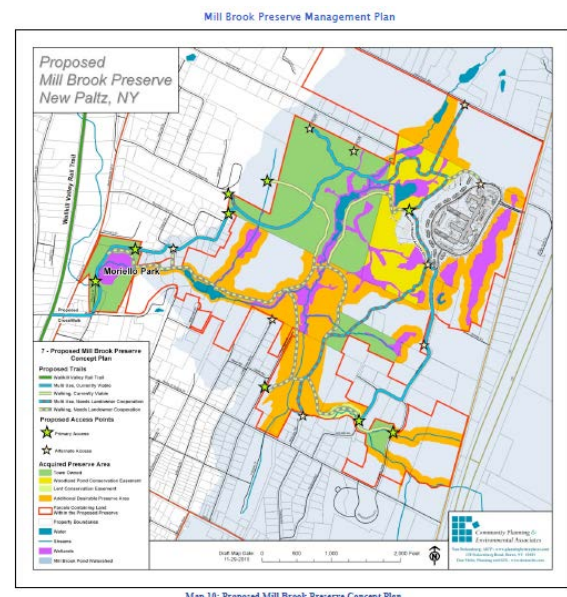
- Encourage communities with opportunities for community-owned forests to establish them.
- Communicate the benefits (health and economic) of green spaces.
- Create a statewide campaign to encourage municipalities and community groups to buy open space for public use.
- Encourage communities to convert vacant lots to public parks/forest areas.
- Provide technical assistance to municipalities, such as creating natural resource inventories, mapping and data analysis, watershed protection, community planning, etc., to obtain, increase, and enhance community owned-forests
- Continue to work with volunteer groups, colleges and schools to promote the benefits of urban and community forests
- Utilize waste tree wood from municipal-owned properties for future projects (park benches, shelters, etc.)

Case study: Mill Brook Preserve in New Paltz, New York: The Open Space Committee of New Paltz Village, New York developed the Mill Brook Preserve plan in 2014, with collaboration between landowners, neighbors, government, and the public. Consisting of stream, wetland, and upland habitats nestled in the Village, the undeveloped area contributes much to the quality of life: recreation, water pollution prevention, wildlife habitat, and a unique “wilderness in the city” character due to the proximity of the urban Village. The tributaries and their surrounding lands make up one of the last remaining undeveloped areas in the Village.

The proposed preserve serves a model in the region for how urbanized areas can have a positive relationship with the local natural systems to make human and natural communities mutually supportive and sustainable. The Preserve will provide a retreat where people can recreate and contemplate the natural world.

From 'The Mill Brook Preserve,' 2014

http://www.townofnewpaltz.org/sites/newpaltzny/files/file/file/mill_brook_preserve_management_plan-final_08.28.2014_01.pdf.



From 'The Mill Brook Preserve,' 2014

Strategy: Help private landowners keep and manage their forests sustainably

Helping New York's private landowners keep and manage their forestland benefits all New Yorkers. To reach our objective of increasing private forestland under professional forest management from the current 1.7 million acres to 5 million acres by 2030, the following actions will be taken:

- Create efficiencies in enforcing the current 480a tax law program through regulation reform and modernization efforts that will allow field staff to spend more time in the field and less time administering the program.
- Explore developing a "Call before you Cut Program" to connect landowners with a professional forester before harvest. This allows the forester to visit with a private landowner at the very pivot point when they identified the opportunity for a harvest. Many states have implemented this program.
- Work with partners to create new financial incentives to offset the costs of ownership and forest management for private forest landowners. Specifically allow for ecosystem management and services as well as traditional timber management.

Increase the number of acres of private forestland under professional forest management from 1.7 million acres currently to 5 million acres by 2030.

Only 1.7 million acres, or 12 percent of the state's private forestland, are currently under 480a tax law plan or a U.S. Forest Service Forest Stewardship Plan.

- Develop and grow the newly created "Regenerate NY" cost-share program to improve forest regeneration on private forestland throughout New York State. This New York State funded cost-share program will be available to forest landowners in 2020.
- Establish a Forest Conservation Easement Land Trust Grants program to protect private forestland. This program would focus on protecting smaller parcels, including working forests, from development.
- Investigate techniques that encourage forest landowners to incorporate forests and forest management planning into estate planning. Specifically support Cornell's "Your land, Your legacy" program.
- Increase technical assistance to DEC staff for on-the-ground practices such as timber stand improvement, tree planting BMP layout, etc.

Strategy: Continue research and assessment efforts to document forest resources

Continue to foster research projects in state forests and forest preserves by swiftly reviewing proposed protocols in a timely manner and, where appropriate, issuing permits. Research,

field assessment, and mapping of various invasive species, tree diseases, and other topics are proactive ways to decide how to manage our forests in the future.

Strategy: Understand and respond to negative effects of climate change on forests

As forests face new stresses from climate change, stewardship needs to anticipate threats and work to minimize their effects on forests. Changes in climate and extreme weather events are also expected to affect infrastructure such as roads, bridges, and culverts on forestlands and will require our adaptive approach.

Land conservation planning is expected to include more emphasis on climate adaptation strategies related to carbon mitigation, refugia for at-risk species and habitats, landscape connectivity for migration pathways, and water supply protection.

- Partner with academic, federal, and other entities to research effects of climate change on forests.
- Working with partners, identify areas with high connectivity and biophysical complexity (TNC's "Resilient and Connected Network for New York State") as well as ways to determine how ecosystem drivers and stressors will change in a particular area or for a particular forest community.
- Working with partners, provide technical assistance to forest managers to incorporate best management practices and stewardship strategies, based on the best available science, into the management of public and private forests.
- Ensure accessibility of climate science and resilience data to support state agencies, local governments, land trusts, and others in integrating climate change resilience into local and regional community planning as well as conservation planning.
- Increase protection of resilient sites for species and communities, including evaluating New York's existing conservation lands to identify gaps that need to be filled to ensure conservation of the full range of habitats to support the state's biodiversity.
- Protect unique forest areas as refugia for at-risk plant and animal species.
- Work to increase connectivity of vulnerable forests where connections would benefit the migration of species while continuing to isolate areas where invasive species pose a threat.
- Adjust the timing of activities, including timber removal, prescribed fire, and recreation as temperatures and precipitation patterns change.

As our climate changes, we may also need to prepare for the following:

- As wildfire risks increase, more resources may be needed to reduce fuel loads, suppress fires after ignition, and manage ecosystems affected by wildfire.
- To manage forests and infrastructure, as well as to prepare for severe weather events, greater financial investments may be required.
- Management activities such as wildfire suppression or recreational activities such as snowmobiling and skiing may need to be altered as temperatures and precipitation patterns change.

- Increase protection of resilient sites for species and communities, including evaluating New York's existing conservation lands to identify gaps that need to be filled to ensure conservation of the full range of habitats to support the state's biodiversity, protect water quality, and mitigate climate change. This is currently done by regional DEC staff identifying the gaps and new projects that are regionally significant as well as by coordinating with central office staff to acquire regionally important projects from willing sellers.

The effects of climate change on forests and the essential role that forests play in mitigating climate change are outlined in Goal #1. Strategies to support forest management to address climate change are outlined under Goal #3.

GOAL #2:

Keep New York's Forests Healthy

The combination of numerous stressors such as invasive species, increasingly severe and frequent weather events, a changing phenological calendar, unsustainable management practices and/or recreation, and localized imbalances of wildlife populations, along with outright loss of forests to development or agriculture, all threaten to undermine the health of New York's forests. In many cases, these stressors may increase or accelerate the damage, and complicate the diagnosis and management of agents that impact forest health. Jointly with the first goal to keep New York's forests as forests, we strive to ensure our forests remain resilient, adaptive, ecologically intact living systems.

This overarching goal supports all three National State & Private Forestry Priorities. Not only do our strategies “*protect forests from threats*,”

“Nature has introduced great variety into the landscape, but man has displayed a passion for simplifying it. Thus, he undoes the built-in checks and balances by which nature holds the species within bounds.”

RACHEL CARSON, SILENT SPRING

including invasive species, a changing climate, and other stressors, they also “*enhance public benefits from trees and forests*” through continued research, assistance to private forest owners, targeted forest fire management, and implementing indigenous knowledge. This goal also supports the priority to “*conserve and manage working forest landscapes for multiple values and uses*,” since resilient, adaptive, and biologically diverse forests can be managed for a variety of benefits and values.

Assessment: Forest health affected by potentially damaging agents

Invasive pests, plants, and pathogens

The major contributors of annual damage to forest resources are from exotic invasive species like the emerald ash borer and southern pine beetle. Some large areas are affected by defoliation events caused by the gypsy moth or the forest tent caterpillar. The damage from these insects is exhibited in a cyclical nature, with few areas suffering more than three consecutive years of defoliation. Other agents of interest are flooding caused by beavers; breakage caused by wind and ice storms; declines in spruce, maple, and white pine from a variety of known and uncertain agents; wildfires; and more.

DEC conducts annual aerial and ground surveys to evaluate population trends of pests known to cause serious damage to forests and to determine the impact and cause of health problems on tree species or sites of concern. Most of the aerial observations lead to a ground-based inspection, and forest health diagnostic laboratory staff identify the damage-causing agent and store specimens.

New York's forests are facing accelerated threats from invasive insects, plants, and diseases, often brought into our country through international trade. The effects to our forests from these invasive agents are similar to the impact of western wildfires. These agents can potentially destroy millions of acres of trees, and even eliminate certain species from our ecosystems. They can drastically alter wildlife habitats, harm water quality, and reduce carbon sequestration by our forests. In addition, they

may devastate forest-based industries, restrict recreational opportunities, and damage the tourism industry. Forest pests also affect the health of our watersheds, with consequences for human health.

As previously mentioned, New York contains 18.9 million acres of forestland, more than any other state in the New York-New England region. This vast forest provides a tremendous

challenge to monitor for the presence of invasive pests and diseases. Once a pest is detected, it is necessary to determine the extent of the affected area and estimate the potential impact. An initial rapid response may have to be followed by a more extensive eradication effort. Elm, chestnut, and butternut have been virtually wiped out of our rural and urban forests because of introduced diseases. It is impossible to predict what pathogen will cause the next extirpation.

| Select List of Significant Damage-Causing Agents in New York's Forests | | |
|--|--|---------------|
| Agent | Forest Type Affected | Native/Exotic |
| Lepidoptera (moths & butterflies) | | |
| Cherry oystershell moth | Prunus: cherry, apple, etc. | N |
| Fall webworm | Maple, birch, poplar | E |
| Gypsy moth | Hundreds of plants, especially oak, aspen | E |
| Spruce bud worm | Spruce, balsam | N |
| Tent caterpillars | deciduous | N |
| Winter moth | Coniferous, deciduous, berries | E |
| Adelgids | | |
| Balsam woolly adelgid | Fir | E |
| Hemlock woolly adelgid | Hemlock | E |
| Coleoptera (beetles) | | |
| Asian long horned beetle | Deciduous, especially maple | E |
| Brown spruce longhorned beetle | Spruce | E |
| Emerald ash borer | Ash | E |
| Hickory bark beetle | Hickory | N |
| Peach bark beetle | Cherry | E |
| Sugar maple borer | Sugar maple | N |
| Two lined chestnut borer | Oak, ash, maple, others | N |
| White pine weevil | White pine, Norway spruce | N |
| Southern pine beetle | Hard pines | E |
| Walnut twig beetle | All <i>Juglans</i> | E |
| Hymenoptera (flies and wasps) | | |
| Sawflies – various, periodic outbreaks | Periodic multiple coniferous and deciduous hosts | N |
| Sirex noctilio | Pines | E |
| Hemiptera (true bugs) | | |
| Spotted lanternfly | Tree of Heaven, maples, others | E |

| Select List of Significant Damage-Causing Agents in New York's Forests | | |
|--|---|---------------|
| Agent | Forest Type Affected | Native/Exotic |
| Diseases | | |
| Anthracnoses | Multiple deciduous hosts, particularly maple, dogwood, sycamore, oak | N/E |
| Armillaria | All trees – fungal diseases that might be the killer of more trees than anything else in New York each year | N/E |
| Bacterial leaf scorch | Oak, particularly red oak | E |
| Beach bark complex | American beech | E |
| Butternut canker | Butternut | E |
| Caliciopsis canker | White pine | E? |
| Chestnut blight | Chestnut | E |
| Dutch elm disease | American elm | E |
| Oak wilt | Oaks – New in 2008 | E |
| White pine blister rust | White pines | N |
| Beech leaf disease | Beech | E |
| Macrofauna | | |
| Deer | Overbrowse of climax/species, hindering regeneration | N |
| Rabbits | Girdle seedlings, hindering regeneration | N |
| Voles | Girdle seedlings, hindering regeneration | N |
| Earthworms | Change in breakdown of leaf litter, soil nutrients, pH | E |

Deer browse

White-tailed deer were nearly eliminated from New York by unregulated hunting in the 1800s and early 1900s. With the advent of protective regulations and science-based wildlife management, the deer population in New York rebounded. With abundant forest edge habitat and a lack of natural predators such as cougars and wolves, recreational hunting became the primary control on deer populations. Over the last 50 years, increased human development eliminated many of the locations formerly available to hunters, and societal changes reduced the number of hunters, resulting in overabundant deer populations. Now there is widespread recognition that the overabundant deer population is negatively impacting human and ecological communities.

Because mature trees aren't affected, deer impacts on a forest may not be immediately evident, but they are profound and long-lasting. Overbrowsing by deer reduces plant diversity in the forest understory and enables invasive species to out-compete natives. Deer browsing impairs forest regenerative processes, preventing seedlings from growing into the next generation of trees, which ultimately leads to fewer mature trees and a less diverse plant community in forests. The ecological changes brought about by deer cascade through forest plant communities also negatively impact wildlife, reducing the abundance and diversity of species that require understory and mid-canopy habitat. The State Wildlife Action Plan identified more than a dozen wildlife species that are threatened by deer overbrowsing, mostly forest-dwelling songbirds and host plant-dependent lepidoptera. It is likely that reduced vegetation density in the understory also negatively impacts some species of amphibians, reptiles, and small mammals.

Direct measurement of deer population density can be difficult and expensive, but ecological impacts can be used as an indirect measure of deer density. DEC is collaborating with researchers at SUNY-ESF and Cornell University to assess deer impacts. A protocol called Assessing Vegetation Impacts from Deer (AVID) has been developed based on forest inventory analysis data and incorporating deer harvest data as an index of deer density. A modeling project published in 2019 (link below) shows locations in New York where deer are significant factors causing poor forest regeneration, and provides data to support efforts to reduce deer populations in those impacted areas.

<https://www.sciencedirect.com/science/article/abs/pii/S0378112719305080>.

Threats from unsustainable recreational use

In addition to unintentionally introducing non-native or otherwise invasive species to New York's forests, the increasing number of visitors, vacationers, and recreationists have the potential to cause

direct impacts on forest health. Popular destinations on DEC lands, in the Adirondack and Catskill Forest Preserve in particular, continue to attract an extremely high number of users. There are many impacts associated with these levels of use, including overcrowded parking areas, degradation of trail infrastructure, crowding on trails, summits, and other popular destinations, and a multitude of inappropriate social behaviors. The physical and ecological impacts of unsustainable recreation use include human waste along trails, soil compaction, erosion, sedimentation, displacement of certain wildlife species, and vegetation loss.

With the increase in recreational use of forests comes the increased potential for the spread of invasive species and other vectors affecting forest health. Recreation within forested areas is an important way to build support for forests, but negative recreational experiences caused by overuse or other factors have the potential to reduce this support.

Strategies to manage recreational impacts are outlined under Goal #4

Assessment: Forest regeneration

A key component of keeping forests healthy in New York State is securing quality forest regeneration.

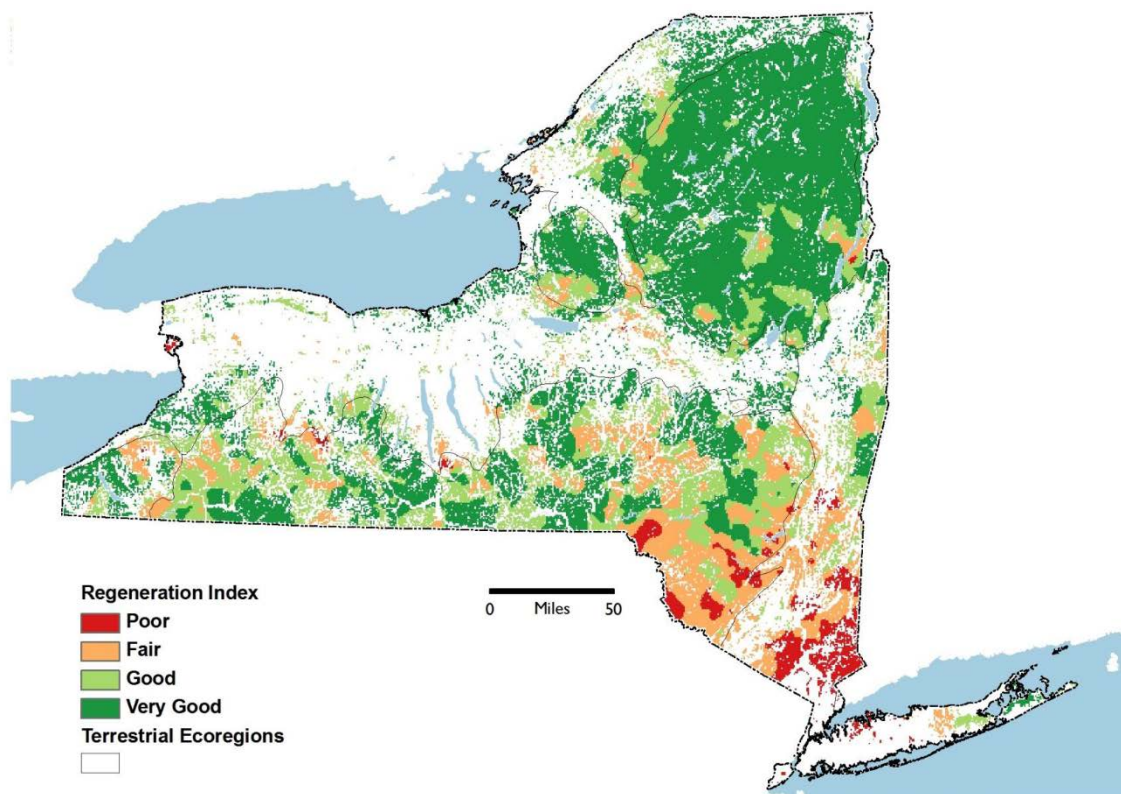
Canopy regeneration

Forest Inventory and Analysis Data from the U.S. Forest Service was analyzed by TNC New York (Shirer and Zimmerman, 2010) to evaluate the status of forest regeneration for our state. Overall, forest regeneration of native canopy species was found to be "very good" or "good" in 68 percent of the plots. However, if only important timber species are selected, only 43 percent of the plots were found to have "very good" or "good" regeneration. For this study, native canopy species included all tree species sampled, except non-native and understory trees.

Timber species consist of those species that represent at least 10 percent of the state's timber harvest, as reported by the DEC Timber Harvest and Consumption Report, or had at least a mean value of at least \$100 per

Successful regeneration of forests has become increasingly difficult due to several biological and societal factors.

thousand board feet according to the DEC Stumpage Price Report. Mapping was then completed for a forest regeneration index to highlight regeneration across our state. For all canopy species, the regeneration is poorest in the Catskills and lower Hudson Valley, as well as in smaller pockets across the Southern Tier Region, while the northern regions of the state were doing the best. If the index only considered timber species, the state overall fared much worse. Regeneration in the Adirondacks is driven by low-value timber species such as American beech and balsam fir. It must be acknowledged, however, that these are critical species for wildlife habitat and as wildlife food source, and they are also among the long-lived, shade-tolerant species of pre-colonial times. *See biodiversity assessment directly below.*



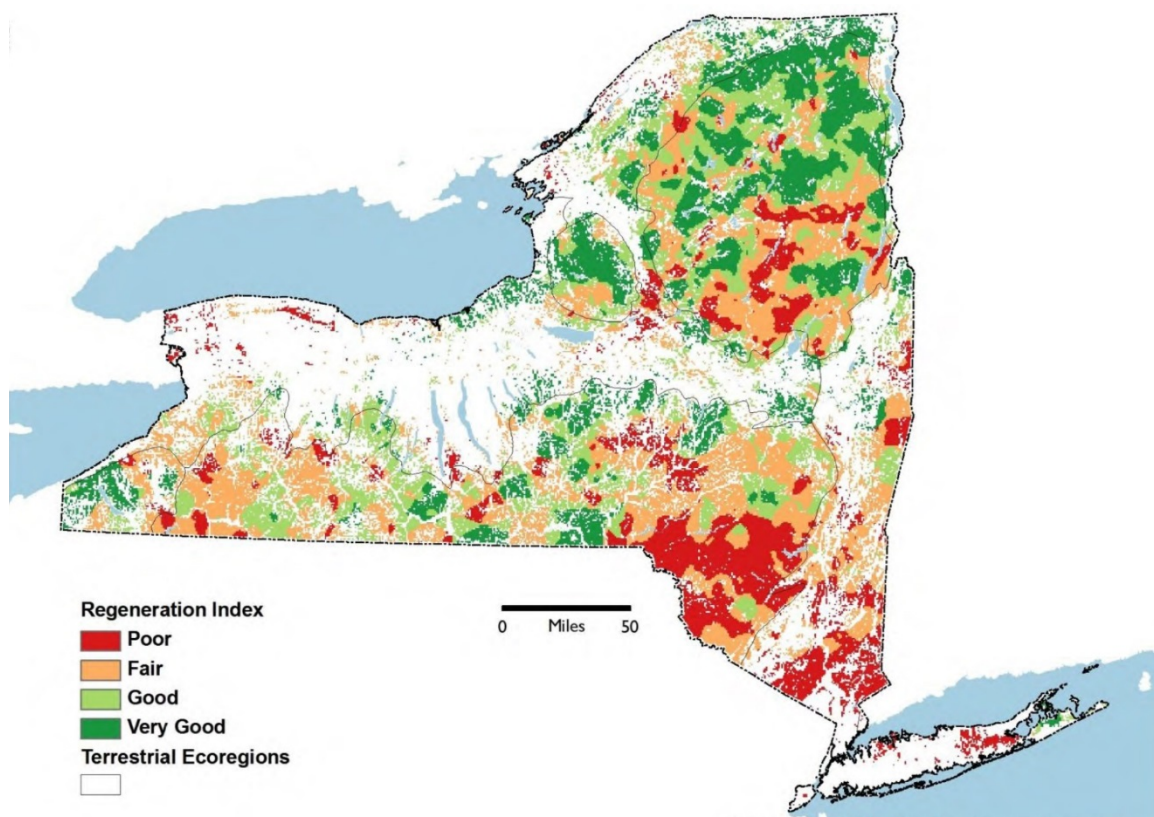
Map of Native Canopy Tree Species Forest Regeneration Index in New York State, 2008

Deer browsing and interfering vegetation

Deer browsing and interfering vegetation are cited as chief causes of the regeneration problem in New York (<https://counties.extension.wisc.edu/buffalo/files/2011/01/Impacts-of-White-Tailed-Deer-Overabundance-in-Forest-Ecosyst.pdf>). Another contributing factor to poor regeneration is the absence of appropriate timber management methods. Landowners often lack interest or are unwilling to implement/invest in recommended management practices (e.g., timber stand improvement) to control less desirable tree species. Unsustainable harvesting practices, such as high-grading, inhibit regeneration by maintaining an overstory of lower quality trees as the seed source, encouraging shade tolerant species, and failing to regenerate seedlings in sufficient numbers to outpace the negative effects of deer browse and competing vegetation. See additional discussion in this Plan's invasives discussion.

Timber regeneration

The lack of regeneration, especially with regards to timber species is troubling as it indicates an uncertain future for some species that now provide vital economic and ecosystem benefits for New York State. The composition of regeneration shows the establishment of commercial species such as sugar maple, ash, and red maple is occurring, but is quickly dominated by beech. The regeneration of beech is problematic due to the prevalence of beech bark disease, which prevents a tree from reaching maturity. In addition, the excellent sprouting response to beech bark disease causes an understory dominated by beech and doesn't allow for the establishment of other native tree species. The development of this beech understory not only reduces the commercial viability of timberlands in New York, but also reduces the overall diversity of stands, which negatively impacts forest vitality and resilience.



Map of Timber Species Regeneration in New York State, 2008

Regeneration of fire-dependent forests

Wildfires are part of the natural environment and serve ecological and cultural purposes. New York experiences hundreds of wildland fires each year that burn forest, brush, and grasslands. Most of these fires are small, but occasionally some reach hundreds or thousands of acres in size. Wildfires are also capable of exposing millions of New Yorkers to smoke and

particulate matter, and can threaten homes and property. New York has several fire dependent ecosystems located across the state, ranging from Albany's and Long Island's pitch pine barrens to oak openings (savannah) in Monroe County to the jack pine stands in Clinton County. Their existence and regeneration depends on regular fire disturbance. These ecosystems contain many of the state's rare and endangered plant and animal species, which are declining due to suppression of forest fires.

Assessment: Status of New York's forest biodiversity

The extent of biological diversity is a strong indicator of forest health and the forest's resiliency in the face of potentially damaging agents, disturbance, severe weather events, and a changing environment. Biological diversity, often shortened to biodiversity, refers to the variety of organisms, and their genetic variants, that occupy the earth. It includes all the ecosystems on the planet and their plants, animals, fungi, and microorganisms. Forest biodiversity encompasses not just trees, but all

other life forms that depend on them. Therefore, biodiversity is a critical element of forest sustainability.

New York is home to 49 forest and woodland community types, catalogued and described by the New York Natural Heritage Program (Edinger, 2014). These include several state-rare communities, such as the maritime forests of coastal Long Island and the high alpine forests of the Adirondacks (See Appendix E, Table 1).

Of New York's 49 forest communities (listed in Appendix E, Table 1), 16 (33 percent) are classified as forested wetland (i.e., "swamp" or floodplain forest) and eight (16 percent) are "woodland" types that usually have less than 60 percent tree canopy cover. The remaining 25 (51 percent) are classified as upland forests, with greater than 60 percent canopy; these range from coniferous forests (e.g., spruce flats and balsam flats) to mixed conifer-deciduous

(e.g., hemlock-northern hardwood forest and pine-northern hardwood forest) to deciduous forests (e.g., beech-maple mesic forest and maple-basswood rich mesic forest). The distribution of the forest types generally follows ecoregional boundaries within the state (see map below). Within a given ecoregion, forests may occur as matrix forest that blankets the ecoregion, or as large and small patch forests embedded within the matrix forest.



Map of New York State's Ecoregions
Ecoregions (Level III) within New York State. (Source: http://maps.tnc.org/gis_data.html)

Northern Appalachian/Boreal Forest Ecoregion (NAP):

- NAP matrix forests: beech-maple mesic forest, spruce-northern hardwood forest, spruce flats, and mountain spruce-fir forest.
- NAP large and small patch forests: includes "mountain" forests and "talus slope woodlands" (Appendix E, Table 2), plus hemlock-northern hardwood forest, maple-basswood rich mesic forest, and several swamp types.

Lower New England/Northern Piedmont Ecoregion (LNE):

- LNE matrix forests: chestnut oak forest, Appalachian oak-hickory forest, beech-maple mesic forest.
- LNE large and small patch forests: hemlock-northern hardwood forest, "talus slope woodlands" (Appendix E, Table 2) and several swamp types.

Great Lakes Ecoregion (GL):

- GL matrix forest: maple-basswood rich mesic forest.
- GL large and small patch forests: hemlock-northern hardwood forest and the more calcareous woodlands and forests (Appendix D, Table 1), and several swamp types, especially silver maple-ash swamp.

High Allegheny Plateau (HAP) and Western Allegheny Plateau (WAP) Ecoregions:

- HAP matrix forests: Allegheny oak forest, hemlock-northern hardwood forest, and beech-maple mesic forest.
- HAP large and small patch forests: rich mesophytic forest, maple-basswood rich mesic forest, hemlock-northern hardwood forest, and several swamp types.

North Atlantic Coast Ecoregion (NAC):

- NAC Matrix forests: oak-tulip tree forest, pitch pine-oak forest, coastal oak-heath forest, and coastal oak-hickory forest.
- NAC large and small patch forests: includes “coastal” and “maritime” forests (Appendix E, Table 2) and several swamp types, especially coastal plain Atlantic white cedar swamps.

Biodiversity Trends

For several hundred years, New York’s forests have undergone a series of changes, from intense logging for lumber, land clearing and plowing for crops and livestock, reforestation to both native and non-native forest types, and natural reforestation. The result has been a progressive homogenization of forests in New York to early and mid-successional forest types, the landscape no longer dominated by the long-lived, shade-tolerant beech, maple, hemlock, and spruce forests of pre-colonial times. In the absence of human disturbance, over time, we would expect succession to bring about forests similar in composition, structure, and function to pre-settlement forest. This occurs in areas with high levels of protection, such as the Adirondack and Catskill Parks and in some state parks like Allegany, Letchworth, and Minnewaska. While vast areas of the state are recovering from the rapid, broad scale clearing of forests, comparisons of pre-colonial and existing forest data indicate that New York forests are still in early stages of recovery (Thompson, 2013). Furthermore, ongoing harvesting and land conversion associated with residential and industrial development, along with the side-effects of this development

Fragmented forests decrease benefits to neighboring towns and villages, such as clean water, mitigation of floods and droughts, pollination in agricultural fields, and pest control.

(invasive species, deer browse, climate change, etc.), as well as global trade practices over the last 150 years all continue to impact New York’s forests at both local and regional scales.

Natural disturbances, such as wind-blown trees, wildfires, ice storms, etc., also alter forested landscapes. These natural events, however, benefit forest biodiversity as over the course of hundreds of years, they increase structural and species diversity, and create more resilient, uneven-aged natural forest systems.

The homogenization and simplification of our forests through historical clearing and ongoing human activities (see “Threats” section below) has reduced the overall integrity of our forests statewide by decreasing forest structure and the number of species we find there. Native species richness, an observable measurement of biodiversity, has declined over time across our state, with about 3.5 percent (118) of NYNHP-tracked species extirpated, 5.3 percent (181) known from only historical records, and 38 percent (1,275) listed as Critically Imperiled to Vulnerable.

Data are not available specifically for forest species, but because of the predominance of forests in New York’s landscape, the status of species generally is likely to be mirrored in forest species. Figure A below represents all vascular plants, vertebrates, and select invertebrates native to New York State across seven different categories of rarity or imperilment.

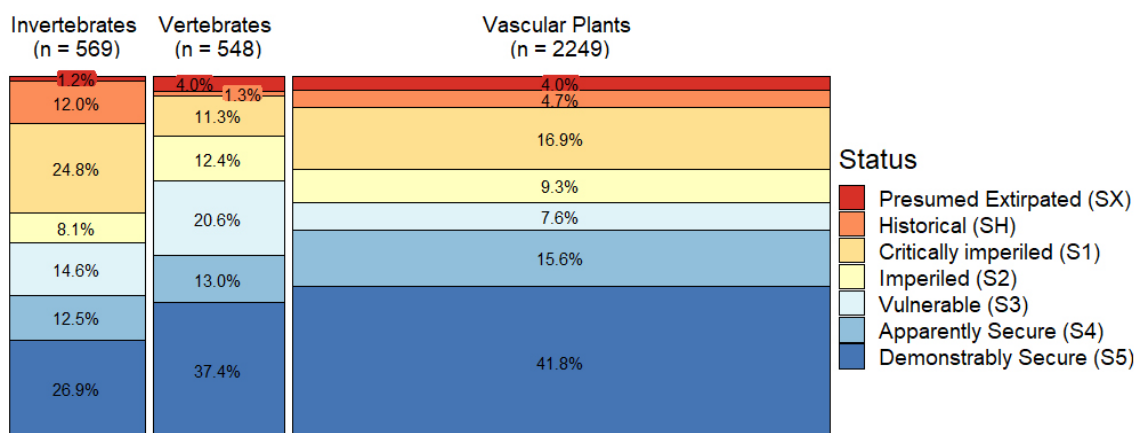


Figure A. Status of all native vascular plants, vertebrates, and select invertebrates in New York (nynhp.org)

Many of the plants and animals tracked in the New York Natural Heritage Program databases are dependent upon or associated with forests (Table 1, below). At minimum, there are 369 species of forest-dependent plants and animals tracked in the program’s databases that are currently listed as Imperiled (S2) and Critically Imperiled (S1) in New York, as determined by expert opinion and the intersection of their occurrences with known forested lands.

Heritage-tracked animals include all species ranked as Critically Imperiled (S1), Imperiled (S2), and select Vulnerable (S3) species, and plants include all species ranked S1 and S2. This information is incomplete, however, as additional tracked species not found in these two data sources may be forest associates.

| Taxonomic Group | # of Imperiled and Critically Imperiled Species |
|----------------------------|---|
| Animals (class) | |
| Mammals | 10 |
| Birds | 23 |
| Reptiles | 6 |
| Turtles | 3 |
| Amphibians | 5 |
| Gastropods | 1 |
| Insects | 118 |
| Plants (subkingdom) | |
| Non-vascular plants | 13 |
| Vascular Plants | 190 |
| TOTAL | 369 |

Table 1. The number of forest-dependent rare species tracked, by taxonomic group, NYNHP

In addition, species occurring in non-forested ecosystems *within forested landscapes* may depend upon the surrounding forest to a considerable extent. For example, aquatic species in streams, rivers, and ponds depend on adjacent forest as a buffer from development and protectant of water quality. Deposits of coarse woody debris in aquatic ecosystems provide cover and oviposition sites for aquatic animals. Grassland plants may be pollinated by insects that emerge from the adjacent forest. Even marine and estuarine animals may benefit from nutrient uptake in adjacent forests, which prevent chemical changes due to runoff from developed areas.

Forest Diversity

Forest owners and managers in all circumstances (urban and rural) are often confronted with forests dominated by a single species or narrow age distribution. As noted in the Assessment portion of this Plan, much of New York State's pre-colonial forest was cleared for agriculture, timber, pulp, and development by the early 1900s. Since then, a large part of the state has returned to forests, with many of those forests originating about the same time. With the exception of the few areas of the state that have not seen ongoing activities or forest management (Adirondacks and Catskills), many forests in New York are composed of trees that are roughly the same age, what foresters call an "even-aged stand." As previously discussed, this "sameness" poses some issues of concern with respect to biodiversity and management options for forest owners.

Natural disturbances like wind-blown trees, wildfires, tornadoes, hurricanes, ice storms, and more, alter forested landscapes. Collectively, over time, these natural events will increase species diversity and structural diversity both among and within forest stands, creating more "uneven-aged" natural forest systems. Trees fall and create gaps that are filled in by seedlings and saplings, and fallen logs provide new areas for colonizing mosses and understory plants. What began as an even-age forest will take hundreds of years to develop the age-class and

structural diversity it had before a stand replacement event like clearcutting. Fortunately, forests in New York's Catskill and Adirondack Parks and State Parks, especially the large ones like Allegany and Minnewaska, have been set aside to fully recover from the vast clearing that occurred before the turn of the 20th century.

Urban Forest Diversity

Urban forests are also unnaturally similar in age or species composition, often dating back to the time of settlement. Historically, many cities, towns, and villages were heavily populated with stately elm trees that succumbed, over a relatively short period of time, to Dutch elm disease. Communities often replaced those elms with Norway maples, silver maples, and ash, which have now proven to have their own problems and threats, especially from storms and invasive pests such as the Asian longhorned beetle. Urban foresters are also finding that "too much of a good thing" is also a bad idea, as they now recognize the importance of maintaining diversity in both species and ages within the urban forest environment.

Threats to Forest Biodiversity

A primary threat to New York's forests includes linear infrastructure (e.g., roads) and land use changes (e.g., development) that can fragment forest patches and reduce forest patch size. Forest fragmentation such as this is possibly the largest threat to the integrity of the large matrix forests in the state. Fragmentation can restrict the movement of plants and animals through the forest, often resulting in the loss of species that require larger blocks of habitat (e.g., black bear, bobcat, certain bird species). The presence of invasive species (e.g., insects, diseases, and plants), overbrowsing by deer and associated lack of regeneration, fire suppression, air pollution (e.g., ozone and acidic deposition), and climate change are other threats to forest conditions, native species richness and composition (see "Effects of a changing climate and environment on forest health," "Connectivity of forests," and "Forest Health Monitoring" in this Goal's Assessment section).

| Class | # of forest habitat-dependent SGCN |
|-------------|------------------------------------|
| Amphibian | 10 |
| Bird | 42 |
| Insect | 64 |
| Lepidoptera | 28 |
| Mammal | 18 |
| Reptile | 18 |

Table 2. NYSDEC Division of Fish and Wildlife

Forest habitat-dependent Species of Greatest Conservation Need (SGCN)

This Plan and New York's State Wildlife Action Plan (SWAP), prepared by DEC's Division of Fish and Wildlife, have fundamental shared interests and priorities: conserving forested lands, protecting healthy watersheds, conserving and restoring diminished native tree species, conserving and creating young forest habitat, and using fire to enhance forest conditions.

The SWAP described the varied forest habitats in New York, and the diverse wildlife species these forest habitats support. Almost half of the 366 species identified as SGCN in the SWAP depend upon forest habitats, a total of 180 different species. This includes representatives of all taxonomic groups that rely on terrestrial habitats, as shown in Table 2. The species assessment documents developed for the SWAP include details on forest habitat needs of these SGCN, such as tree species, canopy or ground layers, edge or interior, and size of forest blocks. The species assessments are available at <https://www.dec.ny.gov/animals/7179.html>.

Seventeen forest habitat types that support SGCN were identified (Table 3), but this does not include some early successional forests categorized as shrublands, nor aquatic habitats in streams flowing through forests. Some of these forest habitats, especially those restricted to coastal locations, are limited in distribution, while other forest types are widespread throughout the state.

| Forest Habitat | # of SGCN |
|-----------------------------------|-----------|
| Atlantic White Cedar Swamp | 4 |
| Boreal Forested Peatland | 15 |
| Boreal Upland Forest | 2 |
| Coastal Coniferous Barren | 19 |
| Coastal Hardwood | 7 |
| Coastal Red Maple-Black Gum Swamp | 3 |
| Conifer Forest Swamp | 6 |
| Floodplain Forest | 16 |
| Hardwood Swamp | 7 |
| Mixed Hardwood Swamp | 6 |
| Mixed Northern Hardwood | 20 |
| Mountain Spruce-Fir Forest | 3 |
| Northeast Upland Forest | 11 |
| Oak Forest | 12 |
| Oak-Pine Forest | 22 |
| Pine Barren | 20 |
| Riparian Forest | 7 |

Table 3. NYSDEC Division of Fish and Wildlife

Threats to SGCN

The process of drafting the SWAP assessed threats to species, but did not directly evaluate threats to habitats. Loss of habitats, including forest habitats, is one of the major threats to the populations of SGCN. Forest habitat is most often lost to development, but for species that depend on young forests, their habitat is also lost to natural forest succession. Natural system modifications through alteration of fire regimes threatens 35 SGCN, especially those dependent on pine bush habitats. Logging is a threat to 51 SGCN, mostly related to siltation of aquatic habitats that can result from improper silviculture practices. Other threats to forest-dependent SGCN include gypsy moth, spruce budworm and hemlock wooly adelgid infestations, deposition of atmospheric pollutants, invasive species, climate change-induced habitat shifts, excessive human recreation, and overabundant white-tailed deer.

Forest management actions to improve habitats for Species of Greatest Conservation Need are ongoing, including silvicultural harvest and prescribed fire. Protection of key forested lands through the purchase of fee title or a conservation easement is a recommended action in New York's SWAP. Protection of floodplain forests is especially important for the multiple conservation

benefits these riparian areas provide: habitat, flood protection, and connectivity. (See also Audubon New York's "Forest Management for New York Birds. A Forester's Guide," 2017. http://ny.audubon.org/sites/default/files/audubonny_forestmgmtfornybirds.pdf.)

Case study: Palmertown Range in Saratoga County, New York. The Southern Palmertown Conservation and Recreation Strategy (Open Space Institute, 2018) is a new vision for this unique area in northern Saratoga County, New York. This area is an ecologically intact landscape with extensive, unfragmented, and diverse forests and wetlands. It is also an important ecological linkage between the Adirondack Park, Lake George, the Capital Region, the Hudson River Valley, the Taconic Mountains of Massachusetts, and the Green Mountains of Vermont. The Southern Palmertown Area is also in close proximity to growing population centers in Saratoga Springs, Glens Falls, and Wilton, and it has the potential to link communities through thoughtful use of a connected landscape of already protected lands. This Strategy includes recommended conservation lands and recreational trails, with connections to many communities, businesses and managed landscapes.

This plan suggests steps that can be taken by local communities working together with thoughtful, cooperative planning and action that will result in retention of the landscape, its environmental services, and natural resources while simultaneously stimulating compatible economic development activities.

https://s3.amazonaws.com/osi-craft/PalmertownRangeFINAL_SUMMARY-for-Web.pdf?mtime=20181105163611



Public Workshop for the Southern Palmertown Conservation and Recreation Strategy, 2017

Assessment: Connectivity of forests

Protection of large blocks of forested land is an important component of wildlife conservation in New York, but connectivity of these protected forestlands is also crucial to provide wildlife the opportunity to move across the landscape. Habitat connectivity is important at many geographic scales, from the local scale of seasonal migration of amphibians between breeding pools and upland habitats, to the regional range expansion of moose between northeastern states. The unimpeded movement

of animals is important to maintain genetic diversity in protected areas, and also allows wildlife to move to suitable habitats, which is an important adaptation strategy to climate change. Among its objectives, the State Wildlife Action Plan identified "Promote habitat connectivity for SGCN," and listed actions for both aquatic and terrestrial connectivity, including dam removal and culvert replacement, and to restore and maintain natural habitats in linkage areas to foster northeast regional habitat connectivity.

The Habitat Assessment chapter of the SWAP identified five areas of large, relatively intact forests within New York—Adirondacks, Catskills, and Allegheny, Tug Hill, and Rensselaer Plateaus—as well as smaller forest blocks that occur at several locations throughout the state. Connectivity to the Adirondacks has long been a conservation priority. The Algonquin to Adirondacks Collaborative has sought to maintain and restore connectivity between these two large protected areas across the heavily developed St. Lawrence River Valley. The Staying Connected Initiative, led by TNC, <http://stayingconnectedinitiative.org>, utilized landscape permeability modeling to identify the least cost path linkages across the northeast. In New York, these linkages include Tug Hill to Adirondacks across the Black River Valley, Adirondacks to Green Mountains across the Lake Champlain Valley, and the Green Mountains to the Hudson Highlands through the Berkshires and Rensselaer Plateau. This conservation work has included partnering with transportation agencies

on wildlife road crossing structures, strengthening local conservation planning capacity, protecting “stepping stone” parcels in identified linkage areas, and developing tools to assess connectivity opportunities and measure project outcomes.

In addition to these northeast regional-scale projects, habitat connectivity efforts are underway throughout New York to maintain connectivity between large forested areas as well as smaller forest blocks. The three large regions in our state that contain a matrix of smaller forest blocks are the Lake Ontario Plains, the Mohawk River Valley, and the Hudson River Valley. In these regions, forest blocks are often separated by agricultural areas, major highways, or both. The Strategic Plan for State Forest Management describes DEC's work to identify connectivity between forest matrix blocks (<https://www.dec.ny.gov/lands/64567.html>)

Assessment: Soil resources in forests

Soil is important to forest sustainability since it is, literally, what supports trees. Soil conditions and their ability to support tree and forest growth are negatively impacted by a variety of factors, including development, compaction and hard-surfacing, erosion, land cover type, fire, severe weather events, changing soil temperature regimes, and even non-native earthworms.

Geology

The topography of New York has been shaped by a complex and turbulent geologic history, including multiple tectonic plate collisions, uplifts and erosions of several mountain ranges, and volcanic activity, as well as advancing and retreating sea levels. New York has one of the world's best fossil records of the Devonian Period (408 to 360 million years ago) with remarkably well-preserved marine sequences, and also non-marine fossils that show the transition to land. Most of the bedrock in New York is over 250 million years old, younger rocks having been almost completely removed by erosion.

New York's present landscape is dominated by the impacts of the last ice age, ending 15,000 years ago. Only a small area of the southwestern part of the state—the southwest corner of the High Allegheny Plateau Ecoregion—escaped glaciation. Glaciers shaped the high peaks in the Catskills and Adirondacks, changed hydrology, formed huge lakes, and covered much of the state with a layer of glacial till. Where huge glacial lakes once held meltwater, there are now thick sand and clay deposits, such as those in the Hudson Valley and parts of Central New York. The remnants of ice age features—such as sand dunes, river sand and gravel deposits, and muck-filled bogs—can be found in many parts of the state. The most ubiquitous material left behind as the ice retreated is glacial till, the rough mixture of rocks, sand, and clay scraped up and bulldozed by the glacier's ice.

Glaciers of the last ice age erased the existing forests and landforms of New York so thoroughly that there is almost no trace of the

pre-glacial ecology. New soils slowly began to develop as organic matter accumulated, laying the foundation for plant succession. About 11,000 years ago, tree species, led by spruce, migrated back north from their glacial refuges. Some of the early trees arriving soon after white spruce included black spruce, elm, and black ash. One of the last major species to arrive in New York was chestnut, reaching the state about 2,000 years ago.

Soils and Associated Tree Species

Bedrock geology forms the framework of the landscape, influencing soil and water chemistry, drainage patterns, the shape and orientation of much of the topography and the resulting local climate patterns. Most of the bedrock in New York, including shale, sandstone, and most metamorphic rock, produces acidic soils. Where the bedrock is limestone or marble, soils are high in calcium.

The difference between forest types growing on acid soils and calcareous soils can be dramatic. Where sandstone bedrock is next to limestone bedrock, the change in vegetation is often abrupt. Pitch pines, chestnut oaks, blueberries, and other acid-loving plants do not grow well on limestone. Other species are more tolerant, notably red cedar, which grows well on rocky sites. For red cedar, lack of shade from competition is a more important factor than soil chemistry.

Many elements of a site affect a tree, including soil thickness and rooting depth, frost effects, soil chemistry, elevation, moisture availability, wind exposure, etc. Different species have different site requirements, and their health and vigor ultimately depend on where they grow. For example, sugar maple growing on a south facing dry slope is likely to be stressed by drought and heat, and more susceptible to insects and disease. However, many oak species would thrive on such a site since they generally prefer warm, well-drained conditions.

Forest Management Implications

Encouraging the growth of tree species on sites with optimal conditions is one of the important benefits of wise forest management. Foresters must rely on their knowledge of what each tree and forest community requires, so that their management efforts result in resilient and healthy forests. A harvest on a south-facing dry slope would focus on perpetuation of species that do best in those conditions, such as oak. This purposefully parallels what we observe on the landscape and know about species requirements for optimal growth.

Long-term Effects of Acid Rain on Forest Soils

In the 1980s, the worst pollutants from coal-burning utility plants in the Midwest, sulfur dioxide (SO₂) and nitrogen oxides (NO_x), were deposited across the Northeast in the form of acid rain or as dry acid particles. Unfortunately, many forests in the Catskills, Adirondacks, and Hudson Highlands grew on naturally acid soils with no buffering capacity to neutralize the acid deposition. Soils became even more acidic, leading to the release of unbound aluminum from soil compounds. Hundreds of lakes became too acidic and poisoned by aluminum to support any life, and the high-elevation forests were dying, their roots damaged by free aluminum in the thin acid soil.

New York passed the 1984 State Acid Deposition Control Act, which was later followed by Article IV of the 1990 EPA Clean Air Act, known as the Acid Rain Program, which required utilities to reduce emissions of SO₂ and NO_x. As precipitation became less acidic, forests began to recover. Today, the impact of acid rain has not gone away. Long-term studies of forest soils show that acid rain has caused major changes in ecosystem cycling of nitrogen, calcium, and carbon. Nitrogen deposition may be lower than it was before legislation, but it continues to accumulate in forest soils. Continued nitrogen deposition is especially destructive. Even when it merely fertilizes hemlocks, it has been linked with increased

vulnerability to adelgids. Soils can become saturated with nitrogen to the point that plants can no longer absorb it, and the excess nitrogen leaches out of the soil to contaminate water. Calcium leaching from acidic soils is a particularly serious problem, not only because soils become even more acidic, but also because calcium is critical for so many plant processes. Reduced soil calcium levels have been implicated in increased frost injury and long-term decline in New York's sugar maples and red spruces.

Effects of Climate Change on Forest Soils

Climate change impacts observed in New York are expected to continue to include rising temperatures and altered precipitation patterns. Forest soils formed as a result of particular

temperature and precipitation regimes which, in turn affected forest development, composition, and productivity. Changes in soil temperature regimes have the potential to undermine the resilience of our forest species, both trees and understory plants. Shorter, warmer winters may not provide timely or sufficient cold periods for trees to become frost hardened, and frequent thaw-freeze cycles during winter may affect dormancy and essential early spring nutrient-uptake cycles. High temperatures and a potential lack of precipitation in the growing season may increase drought stress and the potential for non-native, drought tolerant species to establish and outcompete native ones.

Note: The benefit of soils storing carbon is discussed under Goal #1, 'Assessment: Valuing forests for carbon storage and community adaptation.'

Assessment: Forest health monitoring

Since 2015, New York has regulated, or prohibited the management of, many invasive plants and animals that are particularly harmful to native species and/or human health. These invasives cannot be sold, imported, purchased, transported, or introduced without a permit (6 NYCRR Part 575, <https://www.dec.ny.gov/animals/99141.html>).

In 2018, DEC's Division of Lands and Forests established an Invasive Species Comprehensive Management Plan to guide New York agencies and their partners toward an effective and coordinated monitoring and response effort across the state, including on private and public forests. The goal of this Plan is to minimize the introduction, proliferation, and negative impacts caused by invasive species (https://www.dec.ny.gov/docs/lands_forests_pdf/iscmpfinal.pdf).

Prevention is the first line of defense against would-be invaders and is the preferred management strategy. Because of the potential for new preventative measures to affect commerce and trade, an economic assessment of the risk of harm from specific invasives can

Prevention is the first line of defense against would-be invaders and is the preferred management strategy.

provide critical information for decision makers. This allows them to evaluate the economic impacts of proposed prevention measures in the context of potential (negative) economic impacts of invasives.

Though investment in prevention measures at all scales is the first line of defense, even the most robust prevention efforts will not be 100 percent effective. For this reason, early detection of invasives and a rapid response to infestations are essential. Emerging technologies may assist with early detection. For example, DEC has deployed a fleet of 22 Unmanned Aerial Vehicles (UAVs) for invasives detection. In addition, current and potential citizen science programs present important opportunities to expand early detection capabilities, while complementing technological approaches with boots on the ground.

The iMapInvasives database provides a venue for citizens to report invasive species observations, and the PRISMs program (Partnerships for Regional Invasive Species Management, <https://www.dec.ny.gov/animals/47433.html>) is responsible for developing early detection networks comprised of trained staff and volunteers. Other existing programs, such as the Citizens Statewide Lake Assessment Program (CSLAP) and Water Assessments by Volunteer Evaluators (WAVE), involve many stakeholders across the state who collect ecological data. However, these programs are not specifically designed to detect invasives. There are opportunities to strengthen New York's early detection capacity and build partnerships through public engagement by expanding the scope of existing citizen monitoring programs to include invasive species, or creating similar programs with an invasives focus.

Threats

While these examples represent significant progress toward effective statewide prevention and early detection/monitoring systems, there is a need to take stock of current practices to identify gaps in the state's early detection program including taxonomic expertise; technological, human, or financial resources; and spatial or ecosystem-specific gaps.

New York is a major port of entry for a wide range of taxa from other lands and waterways, and for decades, state officials and resource managers have provided a critical line of defense to prevent the establishment and proliferation of invasive species that can harm public health, ecosystem integrity, agricultural productivity, and market access, as well as commerce. Despite these ongoing management efforts, global trade, climate change, and the spread of invasive species across state boundaries continue to elevate the risk invasive species pose to all New Yorkers.

Focus Area: Urban forest health

In urban communities, there are fewer trees and each individual specimen is more important than it would be in a rural forest. Invasive species and diseases like ALB, EAB, and Dutch elm disease have threatened and devastated urban forests with associated economic and human health impacts. Outreach to the general public and municipal staff is essential to early detection of threats to our trees. Often, private citizens prove to be invaluable in these efforts because of the increase in numbers of people looking for threats. For example, the first ALB in New York City was found by a private citizen.

Loss of trees due to Dutch elm disease and, to a lesser extent to EAB, showed the importance of good urban forestry including having inventories (knowing what you have and where it is) and management plans (for storms and other disasters). Streets and entire blocks used to be lined with elm trees. Ash were often planted to replace the elms, and when EAB infested communities again, street after street was cleared of dead ash. Tree diversity and healthy trees make a community forest more resilient, which is important since these communities are where most people live.

Strategy: Foster diversity of native plants and animals in forests

- Continue to work with the Natural Heritage Program and DEC's Division of Fish and Wildlife to identify, maintain and encourage important natural communities and species of special concern through field surveys and mapping. Expand this effort to include sharing known occurrences with private landowners.
- Encourage landowner participation in Natural Resource Conservation Service programs, such as the environmental quality incentives program and wildlife habitat improvement program. These programs help to encourage and promote local native plant and animal diversity by utilizing a cost-share programs for practices such as planting, wildlife food plots, habitat improvement, reducing soil erosion, etc.

Low-diversity forest communities are at greater risk during severe weather events and shifting phenology schedules. Studies have consistently shown that diverse systems are more resilient to disturbance, and low-diversity ecosystems are more vulnerable to change.

- Focus conservation efforts where forests will provide habitat for wildlife under warming climate conditions. Consider how shifts in forest wildlife species' ranges will need to be accommodated as the species move to higher elevations or northward.

Strategy: Boost forest regeneration and healthy forest structure

Private lands

The lack of forest regeneration in New York is a major threat to the economic and ecological productivity of its forestlands. The cost burden of establishing forest regeneration for 75 percent of the forested acres in the state falls directly on private landowners.

- Develop and grow the newly created "Regenerate NY" cost-share program to improve forest regeneration on private forestland throughout the state. This state-funded program will be available to forest landowners by 2020 and will help defer the cost of forest regeneration practices, such as interfering vegetation control, tree planting and maintenance, and site preparation.
- Explore ways DEC can reduce or remove barriers for consulting foresters and loggers to obtain pesticide licenses and increase the number of commercial pesticide applicators statewide.
- Work with DEC's Division of Wildlife and conservation partners to help landowners and communities manage deer populations.
- Explore shared stewardship opportunities with the U.S. Forest Service to discover innovative solutions for solving forest regeneration problems.

- Work with partners to develop innovative outreach methods and new products to attract landowners to forestry and efficiently meet their needs (Forest Health Plans, Snap-out plans, etc.). Implement management strategies that ensure the long-term health of the soil, root-zone, ground cover, understory, and canopy.
- Continue to provide native tree seedlings for forest restoration. Emphasize native plants, pollinators, and insects.
- Implement harvesting strategies and cycles with an eye toward long-term ecological productivity, climate change, and regeneration of all living organisms sustained by the forest.
- Rely on the Young Forests Initiative of DEC's Division of Fish and Wildlife to increase the acres in early successional habitat. These seedling and shrubland acres are beneficial for migrant songbirds, native gamebirds, and other wildlife.
- Use uneven-aged management on State forests to achieve large unbroken expanses of woodland, needed by many wildlife and birds.
- Consult with DEC's Division of Fish and Wildlife staff to assess stressors and threats outside of invasives. Identify shared priorities with the Wildlife Action Plan.

State forests

- Manage state forests using an ecosystem management approach, integrating principles of landscape ecology, multiple use management, and silviculture to promote habitat biodiversity, while enhancing the overall health and resiliency of state forests. Because forests are dynamic systems that are constantly being shaped by the forces of nature, also apply adaptive management techniques to respond to insect and disease epidemics, wind and ice storms, and other natural occurrences. Follow guidelines established in the Strategic Plan for State Forest Management (<https://www.dec.ny.gov/lands/64567.html>).
- Manage state forests sustainably for forest products, utilizing accepted silvicultural methods to enhance existing specimens while regenerating future timber products.

- Partner with the plant conservation community to protect forests and the habitat they provide for native plants and animals.
- Educate New Yorkers to be part of adaptive conservation communities that are either proactive about stressors and threats to native plants and animals, or respond quickly to changing conditions.
- Look to communities that are already modeling these efforts, even if they are not located in New York State.

Unit Management Plans for state lands

- Evaluate each unit individually, and work directly with DEC's Division of Fish and Wildlife, including the New York Natural Heritage Program.
- Be wildlife and plant sensitive, as well as habitat oriented in trails and recreation planning.
- Implement harvesting strategies that will minimize effects on wildlife activity and habitat during forest management activities.
- Limit or avoid human access to sensitive areas as an explicit strategy.

Strategy: Protect from, remove, or mitigate impacts of invasive species and pests

Multiple New York State agencies and partners have collectively developed a nationally recognized invasive species management program that is positioned to continue being a leader in invasive species prevention and management. https://www.dec.ny.gov/docs/lands_forests_pdf/iscmpfinal.pdf.

Continue to build partnerships and capacity

Overcoming the threats posed by invasive species requires the combined and synchronized actions of many parties, including private citizens, elected officials, and resource management agencies.

- Advance the capabilities of iMapInvasives.
- Develop campaigns specifically targeted to reach private landowners.
- Strengthen relationships with local municipalities to improve local engagement and buy-in.
- Engage climate change experts in invasive species collaborations.
- Connect with national invasive species organizations and neighboring states to leverage knowledge and resources.
- Consider citizen science projects (i-Tree and other resources) to engage the public. Projects should not only look for and report invasives, but help to document overall forest health.
- Leverage citizen science opportunities and other engagement with community members, students, and landowners to help implement monitoring or research projects that target detection or management of invasive species.



DEC's Jess Cancelliere (on right), along with the U.S. Forest Service, Long Island Pine Barrens Commission, and Dartmouth College investigate an outbreak on Long Island of southern pine beetle in white pine, which is not its traditional host. (DEC, 2017)

Continue to coordinate regional invasive species management functions

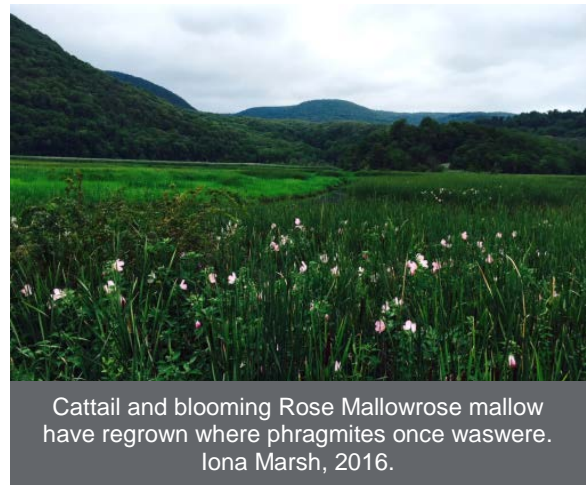
Eight Partnerships for Regional Invasive Species Management (PRISMs) provide complete coverage of New York, with a focus on facilitating cooperation between public and private interests.

- Continue building expertise within the eight PRISM regions of the state.
- Provide regionally adapted, on-the-ground actions regarding outreach, prevention, management, and monitoring.
- Identify regional priorities for allocation of resources.

Commit to a centralized framework for sharing invasive species information

- Establish a collaborative Horizon Scanning Committee focused on prioritization at the state level.
- Advance preparedness through information sharing

Case Study: Iona Marsh Restoration Work. Located along the Hudson River in Bear Mountain State Park, Iona Island has seen various uses over the years, including housing a U.S. Navy arsenal. Five Navy buildings still stand on a small portion of the island. Most of the island, however, has returned to a more natural state, with woods, meadows, and rocky outcroppings, and currently serves as a sanctuary for wintering bald eagles. In 1974, the island achieved National Natural Landmark status, and was designated a New York State Bird Conservation Area and Audubon Important Bird Area shortly thereafter.



Cattail and blooming Rose Mallowrose mallow have regrown where phragmites once were. Iona Marsh, 2016.

A key natural feature of Iona is the extensive marshlands, 153 acres on its western side. Part of the Hudson River National Estuarine Research Reserve, this brackish tidal marsh teems with life, including fish, waterfowl, waterbirds, plants, and crustaceans. The rich biodiversity, which includes a number of State-rare species, has been threatened in recent times. *Phragmites australis* (common reed) eventually covered nearly 80 percent of the marsh, concurrent with the decline in marsh specialist birds and specialized brackish marsh plants. In an effort to reverse these trends, the partnership of the Palisades Interstate Park Commission, the Hudson River National Estuarine Research Reserve, and the Highlands Environmental Research Institute began in 2008. This DEC-funded management program focused on a 10-acre test area, with the goal to reduce the presence of invasive phragmites and make room for native plants. If the program was successful in this small area, it could be expanded to additional marshlands.

A monitoring program was implemented and showed dramatic results. More than 90 percent of the phragmites in the test area were eliminated within a year and nearly 97 percent by the third year. Researchers saw the return of huge meadows of annual native marsh plants, including some State-threatened species, followed by native cattail stands. Marsh specialist birds such as Virginia rail, least bittern (State-threatened), and marsh wren soon followed. The project was expanded to an adjacent 32-acre marsh area known as Ring Meadow. Both target areas now have less than five percent phragmites cover, an overall success on the journey to reestablish native vegetation and improve the marsh ecosystem.

Advance Prevention, Early Detection, and Response to Invasive Species

- Maintain and expand resources dedicated to prevention and early detection.
- Conduct economic impact evaluations of invasive species to support cost-benefit analyses and set priorities.
- Develop and apply emerging technologies.
- Establish an IS-specific monitoring network.
- Support the advancement of the early warning notification system.
- Continue to support research and development.

Evaluate Success

- Develop quantitative metrics designed to evaluate progress and outcomes of key recommendations.
- Develop a template for cooperators and contract partners to define objectives and measures of success.

- Conduct post-intervention monitoring to evaluate and document effectiveness in accordance with the pre-defined objectives and criteria.

Strategy: Manage forest fires for the benefit of forests

New York's forest fire-dependent ecosystems, and the rare species they support, are declining because of fire suppression. Benefits of fire include recycling nutrients back into the soil, changing the soil chemistry and structure to promote the growth of certain species of plants, promoting seed germination, and creating gaps for light-dependent plants. Fire used in a prescribed manner can accomplish these goals. In addition, prescribed fire can be used to reduce fuels (e.g., dry matter on the forest floor) available in the event of a wildfire, thereby reducing the intensity and size of the wildfire, as well as reducing its overall impact to nearby communities.

- Improve minimal impact strategies and techniques (MIST) for containing wildfires by developing enhanced hand-crew firefighters and expanding aviation capabilities.
- Support state and local governments and non-government organizations using prescribed fire to manage fire dependent ecosystems.
- Maintain and improve the expertise and capability of state agencies, compact members, and federal agencies to control wildfires.

- Increase the capacity for conducting prescribed fires, including pre-fire treatments and post-fire monitoring
- During and post-fire, continue the productive collaboration between Rangers from DEC's Division of Forest Protection with natural resource advisors: from DEC's Lands and Forests on state forests; from Fish and Wildlife on WMAs; and from OPRHP on state parks and historic sites.

Indigenous peoples' fire management

Indigenous peoples living in the boundaries of present-day New York, notably Shinnecock in the Pine Barrens, have a long history of using fire to care for and enhance forest resources. These practices help forests regenerate, reduce insect pests, and increase the availability of certain cultural resources. Many indigenous people, especially elders, still hold knowledge of burning practices.

- Engage indigenous peoples' fire management knowledge and practice.

See also Strategy below: Cooperatively implement indigenous knowledge to maintain forest health.

Strategy: Cooperatively implement indigenous knowledge for forest health

Indigenous peoples maintain extensive ecological knowledge systems, sometimes referred to as Traditional Ecological Knowledge (TEK).

Far from being an anachronism, the widespread engagement of TEK to address contemporary issues such as climate change, sustainable resource management, and ecological restoration illustrates its value for contemporary sustainability solutions. Cooperative implementation would include assessment, monitoring, management planning, and implementation. <https://us.fsc.org/preview.fsc-std-usa-v1-1-2018.a-719.pdf>

Forest Stewardship Council – Forest Management Standard

Principle 3: Indigenous Peoples' Rights

Criterion 3.4 Indigenous peoples shall be compensated for the application of their traditional knowledge regarding the use of forest species or management systems in forest operations. This compensation shall be formally agreed upon with their free and informed consent before forest operations commence.

Indicator 3.4.b When traditional knowledge is used, written protocols are jointly developed prior to such use and signed by local tribes or tribal members to protect and fairly compensate them for such use.

Indicator 3.4.c The forest owner or manager respects the confidentiality of tribal traditional knowledge and assists in the protection of such knowledge.

What is TEK?

TEK refers to the body of knowledge, practice, and belief concerning the relationship of living beings to one another and to the physical environment, which is held by people in societies with a long history of direct dependence on local resources (Berkes, 1993). TEK is part of the cultures it comes from. Like Western science, TEK is based on systematic observations of nature. Both knowledge traditions have predictive power, and in both traditions, observations are interpreted in a cultural context. TEK has value not only for its wealth of factual information, but also for the cultural framework of respect, reciprocity, and responsibility in which it is embedded (Kimmerer, 1998, Pierotti and Wildcat, 2000). Scientific approaches for sustainability solutions have been effective in certain arenas, but it has become clear that science alone is limited to address problems that include human values.

Strategy: Help private forest owners keep their forests healthy

Private landowners are increasingly finding it difficult to manage their forestland for forest health. Pests and interfering vegetation threaten the short- and long-term economic values of their property. Other values such as ecological integrity and aesthetic beauty of their forestland could also be diminished. The following strategies will be pursued to help landowners keep their forestland healthy (*See more under Goal #4*):

- Develop and grow the newly created “Regenerate NY” cost-share program to improve forest regeneration on private forestland throughout New York State. Cost-share forest regeneration practices include interfering vegetation control, tree planting and maintenance, and site preparation.
 - Forest Health Cooperator Program. Establish a network of long-term forest health monitoring plots on private forestland through voluntary agreements with forest landowners. Work with DEC’s Bureau of Invasive Species and Ecosystem Health to set up permanent forest health plots on private lands to assist with early detection of forest health issues.
 - DEC’s private lands foresters to provide to landowners a “forest health check-up” assessment of private forests as part of service. In conjunction with BEIS, develop a “forest health checkup” as a targeted product for forest landowners who want to know if their land is healthy but don’t want or need a full forest stewardship or management plan. Engage landowners in assisting with “check-up” and work to establish a protocol landowners can follow to monitor forest health issues.
 - Prior to—as well as during—timber harvest, and prior to allowing public access for recreation and hunting, consult with DEC’s Division of Fish and Wildlife staff, incorporate strategies for specific forest types to maintain and enhance wildlife habitat activities, be wildlife- and plant-sensitive, and be habitat oriented.
- The cost for landowners to maintain a healthy forest is high. Encouraging tree regeneration on private land through certain types of silviculture treatment is especially costly. High costs can deter forest owners from acting.
- Limit human access to sensitive areas, and take steps to avoid sensitive areas altogether as an explicit tool for forest health protection.
 - Promote the “Trees for Tribes” program to improve stream health and increase connectivity, which support forest health and create or expand buffers to existing forest. Also promote the “Buffer in a Bag” program, <https://www.dec.ny.gov/animals/115903.html>, a program introduced in 2019, that provides a bag of tree and shrub seedlings for landowners to plant along streams.
 - Develop additional property tax incentive programs to encourage sustainable forestry.
 - Build program capacity for invasive species and forest health to assist private landowners:
 - Hire additional Division of Lands and Forests (DLF) staff to work with private landowners on invasive species and forest health issues.
 - Work with DLF staff, other DEC divisions, and local, state, or federal agencies to incorporate considerations for forest health, forest pests, and invasive species in current programs and plans, such as water, climate change, and deer management.

Strategy: Continue forest health-related research initiatives

- Investigate issues and strategies for overcoming forest regeneration problems.
- Explore forest resilience: what mosaic of forest age/type and other characteristics best support forest health and resist invasions or pests?
- Develop and implement monitoring/research projects that target detection and management of invasive species:
 - Understanding invasive species biology, ecology, interactions, and impacts,
 - Forecasting and prioritizing invasive species,
 - Identifying and detecting invasive species,
 - Managing invasive species and altered ecosystems.
- Continue to develop forest health research projects that:
 - Answer biological questions about a tree or pest,
 - Assess the efficacy of our management of a pest or disease,
 - Improve forest management on a landscape level scale.
- Develop a robust research laboratory.
- Build and maintain statewide forest health datasets.
- Build a network of cooperating researchers to expand forest health research and promote New York State as a leader in forest health science.
- Work with land managers to translate science into practical applications.



DEC's Liam Somers identifies nitidulid beetles under a microscope as part of an ongoing research project to study the important vectors of oak wilt (DEC, 2019)

- Develop cutting-edge tools to analyze forest conditions, and accelerate the pace and scale of forest management or invasive species treatments.
- Increase research that will enhance the productivity, utilization, and sustainability of tree species threatened by climate change:
 - Implement experimental treatments in permanent research plots on state forestland to potentially increase the productivity and sustainability of vulnerable tree species,
 - Manage uncertainty by using results from permanent plots to develop and validate models that predict how forests change over time and how they respond to climate change, biotic invasions, and land management,
 - Use research results to educate the public and increase acceptance of active forest management.

GOAL #3:

Ensure Forests Benefit Humans and All Living Creatures

Once New York's strategies are in place to keep forests as forests and to keep them healthy (our first two goals), the stage is set for targeted efforts so humans and other living organisms can continue to receive vital benefits from our forests. New York's forests generate life-sustaining clean air and water, contribute to our mental and physical health and happiness, and supply us with food, shelter, and renewable economic goods. As changes in our environment and climate accelerate and threaten our access to these benefits, our forests become increasingly important, with beneficial impacts well beyond our state borders.

"The best friend on earth of man is the tree. When we use the tree respectfully and economically, we have one of the greatest resources on the earth."

FRANK LLOYD WRIGHT

This goal directly addresses the National S&PF Priority to 'Enhance public benefits from trees and forests.' The strategies identified under this goal also aim to 'conserve and manage working forest landscapes for multiple values and uses' and to 'protect forests from threats,' the other two National S&PF Priorities.

Assessment: Forest protection for drinking water quality and supply

Drinking Water Quality and Supply

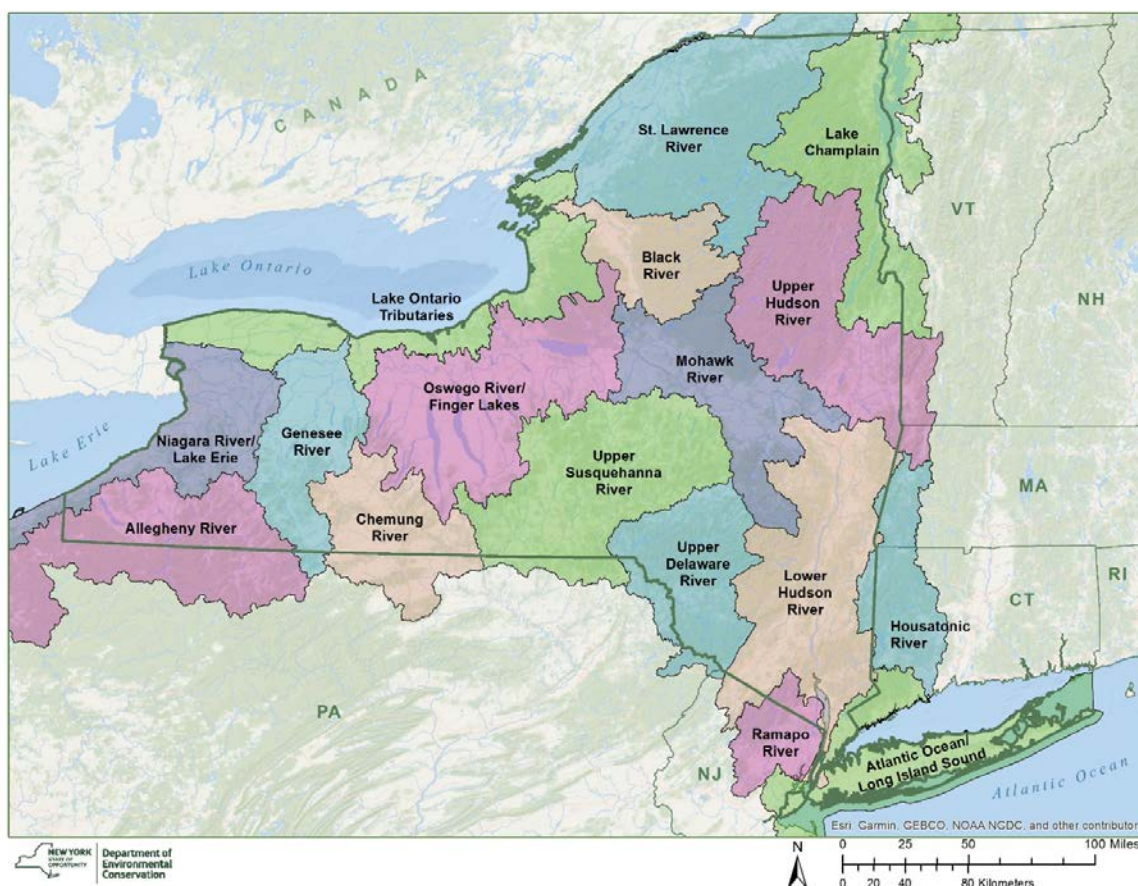
Forests are the first line of defense when protecting water quality, which is essential for people and all living organisms. Forests and their soils act like huge sponges, soaking up enormous amounts of precipitation. By the time rain and snowmelt seep through forest soil into groundwater or nearby surface water, the precipitation is cleaned and purified. Forested watersheds also moderate water quantity by slowing surface runoff and increasing the infiltration of water into the soil. The result is less flooding, cleaner water downstream, and greater groundwater reserves (Ernst, Caryn, 2004). Watershed protection is the first and most fundamental step in a multiple-barrier approach to protecting drinking water.

New York State's involvement in land acquisitions in critical watersheds has been essential to protecting drinking water quality throughout our state. Protecting natural ecosystems and the drinking water they provide is easier, more efficient, and more cost effective than the engineered alternative. When communities invest in land

In addition to being a forest-rich state, New York has a seeming abundance of clean, high quality water.

protection as a way to protect their drinking water, they are investing in the long-term health and quality of life of their citizens – guiding growth away from sensitive water resources, providing new parks and recreational opportunities, and protecting farmland and natural habitats, as well as preserving historic landscapes. Many communities don't realize the natural filtration forests provide, and the cost-saving benefits of source protection versus the potentially dramatic increase in treatment costs that can result from the loss of forests. (Ernst, 2004)

New York State has taken many actions to protect forests in order to maintain and enhance water quality, including the creation of the Adirondack and Catskill Forest Preserves, as well as the establishment of New York City's upstate surface reservoir system, and the forest protection component of their Filtration Avoidance Determination.



Map of New York State's Watersheds

Example – New York City

The primary source of New York City's drinking water is the Catskill area watershed, so the City works to protect and restore this watershed rather than build a multi-billion-dollar water filtration plant. New York City estimated the cost of installing filtration alone to be nearly \$7 billion, with over \$300 million in annual operating costs. Instead, they chose to support the quality of land management in its source watershed, which will sustain high water quality for a substantially lower investment. New York City manages almost 50,000 acres in the Catskills, and the state manages more than 200,000 acres in the Catskill watershed. Jointly, the City and state encourage private owners in the New York City watershed to keep forests as forests and implement forestry practices that restrict runoff, reduce sedimentation, and take up contaminants.

Example – Long Island

Similarly, the Long Island Pine Barrens and its underground aquifer provide virtually all the Island's drinking water, supplying millions of people. Two hundred years ago, the Pine Barrens blanketed a quarter of Long Island. Today, most of that land is developed. The approx. 102,500 acres remaining has been divided into two categories by the New York State Central Pine Barrens Commission: the Core Preservation Area (55,000 acres) and the Compatible Growth Area (47,500 acres).⁶ The U.S. Environmental Protection Agency designated this aquifer system as the nation's first sole source aquifer, requiring special protection. It is managed jointly by state, county, and local governments.

⁶ The Pine Barrens Legislation - NY Environmental Conservation Law Article 57.

Threats

Most people do not make the connection between forested watersheds, the water coming from their faucet, and stormwater or flood mitigation. Similarly, the public is generally unaware of the threats to their water supplies. Considering that the majority of New York's forests are privately owned, a similar statement can be made that most people don't make the connection between privately owned forests and the water coming from their faucet. This lack of public awareness can lead to poor management decisions and lack of support for forest retention and management. This lack of support, in turn, leads to urban and suburban sprawl, or conversion of forests to agricultural use. The resulting loss of forested cover:

- Undermines the land's capacity to absorb and hold water,
- Increases pollutant runoff from paved surfaces, rooftops, treated lawns, agricultural lands, etc.
- Disrupts the natural hydrology of water flows, volumes, rates, retention, and storage.

Protecting and managing forests in source watersheds is an essential part of future strategies for providing clean, safe drinking water that people can afford. One of the main reasons why suppliers are revisiting the idea of source protection is the growing realization that allowing untreated water quality to degrade increases treatment and capital costs.

Assessment: Benefits of urban tree canopy and green infrastructure

Collectively, community trees comprise an urban forest that can be thought of as a city's green infrastructure, while a city's roads, sewers, bridges, and water treatment plants comprise its gray infrastructure.

Social and economic urban benefits

Eighty seven percent of New Yorkers live and work in urban or suburban areas (Nowak et al. 2018). See also 'Map of New York State's Population Density, 2010' in Goal #1. Community forests represent most people's daily environment. Urban tree cover contributes to walkable neighborhoods, as well as distinctive and attractive places with a strong sense of place. The presence of parks and trees in neighborhoods encourages socializing, bonding, and exercise, and can reduce crime. As a result, trees and a property's proximity to parks have been shown to increase residential and commercial property values.

The urban tree canopy also reduces heating and cooling costs. In the summer, trees reduce the urban heat island effect: they shade buildings, sidewalks, streets, and other structures, keeping them cooler and reducing air conditioning or

other energy costs. In addition, strategically placed trees of appropriate species shelter buildings from cold winds in winter months, reducing heating costs.

Investment in maintaining green infrastructure pays off multifold in the form of reduced spending on gray infrastructure, such as high-cost facilities to manage stormwater, and mitigate air and water pollution, as well as insulate against temperature extremes. The planting and care of community trees represent wise investments in what is perhaps the only part of a city's infrastructure that actually increases in value and contribution over time.

Thus, greening our urban areas and communities helps to support New York's Smart Growth initiative to combat urban sprawl, make our existing urban areas and communities more attractive, and mitigate pressures on open space conservation in rural areas that often attract sprawl-type development (www.dot.ny.gov/programs/smart-planning/smartgrowth-law).

Urban health and education benefits

Social and economic benefits of the urban tree canopy are supplemented with improved mental and physical health, as well as educational benefits. These benefits are explored further under ‘*Assessment: Human health, safety, and other ecosystem benefits from forests.*’ Briefly, decades of research shows that spending time around trees and being exposed to the chemicals they give off boosts our immune system, reduces stress levels, helps children learn better, and allows patients to recuperate faster with views of trees from their window. Just five minutes around trees can improve personal health. Most urban populations rely on urban forests to provide this exposure, since many people may not be able to visit rural forests during their workweek and some may never leave their urbanized environment. It is the urban forest that provides the above outlined benefits to the majority of New Yorkers.

Urban environmental benefits

Community forests are important for birds, pollinators, and other wildlife. Trees are food for insects, which, in turn, are food for birds and other wildlife. Parks can provide needed rest stops for migratory birds. Urban forests can also provide vital corridors between larger tracts of rural forests.

Impact of losing urban trees

The invasion of the emerald ash borer (EAB, *Agrilus planipennis*) since 2002 provided an unfortunate opportunity to look at the effect of tree loss on human health. EAB is a non-native, wood-boring beetle that can kill all species of ash trees within three years of infestation. In some communities, entire streets lined with ash were left barren after the beetle arrived in the neighborhood. A study that looked at human deaths related to heart and lung disease in areas affected by EAB infestations found that across 15 states, EAB was associated with an additional 6,113 deaths related to lung disease and 15,080 heart disease-related deaths.

Assessment: Health, safety, and other benefits from forests

Access to clean air and water

The life-sustaining and health benefits of clean air and water are undeniable. Both through their leaves and roots, trees naturally filter or absorb pollutants in air and runoff from farm fields or urban surfaces. Forests and their soils prevent these pollutants from entering streams, thereby improving water quality for entire watersheds and corresponding aquifers.

Additional human health benefits

Research in the U.S. and around the world is showing that being surrounded by trees or visiting a forest has real, quantifiable health benefits, both mental and physical. Exposure to forests boosts our immune system. When we breathe in fresh air, we also breathe in phytoncides, airborne chemicals that plants give off to protect themselves from insects. Phytoncides have antibacterial and antifungal qualities. When people breathe in these

chemicals, their bodies respond by increasing the number and activity of a type of white blood cells called natural killer cells or NK. These cells kill tumor- and virus-infected cells in our bodies. In one study, increased NK activity from a 3-day, 2-night forest bathing trip lasted for more than 30 days. Japanese researchers are currently exploring whether exposure to forests can help prevent certain kinds of cancer.

Spending time around trees also reduces stress; lowers blood pressure and the stress-related hormones cortisol and adrenaline; decreases anxiety, depression, anger, confusion, and fatigue; and improves a person’s mood. And because stress inhibits the immune system, the stress-reduction benefits of forests are further magnified.

Spending time in nature helps people focus. Trying to focus on many activities or even a single thing for long periods of time can mentally drain us, a phenomenon called Directed

Attention Fatigue. Spending time in nature, looking at plants or water, and observing wildlife gives the cognitive portion of our brain a break, allowing us to focus better and renewing our ability to be patient. The part of the brain affected by attention fatigue is also involved in Attention-Deficit/Hyperactivity Disorder (ADHD). Studies show that children who spend time in natural outdoor environments have a reduction in attention fatigue. Similarly, children diagnosed with ADHD show a reduction in related symptoms. Researchers are investigating the use of natural outdoor environments to supplement current approaches to managing ADHD. Such an approach has the advantages of being widely accessible, inexpensive, and free of side effects.

Patients recover from surgery faster and better when they have a "green" view. Hospital patients may be stressed from a variety of factors, including pain, fear, and the disruption of normal routine. Research found that patients with views of trees had shorter postoperative stays, took fewer painkillers, and had slightly fewer postsurgical complications compared to those who had no view or only a view of a cement wall.

Note: the benefits of recreational opportunities are assessed separately under this Goal.

Flood and erosion resilience

The many benefits floodplain forests provide were lost with their disappearance. Floodplain forests help prevent catastrophic flooding downstream by storing and slowing floodwaters. Tree roots help stabilize riverbanks, controlling erosion.

Floodplain forests, once common along northeastern rivers before European settlement, are now a rare natural community. Their fertile soils, with few stones, were prized for farming

and easy to build on, so most floodplain forests were cleared for agriculture and development. In addition, threats to our remaining floodplain forests include dams and invasive species. Dams alter the river's natural flooding regime and trap nutrient-rich sediments that would normally be deposited in these forests. Run-of-the-river dams, which allow normal flow except in periods of high water, are better for floodplain forests. Invasive species such as Japanese knotweed do well in the exposed soils and abundant sunlight of floodplain forests and can outcompete native vegetation.

Wildlife benefits

The overhanging tree canopy of floodplain forests keeps the water cooler in summer, aiding coldwater fish such as brook trout, not to mention providing great fishing opportunities. The rich soils of a floodplain forest create ideal habitat for insects and amphibians, which, in turn, become prey for animals like woodcock, mink, and raccoon.

Spring flooding thaws the soils of floodplain forests earlier than the soils of surrounding areas, making insects available to birds earlier. For this reason, spring migrants follow rivers and feed in floodplain forests as they journey north. Some, like the warbling vireo, northern oriole, and great crested flycatcher, stay and nest in the northeast, including northern New York. Birding enthusiasts enjoy exploring streamside forests in every season.

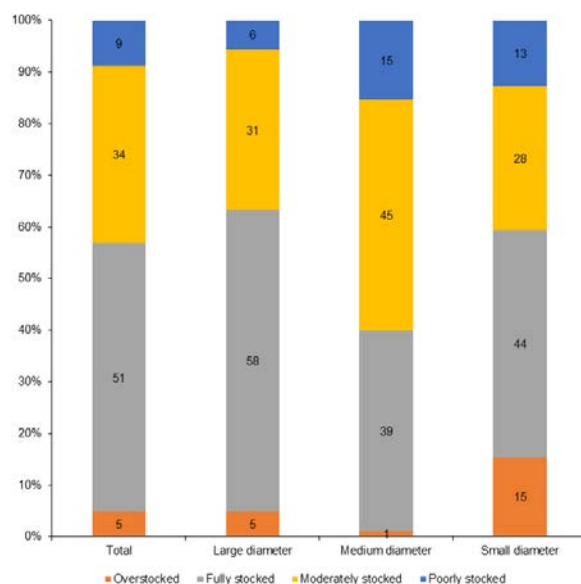
Note: The urban-specific ecosystem benefits of forests are discussed under Goal #3, 'Assessment: Benefits of urban tree canopy and green infrastructure.' The benefit of soils storing carbon is discussed under Goal #1, 'Assessment: Valuing forests for carbon storage and community adaptation.'

Assessment: Productive capacity of timberlands

Over 15.5 million acres of forestland in New York is classified as timberland, according to the USDA Forest Services' Forest Inventory and Data Program—over 13 million acres of which are privately owned. The main economic benefit to both landowners and society at large is the production of traditional forest products from timberlands.

The most updated FIA inventory for New York was completed in 2017 (New York Forest, 2017). These data show that the trend in the structure of lands classified as timberlands closely follows that of all forestland in the state. Timberlands continue to grow older and larger. 65 percent of timberland area is classified as large tree size, or sawtimber, 25 percent is in poletimber class, and only 9 percent is in a stage where seedling and sapling size trees predominate.

Stocking is a measure of the area occupied by trees (usually expressed by basal area square feet/acre), that is generally used as a tool to help manage forests for timber production. A little over 43 percent of timberland acres are poorly stocked or at the medium stocking level, with 57 percent of the total timberland acres being classified as fully or overstocked. A closer look at the stocking levels as they relate to size classes reveals that 63 percent of the sawtimber area is fully or overstocked.



Percentage of timberland area by live-tree stocking class & stand-size class. (New York Forest, 2017)

Over 15.5 million acres of forestland in New York are classified as timberland...

On the surface, this may indicate strong productive capacity to provide timber products. However, other characteristics – such as timber quality, stocking class, and species composition—have to be considered to assess future productive capacity.

Additional analysis of the FIA data of commercially important forest types in New York shows that two of the predominant types, maple-beech-birch and oak-hickory, represent 71 percent of timberland acres. These forests showed a significant decrease in the percentage of acres in the poorly or medium stocked category: 57 percent in 2007 dropped to 41 percent in 2017. This points to the continued growth occurring in these two forest types, with 60 percent of them now classified as overstocked or fully stocked (up from 43 percent in 2007). Stands that are overstocked and/or fully stocked are often suited to a commercial harvest under various scientific silvicultural guides and regimes designed to maximize the growth rates of commercially viable species. Overall, nearly 90 percent of timberland acres are in a condition where trees of potential commercial value dominate.

Two important commercial species, sugar maple and northern red oak, show decreases or little growth in the number of dominant or co-dominant trees since 2007. These are trees 5 inches or more in diameter that are now in the main part of the forest canopy. Red maple continues to be New York's most abundant tree and has shown marginal change in its numbers since 2007. Other important species, such as black cherry, eastern white pine, and spruce, indicate little increase in numbers over the same time periods.

There are a few concerning trends with regards to the composition of seedling-sized trees in terms of commercial compared to non-commercial species. In the period between 2007 and 2017, there was a 37 percent decrease in the number of sugar maple seedlings and a 35 percent decrease in black cherry, while the percentage of non-commercial beech seedlings increased to 37 percent. There are a few bright spots, with increases in three commercial species: yellow birch (22 percent), red spruce (6 percent), and balsam fir (14 percent), as well as decreases in non-commercial striped maple (-25 percent). Decline in hardwood species may also be linked to decreased winter snow cover/warming.

The growth in beech tree numbers is a concern since beech has little prospect for being an important commercial species due to beech bark scale, which often kills beech after it reaches merchantable sizes. Regionally, beech saplings interfere with desired regeneration and continue to be a problem for foresters.

The decrease in sugar maple, the New York State Tree, is very concerning for not only the timber industry, but also for the maple syrup industry and ecotourism. Recent research indicates that lack of snow cover, an increasing threat as our climate changes, is among the factors that significantly diminish the growth rates of sugar maples (<https://theconversation.com/climate-change-is-shrinking-winter-snowpack-which-harms-northeast-forests-year-round-103410>). See also above, *Assessment: Soil resources in forests*.

While it may appear less than optimal to have acres in anything other than a fully stocked condition, in fact, levels below fully stocked may be desirable depending on ownership objectives, such as wildlife habitat, or if the condition is the result of deliberate and beneficial timber management practices. On the other hand, less than fully stocked condition can be deemed detrimental in terms of carbon sequestration potential since these levels indicate that additional forest biomass, or carbon, could be stored in the standing forest.

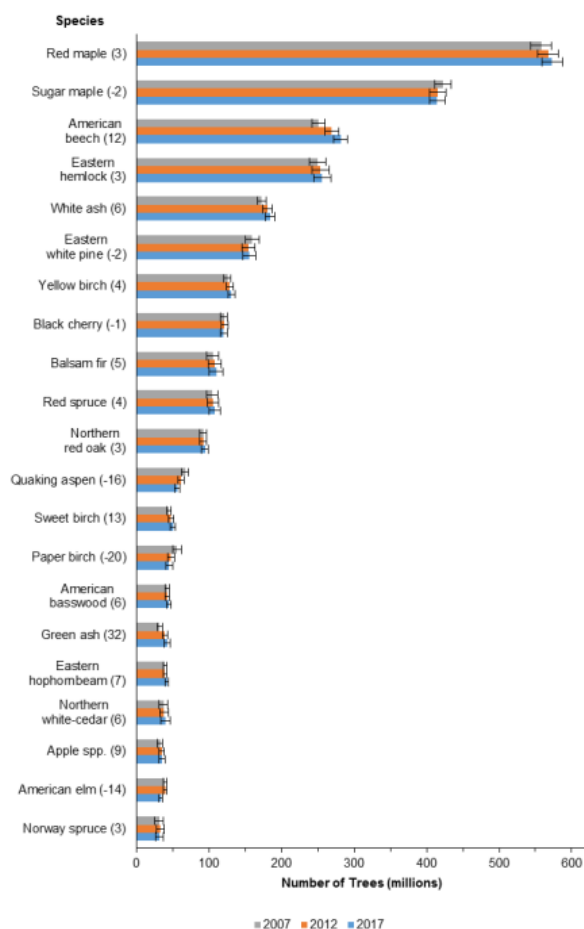


Chart indicating stocking for all forest types

Annual removal of merchantable wood volume compared with net growth

Comparisons of harvested volume to net growth is a useful way to evaluate the sustainability of harvesting practices. Simply dividing annual net growth volume by annual harvest volume produces a ratio showing the rate of growth compared to the rate of harvest. A net growth to harvest removal volume (G:R) over 1.0 indicates that net growth is outpacing removals. Thus, a ratio under 1.0 indicates volume is harvested at a rate exceeding growth, a situation that would be unsustainable long-term. The 2017 statewide G:R was 2.8, meaning that net growth was 2.8 times harvest volume on an annual basis, an increase from the 2012 G:R of 2.3. Among the top 10 species ranked by total net volume, G:R was highest in yellow birch, with a net growth 5.6 times harvested volume (Fig. G4), followed

by northern red oak (4.5), eastern white pine (4.1), eastern hemlock (4.1), and red maple (3.4). Red pine was the only species with at least 1 percent of total net volume that had harvests exceeding net growth as shown by a G:R of 0.5, though several other species (sugar maple, American beech, American basswood, quaking aspen, and chestnut oak) had ratios of 2.0 or less.

Harvest patterns by major ownership groups remained consistent as compared to 2012 estimations, but strong differences were

observed between the groups. Public timberland accounted for 13 percent of net volume in 2017, but was only 7 percent of annual harvest removals volume. This led to disparate G:R ratios in the two major ownership groups. Public timberland had a statewide G:R of 3.6 and privately held timberland was 2.8. While public timberland had the higher G:R, only 7 percent of volume harvested from public land was in rough cull trees, but 10 percent of private harvested volume was rough cull.

| Annual change components as a percentage of net volume | | | | | | | |
|--|---------------------------------------|---|-------------------|-------------------------|-----------------------|------------------|------------|
| Unit | Net Volume (million ft ³) | Ratio of net growth to harvest removals (G:R) | Annual Net Growth | Annual Harvest Removals | Annual Other Removals | Annual Mortality | Net Change |
| Adirondack | 4,113 | 1.9 | 2.3 | 1.2 | 0.0 | 1.5 | 1.1 |
| Lake Plain | 5,320 | 3.6 | 2.4 | 0.7 | 0.0 | 0.8 | 1.7 |
| Western Adirondack | 3,340 | 2.3 | 1.9 | 0.8 | 0.2 | 1.2 | 0.9 |
| Eastern Adirondack | 2,414 | 1.2 | 1.8 | 1.5 | 0.6 | 1.3 | -0.3 |
| Southwest Highlands | 4,159 | 2.9 | 2.3 | 0.8 | 0.0 | 0.8 | 1.5 |
| South-Central Highlands | 6,330 | 3.2 | 2.1 | 0.6 | 0.0 | 0.8 | 1.4 |
| Capitol District | 3,600 | 4.2 | 2.3 | 0.6 | 0.0 | 0.9 | 1.8 |
| Catskill-Lower Hudson | 5,466 | 5.7 | 1.4 | 0.2 | 0.1 | 1.2 | 1.1 |
| Statewide | 34,743 | 2.8 | 2.1 | 0.7 | 0.1 | 1.0 | 1.2 |

Timberland net volume, net-growth-to-harvest (Forest Inventory and Analysis Report, New York Forest 2017)

Assessment: Costs of forest management

Ownership and management of forested lands entails significant costs. The initial purchase, mortgage, and liability or other insurance coverage, and the subsequent real property taxes, management practices, and maintenance activities all have associated costs. To many corporate entities, the bottom line may be a fixed dollar figure. To most family forest owners however, a dollar figure may not constitute the bottom line. Instead, the opportunity to see

wildlife, to hunt or fish, to get away from it all, or to appreciate the scenery and open space may have substantial value that cannot be easily related to a dollar figure.

For forest owners, real property taxation continues to rank high among voiced obstacles to continued sustainable use of rural lands. There are state-level programs that offer to lessen the burden of real property taxes.

New York's current Forest Tax Law offers preferential real property tax treatment to certain landowners who manage their land for timber harvest, and the local government pays for this treatment through a reduction in tax revenues. A significant question is how to continue to raise funds for local government costs normally paid for by real property tax revenue without an undue transfer of tax liability to non-participating ownerships. State support of such preferential tax treatment is argued by some as a fair way to support a societal benefit. Whether done by some form of state payment to affected municipalities or individuals, or as an income tax credit, alternative forms of state support for a state mandated program has been called for from many sides of the issue.

Income from the sale of forest products should not be taxed at such a rate that it becomes a

disincentive to sustainable forestry. Enlightened capital gains treatment and recognition of the costs of long-term management should result in income tax policy that is consistent with the promotion of sustainable land use and management.

Both the individual owner and the general public benefit from management actions conducted to enhance long-term forest health and productivity. These actions cost money. Publicly supported financial assistance programs implemented at the federal and state levels hold some promise to help keep forest as forests with sustainable management as a basis for use of these lands. However, historic levels of funds have been wholly inadequate to address the potential need and opportunity. Investment from the private sector may hold promise to address, at least in part, forest owners' need for financial support.

Assessment: Economic impact of New York's forests

New York's forest products industry is as diverse as any other state's, with businesses ranging from pulp-, paper-, and sawmills, biomass energy plants, and secondary manufacturing of almost every type, as well as the foresters and logging/trucking contractors who produce raw materials and deliver them to a market.

For the forest products industry, challenges are persistent and require innovation by not only investing in new equipment, but also investing in the training and development of employees. Challenges experienced by all sectors result from global competition, high energy costs, and other business-related expenses. The current workforce shortage in logging - trucking in particular - is a major challenge for the industry. In addition, natural factors also provide challenges. For example, quarantines as a result of exotic and invasive forest pests make it more difficult to operate a business as usual.

New York's forest-based recreation contributes significantly to the state's overall economy. These opportunities are categorized as purchases at food and beverage stores, service stations, lodging, eating, and drinking

establishments, and a host of other retail trade and service sectors. Wildlife viewing is the largest contributor, with over 38 percent of the total sales in 2011, followed by, in order: hunting, camping, downhill skiing, hiking, cross-country skiing, fall foliage viewing, and snowmobiling.

The data below, from the forest product and forest-based recreation industry, highlights some economic benefits:

- In 2014, the direct contribution of forest products industry to the New York economy was over \$13 billion*.
- In 2014, the forest products industry directly employed 41,000 people and generated a payroll of over \$1.6 billion*.
- In 2011, Forest-based recreation and tourism provided 31,926 jobs and generated payrolls of \$936 million**.
- In 2011, revenues from forest-related recreation and tourism activities totaled \$8.2 billion**.

- In 2011, New York rural landowners received estimated stumpage revenue of over \$250 million**.
- In 2018, New York was the second leading maple syrup producer in the United States, with the value of maple syrup production totaling over \$26 million.

* "New York State Forest Industry-An Economic Overview-2014," written by Marial Cavo, John Wagner, and David Newman on behalf of the New York State Wood Products Development Council.

** *The Economic Importance of New York's Forest Based Economy*. 2013. Northeast State Foresters Association. https://www.dec.ny.gov/docs/lands_forests_pdf/economicimportance2013.pdf.

*** National Agricultural Statistics Service report: https://www.nass.usda.gov/Statistics_by_State/Pennsylvania/Publications/Survey_Results/2019/Maple%20Syrup%202019.pdf

Threats

Challenges experienced by all sectors result from high energy costs, global competition, and other business-related costs. In addition, natural factors also provide challenges. For example, quarantines as a result of exotic and invasive forest pests cause significant challenges to operating a business as usual. Those in the industry who continue to do well have the flexibility to try new methods, invest in the latest equipment, and seek out and hire the best employees.

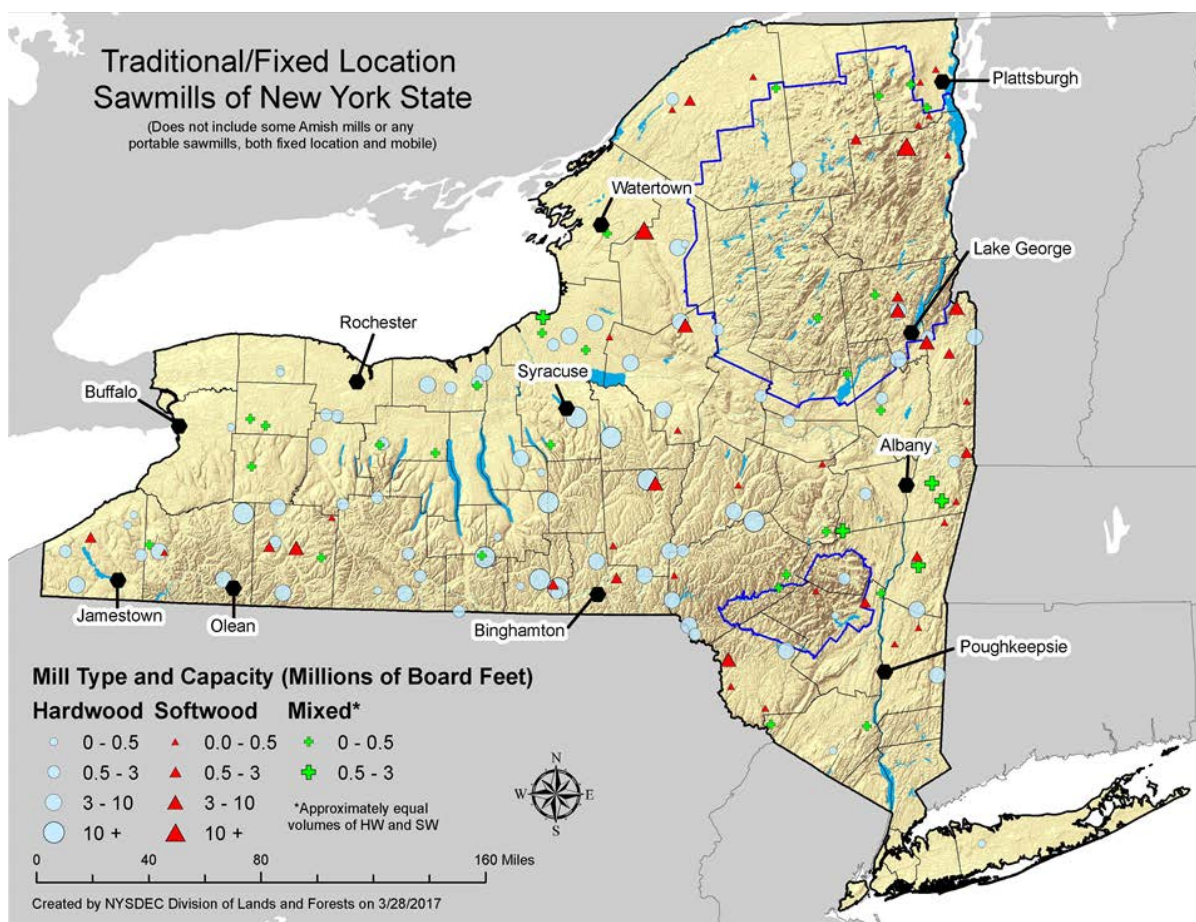
Assessment: Forest product manufacturing

Wood products are environmentally friendly and renewable, and the proper management of their raw source, trees, supports the sequester and storage of carbon. Wood products also provide economic benefits in the form of jobs and manufacturing. Markets for the goods and services derived from forests are essential to generating revenues and returns on investments. Markets need to be diverse, distributed across the state, and accessible by all forest owners. Access to markets should not be unduly restricted by regulations, policies, or laws. These preferred conditions support and sustain private forest ownership, retention, and management.

Traditional markets for wood products include sawmills, veneer mills, pulp and paper manufacturers, pallet mills, and firewood. These users are often called "primary markets," as they take logs from the woods in round form and convert them into products. Over the last two decades, as many pulp- and paper mills closed or switched to imported/purchased pulp, and numerous sawmills closed or consolidated, New York and much of the Northeast have seen a decline in the number and diversity of traditional primary wood markets. Loss of these markets has limited management options for

forest owners and managers, and reduced potential returns. Losses also occurred among secondary wood products manufacturers that buy local lumber and turn it into furniture, cabinetry, flooring, tool handles, and other finished or semi-finished goods. These manufacturers are essential to providing the next link in the economic chain, keeping local mills and harvesters in business.

At the same time, some wood products markets are 'emerging,' such as those for energy biomass or chemical production, but these markets are not yet well developed or geographically dispersed in New York. In addition to using logs, many of these markets also rely on byproducts of other wood processors, including bark, chips, slabs, edgings, and even papermill sludge. These users can provide an important secondary revenue stream for sawmills, pulp mills, and timber harvesters, which helps them stay viable. However, the biomass users' viability may depend on the mills staying in business and continuing to generate affordable byproducts. Whether those businesses can survive is often dictated by other market conditions far beyond the biomass users' control.



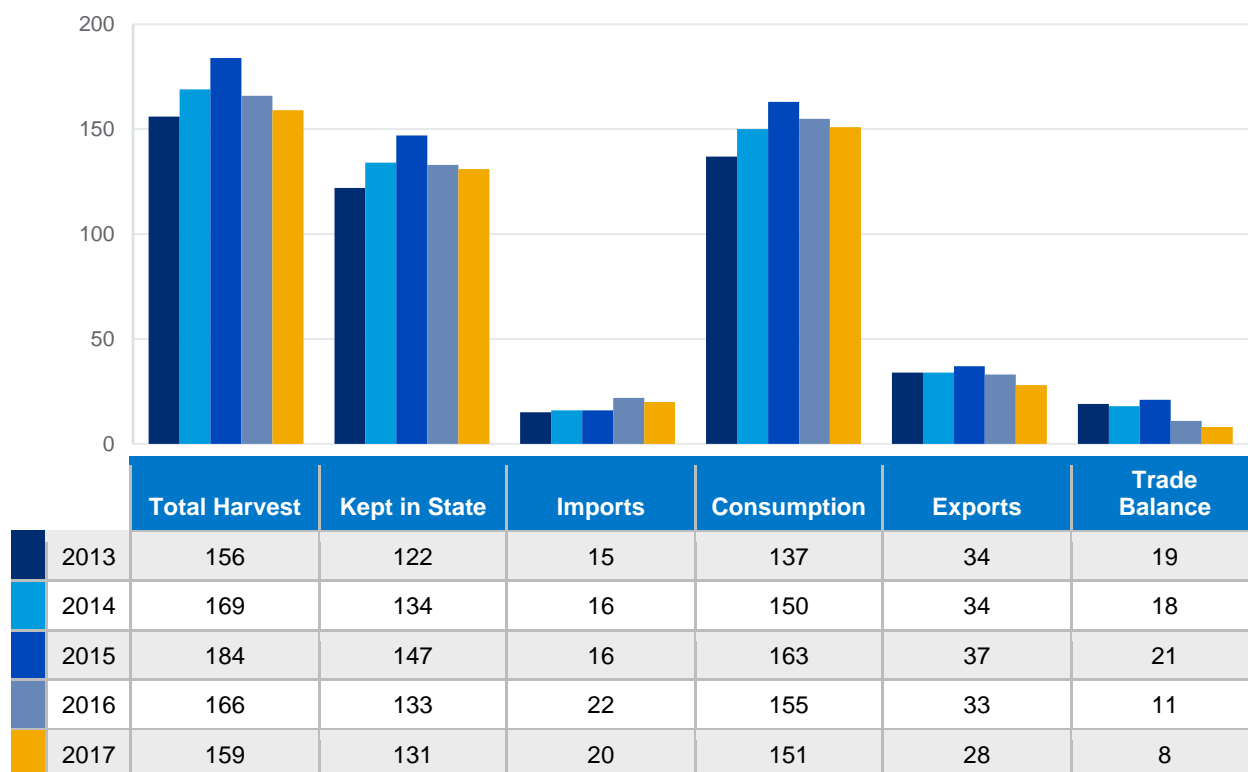
Map of New York State's Traditional / Fixed Location Sawmills

Currently, most harvesting of low-grade timber products takes place in the 14-county North Country region of New York. These markets provide direct economic benefits to landowners by allowing them to sell low-value trees. These markets also provide long-term benefits by 1) improving the overall quality and health of the residual forest by removing poorly formed, diseased, and underperforming trees; and 2) stimulating the regeneration of seedlings and saplings by allowing light to hit the forest floor. Further diversification of markets could safeguard the ability to continue harvesting low-grade timber at high levels.

The expansion of low-grade markets into other parts of the state will improve the overall health and productivity of our managed forests. Failure to gain additional markets for low-grade timber products reduces the ability to renovate degraded stands and contributes to forests

becoming under- or moderately stocked and underproductive. Most of the forestry and logging jobs in New York are located in the North Country, supported by low-grade markets, TIMO's, forest management firms, and traditional pulp-, paper-, and lumber mills.

The majority of New York's valuable hardwood industry is, however, located in the western, central, and Southern Tier regions of the state. High quality hardwood forests and the mills that surround them provide for a viable rural economy in these traditionally economically depressed areas. Private and public landowners benefit from the close proximity to markets and a tradition of forest management. These areas are also susceptible to exploitative harvesting practices of highgrading and diameter limit cutting, which often occur when a professional forester was not involved in conducting a harvest.



Wood and wood product production, consumption, and trade

The Capital Region, Catskills, and Lower Hudson Valley regions of the state have particular challenges when it comes to traditional forestry activities and viable forest markets. These areas have lost much of the mill capacity they traditionally had, sometimes making it difficult for landowners to sell their forest products and manage their property sustainably. This is especially true for low-grade markets, which are virtually non-existent in these areas, so landowners have to pay out of pocket to perform some clearing and thinning activities associated with traditional forest management regimes. This also can contribute to a culture of high grading to keep a harvest economically viable for the landowner. Many times that lack of markets fosters inactivity on the part of the landowner as far as traditional forest management is concerned, which can lead to slower growth rates and unhealthy or degrading forest conditions. A degraded forest provides less traditional economic benefit to the landowner through the production of wood

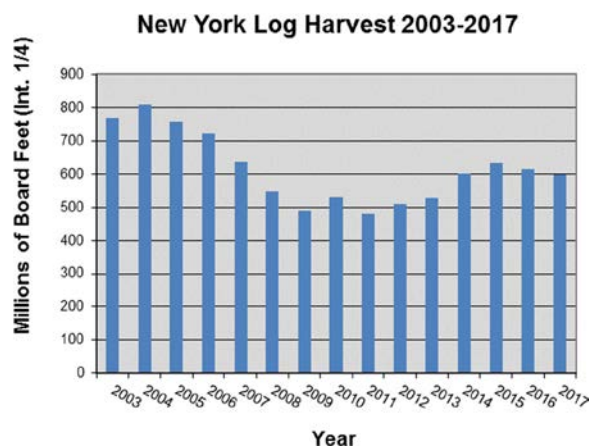
products, which in some cases, affects a landowner's willingness to hold forestland for the long term. This, in turn, creates the possibility of conversion to non-forest or exploiting the resource for short-term economic gain at the expense of long-term benefits.

There is a growing interest and need to explore new economic opportunities for forest landowners, typically called "non-traditional markets." These opportunities can range from recreational or hunting leases to special forest products, such as ginseng, mushrooms, nuts, fruits, and decorative botanicals, to payments for ecosystem services, such as carbon sequestration, wildlife habitat conservation, or water quality protection. Forestland leasing has been a historic practice in many areas of New York, especially on large ownerships formerly held by forest products industries. Payments for ecosystem services are starting to receive a great deal of attention as a method for landowners to monetize these services, on par with traditional forest product markets. If issues

of quantification, verification, permanence, valuation, and funding sources can be worked out, this approach could provide significant economic motivation and compensation for forest owners to retain and sustainably manage their woodlands.

In 1999, DEC's Forest Utilization Program initiated an industrial timber harvest production and consumption reporting program to account for timber product harvest and disposition on an annual basis. This report provides an enhanced understanding of the forest industry's economic contribution to rural New York, and it augments information provided by U.S. Forest Service's FIA program. The report is widely distributed to forestry partners and industry in New York, and it is made available to the forestry research community, as well as the general public. In recent years, the report has been utilized effectively by potential developers of biomass energy facilities investigating woody biomass feedstock availability.

After high harvest levels in the early 2000s, New York saw a decrease in the level of log harvest during the Great Recession years of 2007 through 2012. Steady annual increases occurred through 2015, with slight decreases in annual harvest levels in 2016 and 2017. Prices stabilized after the recession years, creating a favorable market for landowners to sell their wood products. Most of the total amount of wood harvested in New York is kept in state and consumed by state mills. There is a steady export market to China for light-colored hardwoods such as ash and maple.



Assessment: Forest-based public outdoor recreation opportunities

New York State offers public access to recreation on a variety of public lands, including state forests, state parks, wildlife management areas, and the forest preserves. In addition, there are abundant recreational opportunities beyond the boundaries of state-managed lands.

Many of the state's most beloved open spaces are dealing with a "new normal" from the impacts of a changing climate. More frequent and intense storms and higher water levels at waterfront parks on Lake Ontario and Lake Erie are causing shoreline erosion, infrastructure damage, and chronically wet campsites. Coastal parks on Long Island have lost boardwalks, and fragile barrier islands and dune ecosystems have been damaged. High winds, high-intensity rain events, and flooding are also impacting many interior areas, bringing down trees and damaging recreational infrastructure. In light of

the new reality, proactive planning with defined action is essential to protect our outdoor recreation areas, and natural and historic resources.

Recreational planning in state forest- and state park management accommodates diverse activities, such as hiking, biking, snowmobiling, horseback riding, hunting, fishing, picnicking, X-C skiing, snowshoeing, nature watching, geocaching, paragliding, rock climbing, and many others. New York's Statewide Parks and Recreation Plan (SCORP), prepared by OPRHP every five years, provides an assessment, along with a vision and broad policy for recreation in our state. The SCORP includes plans for statewide trails and open space, as well as regional initiatives, such as the Great Lakes and Lake Champlain Basin programs, that help achieve regional management goals.

State Parks and Historic Sites

OPRHP administers more than 350,000 acres of land, with 180 state-owned parks and historic sites. The agency allows public access to some of the state's most scenic natural landscapes, and offers year-round programs to visitors at nature centers, visitor centers, and the outdoors. OPRHP offers recreation at campsites, cabins and cottages at a multitude of historic sites; on trails, day-use areas, beaches and swimming pools, fishing access sites, etc. The agency administers 30 nature centers offering environmental education programs for children, families, adults, and school groups across the state. Stewardship of these natural resources is managed by OPRHP's Division of Environmental Stewardship and Planning.

OPRHP's framework for resource planning is a progression from statewide policy and goals to system management directions, to park and site plans, and, finally, to implementation of capital projects and resource management actions. OPRHP undertakes environmental stewardship projects focused on habitat restoration to benefit rare, threatened and endangered species, and species of greatest conservation need.

With continued losses of natural areas through development, New York recognizes the critical need for new parkland designations for places with wildlife, flora, and scenic, historical, and archeological sites that are unique and rare in the state. Article 20 of the Parks, Recreation and Historic Preservation Law gave OPRHP's commissioner the authority to designate park preserves. The Article also allowed the creation of park preservation areas, to conserve areas of state parks, parkways, and historic sites, as well as recreational facilities that, although the entire facility does not qualify as a Park Preserve, nonetheless possess outstanding ecological values, including assemblages of flora and fauna that are unique or rare in the state.

OPRHP's Park Preserve system currently consists of eight Park Preserves and eight Park Preservation Areas, comprising more than a third of total lands under OPRHP's jurisdiction. Nearly



Breakneck Ridge Trail in Hudson Highlands State Park Preserve (OPRHP). Granite outcroppings afford breathtaking views of the Hudson River Valley. In 2018, this trail was a Leave No Trace hotspot due to high and growing visitation that challenges the protection of resources in this Park Preserve.

80 percent of the State Park system consists of natural areas with varied geologic features and ecological habitats. These notable landscapes include the waterfalls and gorges of the Finger Lakes region, the Genesee River Gorge at Letchworth State Park, the old growth forests of Allegany, and the islands of the St. Lawrence and Hudson Rivers, as well as cliffs at Minnewaska State Park Preserve (Hudson Valley region) and the Helderberg Escarpment of John Boyd Thacher State Park (rising over the Hudson and Mohawk Valleys).

State Forests, Wildlife Management Areas, and the Forest Preserve

DEC's Division of Lands and Forests and Division of Fish and Wildlife administer nearly 4 million acres of land, including approximately 3 million acres of Forest Preserve, over 800,000 acres of State Forests, nearly 200,000 acres of Wildlife Management Areas, and over 900,000 acres of Conservation Easements. These lands are rich in both recreational opportunity and ecological significance, and are home to 52 campgrounds, 12 fish hatcheries, 1,280 miles of easements for public fishing rights, over 400 boat launch and

fishing access sites, two Submerged Heritage preserves, several day-use areas, and about 2,800 miles of trails, as well as several environmental education centers and summer camps. Within the mandate of New York's Environmental Conservation Law (ECL), which requires the Department to first and foremost protect New York's environmental resources, there are a variety of opportunities for public enjoyment of the state's public lands, including hiking, camping, canoeing, hunting, fishing, trapping, snowmobiling, skiing, mountain biking, and rock climbing.

The Adirondack Park Agency (APA) works with DEC in a concerted effort to undertake planning that is critical to improving recreation opportunities throughout the Adirondack Park, where the majority of state lands exist. Numerous unit management plans (UMPs) have been drafted and approved for specific areas that span the range of diversity from popular public campgrounds to the region's more remote, less-used wilderness areas. Through this inter-agency planning process, a primary objective is to facilitate practices such as a "Limits of Acceptable Change" management approach to protecting natural resources, and a "Recreational Opportunity Spectrum" method of inventorying the Park's available recreational resources.



Mountain biking has become an increasingly popular activity on public lands. To accommodate this interest and also protect forest resources, state agencies engage in a planning process with stakeholders and the public to ensure that trail systems are sustainably designed and withstand compatible uses.

Examples of successful mountain biking systems on state lands include Elm Ridge Wild Forest in the Catskills, Wilmington Wild Forest in the Adirondacks, and Grafton Lakes State Park in the Capital Region.

Assessment: Economic benefits of outdoor recreation

When people recreate, they improve their health and support the state's economy. International and out-of-state visitors who come to Niagara Falls or other scenic areas in New York State help support nearby restaurants, lodging facilities, and car rental companies. Bikers along the Empire State Trail support convenience stores, bike shops, eateries, bed and breakfasts, and inns. And visitors to the state's many freshwater and marine beaches support Main Street businesses, private recreation providers, and other local entities.

Approximately 52 percent of state residents participate in some form of non-motorized recreation annually. This generates approximately \$41.8 billion in consumer spending in New York each year, directly supporting 313,000 jobs, providing \$14 billion

in wages and salaries, and producing about \$3.6 billion in state and local tax revenue.

New York's state park system alone received roughly 67 million visits, and visitors spent about \$4 billion from April 2015 to March 2016, according to a 2016 report. This spending supported nearly 54,000 jobs. For every dollar of direct spending generated by OPRHP facilities, an additional \$9 of spending was induced statewide. The report also noted benefits that were more difficult to measure, such as increased tax receipts and increased valuation of nearby properties.

Opportunities for outdoor recreation in New York attract significant numbers of visitors, both residents and people from outside the state. Natural landscapes, including Niagara Falls,

Long Island's beaches, and the Adirondack Mountains, continue to be a major draw. According to a 2010 report, outdoor recreation contributes approximately \$11.3 billion to New York's tourism economy—more than 25 percent of the state's total tourism industry—and \$800 million in tax revenue.

Note: this information was obtained from the New York State Statewide Comprehensive Outdoor Recreation Plan (SCORP) 2020-2025, prepared by OPRHP.

<https://parks.ny.gov/inside-our-agency/documents/SCORP20202025PublicWebinarPresentation.pdf>

Priority Landscapes: Recreational hotspots and long distance trails

Immersion in the beauty and diversity of New York's forests, as well as opportunities for a wilderness experience, are among the main draws of long-distance trails in our state. New York is fortunate to be home to several long-distance trails, including several that connect our state to its neighbors or to multistate landscapes.

Long Path – except for its first 14 miles, the 375-mile long hiking trail traverses the west side of the Hudson River in New York, connecting Ft Lee, New Jersey to Altamont, New York; <https://www.nynjtc.org/region/long-path>.

Finger Lakes Trail – the main Finger Lakes Trail (FLT) from the Pennsylvania – New York border in Allegany State Park to the Long Path in the Catskill Forest Preserve offers 580 miles of hiking. There also are six branch trails and 29 loop trails and spur trails that extend from the main FLT, which total an additional 412 miles. Together, the Main Trail and all branch, loop, and side trails, the Finger Lakes Trail System offer nearly 1,000 miles of hiking in New York State; <https://fingerlakestrail.org/>.

Appalachian Trail – A total of 88.4 miles of this approximately 2,200-mile-long hiking trail are in New York. This historic and internationally renowned trail traverses the Appalachian Mountain range and connects Springer Mountain, Georgia to Mount Katahdin, Maine; www.appalachiantrail.org.

Empire State Trail – the goal of this proposed multi-use trail is to link communities across New York, interpreting the history and beauty of the Hudson River Valley, the Erie Canal, and the

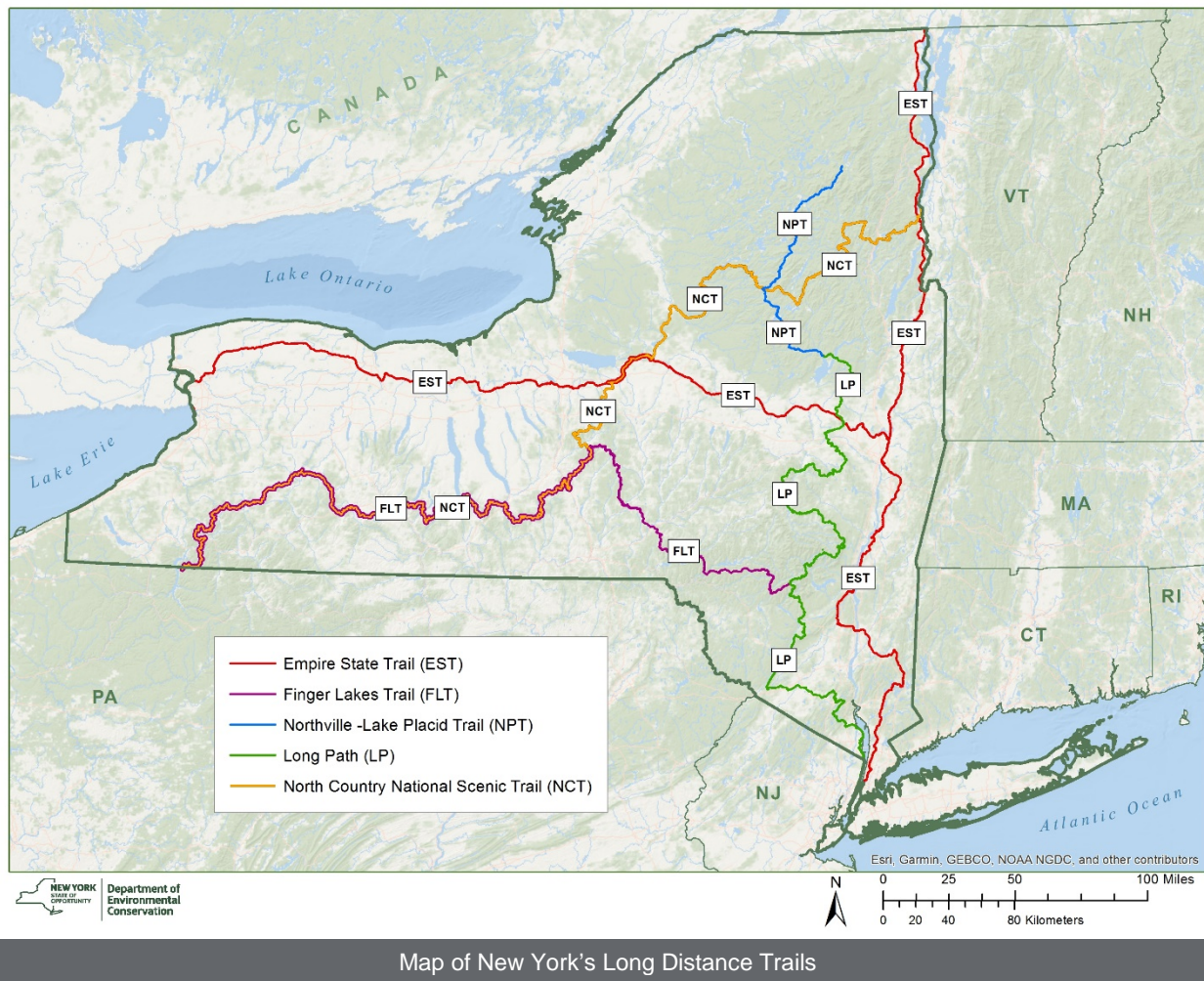
Beyond offering unique opportunities for extended forest-based adventure, these trails also provide connections between larger forest blocks hundreds of miles apart.

It is no surprise that long-distance trails are a priority project of their own in New York's Open Space Plan. These trails are also great examples of uniting public and private lands, and the trails represent opportunities for targeted conservation efforts through broad partnerships.

Champlain Valley. The trail aims to promote connections to regional bicycling and hiking trails, such as the Hudson Greenway Trails, Appalachian Trail, the trails of the Adirondack and Catskill Parks, the St. Lawrence Seaway Trail, the Genesee Valley Greenway, and many others; <https://www.ny.gov/empire-state-trail/about-empire-state-trail>.

Northville-Placid Trail – the 138-mile trail passes through what many consider the wildest and most remote parts of the Adirondack Park, connecting Northville and Lake Placid; <http://www.nptrail.org/>.

North Country National Scenic Trail – the New York section of this trail traverses 717 miles, running through the Adirondack Park from the New York/Vermont border to Allegany State Park at the New York/Pennsylvania border. This 4,600-mile, multi-state and multi-use trail runs from Crown Point in Essex County, New York to Lake Sakakawea State Park in North Dakota; <https://northcountrytrail.org/>.



Focus Area: Urban areas and urban forests

The goal of New York's Urban and Community Forestry program (UCF) is to support municipalities, volunteer groups, and professional organizations in the planning and management of urban and community forests in the state; in other words, to help communities develop their own UCF programs. The U.S. Forest Service, which provides funding for this program, directed community support to focus on technical assistance, development of tree ordinances, tree boards, and management plans for these communities. The Forest Service tracks the state's activities through the Community Accomplishment Reporting System (CARS). Just over 700 communities in New York State are capable of undertaking a UCF program. In other words, 700 communities have public trees along streets and in parks. As of

The connection to trees in urban settings is the cornerstone of garnering support for rural forests among urban residents.

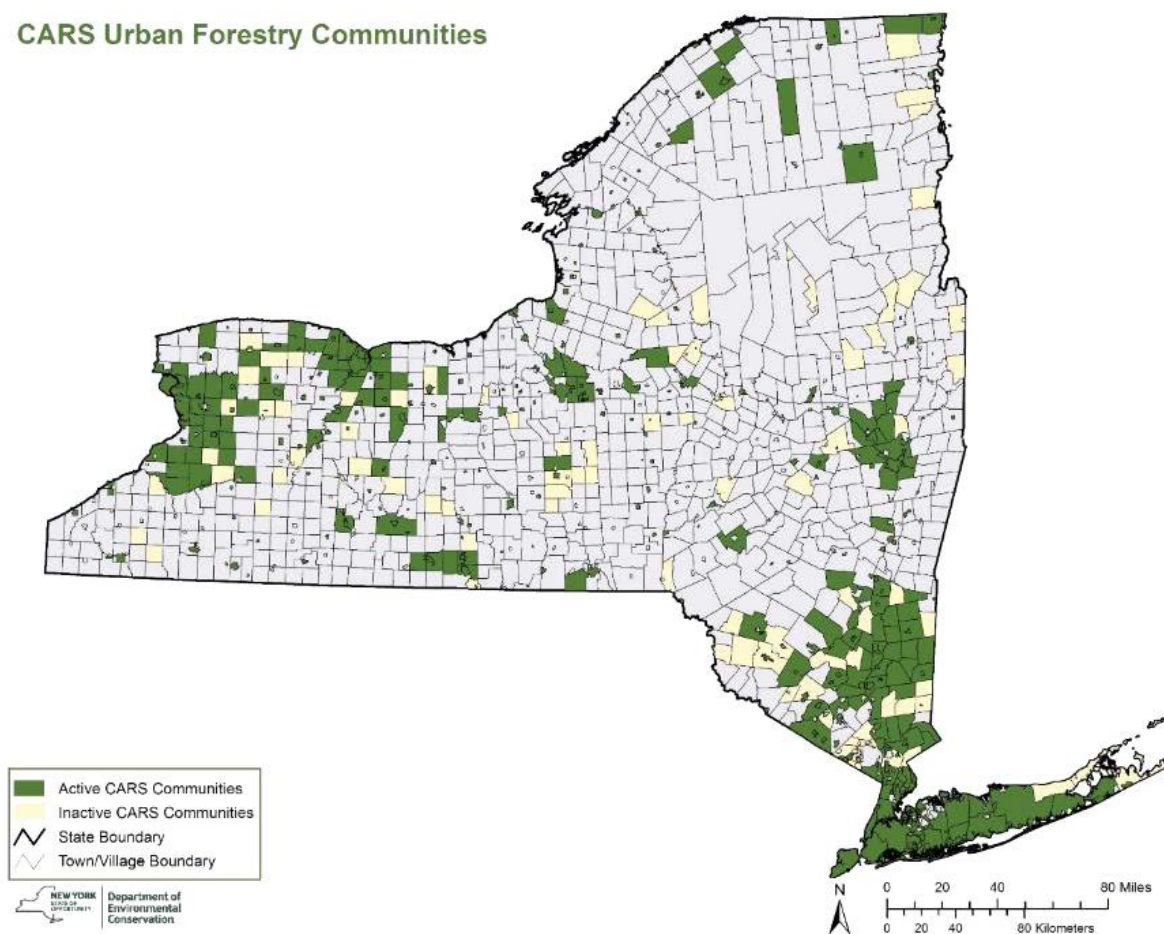
2018, about 430, or 60 percent of the CARS communities were engaged in urban forestry programs or activities.

Trees have numerous positive effects on human health and quality of life. When people utilize parks and shady, tree-lined streets, they are more likely to meet and establish bonds with their neighbors, which helps to create a sense of community. When people enjoy spending time in their neighborhoods, they develop pride and a sense of ownership in their communities.

More than half of New York's communities have an organized tree program. Some are completely run by volunteers, while others are driven by and funded by municipal programs. Many programs fit somewhere in-between. Most community forestry programs have utilized and continue to seek outside technical assistance from DEC, New York State ReLeaf (a partnership between DEC, tree care professionals, and volunteers), and other tree care experts to improve their knowledge and programs.

Communities continue to need support in the form of educational workshops, forester contact, financial assistance, and access to the latest research in order to begin or improve a program. New York Town Law, Section 271, amended in 2007, requires members of town planning boards, zoning boards of appeals, and county planning boards to receive a minimum number of hours of training each year. These trainings introduce the benefits of trees and demonstrate how to create and maintain greenspaces when developing zoning laws or approving site plans.

CARS Urban Forestry Communities



Map of New York State's Communities in Community Accomplishments Reporting System (CARS)

Focus Area: Forests and cultural resources

Protection of cultural resources, in forests as well as other areas, is of utmost importance to indigenous peoples. "Examples of sites of current or traditional cultural, archeological, ecological, economic, or religious significance may include ceremonial, burial, or village sites; areas used for hunting, fishing, or trapping;

current areas for gathering culturally important materials (e.g., ingredients for baskets, medicinal plants, or plant materials used in dances or other ceremonies); current areas for gathering subsistence materials (e.g., mushrooms, berries, acorns, etc.)" (FSC 2019). <https://us.fsc.org/preview.fsc-std-usa-v1-1-2018.a-719.pdf>.

Focus Area: Resources and tenure rights of indigenous peoples

Treaty rights

One key treaty between the U.S. and a confederacy of indigenous peoples is the 1794 Treaty of Canandaigua. It established peace between the U.S. and Haudenosaunee, guaranteed that the U.S. will not claim Haudenosaunee lands, reaffirmed the Haudenosaunee and U.S. as separate sovereign nations, and affirmed the right of the Haudenosaunee to “free use and enjoyment of their lands,” including hunting, fishing, and gathering. Indigenous peoples across the continent consistently reserved these “usufruct” rights, not only on reservations, but throughout their larger aboriginal territories because of the absolute necessity and cultural importance of these practices.

Doctrine of Reserved Rights, Supreme Court United States v. Winans 1905: A treaty is not a grant of rights to the Indians [sic] but a grant of rights from them. Any right not explicitly extinguished... is considered to be "reserved" to the tribe.

These rights remain an essential part of life to Haudenosaunee, Shinnecock, and other native peoples of the lands now called New York State.

<https://us.fsc.org/preview.fsc-std-usa-v1-1-2018.a-719.pdf>.

Forest Stewardship Council – Forest Management Standard

Principle 3: Indigenous Peoples' Rights

Criterion 3.2 Forest management shall not threaten or diminish, either directly or indirectly, the resources or tenure rights of indigenous peoples.

Guidance: “Tribal resources” may include but are not limited to: subsistence hunting and gathering areas, fisheries, cultural sites, and other resources on or off the FMU that may be adversely affected by management activities.

Indicator 3.2.a During management planning, the forest owner or manager consults with American Indian groups that have legal rights or other binding agreements to the FMU to avoid harming their resources or rights.

Consultation entails active, culturally-appropriate outreach to tribes or designated tribal representatives. It is recognized that actual consultation is out of the control of the forest owner or manager, but that attempts must be made to invite such consultation.

For family forests, small private landowners may rely on government-to-government consultation between state and Indian Nations, and abide by the outcome.

Indicator 3.2.b Demonstrable actions are taken so that forest management does not adversely affect tribal resources. When applicable, evidence of, and measures for, protecting tribal resources are incorporated in the management plan. This includes resources that may not be directly on the FMU but may be affected by its management.

Forest Stewardship Council – Forest Management Standard (CONTINUED)

Criterion 3.3 Sites of special cultural, ecological, economic or religious significance to indigenous peoples shall be clearly identified in cooperation with such peoples, and recognized and protected by forest managers.

Indicator 3.3.a The forest owner or manager invites consultation with tribal representatives in identifying sites of current or traditional cultural, archeological, ecological, economic or religious significance. If consultation was not possible, regional databases or references that contain relevant data may be used to compile this information.

Indicator 3.3.b In consultation with tribal representatives, the forest owner or manager develops measures to protect or enhance areas of special significance (see also Criterion 9.1).

Confidentiality of sensitive information is to be maintained. Public management plans may omit specific information.

Focus Area: Managing wildfires and communities at wildfire risk

Wildfire is defined as an uncontrolled fire spreading through natural or unnatural vegetation that often has the potential to threaten lives and property if not contained.

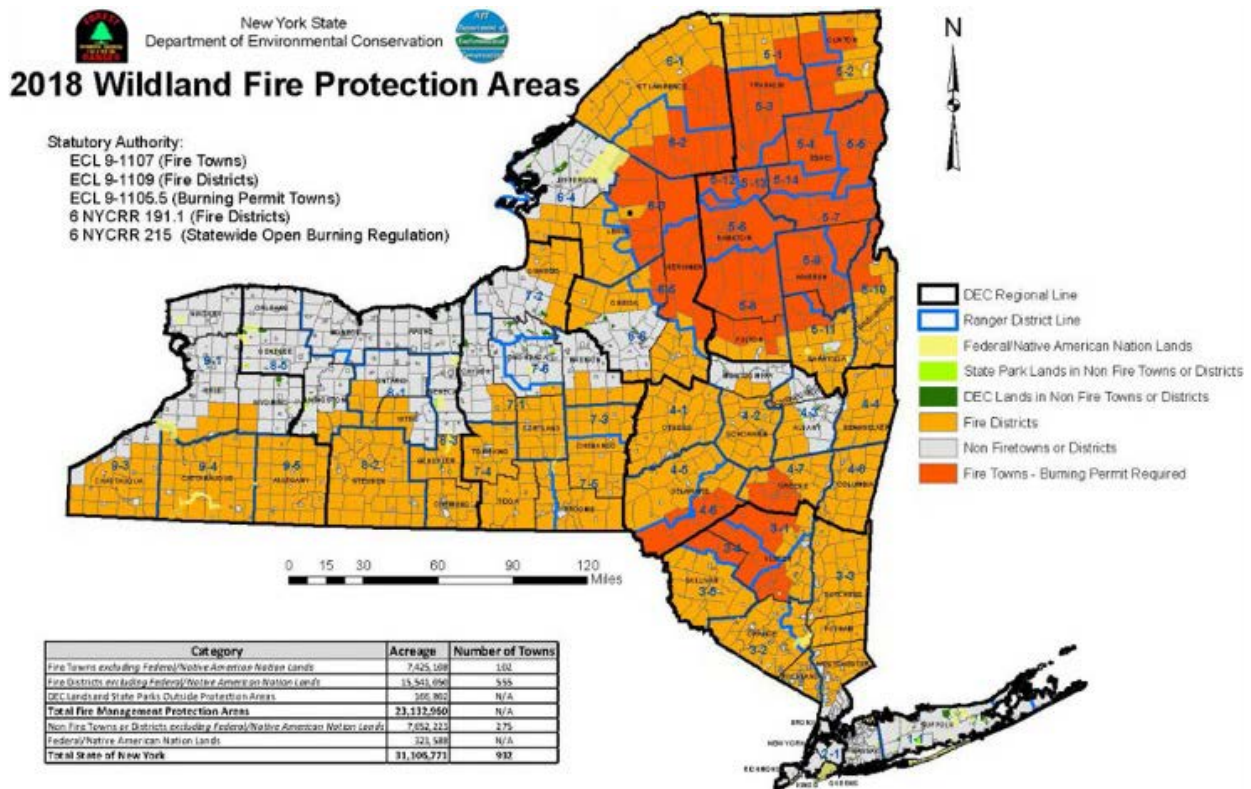
Wildfires that burn in or threaten to burn buildings and other structures are referred to as *wildland urban interface fires*.

New York has large tracts of diverse forestlands, many of which are the result of historic destructive wildfires. Although these destructive fires do not occur on an annual basis, New York's fire history has a cycle of fire occurrence that results in human death, property loss, forest destruction, and air pollution.

New York State is 30.9 million acres in size, with 18.9 million acres of non-federal forested lands and an undetermined amount of non-forested lands with significant wildfire potential. All of New York's 19.8 million residents are affected by the most serious wildfires. Smoke and particulate matter from wildfires 500 miles north in Quebec often drift to New York City. Wildfires in the surrounding wildland-urban interface of New York City suburbs often do the same.

Community and Individual Protection from Wildfire

Local communities and residents have the greatest role at preventing fires, loss of life, or property damage. The number of wildfires caused by debris burning, campfires, smoking, and children continues to decline due to prevention strategies and behavioral changes. However, regardless of prevention strategies, destructive wildfires will continue to occur when weather, fuels, and topography support rapid fire spread. Communities-at-risk to wildfire should develop Community Wildfire Protection Plans (CWPPs) as a comprehensive means of addressing risk issues and mitigation strategies. The statewide 'Firewise NY' program (<https://www.dec.ny.gov/lands/42524.html>) provides specific recommendations for communities, homeowners, and individuals to protect themselves and their properties from destructive wildfires.



Map of New York State's Communities in Community Accomplishments Reporting System (CARS)

Existing Community Wildfire Protection Plans

New York State currently has a few CWPPs:

1. The 2,816-acre Shawangunk Ridge CWPP, created in 2012, for the Town of Wawarsing, Ulster County, covering the historic Cragmoor hamlet. Note: Awosting Reserve, Minnewaska State Park, Roosa Gap State Forest, and Shawangunk Ridge State Park are located near Plan boundaries.
2. The 13,680-acre Ridge-Manorville-Calverton CWPP, updated June 2016, for the hamlets of Ridge, Manorville, and Calverton in the Towns of Brookhaven and Riverhead, Suffolk County.
3. Draft CWPP for the 3,558-acre Eastern Shore of Staten Island (New York City), Richmond County, completed by New York City Parks in 2012, affects all or portions of the communities of Oakwood Beach, New Dorp Beach, Midland Beach, South Beach, Old Town, Grasmere, Arrochar, and Shore Acres, as well as over 1,350 acres of publicly owned open space.

DEC's Forest Ranger Division has a statutory requirement to provide a forest fire protection system for 657 of the 932 townships throughout New York. This area excludes cities and villages; it covers 23.5 million acres of land, including state-owned lands outside the 657 towns. The Lake Ontario Plains and New York City-Long Island areas are the general areas not included in the statutory protection.

For a full listing of CWPP, requirements, etc., see: <https://usfs.maps.arcgis.com/apps/MapJournal/index.html?appid=0cb28162e4ed41a8920beb0d567b643f>.

Existing Fire Management Plans

New York State currently has a few FMPs:

1. The 13,000-acre Albany Pine Bush Fire Management Plan, renewed May 13, 2019, affects residents in the towns of Colonie and Guilderland, the village of Colonie, and the City of Albany, all located in Albany County. DEC is in a cooperative agreement with the Albany Pine Bush Preserve (CA00440).
2. The 90,000-acre Northern Shawangunk Ridge Fire Management Plan, completed in February 2011, affects residents in the cities of Wawarsing, Shawangunk, Rochester, Gardiner, New Paltz, Marletown, and Rosendale, and the village of Ellenville, all located in Ulster County.
3. The Wildland Fire Management Plan for Brookhaven National Laboratory, a 5,265-acre site located in the heart of the Central Pine Barrens on Long Island, New York, completed in 2014, affects residents in neighboring Suffolk County communities, predominantly residential developments scattered among wooded acreage.
4. The Central Pine Barrens Fire Management Plan, from April 1999. The largest portion of the approx. 80,000-acre Central Pine Barrens lies within the Town of Brookhaven, with the rest extending to the towns of Riverhead and Southampton, and the northern portion of the villages of Quogue and Westhampton Beach. DEC is a member of the task force that helped write the plan, and is part of the Fire Management Plan.

Compact and/or federal agreement

During the occasional years when wildfire occurrence is beyond the ability of fire departments and forest rangers to adequately control, New York has extensive mutual aid

support from surrounding states, several federal agencies, and four Canadian provinces.

New York has been a member of the Northeastern Forest Fire Protection Commission since 1949. The mandate of the Northeastern Forest Fire Protection Compact is to provide the means for its seven member states, five Canadian provinces, and four federal land management agencies to cope with fires that are beyond individual jurisdictions through resource sharing (mutual aid). <https://www.nffpc.org/en/information/about>. In addition, New York has an annual agreement with the U.S. Forest Service, National Park Service, and U.S. Fish and Wildlife Service to exchange firefighting personnel and resources, as needed, to combat the most nationally severe wildfires.

Responsibilities for Wildfire Control

The Department of Environmental Conservation's Division of Forest Protection ("Forest Ranger Division") is designated New York's lead agency for wildfire mitigation in the state's Comprehensive Emergency Management Plan (CEMP, Vol2, ESF #4). <http://www.dhSES.ny.gov/planning/CEMP/volume-2.cfm>.

New York's large size, diverse topography, and variety of climates require the state be divided into distinct units for describing wildfire potential and risk. Through research and 35 years of wildfire occurrences linked to fire weather indices, New York is divided into 10 fire danger rating areas (FDRAs): <https://www.dec.ny.gov/lands/68329.html>. FDRAs are defined by areas of similar vegetation, climate, and topography, in conjunction with agency regional boundaries, National Weather Service fire weather zones, political boundaries, fire occurrence history, and other influences. See New York's hazard mitigation plan for wildfire: <http://www.dhSES.ny.gov/recovery/mitigation/documents/2014-shmp/Section-3-17-Wildfire.pdf>.

New York is a home rule state. In the case of wildfire, the local fire department has the primary responsibility (incident command) for the control and containment of wildfires in its jurisdiction. New York State does not adhere to the 'Let It Burn' policy, as the Northeastern U.S. has a longstanding land ethic that is different from states farther west that have large tracks of open space.

The Catskill Park and Adirondack Park fall under the Environmental Conservation Law, Sec. 9-1105. 1 (c): Setting of forestland on fire except where necessary to implement any provision of this chapter, including, but not limited to, paragraph v of subdivision two of section 3-0301 of this chapter; provided, however, that nothing contained in this paragraph shall permit the setting on fire of any land constituting the forest preserve or of any state land within the Adirondack Park or the Catskill Park for any purpose other than fire suppression. The Department shall promulgate regulations governing the use of fire which shall include provisions for notification of, or waiver of notification by, local fire officials.

Wildfire Causes

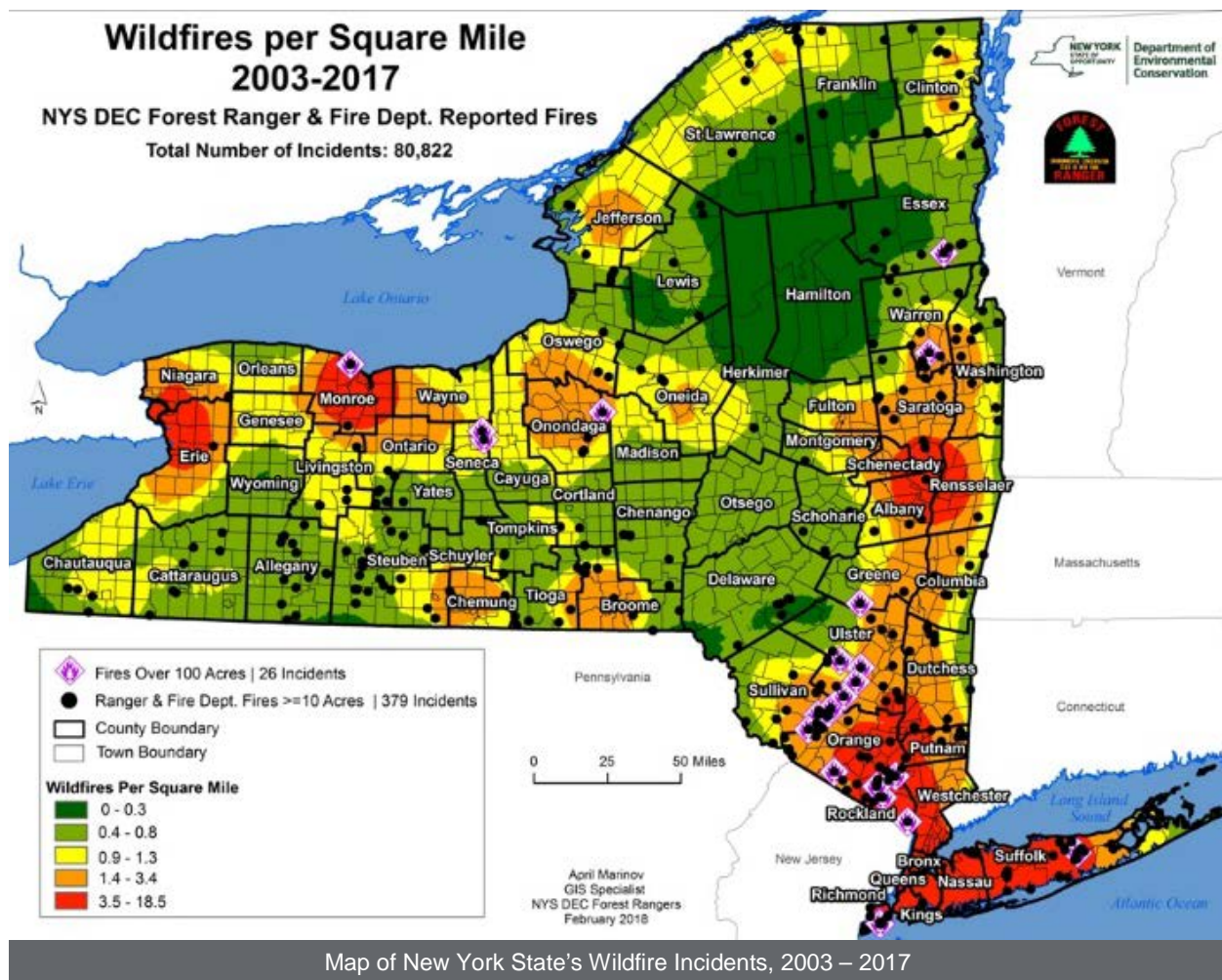
Beginning in 2010, New York enacted revised open burning regulations that ban brush burning statewide from March 15 through May 15, a period when 47 percent of all fire department responses occur. Forest ranger data indicates that this new statewide ban resulted in 46 percent fewer spring wildfires caused by debris burning in upstate New York from 2010-2017 than the previous 8-year average. Debris burning has been prohibited in New York City and Long Island for more than 40 years. Since compliance with this regulation is a continuing objective, historical fire occurrence data from forest rangers and fire departments will serve as a benchmark for analysis of wildfire occurrence. As wildfires caused by debris burning decline through regulatory enforcement, incendiary or arson fires will likely be the primary cause of wildfires in the future. Addressing this issue will require a greater intensity of enforcement than current enforcement for all other causes combined.

Wildfire Occurrence

Over the past 25 years (1994-2018), Division of Forest Protection records indicate that rangers suppressed 5,090 wildfires that burned a total of 49,872 acres. New York, however, does not have a consistent wildfire season, and its fire history indicates periods of time when wildfires are much more numerous and destructive than the 25-year average would indicate. For example, in 2012, a 992-acre wildfire burned through Long Island's Central Pine Barrens, destroying three homes and one fire engine. In 2015, a 2,759-acre wildfire burned from Roosa Gap, Sullivan County, to Cragmoor, Ulster County, threatening 50 residences before being contained. In 2016, the Sam's Point Fire in Ulster County burned 2,028 acres, threatening a radio communication tower complex that serves the Lower Hudson Valley and southern Catskill Mountains.

According to 1993 - 2017 wildfire occurrence data from DEC's Forest Ranger Division, 95 percent of wildfires in New York are caused by humans, while lightning is responsible for 5 percent.

Debris burning accounts for 33 percent of all wildfires, incendiary fires account for 16 percent, campfires cause 16 percent, and children are responsible for 4 percent. Smoking, equipment, railroads, and miscellaneous causes contribute to the remaining 25 percent of wildfires.



Strategy: Manage forest fires for public safety and benefit

To minimize the occurrence of wildfires and the associated property loss, forest damage, and potential loss of life, New York will need to accomplish the following objectives:

- Maintain a highly trained, well-equipped forest ranger force that uses its expertise and resources to contain the most serious fires.
- Support fire departments with their responsibility for the initial attack on most wildfires.
- Enforce fire prevention laws, especially the apprehension of people who purposely set fires.
- Use wildfire predictive services to notify the public and fire officials of fire danger potential. Identify communities-at-risk of destructive wildfires and support the development of Community Wildfire Protection Plans (CWPPs) for them. Conduct fire prevention programs in areas of greatest need.
- Support and implement Firewise, and Ready, Set, Go! programs.
- Practice safe debris burning and recreational fires in all forests and wildland-urban interface environments as allowed by state and local regulations.

- Support fuel reduction techniques in critical wildland-urban interface communities.
- Support communities with CWPP, and also identify communities-at-risk of destructive wildfires, and support the development of CWPPs for these communities.

See also: <https://www.dec.ny.gov/lands/42378.html>.

Prescribed burns

Wildfires do not include naturally or purposely ignited fires that are controlled for the purpose of managing vegetation for one or more benefits. The safe and controlled reintroduction of fire into fire-dependent ecological systems is part of a suite of management actions designed to improve forest health and habitat for native wildlife species. Continue to manage prescribed burns to:

- Improve wildlife habitat. For example, promote the growth of grasses for the habitat improvement of the Short-Eared Owl.
- Help to restore, improve, and maintain the health of the pitch pine-oak-heath rocky summit by reintroducing fire to this fire-dependent community. Exclusion of fire from this landscape has resulted in significant degradation of the pitch pine-oak-heath rocky summit woodlands by allowing the growth of species that are undesirable to this community, such as white pine and red maple.
- Reduce fuels such as brush and other vegetation, which will decrease wildfire threats in the area and surrounding communities.
- Enhance opportunities for wildlife-based recreation, such as hunting, bird watching, and wildlife photography, since controlled burns benefit the habitat of native wildlife species.
- Help prevent or manage the southern pine beetle. Prescribed burn plans will need to be compliant with 6NYCRR Part 194.

Strategy: Conserve and manage working forests for multiple values and uses

- Maintain the ability of public and private forest-owners to practice active, sustainable management on appropriate forestlands not set aside for special purposes (such as the Forest Preserve, Unique Areas, and special protection areas). This allows working forests to provide the full spectrum of benefits.
- Implement and demonstrate sustainable forest management on public lands.
- Educate the public on forest stewardship and all the benefits of working forests.
- Purchase working forest conservation easements.
- Encourage landowner participations in forest carbon markets.

Simply keeping forests as forests is not enough, on its own, to meet the needs of present and future generations. Many of the desirable and essential benefits, goods, and services that forests provide can come from working forests.

Strategy: Manage forests for sustainable recreation opportunities

Managing for forest health also provides opportunities for sustainable recreation. However, as forest pests threaten New York's forest environments, it is increasingly important to identify high value recreation areas and protect them for future generations. With limited resources to fight increasing numbers of forest pests, strategies should prioritize unique and critical environments that provide opportunities for public use and access. Access to enjoyable recreation also improves public appreciation of the outdoors and support for forestland protection.

- Identify high priority forest ecosystems that are critical to recreation and public access. Prioritize resources to protect these unique and critical environments.
- Survey for forest health threats at recreation and public use facilities.
- Improve public outreach and awareness of invasive species at high use recreation areas.
- Manage invasive species in priority resources to minimize impacts to recreation and public access.
- Work with land managers and stakeholders to identify new forest pests that may affect sustainable recreation, public use, and access.
- Educate land managers and support the implementation of actions to enhance forest health, biodiversity, and resilient forest ecosystems.
- Recognize changing statewide demographics, e.g., the number of state residents is growing, more people are living in urban/suburban areas, and the ethnic/cultural composition of residents is constantly changing.
- Monitor for changes in habits of public land use and corresponding land management.
- Ensure that forest health management activities (e.g., cutting, herbicides, trapping, and other treatments) are explained via signs or kiosks to educate the public.
- Wherever possible, maintain/enhance/create buffers to mitigate impacts to recreational areas.

Strategy: Support forest management as a mitigation and adaptation strategy

Since all forests are a critical tool for adapting to climate change and mitigating its effects, management strategies and actions designed to keep trees and forests healthy, expand or maintain forest cover, and help forests and local communities withstand climate change impacts are a priority for New York—both to meet the goals of New York's Forest Action Plan and to achieve the state's climate change goals.

- Explore and identify what forest management practices are beneficial to climate change mitigation. Expand forester training to include forest management and harvest BMPs, and provide expertise in BMPs that to help adapt to a warmer, wetter climate.

- Enhance forest carbon assessments and monitoring. Research and communicate forestry Best Management Practices for climate mitigation and adaptation, including through the Climate and Applied Forest Research Institute (CAFRI) at SUNY ESF.
- Promote regenerative forest stewardship on private lands to bolster growing forests and increase resilience to disturbance.
- Support forest carbon markets to protect forestland, and improve management to increase amounts of forest carbon sequestered and the accompanying benefits of forests. See TNC's Working Woodlands as one example: <https://www.nature.org/en-us/about-us/where-we-work/united-states/working-woodlands/>
- Encourage long-term carbon storage by promoting forest product uses and markets.
- Develop clear guidance on the carbon benefits of forests by type, size, age class, etc. to ensure proper accounting of net carbon benefits of forests. Work to minimize all impacts on forests. For more on municipal planning and zoning for forest protection, see Goal #4, *Assessment: Planning, zoning, and policies for resiliency and forest protection.*
- Develop clear guidance on the carbon benefits of forests by type, size, age class, etc. to ensure proper accounting of net carbon benefits of forests. For more on municipal planning and zoning for forest protection, see Goal #4, *'Assessment: Planning, zoning, and policies for resiliency and forest protection.'*
- Work with NGOs and municipalities to promote private land conservation on parcels not suited for direct protection by the state. Continue and strengthen forest conservation efforts to avoid forestland conversion.

- Continue and strengthen all strategies identified in this Plan. This includes forest conservation, invasive plant management, native plant restoration, and the protection and expansion of forested riparian buffers. Promote various stages of succession for multiple benefits: mitigation, adaptability, diversity of age structures. Continue planting a diversity of species in a variety of habitats. Increase the magnitude of prescribed burns in response to temperature rise and amplified frequency of droughts, which will help prevent the buildup of fuel and lower the risk of wildfires.

Urban forests play an important role in mitigating the effects of climate change. A robust green infrastructure, through active planning and management, improves and strengthens a community's resilience. Communities that invest in their forests can reduce pollution, stormwater run-off, grey infrastructure costs, and energy costs. DEC's Urban and Community Forest (UCF) Program will support these efforts through grants, as well as education and outreach opportunities. The UCF program also supports New York's climate goals to address the effects of climate change. (See '*Enhance forest contributions to ecosystem benefits*' below.)

- Engage and educate communities on the importance of urban forestry and green infrastructure.
- Increase the capacity of urban NGOs and land trusts to steward and acquire urban parcels that could become small community forests or "pocket forests." <https://www.americanforests.org/blog/picking-pocket-forests/>.
- Partner with climate change and green infrastructure programs to include urban forestry in more urban planning.
- Educate planners on the importance of trees in development and green infrastructure projects.
- Encourage preparations for storms and recovery of damaged landscapes.

- Increase the total tree canopy level across urban areas in the state with tree plantings to increase carbon sequestration, decrease energy use, and reduce greenhouse emissions.
- Promote the conversion of brownfield sites to green areas that could potentially site alternative energy projects (i.e., solar).

Strategy: Enhance forest contributions to ecosystem benefits

Drinking water

Current research on the public health impacts of urban and agricultural runoff in untreated water sources, and a recognition of the high costs and limitations of technological fixes, reinforce that forests are critical to the quantity and quality of water supplies (Barnes et al., 2009). According to the EPA, more than 60 percent of U.S. water pollution comes from runoff from lawns, farms, cities, and highways, as well as leachate from septic systems. In New York State, the Section 303(d) list of impaired waters from 2016 includes about 400 water bodies. The list identifies those waters that do not support appropriate uses and that require development of a Total Maximum Daily Load (TMDL) or other restoration strategy.

- Better leverage the Water Quality Improvement Project (WQIP) program. Increased staffing levels will be required to support the program and facilitate transactions, especially if land trust conservation easement funding becomes available.

Erosion and flood control

In recent years, watershed associations have been planting buffer strips of trees along rivers that have native, flood-tolerant trees and shrubs. There also have been a few encouraging initiatives to restore whole floodplain forests in the Northeast. Floodplain forest species, such as marsh bedstraw, willows, and dogwoods, have sprouted from the natural seed bank that remained in the soil and from seeds washed in by floods.

- Utilize different silvicultural systems to enhance habitat for wildlife species. The types of trees that do well vary with the duration of flooding.
- Maintain and re-establish riparian buffers to decrease erosion and increase fisheries quality.

Urban forests

Urban and community forests provide a wide variety of ecosystem benefits, such as stormwater retention, flood control, improved air quality, and reduced heat island effect. They can also provide health benefits. It is essential to continue educating communities about opportunities to improve and increase their urban forest cover and to instill a greater appreciation for forests that surround us. Since 2008, New York State has seen a decrease in the forested cover in urban areas. If this trend continues, it could cause a decrease in the ecosystem benefits communities receive from the trees.

- Encourage and support tree planting and revegetation efforts, particularly following storms and severe weather events, or after other disturbances, such as EAB-related management. Promote tree plantings as green infrastructure.

Case Study: Niagara River Restoration Projects.

In 2018, DEC and OPRHP began to restore wetlands and riparian areas at several sites along the Niagara River, named by the U.S. EPA as an 'Area of Concern' in 1987. The project sites, Spicer Creek Wildlife Management Area, Beaver Island, and Buckhorn Island State Parks, are important habitats that support the Niagara River fishery and the nationally designated "Important Bird Area."

Buckhorn's East River Marsh has the largest remaining riverine emergent wetland hydrologically connected to an ecologically unique forested wetland/wet meadow habitat, once abundant along the Niagara River corridor. The restoration work will contribute to restoring the beneficial use impairment "Loss of Fish and Wildlife Habitat" in the 'Area of Concern' program.



Completed in 2018, the Beaver Island State Park (project restored approx. 10 acres of natural habitat along the shores of the upper Niagara River. In the 1950s, the original wetlands were filled during dredging associated with recreational improvements at the Park. The completed restoration included extensive native plantings, such as red maple and black willow, and a new nesting platform for ospreys, a state-listed Species of Special Concern. In addition, native trees were planted at various locations in the Park. The Beaver Island project is one of eight Habitat Improvement Projects (HIPs) that are part of the 2007 relicensing of the New York Power Authority's (NYPA) Niagara Power Project by the Federal Energy Regulatory Commission. As part of the 50-year term of its license, NYPA has made a commitment to provide additional funds for operation and maintenance of the HIPs, in cooperation with the DEC.

- Highlight "Rock Star" projects (a public outreach term DEC uses to highlight outstanding activities) that maintain and enhance forest contributions to ecosystem projects. Explore how other communities can benefit from or replicate such projects, e.g., Buffalo's project that turns vacant lots into planted areas to reduce stormwater runoff, <https://www.epa.gov/green-infrastructure/greening-vacant-lots>.
- Provide technical assistance to communities to ensure that community forests maintain a high diversity of tree species. Provide funding for communities to plant and maintain their trees. Encourage native plantings when possible.
- Collaborate and look for partnerships within healthcare communities.
- Encourage/educate communities on how to plan, design, and manage urban forests to improve health and wellness.
- Increase pervious surfaces in urban areas.
- Provide incentives (tax breaks, monetary awards, recognition) to communities with exceptional canopy cover.
- Work with federal and state agencies (FEMA and SEMO) and communities to encourage enhanced preparation for severe weather events and the recovery of damaged or deteriorated landscapes to more healthy and resilient conditions.

- Educate foresters and planners on post-storm/event trauma and how to talk with residents who are rebuilding in tree-damaged communities.
- Establish baseline urban canopy metrics and continue measuring metrics.
- Encourage communities to work with partners to plant more trees through grants, non-profits, private funding sources, volunteers, etc. Partner with climate change and green infrastructure programs to include urban forestry in more city planning.
- Educate various municipal departments (Planning, DPW, Mayor's Office, etc.) on the importance of integrating urban planning and forestry in all levels of planning.
- Encourage, promote, and support opportunities to enhance the tree canopy in environmental justice areas (<https://www.dec.ny.gov/public/915.html>)

Strategy: Maintain sustainable markets for sustainable forest products

Healthy markets to sell forest products are economic drivers for private landowners to offset the cost of forest management and provide a pathway to sound forest stewardship. Landowners will be better able to manage their forests sustainably if there are stable forest products markets throughout New York State. The more wood products are used to replace materials that heavily rely on fossil fuels in their production, the less carbon will be released into the atmosphere.

There is a growing interest and need to explore new economic opportunities for what are typically called “non-traditional markets.” These opportunities can range from recreational or hunting leases to “special forest products,” such as ginseng, mushrooms, nuts, fruits, and decorative botanicals, to payments for “ecosystem services,” such as carbon sequestration, to wildlife habitat conservation or water quality protection. Forestland leasing has been an historic practice in many areas of New York, especially on large ownerships formerly held by forest products industries. The following actions will be taken to support sustainable traditional and nontraditional forest product markets in New York State:

- Incorporate “No Market, No Stewardship” messaging into forest stewardship outreach materials.
- Keep current markets and grow new ones, including low-grade markets. For example, Vermont created a task force to explore forest carbon markets. New York could follow suit.
- Look for ways to leverage private funding to support forest management practices that enhance carbon sequestration and mitigate the effects of climate change. This can be pursued through public-private partnerships.
- Support partners in workforce development efforts to recruit high school students into the logging and forestry industries.
- Promote the use of trained and certified professional loggers to private forest landowners through DEC's forest stewardship program and forest tax law program.
- Explore incentives for mills, loggers, and foresters to follow best management practices, remove invasives, and improve the forest for the future.

- Target federal stewardship dollars and outreach efforts in the Southern Tier and Western New York, where the majority of New York's valuable hardwood resources and hardwood mills are located. Focusing state stewardship efforts on landowners will support the local, rural economy in traditionally economically depressed regions where the forest industry is essential.
- Encourage traditional uses of forestland to include agroforestry; harvest of forest products, e.g., maple sap; wood products; and recreation, including hunting, fishing, trapping, camping, hiking, wildlife viewing, etc.
- Work with partners to create new financial incentives to offset the costs of ownership and forest management for private forest landowners. Specifically, allow for ecosystem management and services, as well as traditional forest management.

Strategy: Recognize indigenous peoples' use of and care for forests.

Lessons from tribal forest management could help improve sustainable management of non-tribal public forestlands.

TRAINING OPPORTUNITY

TRIBAL FOREST ADAPTATION PLANNING AND PRACTICES WORKSHOP

Natural resource managers will learn how to understand, develop, and implement management actions that help ecosystems respond to climate change. This workshop will:

- Provide information on the current and anticipated effects of climate change on the forested landscapes across New York and New England.
- Outline adaptation concepts and strategies supporting sustainable management of forests, waters, and other natural resources.
- Describe resources and tools that can be used to integrate climate change into the management of forests and forest watersheds.
- Identify actions that enhance the ability of forests and other ecosystems to adjust to changing conditions.

Real-world examples of climate adaptation projects that work to meet landowner goals will be featured, and participants will engage in a variety of interactive activities to identify climate change issues and potential adaptation actions.

WHO SHOULD PARTICIPATE:
Professional foresters and natural resource professionals working for tribal organizations and partners.

We ask participants to select a real-life land management project relevant to their job to use during the workshop.

A management project could be part of a forest management plan, timber harvest plan, or other natural resource management project. The workshop would consist of 2-3 people to work together on your project. Best teams would include the people most relevant to making decisions about your project, such as planners, specialists, or managers.

DETAILS
September 10-11, 2019
Alwesanne Mohawk Casino Resort
873 Rte 57, Hogenburg, NY 13365

INTERESTED?
Sign up!
Contact Les Benedict, Saint Regis Mohawk Tribe, to register:
les.benedict@stregis-tribe.gov
(518) 338-5937 x118

A \$10 registration fee will help offset the workshop costs (provided for tribal staff). Lunch and refreshments will be provided.

Logos for DEC, Saint Regis Mohawk Tribe, and others are shown at the bottom.

Case Study: Forest Co-Management. At Brasher State Forest in the St. Lawrence Flatlands Unit, New York, Haudenosaunee (indigenous peoples) have a cooperative agreement with DEC to manage the forest for black ash, a cultural keystone species used by Haudenosaunee for basket making. This agreement is included in DEC's forest management plan. Basket making, along with many other land-based practices, is socially and economically integral for indigenous communities. This work has resulted in renewal of traditional knowledge and increased study of black ash ecology, benefitting both indigenous communities and the ecosystem, and, in turn, helping DEC fulfill its environmental responsibilities and take steps toward recognition of the land rights of indigenous peoples.

"Tribal Forest Adaptation Planning and Practices Workshop."

A training for natural resource managers, organized by NIACS, Northern Forest Climate Hub, and Saint Regis Mohawk tribe Environment Division.

GOAL #4:

Appreciate, Support, and Protect New York's Forests

On the one hand, this goal builds on New York's previous target to ensure continued benefits from forests. From our recognition of these benefits follows our willingness to support and protect forests. On the other hand, this goal also brings us full circle to the first target to keep our forests as forests; without our efforts to support and protect them, our forests will not remain forests. The pressures on forests from human activities and associated changes in our environment require us to act. In sum, this goal is the keystone that ensures the success of the other three goals in New York's circular framework.

"We must protect the forests for our children, grandchildren and children yet to be born.

We must protect the forests for those who can't speak for themselves, such as the birds, animals, fish and trees."

**QWATSINAS (HEREDITARY CHIEF
EDWARD MOODY), NUXALK NATION**

This final goal directly targets two National S&PF Priorities: *protect forests from threats and enhance public benefits from trees and forests.* The third national priority, *conserve and manage working forest landscapes for multiple values and uses*, is embedded in the outlined strategies.

Assessment: Planning, zoning, and policies for resilience and forest protection

Comprehensive planning and local zoning ordinances are tools often used to manage or direct growth, help maintain open space or other environmental benefits, or to ensure that infrastructure, such as water supply or sewage capacity, is not overburdened. Depending on how such ordinances are written and enforced, they can be great tools for promoting forest sustainability. However, they can also have unintended consequences that could put them in direct conflict with sustaining forests.

New York is a home rule state. Authority for planning and zoning rests with municipal governments. While the state does not require

municipalities to adopt either a comprehensive plan or a zoning ordinance, those that adopt zoning and other land use regulations must ensure that they are "in accordance" with an adopted comprehensive plan.

The initial Community Risk and Resiliency Act (CRRA), enacted in 2014, required applicants (be they a homeowner or an agency) in a limited set of permit programs, and for funding in the Open Space Program, to demonstrate consideration of sea level rise, storm surge, and flooding. The Climate Leadership and Community Protection Act (2019) revised the Community Risk and Resiliency Act: it expanded

Indigenous worldviews recognize the rights of the lands and waters to carry out their own duties and responsibilities. The Haudenosaunee Thanksgiving Address, a protocol for understanding of and engagement with the natural world, specifically mentions the duties of Mother Earth, the Waters, and the Fish, among other elements of Creation. The recognition and correlated responsibility of human beings to protect these rights of nature can be a motivating and guiding principle in conservation and protection efforts.

the permitting programs included and required New York State to take into account all future physical risks due to climate change. (<https://www.dec.ny.gov/energy/102559.html>)

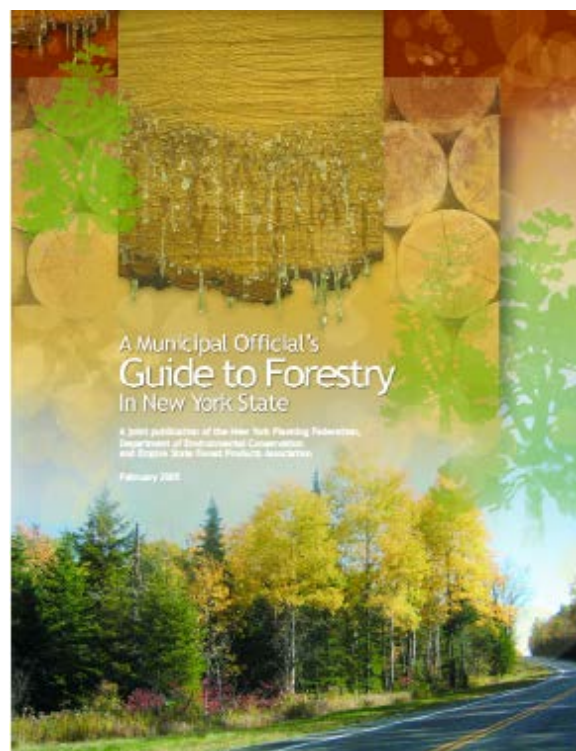
The CRRA requires DEC to provide guidance on the use of natural resilience measures, including forests and riparian buffers among others, to reduce risks associated with flooding, storm surge, and sea level rise. All CRRA guidance documents will be released in early 2020. DEC anticipates developing program-specific guidance to incorporate flood-risk reduction recommendations developed pursuant to CRRA, as well as consideration of other climate hazards significant to each project type, in its permit programs.



Also pursuant to CRRA, in 2019 the Department of State released a toolkit of model local laws to enhance community resilience. In addition to coastal measures, this guidance includes wetland and watercourse protection approaches, stormwater control, and the management of floodplain development. To download the documents, visit: <https://www.dos.ny.gov/opd/programs/resilience/index.html>.

More specific municipal planning efforts related to forestry are outlined in *A Municipal Official's Guide to Forestry in New York State*, NYPF, NYSDEC and ESFPA, 2005.

Many municipalities lack either a comprehensive plan, zoning ordinance, or both. Even among municipalities with both, one may be out-of-date or inconsistent with the other. Such documents can discourage multiple forest uses and forest retention if they are unclear, confusing, or contradictory. They can provide mixed or unreliable messages to landowners, forest



businesses, and residents about forest-related expectations or community goals and objectives. The State's 'Right to Practice Forestry' legislation, adopted in 2004, calls on localities to support and facilitate the practice of forestry in the development of local comprehensive land use plans, zoning ordinances, or regulations, and provides for review and comment on proposed ordinances by the Department of Environmental Conservation.

In an attempt to regulate land clearing, many communities facing development pressure have adopted local ordinances that end up restricting sustainable forestry practices. Private forest landowners, timber harvesters, foresters, and the wood products industry are concerned about overly restrictive local ordinances. For many private landowners, the opportunity to periodically earn income from their forests is an important, if not essential, factor contributing to their ability to sustainably manage their forests and resist pressure to subdivide or develop them. Most towns want to find the right balance between preserving traditional uses, such as agriculture and forestry, with economic development and resource protection or preservation.

Planning should begin with a Natural Resource Inventory (NRI) that identifies important forest resources in the community, including large forest blocks, forest linkage zones, riparian forest buffers, and exemplary forest communities. Forest and other natural resource data should be analyzed to identify priority areas for maintaining forest cover and uses. Inventories can be developed in the context of a comprehensive plan, Open Space Plan, or as a stand-alone reference document. The results of an NRI should be available for use by municipal officials, county planning agencies, interested community and watershed groups, developers, and residents. Some applications of an NRI include: environmental review of development proposals; identification of conservation priorities; comprehensive plan updates; zoning and subdivision regulation updates; open space planning and acquisition; and Critical Environmental Area (CEA) designation. See our *Case Study for CEAs: Conserving critical environmental areas in Wawarsing*, under Goal #1.

A comprehensive plan should ideally articulate goals and objectives for forest uses and conservation; for example, “to protect forestland for multiple-use forestry, including timber production, watershed management, fish and wildlife habitat, and recreation” (from the Municipal Guide).

Communities need planning and zoning that protects forests and their benefits, while allowing sustainable forest uses.

DEC’s *Hudson River Estuary Program* is an excellent resource that provides guidance to communities with their planning efforts: https://www.dec.ny.gov/docs/remediation_hudson_pdf/nrifactsheet.pdf and https://www.dec.ny.gov/docs/remediation_hudson_pdf/nricover.pdf.

Zoning is the mechanism by which a government regulates certain aspects of land use, such as the siting and density of development and allowable uses. It is also a way for a community to identify land uses (i.e., residential, commercial, etc.) that are compatible with each other and the setting in which they exist. As such, zoning is the best tool for preserving and enhancing forested landscapes. The identification of land use goals within planning documents can provide the groundwork for adopting zoning laws or regulations that enforce the protection of those areas. Zoning should ideally define forest uses and include forestry as a permitted use within appropriate zoning districts. The Municipal Guide offers guidance on crafting a municipal forestry law or ordinance that balances the right to practice forestry with the desire for a reasonable local review process. For example, the Timber Harvesting Law by the town of Hyde Park, New York, serves as a good example based on the Municipal Guide. <https://ecode360.com/14987313>.

Assessment: Economic framework for sustainable private forestry

Establishing a viable economic framework begins with providing forest landowners with incentives for practicing sustainable forestry on their property. These incentives can either come through the economic markets or through payments or service rendered at a lower cost. Markets for goods and services that forest landowners provide can be through traditional forest product markets, or value added markets,

such as maple syrup, ginseng, mushrooms, etc., all which have economic value. However, some timber markets are not available to some landowner in the state. The continuing contraction of the forest industry means that landowners will no longer have the main economic driver to motivate them to perform sustainable forest management. As stated earlier, the lack of markets removes an

economic tool for landowners to keep and manage their property, and may pressure some to liquidate their forestland, considering it a bad investment. Keeping landownership viable economically is critical to not only a robust timber industry, but for all the other benefits our society obtains from forestland.

Lowering real property taxes on forestland, receiving an income tax benefit, or even providing a direct payment to landowners are all ways to lower costs for landowners. Most other states have recognized the benefit forest landowners provide to the rest of society, and those states provide incentives through tax abatement, current use programs, and some direct payment programs.

Assessment: Unsustainable or exploitative harvesting practices

The average family- or farm forest owner has many different reasons for owning their woodlots, and many different goals and objectives for the property. With appropriate management or silviculture, property owners can maintain their forests indefinitely, while using them today for many different purposes. That is the essence of sustainable forestry. It means keeping forests healthy, productive, and available for future generations, while reaping benefits today. This includes monitoring forest health and other conditions; maintaining appropriate numbers, kinds, and ages of trees; enhancing the growth and vigor of desirable species; and regenerating new trees and forests when the current ones reach maturity or no longer serve landowner needs and objectives.

Because trees of good form and desired species have market value for a host of products people depend on for daily living, woodlot owners can often sell trees to generate revenue and pay off their investments in ownership and management. These periodic timber harvests and sales can help meet short- and long-term needs and objectives if planned and executed with the future in mind. Unfortunately, many woodlot owners and harvesters neither use silviculture nor practice sustainable forestry.

Among new emerging markets is a carbon offset market, where net polluters are compelled through regulation to offset their production of carbon emissions with purchase credits. These credits represent a net uptake of carbon through the conservation of forests using sound, scientific forest management techniques. Some of the credits sold in a carbon market are provided by forest landowners that have agreed to adopt standards and specifications designed to manage their forest for carbon storage and uptake. For example, a company that emits carbon would be allowed to purchase a certain amount of credits in order to counter the impacts of its carbon releases.

Instead, they employ unsustainable cutting practices, such as diameter-limit cutting. This simplistic approach basically removes the largest, most valuable trees and leaves smaller ones. Typically, the smaller trees left behind also are the poorest form or quality, or are suppressed trees that will not respond with increased quality growth. “Economic clear-cutting,” removing only (and all) the marketable trees, and “selective cutting,” harvesting only certain selected species or quality of trees, are also recognized by forestry professionals as unsustainable practices. These practices are often characterized as “high-grading,” and this has been deemed, by some, “the hidden disaster of U.S. forests.”

Neither diameter-limit cutting nor high-grading tries to maintain or improve forest health or productivity, which are key elements of sustainable forestry practice. Nor do these practices deliberately regenerate new, desirable trees to replace the ones removed by the cutting, ensuring and improving future woodlots. As a result, the next “forest” may have a patchy and irregular mix of open and crowded areas, short and poorly formed trees, or trees of limited diversity, low economic and ecological value, or lacking other desired characteristics. This

creates undesirable conditions within the forest, reduces the potential for producing consistent amounts of wood products (including firewood, pulpwood, biomass, or timber) and the potential economic returns from those products, and may adversely impact vegetative wildlife habitats and other forest values. It also may open forests to being dominated by ferns or beech sprouts, or invaded by other undesirable, non-native plants, such as garlic mustard, buckthorn, Japanese barberry, or multiflora rose. The situation usually worsens when a second or third diameter-limit cut is conducted in the same area in future years.

Better stewardship of wooded lands following recognized, sustainable forestry principles and the advice of a professional forester can help

avoid these forest sustainability threats. With public benefits at stake, such as clean air, clean water, wildlife habitat, and future timber supplies, as well as personal benefits for forest owners, some states and localities have implemented regulations designed to ensure sound forest stewardship and conservation. To date, New York State largely relies on education and technical and financial assistance for private woodlot owners to voluntarily promote sustainable forestry. Professional forestry services and assistance are available from DEC foresters, as well as private sector foresters (such as those participating in DEC's Cooperating Forester Program), or other forestry professionals working in the public and private sectors.

Assessment: Legal and institutional framework for state-owned forest protection

The body of law that established the New York State Department of Environmental Conservation (DEC) and authorizes its programs is called the Environmental Conservation Law (ECL). DEC is responsible for administration and enforcement of the ECL. <http://public.leginfo.state.ny.us/lawssrch.cgi?NVLWO>:

Cooperative Forestry Assistance Act (1978): This federal law provides the foundation for cooperative forestry programs implemented by states with federal support. The Cooperative Forestry Assistance Act authorizes key programs, including Rural Forestry Assistance, Forest Stewardship, Forest Legacy, Forest Health Protection, Urban and Community Forestry, Rural Fire Prevention & Control, and Community Fire protection.

Forest Practice Act (1946): This act authorizes forestry assistance for private forest owners to encourage the practice of forestry so that damage to the environment caused by unplanned overcutting can be avoided. The act also assists in helping to stabilize New York industries that are dependent upon forest products.

Article 14 (1894): New York's Forest Preserve lands are protected as "forever wild" by Article XIV of the State Constitution. New York's Forest Preserve is the largest state-designated wilderness in the country.

Criterion 7 in New York's 2010 SFAP offers an extensive overview of "Legal, Institutional & Economic Framework for Forest Conservation & Sustainable Management." See: http://www.dec.ny.gov/docs/lands_forests_pdf/fras070110.pdf

Focus Area: Sustainable forestry and BMPs

Regardless of whether a forest landowner has ever used the services of a professional forester, if that landowner want to sell timber products, it will typically involve a timber harvester or logger. The harvester is one of the most vital links in the forestry economic chain, and, arguably, will have the most direct influence on the forests they work on and the future forests that grow. Very few landowners have the equipment or skills needed to conduct a commercial timber harvest on their own.

Timber harvesters also have direct market knowledge that landowners do not possess. There are two key sustainable forestry issues related to timber harvesters. The first is demographic. Numerous studies have shown that the overall population of loggers is aging and fewer new workers are joining this field. Many factors contribute to this trend. Logging is a very hazardous occupation. It's seen as "low-tech" and low-paying, and is rarely recommended by high school guidance counselors or career counselors. The work environment can be challenging – outdoors in all kinds of weather. Costs of entry to this business can be prohibitively high. The large equipment necessary (skidders, forwarders, processors, chippers, and trucks) can all be very expensive, and financing can be difficult. As the current generation of timber harvesters ages out of the workforce, many people question whether there will be an adequate supply of woods workers to accomplish vital forest management objectives in the future.

Secondly, it is critically important to forest sustainability and natural resource protection that timber harvesters are well trained - skilled in harvesting techniques, business practices, and resource protection. They also need appropriate incentives, direction, and financial motivation to apply "best management practices" in the woods. At the end of the day, the logger is where the "boots meet the dirt" for most of the forests in New York State.

Sustainable forest management has been and continues to be a central goal for New York State and the Department of Environmental Conservation. Ultimately, forest sustainability is determined by the people and practices that directly act upon the landscape. The decisions and choices landowners make about their forestland, and those made by foresters, timber harvesters, recreationists, and other forest users, all influence and change the resource.

New York has a vast and diverse forestland base, held in a combination of public and private ownerships, and managed to provide a broad array of environmental, social, and economic benefits to meet the needs of present and future generations. The Forest Preserve, Unique Areas, and State Parks are set aside and managed to protect and sustain the special qualities and benefits afforded by natural areas and ecosystems. Legal guidelines and management structures are in place to achieve those goals. State Forests managed by DEC are dual-certified under the Sustainable Forestry Initiative and Forest Stewardship Council "green certification," and can serve as models of sustainable forest management for other landowners. Urban forests are protected and managed by communities and, as discussed elsewhere, local, state and national programs are in place to promote their sustainable management. Since the vast majority of New York's forestland is in private ownership, this section focuses on the issues affecting that group and strategies to address those issues.

Some significant and emerging areas of forest and natural resource science and management still have gaps in knowledge and uncertainties over strategies and impacts.

- What are the effects of climate change on our forest ecosystems?
- How to or should we manage forests to mitigate or adapt to climate change?

- How to detect, eradicate, or manage invasive pests?
- How to prevent or deal with the impacts of air pollution, acid rain, and acidic deposition on forests?

- How to restore habitats and/or maintain certain ecosystems, particularly for rare, threatened, and endangered forest-dependent species?

These questions require further research to be answered, and further technology development to identify future actions.

Strategy: Enhance legal protections and policy frameworks in support of forestry

Municipalities often install tree ordinances or road bond requirements that target forest management activities within their village or town. This lack of support of forestry deters forest landowner from conducting activities that will improve the health of their forest and provide an economic benefit to the landowner and community.

As forest health issues multiply on New York's forests, it may become important to track where forest products are harvested from in order to certify compliance with local, state, and federal quarantines. It also may be desirable for landowners and industry to be able to certify where some products came from to be able to sell their products overseas. Regulation and policy need to reflect these challenges moving forward.

- In addition to incentives, education, and outreach, also consider targeted policies and regulations that motivate retention, expansion, and beneficial management of forests, while discouraging deforestation.
- Ensure that forests play a critical role in climate action plans.
- Explore strengthening land use and zoning regulations to protect forestland and forestry activities.
- Investigate avenues for raising the profile of professional forestry, the professional forester, and the professional logger in New York State.

Policy and regulation frameworks designed to protect communities from the negative effects of poor forestry practices, but not to restrict forestry activities, are important in maintaining community support of forestry.

- Explore developing a notification system for timber harvesting on private lands in New York. The purpose of this system could be for the monitoring of forest health agents and water quality.
- Expand policies (e.g., state building code) that protect current markets and encourage diversification of markets (including low-grade markets).
- Build on management strategies that promote healthy, productive, and sustainable forests based on articulated, long-term goals and values; utilize the guidance and expertise of a professionally educated forester; consider many variables, such as wildlife habitat, water quality, and recreation, as well as timber and economic returns.
- Incorporate "Best Management Practices" (See *Focus Area: Sustainable forestry and BMPs*) and other investments that protect natural resources and increase long-term values derived from forests.
- Use trained loggers who have the skills to perform low-impact harvesting.

Strategy: Increase incentives to use the latest science in forest management

Incorporating the latest scientific data and knowledge into practical forest management activities creates better outcomes for landowners and society in general. Management solutions also need to be scale appropriate for small vs. large landowners.

- Develop and grow the newly created “Regenerate NY” cost-share program to improve forest regeneration on private forestland throughout the state.
- Develop forest management workshops and training for forestry professionals on the latest scientific forestry topics.
- Update forest tax law regulations to allow for new silvicultural methods to be explored.
- Establish an online silvicultural library that consulting foresters and staff maintain and contribute to.
- Offer financial means for private landowners to improve forest health through partnership with DEC’s Division of Lands and Forests:
 - Continue to incorporate forest health, forest pests, and invasive species considerations into updating the 480-a Forest Tax Law, the EQIP program, and working forest conservation easements.
 - Create a cost share or tax rebate program for targeted invasive species removals, thinning, restoration, and forest management to improve forest health and lower the risk of attacks by invasive species and/or forest pests.
 - Create invasive species and forest pest tree removal programs that provide some financial assistance (e.g., cost share, tax rebates, etc.) to remove previously infested hazard trees areas that have been the most impacted.
- Expand funding for forestry incentive programs to directly enhance and complement other efforts for retaining forests and implementing sustainable forestry on-the-ground.
 - Demand for these practices from New York forest owners and managers has always well exceeded available funding, indicating a far greater potential for applying conservation practices on the ground.
 - Forestry incentive programs such as the Forest Land Enhancement Program (FLEP), Wildlife Habitat Improvement Program (WHIP), and Environmental Quality Incentive Program (EQIP) have been used in New York to promote and facilitate preparation of Forest Stewardship Plans for private forest owners, and to implement various forest and environmental improvement practices including timber stand thinning, invasive species removal, reforestation and tree planting, riparian buffer establishment, wildlife habitat improvement, forest road stabilization and water quality protection.

Strategy: Increase technical expertise among forest owners and managers

- Empower private landowners and property managers through forest health education and technical advice.
- Continue to provide workshops and other learning opportunities:
 - Support regional Bureau of Invasive Species & Ecosystem Health staff throughout New York State, with Regional staff conducting workshops and providing consultations, management recommendations, and more.
 - Collaborate with organizations, such as New York State Forest Owners Association, My Woodlot, Cornell Cooperative Extension, Soil & Water Conservation Districts, and others to provide education and outreach.
 - Encourage private forest owners to attend Invasive Species Awareness Week (ISAW) events. ISAW is an annual educational campaign each July that offers many opportunities for New Yorkers to learn more about the invasive species impacting their community and what they can do to manage them. Activities include guided hikes, plant and animal identification workshops, MapInvasives training, and much more.
 - Create and promote native plant lists for nurseries, landscape centers, garden centers, and private landowners on the benefits of native plants and how to choose native alternatives in place of invasive species.
 - Inform private landowners of the presence of invasive species and forest pests on their properties following surveys, and offer technical advice.
- Continue to connect the public and private land managers to the technical advice they need:
 - Provide identification services for invasive species and forest pests through the Forest Health Diagnostic Lab (foresthealth@dec.ny.gov and isinfo@dec.ny.gov) and the Forest Health Information Line (1-866-640-0652).
 - Connect private landowners with DEC Division of Lands and Forest Foresters, Biologists, and Partnerships for Regional Invasive Species Management (PRISMs) for technical advice.
 - Connect private landowners with Consulting Foresters for additional technical advice.
 - Provide sufficient basic and technical information on the DEC website and New York State's invasive species clearinghouse, <http://nyis.info/>.
 - Develop and provide innovative forest assessment tools that forest owners and/or managers can easily use and understand. An example is the Forest Health Outreach Tool and Scorecard, jointly developed by Cornell Cooperative Extension, the U.S. Forest Service, and The Nature Conservancy. <https://forestadaptation.org/learn/resource-finder/ny-checklist>.
 - Provide management plans and best management practices (BMPs) on invasive species (i.e., dealing with dead ash after EAB infestation, invasives management post-harvesting).

- Continue to raise awareness of forest health-related issues through print media, broadcast media, social media, etc.
- Continue to increase the use of iMapInvasives for tracking and sharing invasive species data.
- Continue to increase the availability and accessibility of location and management data for forest pests and invasive species through iMapInvasives to inform the public and private landowners.
- Increase the number of demonstration forests statewide, which highlight forest management practices promoting forest health and showcase these forests for technical examples and education.
- Encourage foresters and timber harvesters to learn and adopt new and better ways to engage forest landowners, and better techniques to conserve forest resources and achieve landowners' sustainable forestry objectives.
- Increase scientific knowledge and/or application expertise among forest owners to improve their ability to practice sustainable forest management.
- Promote silvicultural practices and guidelines and timber harvesting Best Management Practices to protect water quality and natural resources. In addition, work to improve and ensure sustainability by employing forest biomass harvesting guidelines, wildlife habitat management standards, invasive species control and management, carbon management practices and recreational development.

Strategy: Provide access to forest data for cooperative stewardship

For cooperative stewardship of all forested lands, it is important to provide access to forest data for all involved in local or regional land use and management decisions. New York State's DEC, NHP, OPRHP, additional state and federal agencies, and others have information, including GIS maps, that can be useful and relevant for a variety of land use planners, organizations, and entities. For example, the Hudson Valley Natural Resource Mapper is a tool developed by DEC for viewing natural features in the Hudson River Estuary watershed: <https://www.dec.ny.gov/lands/112137.html>. Sharing could be deployed via the new Department-wide mapping tool, with reference to the GIS clearinghouse for underlying layers.

- Provide access to forest data to planning and zoning boards, Conservation Advisory Councils (https://www.dec.ny.gov/docs/remediation_hudson_pdf/cacfsheet.pdf), and land trusts.

Providing access to data helps forest managers fulfill FSC Criterion 3.1: "Indigenous peoples shall control forest management on their lands and territories" (FSC 2019).

Good stewardship of forestlands will help provide our country's needs for clean water and air, thriving populations of fish and wildlife, quality outdoor recreation experiences, and a continual supply of wood products, and will help to meet our state's climate goals.

State, federal, and other agencies also have information and data about Indian reservation lands, as well as indigenous peoples' aboriginal territories spanning New York State. The data pertains to lands, waters, sites, species, and materials of cultural importance to Native people.

- Provide access for representatives of indigenous communities to ensure their sovereignty by giving them data needed to care for lands and resources. Share data to ensure equity in indigenous peoples' participation in management and use decisions about forests and forest resources in aboriginal territories.

- Enable Indigenous peoples and other stewardship partners to access the same research, data, and technology that DEC uses, which will provide consistent tools to care for New York's forests and improve results of forest stewardship efforts.

Strategy: Cultivate stewardship ethic among landowners

The right to own land is among the most treasured and valued rights of all American citizens. The ownership of land not only gives landowners the right to pursue personal goals, but also carries the responsibility of good stewardship. Life and the ecosystems that support it depend on strong stewardship or the ethic we apply to caring for earth resources.

Landowners who follow a forest stewardship ethic:

- Guard against soil erosion and the depletion of soil productivity,
- Protect wetlands, riparian areas, and stream and river corridors,
- Mitigate climate change and the build-up of carbon dioxide,
- Protect forests from insects, diseases, wildfire, overgrazing, and poor harvesting practices,
- Conserve New York's biological diversity by protecting endangered species and rare forest communities,
- Ensure future generations have forests to enjoy and that meet their needs, and
- Contribute to the natural beauty of the earth.

Efforts to strengthen the stewardship ethic can be focused on multi-generational landowners, as well as new landowners who don't have a history of ownership or management:

- Look for opportunities to engage landowners in citizen science or efforts that have a community/regional connection.
- Develop outreach materials that recognize the various types of landowner, size of ownerships, and the reasons landowners own forest land in New York State.
- Continue to offer planning assistance through the Forest Stewardship Program.
- Continue to encourage private landowners to work with private foresters through the Cooperating Forester Program.
- Continue to encourage private landowners to develop a stewardship plan and work with private foresters through the Forest Stewardship Program.
- Continue to promote the existence of healthy young forests through the Young Forest Initiative.

- Continue to support the Division of Fish and Wildlife's Deer Management Assistance Program to help address large deer populations, which severely impact forest regeneration.
- Offer planning assistance to private landowners for developing an invasive species and/or forest pest management plan if the development of this plan does not fit into one of the above-listed programs.
- Pursue allowances for treatment of aquatic invasive species and plant invasive species on private lands through the Conservation Law.
- Continue to work with private landowners to conduct invasive species and forest pest eradication and management efforts on private lands, when feasible.
- Work with the New York State Tree Nursery at Saratoga to create a restoration program for areas impacted by invasive species or forest pests to help landowners obtain access to native trees, shrubs, and plants for replanting.
- Work to identify private landowners' nearby areas of ecological concern, and provide outreach to those landowners to help prevent new invasions.
- Work to identify and address underlying problems attributable to invasive species and forest pest damages, such as overcrowding, eutrophication, and the creation of clearings or other disturbances.

Strategy: Support local planning and zoning efforts to advance forest conservation

- Reach out to local governments about the availability of DEC staff to review and comment on proposed timber harvesting ordinances.
- Develop model local laws for timber harvesting, and forest and tree conservation.
- Develop outreach on best management practices for the conservation of trees and forest stands during different phases of site planning and construction.
- In conjunction with the New York State Department of State's Local Government Training Program, develop a municipal training presentation focused on planning and zoning for forests, with guidance tailored to different regions of the state. Develop a schedule for offering the presentation at planning and zoning conferences on a regular basis.

Comprehensive planning and local zoning ordinances are tools often used to manage or direct growth, help maintain open space or other environmental benefits, or ensure that infrastructure, such as water supply or sewage capacity, are not overburdened. These tools can be used to prioritize conservation and sustainable management of important forest areas and to avoid forest fragmentation.

See also *Assessment: Planning, zoning, and policies for resiliency and forest protection*, under Goal #4.

- Provide grant funding to support municipal forest planning and zoning.
- Engage local conservation advisory councils and boards, or encourage their establishment. Conservation advisory councils counsel municipal boards on matters related to the environment, and assist with the review of proposed development projects.
- Develop clear guidance on the carbon benefits of forests by type, size, age, class, etc. to properly evaluate the net carbon effects of renewable and clean energy installations, and to ensure proper accounting of the net carbon benefits of forests.
- Develop clear guidance on the carbon benefits of forests by type, size, age, class, etc..

Forestry is uniquely positioned to provide economic and ecological benefits to all New Yorkers. Education of the public is paramount in developing support for forests, forestry, and private forest landowners.

Strategy: Foster public literacy about forest health and sustainable forestry

Improving the productivity and health of New York's forests requires motivated landowners to conduct sound forestry practices on the ground. Timber harvesting is not a major driver of why New York private landowners own their forests; however, it is often an activity that is pursued after a solicitation occurs, without the landowner having much knowledge of forestry. The majority of New York's population resides in urban areas, and traditional forestry is not part of their culture. This can lead to the public being misinformed about forestry and timber harvesting, and helps to foster a negative view of one of New York's most environmentally sustainable industries.

- Improve and update private lands outreach materials to provide more consistent messaging. Develop materials that emphasize the connection between forest landowners and the general public, as well as all the benefits of conserving and sustainably managing forests.
- Create an outreach strategy that clearly explains the "No Markets, No Stewardship" relationship between healthy, thriving forest product markets and healthy thriving forests. Creating products out of wood from New York forests emits much less carbon than products made from other materials.
- Develop a social media strategy to connect users of private lands programs to each other. These programs include the Forest Tax Law Program and the Forest Stewardship Program. This would also provide an opportunity for the public to participate in citizen science.
- Educate urban New Yorkers about the benefits of traditional forest management.
- Establish a "Your Local Forest Day" modeled after "Local Farm Day" events to promote the connection between forest products, forest landowners, and the general public. Forest landowners would hold events and invite the public to their property to talk about forestry issues.

- Create a “Your Neighborhood Forest Program” that would hold forestry forums and outreach events across the state for targeted neighbors of state lands in order to model forestry practices.
- With partners, develop a New York State Private Forest Landowners Conference to be held every two years to focus on issues related to private forests in our state.
- Create forestry education materials for the New York State Legislature to promote forestry and private land stewardship.
- Maintain green certification.
- Incorporate science-based forestry material into primary/secondary school curricula.

Strategy: Manage recreational user impacts in New York's state-owned forests

Throughout the country, recreational use of public lands has risen exponentially in the last decade. New York is no exception, with certain locations being completely overwhelmed with visitors. Steps should be taken to ensure that public use of these areas occurs in a manner that maintains public safety within communities, along roadways, at trailheads, and in interior areas; protects natural resources and recreation infrastructure; provides a quality recreation experience; supports local economic vitality; and is based on science and/or the best available data.

- In trail and recreation planning, be wildlife and plant sensitive, and habitat oriented.
- Explicitly limit, discourage or prevent human access to sensitive areas.
- Construct trails and other facilities in a manner that accommodates the expected level of use with minimal maintenance, while factoring in climate change (i.e., extreme rain events) as an added impact to facilities.
- Using Volunteer Stewardship Agreements, encourage individuals and groups to help with maintenance of various facilities on State Lands (e.g., trails, infrastructure, etc.)
- Use various steward programs (backcountry stewards, front country stewards, and others) to help educate the public about basic principles of Leave No Trace, protecting sensitive vegetation, wildfire prevention, wilderness preparedness, etc.).

Strategy: Engage communities about the importance of urban forestry

Most New Yorkers live and/or work near community forests, yet they often don't realize how important the trees in front of their home, along their route to work, and outside their workplace are to their health and well-being. With more and more people living in urban areas, it's increasingly important to improve the health of urban forests and their conditions to ensure they thrive.

To appreciate trees, municipal workers and residents first need to be aware of their importance. That will motivate people to act to

protect, improve, and increase this vital resource. DEC recognizes that it is through urban or suburban green infrastructure that the majority of residents are introduced to the joy and benefits from trees and forests. This integration of urban forestry into all levels of city, regional, and state master planning will promote a greater awareness, and educate and elevate the value of urban trees and urban forests ecosystems, and their importance to community sustainability and resilience.

- Participate in outreach events to reach more communities and residents.
- Provide presentations and training to communities interested in learning about urban forestry, and include schools and municipal employees (beyond DPW workers) in these efforts.
- Identify community organizations for partnerships (e.g., explore implementing a Stewardship Mapping and Assessment Project for all of New York).
- Increase statewide connectivity and communications among urban forestry organizations and municipalities.
- Hold statewide educational seminars, workshops, and webinars on urban forestry topics.
- Create an urban forestry newsletter, sharing UCF news and success stories from around the state.
- Create educational webpages and print products aimed at different audiences, e.g., classroom posters, pamphlets for city planners about the benefits of trees.
- Develop an Urban Forest Planning guide for municipalities/community groups.
- Educate various municipal departments (Planning, DPW, Mayor's Office, etc.) on the importance of integrating Urban Forestry in all levels of planning

This means that municipalities need to integrate Urban and Community Forestry into all levels of planning, including community comprehensive and master planning efforts.

Strategy: Develop cultural sensitivity training from indigenous peoples

Work cooperatively with Indigenous Nations to further develop educational materials and educational opportunities, determined by Indigenous Nations, to help New York State government and citizens learn about these Nations.

The need for education in cross-cultural understanding responds to concerns expressed by Indigenous Nations that treaties and rights, as well as hunting, fishing, and gathering

protocols and practices, are not well understood by many DEC personnel or by surrounding non-Native communities. Both public and private landowners would benefit from better understanding of these topics. Cultural sensitivity training materials are currently available for DEC employees through the Office of Environmental Justice. Forest owners are encouraged to learn about the history and present concerns of indigenous peoples.

Strategy: Increase institutional capacity, knowledge, and information exchange

- Provide resources to DEC's Bureau of Forest Resources Management to improve the delivery of programs to private landowners and implement strategies in the Forest Action Plan. The relationships that DEC staff and forest landowners develop is important in fostering good forest stewardship practices over the long term. Having staff available for field visits, quick assessments, advice and follow up, is key to increasing the amount of private land engaged under professional forest management.
- Increase the number of FTEs working on private lands by 2030 (based on 2020 levels) to serve the 700,000 forest landowners who own 75 percent of the forest resource.
- Work with the New York State Department of Civil Service to develop separate "Outreach Forester" positions to be placed in each region to coordinate public outreach on forestry issues.
- Provide forestry, computer, and communications training to Regional Private Lands staff so they can keep pace with the latest techniques and technology to efficiently and effectively perform their job duties. Develop a customer- and public service-based message and approach throughout all state private land programs.
- In order to provide urban communities and the public with the best and most up-to-date information, DEC's Urban and Community Forestry Program staff require continuous training, as well as continuous updates to their technical capacity and knowledge, along with access to equipment based on need. UCF staff also aim to seek certifications relevant to the program's goals and objectives.

Multi-State Priority Areas

Northern Forest

States: Maine, New Hampshire, New York, and Vermont



The Northern Forest region includes over 26 million acres stretching from New York's Tug Hill and Adirondack Park areas through northeast Vermont, Coos County in New Hampshire, and into the Great North Woods of Maine.

Issues associated with the area

- Decreasing forest acreage caused by rapid and unrelenting conversion of forests to developed uses.
- Change in ownership patterns due to the transfer of lands into smaller parcels.
- Loss of forestland and fragmented forests, which undermines the integrity of forest ecosystems and fragile wildlife and fisheries habitats.
- Uncertain markets present challenges to forest products-based economic development, infrastructure, and communities.

Existing efforts

1. The four states have entered into an MOU with the U.S. Forest Service and the Natural Resource Conservation Service to actively cooperate in the conservation and management of working forest landscapes in the area. More specifically, this effort is intended to demonstrate, through pilot projects, how the partners can pool resources and coordinate efforts so that working private forestlands areas are conserved and protected from conversion to other uses.
2. Engaging stakeholders in developing an implementation strategy for how to keep the Northern Forest region's "forests as forests."
3. Engaged in the New England Governor's Conference Commission on Land Conservation Forest Conservation Initiative.

Opportunities for partnership, cooperation, and projects

- Outreach to public officials, the forest industry, environmental groups, private forest landowners, and other interested members of the public in support of forest conservation
- Address the loss of productive forestland to other uses, and potential impacts in the Northern Forest.
- Explore/expand economic and ecological partnerships with Canada
- Engage forest landowners in stewardship efforts by providing technical and financial assistance for improved forest management.

- Work to maintain and diversify the markets for wood products that allow sustainable forest management.
- Promote third party certification to recognize sustainable forest management.
- Recommend policies that encourage sustainable practices.
- Work to acquire forest conservation easements to maintain working forests.

Highlands Region

States: Pennsylvania, New Jersey, New York, and Connecticut



The Highlands are a region of national significance bordering an expanding metropolitan area. The 3.4 million-acre region, with 319 municipalities and 25 counties, has abundant forests, fields, and natural resources that provide quality drinking water, recreation, and economic opportunities to its residents, but pressures to alter land use are great.

Issues associated with the area

- This area is identified by TNC and others as a critical forest corridor connecting Appalachian forests of the Mid-Atlantic to the Northern Forests of New England. This corridor also provides a significant migration pathway for plants and animals adapting to a changing climate.
- Urbanization and sprawl are big issues in this corridor and a driver of forest fragmentation.
- Protecting surface- and groundwater quality: millions of residents in and outside the Highlands depend on drinking water from this region.

- Conserving the landscape for wildlife, rare and native plants, and environmental quality. Deer browse and the resulting lack of forest regeneration is also an acute issue in this area.
- Retaining working forests and farms to ensure economic viability.
- Providing appropriate recreational opportunities near and along the urban corridor.

Existing efforts

1. In 2010, the U.S. Forest Service completed its update about the natural resources in CT and PA, including identification of high conservation value lands, the effects of land use change on the resources, and strategies for conserving them. Respective studies for New York and New Jersey were completed in 1992 and 2002, respectively.
2. Highland Regional Study
https://www.fs.usda.gov/naspf/sites/default/files/publications/highlands_regional_study_ct_pa_10_screen.pdf
3. Hudson to Housatonic RCP for regional land conservation and stewardship,
<https://h2hrpc.org/>.
4. Staying Connected Initiative, connecting the southern Green Mountains in Vermont to the Hudson Highlands in New York,
<http://stayingconnectedinitiative.org/our-places/greens-to-hudson-linkage/>.

5. Forest Legacy projects. The New York-New Jersey Highlands are part of this regional landscape and are Forest Legacy Areas, as designated by the U.S. Forest Service. See sections in this Forest Action Plan about the Forest Legacy program.
6. NPS: Appalachian Trail corridor protection. The Appalachian Trail traverses the Highlands Region in New York, New Jersey, and Connecticut. <https://www.nps.gov/appa/learn/management/upload/AT-report-web.pdf>
7. New York State Forests, DEC: Sterling Forest has tremendous value as the single largest block of intact forest in the New York Highlands and serves as a source of drinking water for more than 2 million New Jersey residents. Sterling Forest also links existing parks in New York and New Jersey, and is part of a vision to create a regional greenbelt.
8. Hudson River Estuary Program, DEC: The Highlands Region includes several Significant Biodiversity Areas.
9. Audubon New York: Large areas are recognized as Important Bird Areas for forest habitat.

Opportunities for partnership, cooperation, and projects

- Partner with land trusts, conservation organizations, local communities, and state agencies to maintain connectivity between forests across the region. Resources are needed to continue land acquisition and easement purchases to protect habitats.
- Continued support for forest health and monitoring programs is important. Invasive species prevention and removal strategies minimize new invasive species and treat existing invasives to promote native forest regeneration.
- Outreach to local communities, including counties, to gather support for ecosystem protection.
- Acquiring fee interest or conservation restrictions over the largest remaining parcels of unprotected, high conservation value forestland, as identified in the U.S. Forest Service Highlands studies, within the forest core and working forest easements in buffer areas reduces the threat of development in these forests.
- Funding for trails and recreation would maintain and expand recreation opportunities. For example, the Appalachian National Scenic Trail (AT) is managed by a public-private partnership of numerous entities of all four states in Highlands Region.

Berkshire-Taconic Landscape

States: New York, Vermont, Massachusetts, Connecticut



Composed of several sub-ranges of the Appalachian Mountains, the Taconic Mountain range runs from northwest Connecticut to northeast New York and extends through western Massachusetts and western Vermont. The landscape is unique in New England as the only intact forest block to have 16,000 acres of forest protected primarily for biodiversity.

With a high degree of ecological integrity and little fragmentation, these forests provide a critical, intact link between the extensive forests of the Northern and Central Appalachians. It is heavily forested and provides recreation, such as the Appalachian Trail, numerous state parks, and waterways.

Issues associated with the area

- This area is identified by TNC and others as a critical forest corridor connecting Appalachian forests of the Mid-Atlantic to New England. This corridor also provides a significant migration pathway for plants and animals adapting to a changing climate.
- The area is vulnerable to development for second homes.
- This heavily forested area provides habitat to rare plants and animals.

- This area offers many opportunities for conservation practices, including conservation easements and land trust projects. Forestland here is a priority for acquisition. This area contains significant sites and landscapes related to New York's (and the nation's) history.
- Ecological protection and restoration are of utmost importance, making it critical to remove invasive species that affect trees and the forest environment. In addition, invasive forest pests are either in this region (Hemlock Woolly Adelgid and Emerald Ash Borer), or nearby, with a high potential to occur in the landscape (Asian Long-horned Beetle).

Existing efforts

1. The last few decades of successful conservation efforts in the landscape have set the stage for implementing broad and ambitious new conservation strategies. These strategies will leverage private money with public funds, improve the resiliency of the landscape, and pioneer adaptation to climate change.
2. The Berkshire-Taconic Regional Conservation Partnership, <http://taconics.org/>.
3. The Staying Connected Initiative, connecting the southern Green Mountains in Vermont to the Hudson Highlands in New York, <http://stayingconnectedinitiative.org/our-places/greens-to-hudson-linkage/>.
4. Forest Legacy projects. The Rensselaer Plateau in New York and the tri-state Taconic Ridge are Forest Legacy Areas, designated by the U.S. Forest Service. See sections in this Forest Action Plan about the Forest Legacy program.

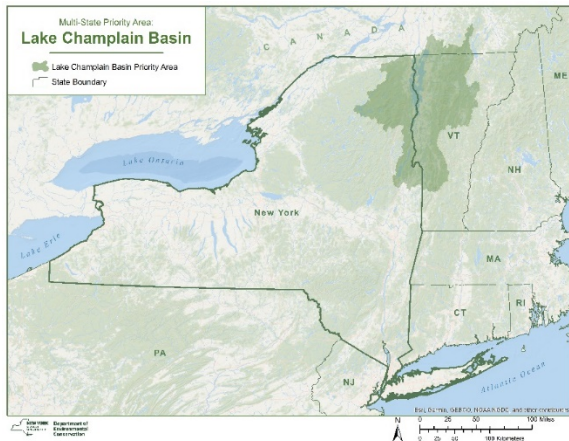
5. Conservation Fund acquisitions, including lands on the Taconic Ridge/Rensselaer Plateau, <https://www.conservationfund.org/news/press-releases/1682-the-fund-buys-23-000-acres-of-forestland-in-ny-vt-ma>.
6. NPS: Appalachian Trail corridor protection. The Appalachian Trail traverses the Berkshire-Taconic Landscape.
7. The Landscape is in CT, MA, and VT, and is located in close proximity to the New York-Connecticut border. <https://www.nps.gov/appa/learn/management/upload/AT-report-web.pdf>.
8. The Berkshire-Taconic Landscape Complex is a Northeast regional priority recognized by DEC, TNC, USFWS, HREP, and others. The 40,000-acre contiguous Complex is one of the most intact forested landscapes within the Lower New England/ Northern Piedmont Ecoregion, spanning from Maine to New Jersey. This complex has been recognized as a Northeast regional priority for its significant habitats and biodiversity areas.
9. Hudson River Estuary Program, DEC: Two Significant Biodiversity Areas of the estuary watershed are recognized in this area: the Taconic Mountains and the Harlem Valley Calcareous Wetlands Complex, which includes significant sections of the southern Berkshire – Taconic Landscape.
10. U.S. Forest Service: The Berkshire-Taconic region, spanning New York, Massachusetts, Connecticut, and Vermont, is identified as a multistate priority area (USFS, 2010), and is adopted in the Forest Action Plans of these respective states.

Opportunities for partnership, cooperation, and projects

- Protecting regional forest connectivity through partnerships with land trusts, conservation organizations, local communities, and state agencies. The Berkshire-Taconic Regional Conservation Partnership is a working example, <http://taconics.org/partners>. Outreach to local communities will garner support for ecosystem protection. Acquiring fee interest or conservation restrictions over the largest remaining parcels of unprotected forestland within the forest core and working forest easements in buffer areas reduces the threat of development in these forests. Invasive species prevention and removal strategies minimize the introduction of invasive species and treat existing invasives to promote native forest regeneration.
- Resources are also needed to continue land acquisition and easement purchases to protect habitats. Continued support for forest health and monitoring programs is also important.
- Funding for trails and recreation would maintain and expand recreation opportunities. For example, the Appalachian National Scenic Trail (AT) is managed by a public-private partnership of numerous entities in all four states of this Landscape. Connecting trails in New York that run only a few miles from the AT would expand recreational opportunities in the Berkshire-Taconic landscape.
- A cross-border rail trail partnership between New York and Vermont on the site of the historic D&H rail bed that Vermont manages as a multiuse trail along the New York border.
- There are opportunities for partnership with the Green Mountain National Forest, which has significant holdings in Vermont.

Lake Champlain Basin

States and countries: New York and Vermont, and Quebec, Canada



The Lake Champlain basin is a multi-national resource of more 5.2 million-acres that is affected by urban development and agricultural runoff.

Challenges include maintaining tree canopy and watershed health to reduce pollution and protect water quality. The effort is being coordinated by the Lake Champlain Basin Program. The basin was also a pilot Signature Landscape of the America's Great Outdoors Initiative. Forestry efforts include the Skidder Bridge Loan Program, which provides free use of skidder bridges for logging operations to implement BMPs in an affordable way. The area continues to be the top priority, and efforts also include an urban green infrastructure initiative in Plattsburgh, which is the most densely populated portion of the basin in New York.

Issues associated with the area

- Forest fragmentation reduces quality wildlife habitat and increases watershed vulnerability.
- Lack of coordinated development and planning to safeguard sustainable forest use. This results in decreased water quality and increased runoff or pollutants entering the watershed.

- Urban stormwater runoff increases the volume of polluted water running into Lake Champlain.
- Invasive plant species in forested areas, such as Hemlock Woolly Adelgid in Lake George forests or the Emerald Ash Borer, weaken forest health and undermine water quality in the watershed.
- In certain areas, such as Clinton County, forests are lost due to conversion back to cropland.

Existing efforts

1. A basin-wide management plan, coordinated by the Lake Champlain Basin Program, that includes activities for many different agencies and organizations.
2. Partnership between federal and state agencies in the region, including DEC, the U.S. Forest Service, and NPS, to advance key initiatives.

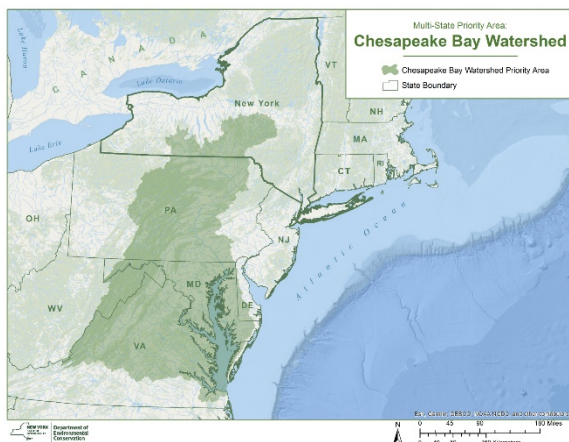
Opportunities for partnership, cooperation, and projects

- Urban forestry projects that provide increased urban forest canopy and stormwater mitigation through plantings. Work with local developers and communities to include forested areas, vegetation plantings, and stormwater runoff mitigations.
- Control the introduction, spread, and impact of nonnative plant species in surrounding forests to preserve the integrity of the Lake Champlain ecosystem.

- Establish and expand forested riparian buffers, which help stabilize streambanks, reduce erosion and nutrient loadings, provide habitat corridors, and provide shade to help cool stream temperatures for fish survival.
- Expand the 'Trees for Tribes' initiative. Following Tropical Storm Irene in 2011, local groups continue to make use of this program.
- TNC is working on a planning effort to identify and conserve priority habitat connections for species requiring large habitat tracts, connecting the Green Mountains with the Adirondacks.
- Explore coordinating efforts with volunteer organizations such as the Greater Adirondack Resource Conservation and Development Council.

Chesapeake Bay Area

States: New York, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, and Washington, DC



More than 150 major rivers and streams of the six states flow into the Bay's approx. 64,000-square-mile drainage basin, including the northern headwaters of the Susquehanna River in New York. Although forests once covered 95 percent of the Chesapeake Bay watershed, due to intense development, today only 57 percent is forested. The Chesapeake Bay itself, located in Maryland and Virginia, is the country's largest estuary.

In 2014, the six watershed states and Washington, DC, along with the federal government, signed the Chesapeake Bay Watershed Agreement, which set goals for the protection of habitat, water quality, and aquatic organisms, as well as for stewardship https://www.chesapeakebay.net/documents/FINAL_Ches_Bay_Watershed_Agreement.withsignatures-HIres.pdf.

Issues associated with the area

- Watershed restoration, urbanization, water quality, and invasive species.

Existing efforts

1. Coordination between the Chesapeake Bay Program, the Forest Service, state agencies, and non-profits through the Bay Program's Forestry Workgroup ensures that forestry issues are addressed in partnership. <https://www.chesapeakebay.net/>.
2. State and federal government agencies provide the leadership to restore the Chesapeake Bay watershed, in part, through forestry partnerships and practices.
3. In 2010, the EPA established the landmark Chesapeake Bay Total Maximum Daily Load, setting limits on the amount of nutrients and sediment that can enter the Bay and its tidal rivers to meet water quality goals. The seven Bay state jurisdictions, in coordination with federal and local partners, created Watershed Implementation Plans (WIPs) that spell out specific steps each jurisdiction will take to meet these pollution reductions by 2025. Federal, state, and local governments coordinate through the Chesapeake Bay Program to develop the WIPs.

4. The seven Bay jurisdictions released their final Phase III of the WIPs in 2019. Recognizing the important role of restoring forest cover, bay states and partners have set lofty forestry targets in three primary areas: 1) restoring riparian forest buffers, 2) increasing urban tree cover, and 3) permanently protecting forests. These practices provide cost-effective ways to improve water quality in the Chesapeake watershed while providing important co-benefits for wildlife and local communities. To support the implementation of these practices, the Forestry Workgroup at the Chesapeake Bay Program developed a Guide for Forestry Practices in Phase III WIPs.

Opportunities for partnership, cooperation, and projects

Shared Stewardship: In 2020, the partnership will publish an updated Chesapeake Forest Restoration Strategy, https://federalleadership.chesapeakebay.net/FINAL%20ChesapeakeForestRestorationStrategy_GPO_130225.pdf. It will be the basis for a watershed-wide Shared Stewardship agreement. Working in partnership across the watershed to coordinate forest restoration and management activities will help maximize the benefits these forestry practices provide to the Chesapeake Bay and residents of the watershed.

Great Lakes Restoration Initiative

States and countries: New York, Illinois, Indiana, Michigan, Minnesota, Ohio, Pennsylvania, and Wisconsin, and the Canadian Province of Ontario.

Lakes: Erie, Huron, Michigan, Ontario, and Superior



The Great Lakes Restoration Initiative (GLRI) is a resource of federal, state, and local governments, tribal/first nations, and other entities to fund and promote the protection and restoration of the Great Lakes by concentrating efforts on five Priority Focus Areas:

- Toxic substances and areas of concern
- Invasive species
- Nearshore health and nonpoint source pollution

- Habitat and wildlife protection and restoration
- Accountability, education, monitoring, evaluation, communication, and partnerships

<https://www.epa.gov/great-lakes-funding/great-lakes-restoration-initiative-glri>.

This initiative relies on U.S. states and Canada working together through lake-wide management partnerships (LMPs). Water in New York's Great Lakes Basin flows to Lake Ontario and Lake Erie, as well as the Niagara and St. Lawrence Rivers. Accordingly, New York participates in the Lake Erie and Lake Ontario LMPs.

Issues associated with the area

- Control aquatic invasive species
- Prevent habitat- and species loss
- Increase coastal health

- Restore beneficial uses of water resources in 31 Areas of Concern
- Reduce non-point source pollution
- Remediate contaminated sediments and toxic pollutants
- Coordinate scientific data collection and communication
- Develop indicators for measuring the health of the Great Lakes

Existing efforts

1. The GLRI began in 2010 with funding to implement work that protects, cleans up, and restores the Great Lakes ecosystem in accordance with the 2010-2014 Great Lakes Action Plan: https://www.dec.ny.gov/docs/regions_pdf/glriplan.pdf.
 - a. The latest GLRI Action Plan for 2020-2024 is currently under development: <https://www.glri.us/node/122>
2. The two lakewide action and management plans (LAMPs) New York State participates in are for Lake Ontario and Lake Erie:
 - a. Lake Erie: <https://www.epa.gov/greatlakes/lake-erie-lamps-and-associated-reports>

- b. Lake Ontario: <https://www.epa.gov/greatlakes/lake-ontario-lamps-and-associated-reports>
- c. Lake Erie State Park: Installed an innovative mushroom-based mycofiltration system to reduce high levels of *e.coli* bacteria. Funding support came from the Great Lake Restoration Initiative. <https://nystateparks.blog/2019/12/10/mushroom-tech-cleans-up-at-lake-erie-state-park/> and <https://parks.ny.gov/environment/documents/posters/RemovingEColiMushroomsMicrofiltrationLakeErieStatePark.pdf>

Opportunities for partnership, cooperation, and projects

- Partner with land trusts, conservation organizations, local communities, and state agencies to protect or restore riparian forests and upland habitats.
- Partner with state water quality regulatory agencies to promote the use of urban forests for stormwater reduction and on-site infiltration.

References

- Barnes et al., 2009. Barnes, Martina C.; Todd, Albert H.; Lilja, Rebecca Whitney; Barten, Paul K. Forests, *Water and People: Drinking water supply and forest lands in the Northeast and Midwest United States*. USDA Forest Service; Northeastern Area State and Private Forestry, 11 Campus Boulevard, Suite 200 Newtown Square, PA 19073; NA-FR-01-08; June 2009. PDF accessed online: https://www.fs.usda.gov/naspf/sites/default/files/forests_water_people_watersupply.pdf.
- Berkes, F. 1993. *Traditional ecological knowledge in perspective*. Traditional ecological knowledge: Concepts and cases (Vol. 1). Canadian Museum of Nature/International Development Research Centre, Ottawa.
- Ernst, Caryn, 2004. *Protecting the source: land conservation and the future of America's drinking water*. San Francisco, CA: Trust for Public Land, Water Protection Service, p. 56.
- Kimmerer, R. 1998. *Intellectual diversity: Bringing the native perspective into natural resources education*. Winds of Change, 13(3), 14-18.
- New York Forest, 2017. *Forest Inventory and Analysis Data Program*. U.S. Forest Service. Draft being prepared for publication.
- Nowack, David J., & Greenfield, Eric J., 2018. *US Urban Forest Statistics, Values, and Projections*. Journal of Forestry, 116(2), 164-177.
- Nowack, David J., & Greenfield, Eric J., 2018. Declining urban and community tree cover in the United States. *Urban Forestry & Urban Greening*, 32, 32-55.
- Nyland et al, 2006. Nyland, Ralph D, Bashant, Amy L, Bohn, Kimberly K, and Verostek, Jane M. *Interference to Hardwood Regeneration in Northeastern North America: Controlling Effects of American Beech, Striped Maple, and Hobblebush*. Northern Journal of Applied Forestry 23(2), 2006, pp. 122-132.
- Pierotti, R., & Wildcat, D. 2000. Traditional ecological knowledge: the third alternative (commentary). *Ecological applications*, 10(5), 1333-1340.
- Shirer and Zimmerman, 2010. Rebecca Shirer and Chris Zimmerman. *Forest regeneration in New York State*. The Nature Conservancy. September 2010. PDF accessed online: <https://cpb-us-e1.wpmucdn.com/blogs.cornell.edu/dist/d/5957/files/2015/03/Forest-Regeneration-in-NYS-shirer-and-zimmerman-29iemne.pdf>
- Waller, D. M., & Reo, N. J. 2018. First stewards: ecological outcomes of forest and wildlife stewardship by indigenous peoples of Wisconsin, USA. *Ecology and Society*.

Appendix A: Forest Legacy Program's Assessment of Need

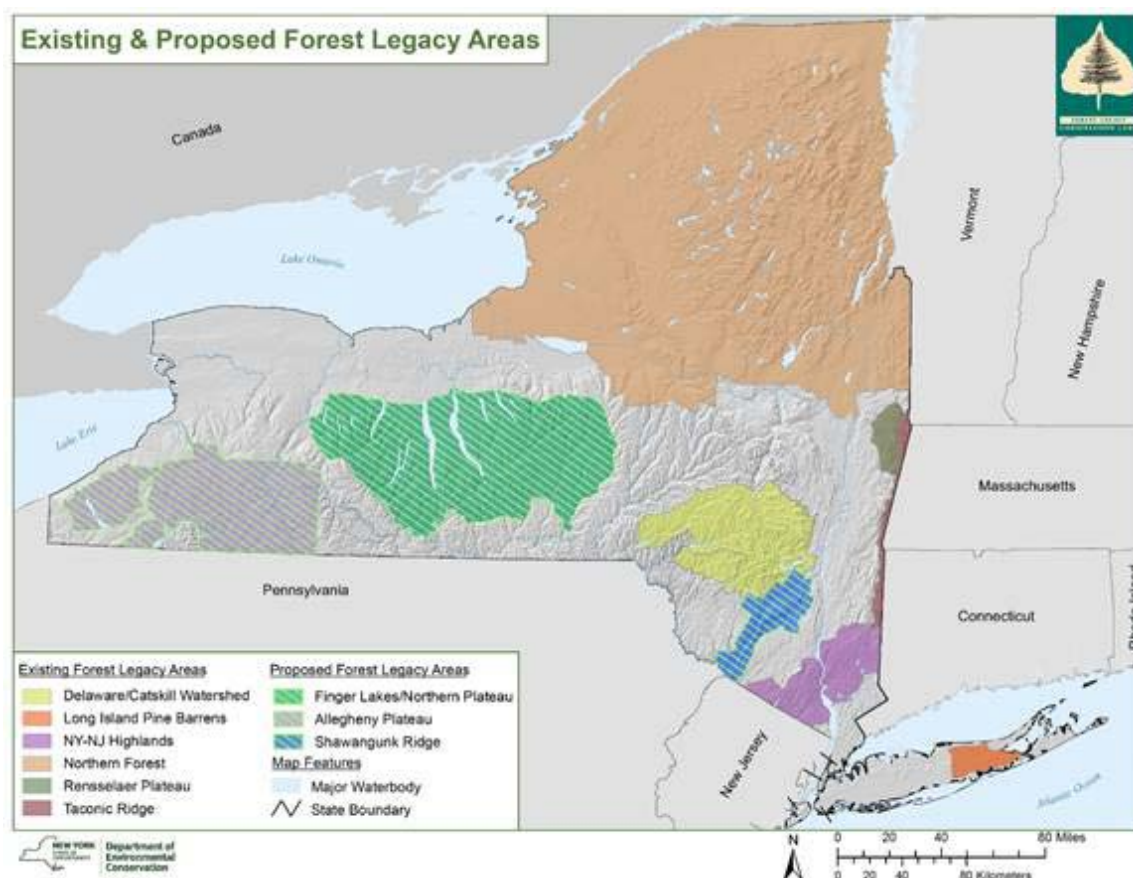
Introduction

Development of the nation's forested areas poses an increasing threat to maintaining the integrity of our country's valuable forest lands. Intact forest lands supply timber products, wildlife habitat, carbon sequestration, soil and watershed protection, aesthetics, and recreational opportunities. However, as these areas are fragmented and disappear, so do the benefits they provide.

The purpose of the Forest Legacy Program (FLP) is to protect environmentally important forest areas that are threatened by conversion to non-forest uses. The FLP is a partnership between participating states and the Forest Service, U.S. Department of Agriculture. These two entities work together to identify important

forest lands and protect them for future generations. The State Forest Stewardship Coordinating Committee (SFSCC) authorized the Forest Legacy Subcommittee to act on behalf of the full SFSCC on all Forest Legacy matters. The Forest Legacy Subcommittee provides guidance on the Assessment of Need and prioritizes the state's submission of annual projects to the US Forest Service.

Conservation easements are the primary tool used to achieve this goal. Priority is given to lands that have important scenic or recreational values: riparian areas; fish and wildlife values, including threatened and endangered species; or other ecological values.



Designed to encourage the protection of privately owned forest lands, the FLP is an entirely voluntary program. It encourages and supports acquisition of conservation easements, legally binding agreements transferring a negotiated set of property rights from one party to another, without removing the property from private ownership. Most FLP conservation easements restrict building development, require sustainable forestry practices, and protect other values. The FLP also supports fee-title land purchases in a limited number of situations where necessary to accomplish the program's objectives.

Current Forest Legacy Areas:

- Northern Forest Lands Study Area (1994 AON)
- Taconic Ridge (1994 AON)
- New York Highlands and Sterling Forest (1994 AON)
- Central Long Island Pine Barrens (1994 AON)
- Catskill/Delaware New York City Watershed (1998 Amended AON)
- Rensselaer Plateau
- Catskill Park Expansion to Catskill/Delaware New York City watershed

Proposed Forest Legacy Areas:

- Allegheny Plateau
- Finger Lakes/Northern Plateau
- Shawangunk Ridge

In order to participate in the FLP, each state is required to develop an Assessment of Need (AON) which documents its need for inclusion in the FLP through an evaluation of current forests, forest uses, and the trends and forces causing conversion to non-forest uses. Additionally, the AON must define eligibility criteria that the state will use to identify and delineate important forest areas as Forest Legacy Areas, identify goals for each FLA, and outline the state's project evaluation and prioritization

procedures. As required by the 2008 Farm Bill, New York has included the AON in its Forest Action Plan as an appendix. The AON references sections of the Forest Action Plan and several state policy documents for additional information.

Forest Resources and Benefits

Scenic Values

Forests figure prominently in scenic values across New York from the Long Island Pine Barrens, the Hudson Valley and Hudson Highlands, Catskill and Adirondack Parks, Rensselaer Plateau, Taconic Ridge, Tug Hill, Finger Lakes, Delaware Highlands, Southern Tier and Allegany State Park. Scenic resources are a tourism driver throughout the state. Forests support Wild, Scenic and Recreational Rivers, Scenic Byways, Scenic Areas of Statewide Significance, and long-distance recreational trails as listed in the state's Open Space Conservation Plan.

The archaeological, scenic, historic and cultural resources of our state provide residents and the country with tangible reminders of the importance of our region's rich and varied heritage. Whether they are rural communities, urban streetscapes, historic working landscapes, or archaeological sites, the presence and knowledge of such resources provide a community and its citizens with continuity and context for their daily lives, and contribute to the overall quality and enjoyment of life. They also can give our communities unique characteristics and a special sense of place, fostering pride in the areas where we live.

The "cultural landscape" created by our historic and cultural resources provides a context for land preservation that goes beyond natural resources and helps strengthen the case for open space protection. Using our landscape as inspiration, Hudson River School painters created a uniquely American appreciation for nature, and New York has been in the vanguard of the environmental movement ever since. The collective efforts to protect our resources are an important part of our heritage in New York, and the policies within this plan will help our state live up to that legacy. (2016 Open Space Conservation Plan)

Fish and Wildlife Habitat

The State Wildlife Action Plan (SWAP) describes the varied forest habitats in New York, and the diverse wildlife species that these forest habitats support. Almost half of the 366 species identified as Species of Greatest Conservation Need (SGCN) in the SWAP depend upon forest habitats, totaling 180 different species. This includes representatives of all taxonomic groups that rely on terrestrial habitats, as shown in Table 1. Of the forest dependent SGCN, 17 are endangered, six are threatened and 29 are of special concern (state designations).

Seventeen forest habitat types that support SGCN were identified (see table in Forest Dependent Species of Greatest Conservation Need), but this does not include some early successional forests categorized as shrublands, nor aquatic habitats in streams flowing through forests. Some of these forest habitats, especially those restricted to coastal locations, are limited in distribution, while other forest types are widespread throughout the state.

Protection of large blocks of forested land is an important component of wildlife conservation in New York, but connectivity of these protected forest habitats is also crucial to provide wildlife the opportunity to move across the landscape. Habitat connectivity is important at many geographic scales, from the local scale of seasonal migration of amphibians between breeding pools and upland habitats, to the regional range expansion of moose between northeastern states. The unimpeded movement of animals is important to maintain genetic diversity in protected areas, and allows wildlife to move to suitable habitats, which is an important adaptation strategy to climate change. The SWAP identified “Promote habitat connectivity for SGCN” as an objective, and listed actions for both aquatic and terrestrial connectivity, including dam removal and culvert replacement, and to restore and maintain natural habitats in linkage areas to foster northeast regional habitat connectivity. (Forest Action Plan Assessment: Forest Biodiversity)

| Class | # of forest habitat-dependent SGCN |
|-------------|------------------------------------|
| Amphibian | 10 |
| Birds | 42 |
| Insect | 64 |
| Lepidoptera | 28 |
| Mammal | 18 |
| Reptile | 18 |

Forest Habitat-dependent SGCN.
NYSDEC Fish and Wildlife Division

| Forest Habitat | # of SGCN |
|-----------------------------------|-----------|
| Atlantic White Cedar Swamp | 4 |
| Boreal Forested Peatland | 15 |
| Boreal Upland Forest | 2 |
| Coastal Coniferous Barrens | 19 |
| Coastal Hardwoods | 7 |
| Coastal Red Maple-Black Gum Swamp | 3 |
| Conifer Forest Swamp | 6 |
| Floodplain Forest | 16 |
| Hardwood Swamp | 7 |
| Mixed Hardwood Swamp | 6 |
| Mixed Northern Hardwoods | 20 |
| Mountain Spruce-Fir Forests | 3 |
| Northeast Upland Forest | 11 |
| Oak Forest | 12 |
| Oak-Pine Forest | 22 |
| Pine Barrens | 20 |
| Riparian Forest | 7 |

Forest Habitat Types that support SGCN.
NYSDEC Fish and Wildlife Division

Public Recreation Opportunities

Understanding the environment is critical to our future, but today, children spend far less time outdoors than their parents did. Often children learn more about nature from television and the internet rather than from direct contact and observation. Efforts to connect New Yorkers to nature described in the Open Space Conservation Plan include:

- Providing access to nature where people live,
- Increasing environmental literacy,
- Showing how contact with nature enhances public health and the quality of life, and
- Involving the next generation in caring for the environment and protecting our open spaces.

Outdoor recreation is an important part of New York's economy. In 2012, it generated \$33.8 billion, and supported 305,000 jobs, \$12.4 billion in wages, and \$2.8 billion in state and local tax revenue. New York State has historically invested in recreational access. It will continue to provide greater access to state lands, improve the availability of recreation information, and improve the economic, social and environmental benefits of those investments. (2016 OSP)

Through the Forest Legacy Program, New York State seeks to provide, when possible and appropriate, access to recreational opportunities. This includes protecting existing recreational opportunities, such as hiking and snowmobile trail routes in perpetuity.

Recreational opportunities include, but are not limited to, traditional recreation such as hunting, fishing, trapping, and wildlife opportunities, as well as canoeing/kayaking, hiking, cross-country skiing, snowshoeing, mountain biking, and light motorized recreation, i.e. snowmobiling.

Approximately one in five Americans has a disability. An increased focus on providing universally accessible amenities on DEC and

OPRHP lands in recent years has resulted in the creation of wheelchair-accessible trails, designated parking, restrooms, picnic areas, campsites, fishing piers, horse-mounting platforms, and boat launches, as well as increased efforts to make all programs and services inclusive. This invites and welcomes people of varying abilities to become active in outdoor recreation, in turn supporting a healthy quality of life for all of our citizens.

Geology and Soil Productivity

Soil is important to forest sustainability since it is, literally, what supports trees. Natural soil conditions, and their ability to support tree and forest growth, are negatively impacted by a variety of factors, including acid deposition, compaction, development and "hard-surfacing", erosion, land cover, fire, and even non-native earthworms.

Geology and Soils

The topography of New York has been shaped by a complex and turbulent geologic history, including multiple tectonic plate collisions, uplift and erosion of several mountain ranges, volcanic activity, earthquakes, igneous intrusions, regional metamorphism, advancing and retreating sea levels, deposition and erosion of huge deltas, and even a huge meteor strike 350 million years ago. Against this changing backdrop, plants and animals evolved, first in the ocean and later on land. New York has one of the world's best fossil records of the Devonian Period (408 to 360 million years ago), with remarkably well-preserved marine sequences, and also non-marine fossils that show the transition to land. Most of the bedrock in New York is over 250 million years old, younger rocks having been almost completely removed by erosion.

New York's present landscape is dominated by the impacts of the last ice age. Only a small area of the southwestern part of the state escaped glaciation (The southwest corner of the High Allegheny Plateau Ecoregion.) Glaciers shaped the high peaks in the Catskills and Adirondacks, changed hydrology, formed huge lakes, and covered much of the state with a layer of glacial

till. Where huge glacial lakes once held melt-water, there are now thick sand and clay deposits, such as those in the Hudson Valley and parts of Central New York. The remnants of ice age features, such as sand dunes, river sand, and gravel deposits and muck-filled bogs, can be found in many parts of the state. But the most ubiquitous material is glacial till, the rough mixture of rocks, sand and clay scraped up and bulldozed by the glacier's ice.

Glaciers erased the existing forests and landforms of New York so thoroughly that there is almost no trace of the pre-glacial ecology. New soils began to develop as organic matter accumulated with subsequent plant successions. About 11,000 years ago, tree species led by spruce migrated back north from their glacial refuges. Some of the early trees, arriving soon after white spruce, included black spruce, elm, and black ash. One of the last major species to arrive in New York was chestnut, reaching the state about 2,000 years ago.

Soils and Associated Tree Species

Bedrock geology forms the framework of the landscape, influencing soil and water chemistry, drainage patterns, the shape and orientation of much of the topography and the resulting local climate patterns. Most of the bedrock in New York, including shale, sandstone and most metamorphic rock, produces acidic soils. Where the bedrock is limestone or marble, soils are high in calcium.

The difference between forest types growing on acid and calcareous soils can be dramatic. Where sandstone bedrock is next to limestone bedrock, the change in vegetation is often abrupt. Pitch pines, chestnut oaks, blueberries, and other acid-loving plants do not grow well on limestone. Other species are more tolerant, notably red cedar, which grows well on rocky sites. For red cedar, lack of shade from competition is a more important factor than soil chemistry.

Many elements of a site affect a tree, including soil thickness and rooting depth, frost effects, soil chemistry, elevation, moisture availability,

wind exposure, etc. Different species have different site requirements, and their health and vigor ultimately depend on where they grow. For example, sugar maple growing on a south facing dry slope is likely to be stressed by drought and heat, and more susceptible to insects and disease. However, many oak species would thrive on such a site since they generally prefer warm, well-drained conditions.

Forest Management Implications

Encouraging the growth of tree species on sites with optimal conditions is one of the important benefits of wise forest management. Foresters must rely on their knowledge of what each tree and forest community require, so that their management efforts result in resilient and healthy forests. A harvest on a south facing dry slope would focus on perpetuation of species that do best in those conditions, such as oak. This purposefully parallels what we observe on the landscape and know about species requirements for optimal growth.

Long-term Effects of Acid Rain on Forest Soils

In the 1980s, the worst pollutants from coal-burning utility plants in the Midwest, sulfur dioxide (SO₂) and oxides of nitrogen (NO_x), were deposited across the Northeast in the form of acid rain or as dry acid particles. Unfortunately, many forests in the Catskills, Adirondacks, and Hudson Highlands grew on naturally acid soils with no buffering capacity to neutralize the acid deposition. Soils became even more acidic, leading to the release of unbound aluminum from soil compounds. Hundreds of lakes became too acidic and poisoned by aluminum to support any life, and the high-elevation forests were dying, their roots damaged by free aluminum in the thin acid soil.

New York passed the 1984 State Acid Deposition Control Act, followed by Article IV of the 1990 EPA Clean Air Act, known as the Acid Rain Program, which required utilities to reduce emissions of SO₂ and NO_x. As precipitation became less acidic, forests began to recover.

Today, the impact of acid rain has not gone away. Long-term studies of forest soils show that acid rain has caused major changes in ecosystem cycling of nitrogen, calcium and carbon. Nitrogen deposition may be lower than it was before state and federal legislation was enacted, but it continues to accumulate in forest soils. Continued nitrogen deposition is especially destructive. Even when it merely fertilizes hemlocks, it has been linked with increased vulnerability to adelgids. Soils can become saturated with nitrogen to the point that plants can no longer absorb it, and the excess nitrogen leaches out of the soil to contaminate water. Calcium leaching from acidic soils is a particularly serious problem, not only because soils become even more acid, but also because calcium is critical for so many plant processes. Reduced soil calcium levels have been implicated in increased frost injury and long-term decline in New York's sugar maples and red spruces.

Effects of Climate Change on Forest Soils

Climate change impacts that are being observed in New York and are expected to continue include rising temperatures and altered precipitation patterns. Forest soils formed as a result of particular temperature and precipitation regimes, which in turn have affected forest development, composition, and productivity. Changes in soil temperature regimes have the potential to undermine the resilience of our forest species, both trees and understory plants. Shorter, warmer winters may not provide timely or sufficient cold periods for trees to become frost hardened, and frequent thaw-freeze cycles during winter may affect dormancy and essential early spring nutrient-uptake cycles. High temperatures and potential lack of precipitation in the growing season may increase drought stress and the potential for non-native, drought-tolerant species to establish and outcompete native ones. (Forest Action Plan – Assessment: Soil resources in forests)

Forest Products and Timber Management Opportunities

New York's forest products industry is as diverse as any other state in the country, with businesses ranging from pulp-, paper-, and sawmills, biomass energy plants, and secondary manufacturing of almost every type, as well as the foresters and logging/trucking contractors who produce raw materials and deliver them to a market.

For the forest products industry, challenges are persistent and require innovation by not only investing in new equipment, but also investing in the training and development of employees. Challenges experienced by all sectors result from global competition, high energy costs, and other business-related costs. The current workforce shortage in logging, and trucking in particular, is a major challenge for the industry. In addition, natural factors also provide challenges. For example, quarantines as a result of exotic and invasive forest pests make it more difficult to operate a business as usual.

New York's forest-based recreation contributes significantly to the overall economy of the state. These opportunities are categorized as purchases at food and beverage stores, service stations, lodging places, eating and drinking establishments, and a host of other retail trade or service sectors. Wildlife viewing is the largest contributor with over 38 percent of the total sales in 2011, and is followed by, in order: hunting, camping, downhill skiing, hiking, cross-country skiing, fall foliage viewing, and snowmobiling.

The data below is from the forest product and forest-based recreation industry.

Highlights include:

- In 2014, the direct contribution of the forest products industry to the New York economy is over \$13 billion*.
- In 2014, the forest products industry directly employed 41,000 people and generated a payroll of over \$1.6 billion*.

- In 2011, forest-based recreation and tourism provided 31,926 jobs and generated payrolls of \$936 million**.
- Revenues from forest-related recreation and tourism activities totaled \$8.2 billion in 2011**.
- New York rural landowners received estimated stumpage revenue in 2011 of over \$250 million**.
- In 2018, New York was the second leading maple syrup producer in the United States, with the value of maple syrup production totaling over \$26 million.

* "New York State Forest Industry-An Economic Overview-2014," written by Marial Cavo, John Wagner, and David Newman on behalf of the New York State Wood Products Development Council.

** The Economic Importance of New York's Forest Based Economy. 2013. Northeast State Foresters Association. https://www.dec.ny.gov/docs/lands_forests_pdf/economicimportance2013.pdf.

***National Agricultural Statistics Service report: https://www.nass.usda.gov/Statistics_by_State/Pennsylvania/Publications/Survey_Results/2019/Maple%20Syrup%202019.pdf

Threats

Challenges experienced by all sectors result from high energy costs, global competition, and other business-related costs. In addition, natural factors also provide challenges. For example, quarantines as a result of exotic and invasive forest pests cause significant challenges to operating a business as usual. Those in the industry who continue to do well have the flexibility to try new methods, invest in the latest equipment, and seek out the best employees.

(Forest Action Plan Assessment: Economic Impact of New York's Forest)

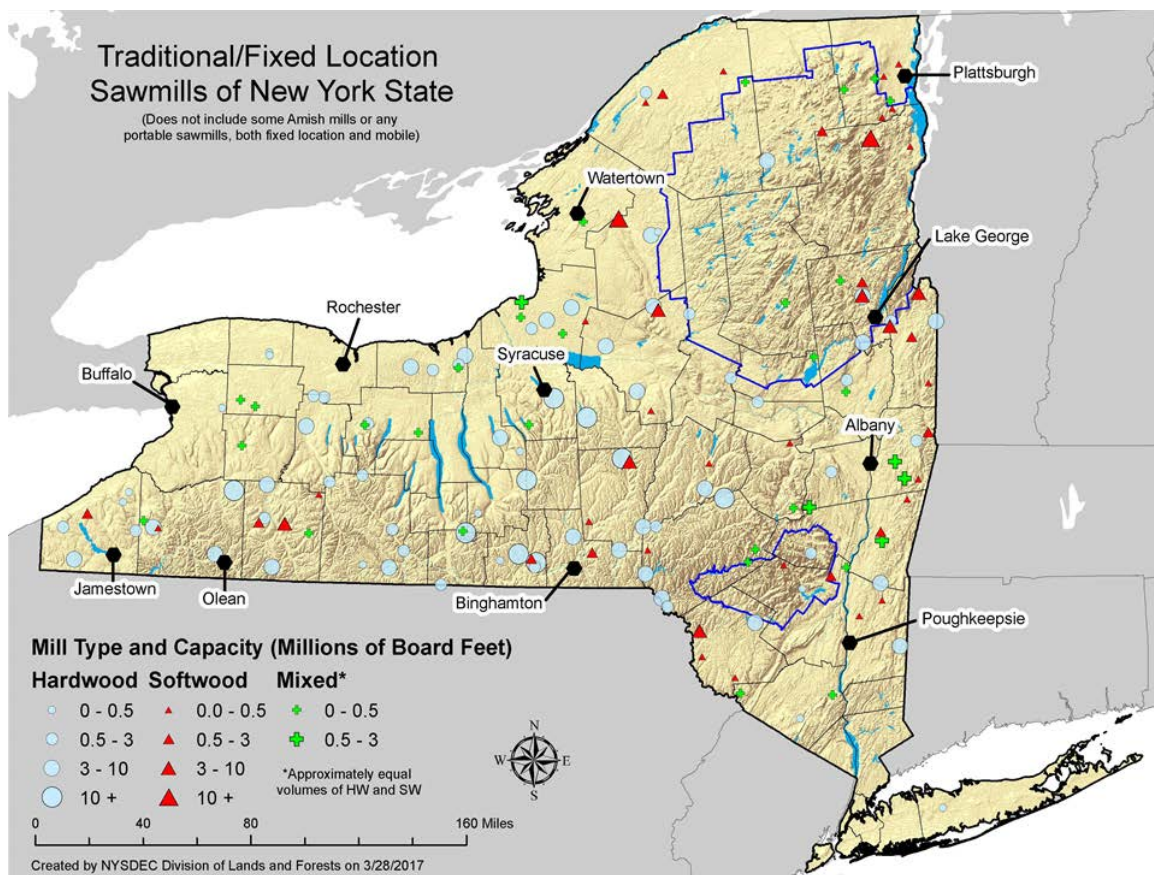
Availability, diversity and viability of markets for forest products

Wood products are environmentally friendly and renewable, and the proper management of their raw source, trees, sequester and store carbon. Wood products also provide economic benefits

in the form of jobs and manufacturing. Markets for the goods and services derived from forests are essential to generating revenues and returns on investments. Markets need to be diverse, distributed across the state, and accessible to all viable forest owners. Access to markets should not be unduly restricted by regulations, policies, or laws. These preferred condition support and sustain private forest ownership, retention, and management.

Traditional markets for wood products include sawmills, veneer mills, pulp and paper manufacturers, pallet mills, and firewood. These users are often called "primary markets," as they take logs from the woods in round form and convert them into products. Over the last two decades, as pulp- and paper mills closed or switched to imported/purchased pulp, and numerous sawmills closed or consolidated, New York and much of the Northeast have seen a decline in the number and diversity of traditional primary wood markets. Loss of these markets has limited management options for forest owners and managers, as well as reduced potential returns. Losses also occurred among secondary wood products manufacturers that buy local lumber and turn it into furniture, cabinetry, flooring, tool handles, and other finished or semi-finished goods. These manufacturers are essential in providing the next link in the economic chain, keeping local mills and harvesters in business.

Some wood products markets are 'emerging,' such as those for energy biomass or chemical production, but these markets are not yet well developed or geographically-dispersed in New York. In addition to using logs, many of these markets also rely on by-products of other wood-processors, including bark, chips, slabs, edgings, and even papermill sludge. These users can provide an important secondary revenue stream for sawmills, pulp mills, and timber harvesters, which helps them stay viable. However, the biomass users' viability may depend on the mills staying in business and continuing to generate affordable by-products. Whether those businesses can survive is often dictated by other market conditions far beyond the biomass users' control.



Map of New York State's Traditional / Fixed Location Sawmills

Currently, most harvesting of low-grade timber products takes place in the 14-county North Country region of New York. These markets provide direct economic benefits to landowners by allowing them to sell low-value trees. These markets also provide long-term benefits by 1) improving the overall quality and health of the residual forest by removing poorly formed, diseased, and underperforming trees; and 2) stimulating the regeneration of seedlings and saplings by allowing light to hit the forest floor. Further diversification of markets could safeguard the ability to continue harvesting low-grade timber at high levels.

The expansion of low-grade markets into other parts of the state will improve the overall health and productivity of our managed forests. Failure to gain additional markets for low-grade timber products reduces the ability to renovate degraded stands and contributes to forests becoming under- or moderately stocked and underproductive. Most of the forestry and

logging jobs in the state are located in the North Country, supported by low-grade markets, TIMO's, forest management firms, and traditional pulp-, paper-, and lumber mills.

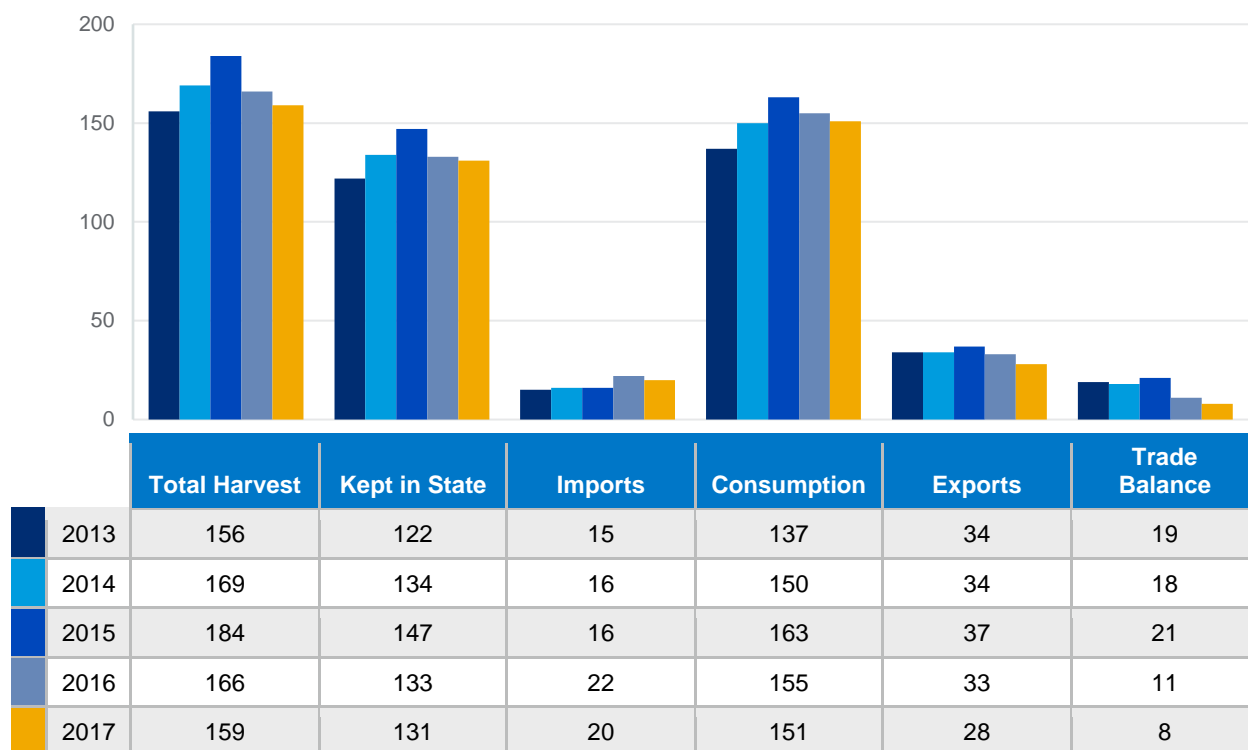
However, the majority of New York's valuable hardwood industry is located in the western, central, and southern tier regions of the state. High quality hardwood forest and the mills that surround them provide for a viable rural economy in these traditionally economically depressed areas. Private and public landowners benefit from the close proximity to markets and a tradition of forest management. These areas are also susceptible to exploitative harvesting practices of highgrading and diameter limit cutting, which often occurs when a professional forester was not involved in conducting a harvest.

The Capital Region, Catskills, and Lower Hudson Valley regions of the state have particular challenges when it comes to traditional forestry activities and viable forest markets. These areas

have lost much of the mill capacity that they traditionally had, sometimes making it difficult for landowners to sell their forest products and manage their property sustainably. This is especially true for low-grade markets, which are virtually non-existent in these areas, so landowners have to pay out of pocket to perform some cleaning and thinning activities associated with traditional forest management regimes. This also can contribute to a culture of high grading to keep a harvest economically viable for the landowner. Many times, that lack of markets fosters inactivity on the part of the landowner as far as traditional forest management is concerned, which can lead to slower growth rates and unhealthy or degrading forest conditions. A degraded forest provides less traditional economic benefits to the landowner through the production of wood products, which in some cases, affects a landowner's willingness to hold forestland for the long term, creating the possibility of conversion to non-forest or exploiting the resource for short-term economic gain at the expense of long-term benefits.

There is a growing interest and need to explore new economic opportunities for forest landowners, typically called "non-traditional markets." These opportunities can range from recreational or hunting leases to special forest products, such as ginseng, mushrooms, nuts, fruits, and decorative botanicals, to payments for ecosystem services, such as carbon sequestration, wildlife habitat conservation, or water quality protection. Forestland leasing has been a historic practice in many areas of New York, especially on large ownerships formerly held by forest products industries. Payments for ecosystem services are starting to receive a great deal of attention as a method for landowners to monetize these services on par with traditional forest product markets. If issues of quantification, verification, permanence, valuation, and funding sources can be worked out, this approach could provide significant economic motivation and compensation for forest owners to retain and sustainably manage their woodlands.

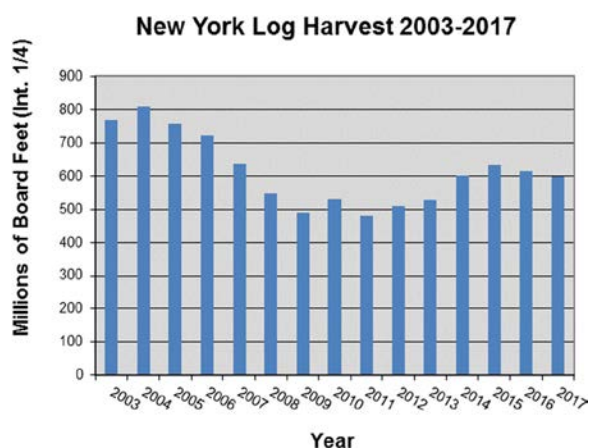
In 1999, the DEC's Forest Utilization Program initiated an industrial timber harvest production and consumption reporting program to account



Wood and wood product production, consumption, and trade

for timber product harvest and disposition on an annual basis. This report provides an enhanced understanding of the forest industry's economic contribution to rural New York, and it augments information provided by U.S. Forest Service's FIA program. The report is widely distributed to forestry partners and industry in New York, and it is made available to the forestry research community, as well as the general public. In recent years, the report has been utilized effectively by potential developers of biomass energy facilities investigating woody biomass feedstock availability.

After high levels of harvest in the early 2000s, New York saw a decrease in the level of log harvest during the Great Recession years of 2007 through 2012. Steady annual increases occurred through 2015 with slight decreases in annual harvest levels in 2016 and 2017. Prices stabilized after the recession years, creating a favorable market for landowners to sell their wood products. Most of the total amount of wood harvested in New York is kept in-state and consumed by state mills. There is a steady export market to China for light colored hardwoods, such as ash and maple. (Forest Action Plan Assessment: Forest Product Manufacturing)



Watershed Values Including Water Quality Protection

In addition to being a forest-rich state, New York also has a seeming abundance of clean, high quality water.

Drinking Water Quality and Supply

Forests are the first line of defense when protecting water quality, an essential resource for people and all living organisms. Forests and their soils act like huge sponges, soaking up enormous amounts of precipitation. By the time rain and snowmelt seep through forest soil into groundwater or nearby surface water, the precipitation is cleaned and purified. Forested watersheds also moderate water quantity by slowing surface runoff and increasing the infiltration of water into the soil. The result is less flooding, cleaner water downstream, and greater groundwater reserves (Ernst, Caryn, 2004). Watershed protection is the first and most fundamental step in a multiple-barrier approach to protecting drinking water.

New York State's involvement in land acquisitions in critical watersheds has been essential to protecting drinking water quality throughout our state. Protecting natural ecosystems and the drinking water they provide is easier, more efficient, and more cost effective than the engineered alternative. When communities invest in land protection to protect their drinking water, they are investing in the long-term health and quality of life of their citizens – guiding growth away from sensitive water resources, providing new parks and recreational opportunities, protecting farmland and natural habitats, and preserving historic landscapes. Many communities don't realize the cost-saving benefit of source protection and the potentially dramatic increase in treatment costs that can result from the loss of forests, and the natural filtration they provide. (Ernst, 2004)

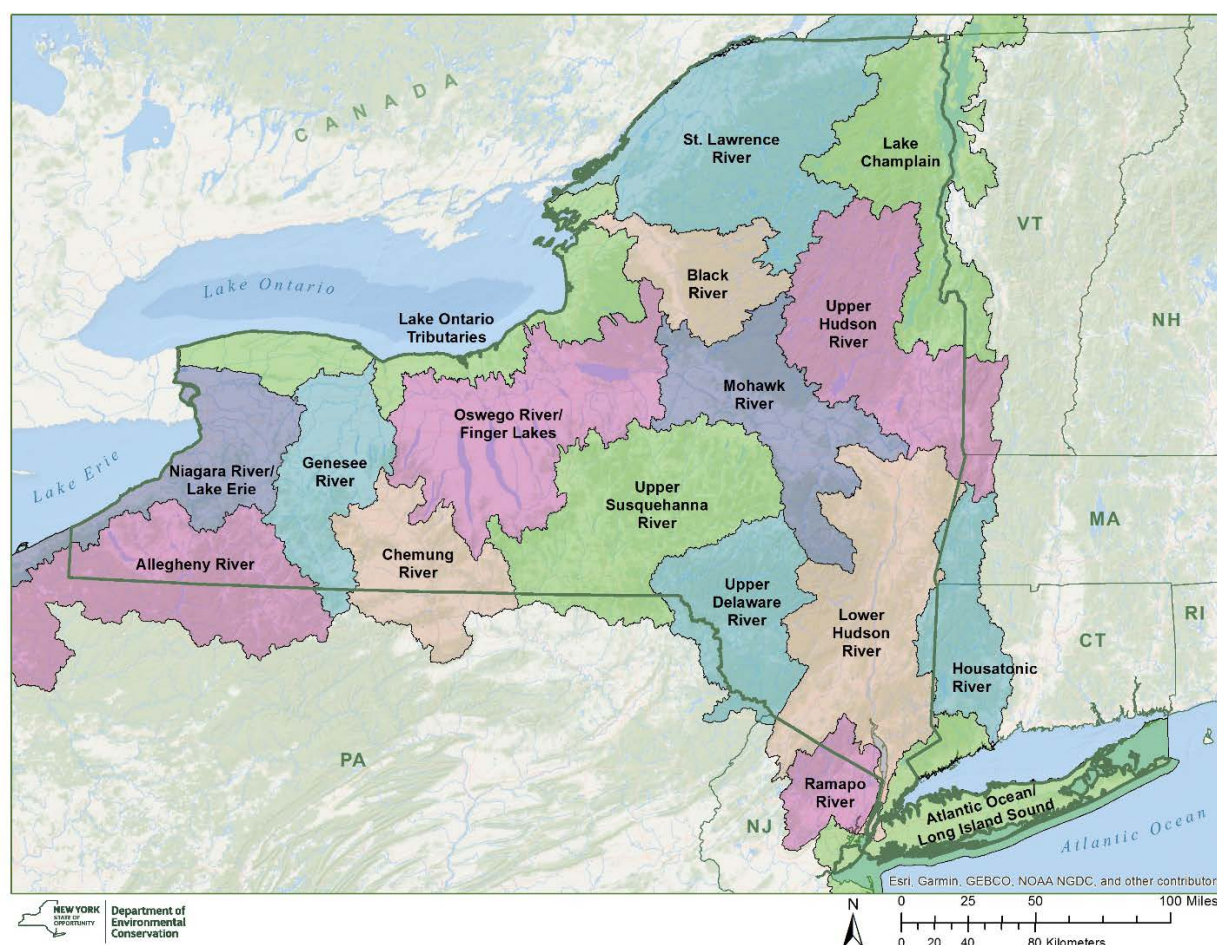
New York State has taken many actions to protect forests in order to maintain and enhance water quality, including the creation of the Adirondack and Catskill Forest Preserves, as well as the establishment of New York City's upstate surface reservoir system, along with the forest protection component of their Filtration Avoidance Determination.

Example – New York City

The primary source of New York City's drinking water is the Catskill area watershed, so the City works to restore and protect this watershed rather than build a multi-billion dollar water filtration plant. New York City estimated the cost of installing filtration alone to be nearly \$7 billion, with over \$300 million in annual operating costs. Instead, New York City chose to support the quality of land management in its source watershed in order to sustain high water quality for a substantially lower investment. New York City manages almost 50,000 acres in the Catskills. In addition, our state manages more than 200,000 acres in the Catskill watershed. Jointly, New York City and New York State also encourage private owners in the New York City watershed to keep forests as forests, and to implement forestry practices that restrict runoff, reduce sedimentation, and take up contaminants.

Example – Long Island

Similarly, the Long Island Pine Barrens and its underground aquifer provides virtually all the Island's drinking water, supplying millions of people. Two hundred years ago, the Pine Barrens blanketed a quarter of Long Island. Today, most of that land is developed. The approx. 102,500 acres remaining Pine Barrens has been divided into two categories by the New York State Central Pine Barrens Commission: Core Preservation Area (55,000 acres) and Compatible Growth Area (47,500 acres). The federal Environmental Protection Agency designated this aquifer system as the nation's first sole source aquifer, requiring special protection. It is managed jointly by state, county, and local governments.



Map of New York State's Watersheds

Threats

Most people do not make the connection between forested watersheds and the water coming from their faucet or stormwater and flood mitigation. Similarly, the public is generally unaware of the threats to their water supplies. Considering that the majority of New York's forests are privately owned, a similar statement can be made: most people don't make the connection between privately owned forests and the water coming from their faucet. This lack of public awareness can lead to poor management decisions and lack of support for forest retention and management.

Lack of support for forest retention in turn leads to urban and suburban sprawl, or conversion of forests to agricultural use. The resulting loss of forested cover:

- undermines the land's capacity to absorb and hold water,
- increases pollutant runoff from paved surfaces, rooftops, treated lawns, agricultural lands, etc., and
- disrupts the natural hydrology of water flows, volumes, rates, retention, and storage.

Protecting and managing forests in source watersheds is an essential part of future strategies for providing clean, safe drinking water that citizens can afford. One of the main reasons why suppliers are revisiting the idea of source protection is the growing realization that allowing untreated water quality to degrade also increases treatment and capital costs. (Forest Action Plan Assessment: Drinking Water Quality and Supply)

Present and Future Threat of Conversion of Forest Land

Land use trends and drivers of forestland conversion

Forest parcelization and fragmentation are two land use trends that cause several problems and result in degraded forest health. Unfortunately, we expect these trends to continue in New York State, at least in the next ten years. These fragmented landscapes support higher deer populations and make the forest more susceptible to invasive species as well, which further undermine forest health.

Parcelization occurs when large parcels of land are divided up into smaller ones. Parcelization results in an increase in the number of owners. Fragmentation occurs when continuous forest is broken up by development of roads, homes, commercial uses, and agricultural purposes

The consequences include the spread of invasive plant species, which tend to establish around forest edges, often out-competing native plants and disrupting entire forest ecosystems. Parcelization can and fragmentation does result in less interior forest for plants and animals that require this specific habitat. Parcelization also increases the number of forest landowners, and can make the task of managing the forest resources of the state more difficult overall. Stewardship efforts must be of sufficient scale to target the large number of landowners responsible for managing these small woodlots. For the forest industry, parcelization increases the costs and complexity of doing business with private forest owners. For example, instead of negotiating for a timber sale on 200 acres with one owner, they may have to work with five different owners to access the same timber resource.

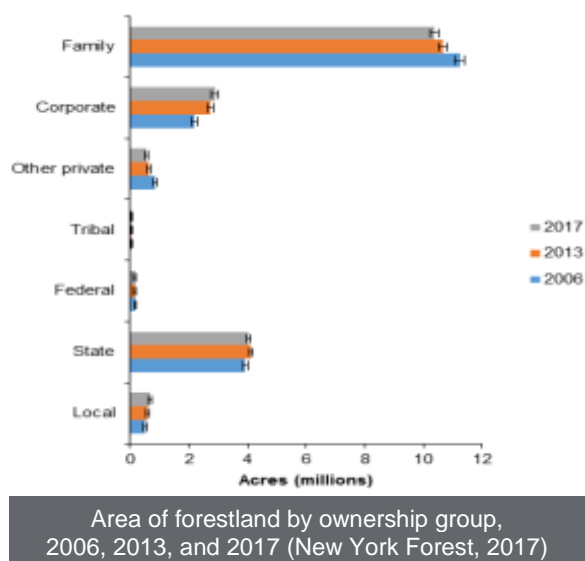
Forest Loss in New York

According to recent data released by the U.S. Forest Service Forest Inventory and Analysis Program, there was a slight net forest loss in New York State of about 1 percent from 2012 to 2017. Around 390,000 acres of gross loss of forestland changed classification to non-forest. Conversely, 250,000 acres reverted back to forestland. Almost half of this gross loss can be explained by conversion to agriculture, while a third is attributed to development. However, most of the land classified as agriculture was defined as idle agriculture and may not yet meet the U.S. Forest Service definition of forestland under the FIA sampling regime.

In New York State, parcelization and fragmentation due to development is concentrated around rural-suburban interfaces in the Hudson Valley bedroom communities of New York City and Long Island, as well as around some upstate cities. These forests are generally less healthy and productive than unfragmented forests and face a variety of threats from invasive plants and pests, and overbrowsing by white tailed deer.

What this means

The net loss of forestland reported in this inventory is small, with gross loss of forest partially offset by gross gain. Since the previous inventory, New York has seen a statistically significant loss of forestland, with a 0.29 percent average annual rate of decline, and a statistically significant gain in non-forest, with a 0.05 percent average annual rate of increase. These changes have more than offset the gains that culminated in the maximum extent of forestland seen in the 2012 inventory, resulting in a 1 percent net loss over the past decade. Gains and losses from multiple causes are driving land-use change dynamics in New York. Movement between forest and non-forest classifications may be a result of land meeting or not meeting FIA's definition of forestland, due to small changes in understory disturbance, forest extent, or forest cover. Such changes are generally not permanent and may be more



prevalent in stands of small diameter trees. Additionally, the definition of forestland changed in 2013 from a minimum of 10 percent stocking to a minimum of 10 percent canopy cover. Over half of the forestland acreage lost to agricultural land uses (112,000 acres) was classified in the latest inventory as idle farmland, a land use defined as areas taken out of agricultural production, but not yet reverted to forestland. It is likely that much of the change was due in part to procedural changes in forestland classifications rather than true on-the-ground land conversion. Monitoring this issue into the next inventory cycle should bring clarity to the question about what the true trend is in forest extent. (Forest Action Plan Assessment: Land use trends and extent of forestland conversion)

Private forestlands

Family forest owners hold 75 percent of all private forestland and 56 percent of all forestland in the state. Other private owners, including corporations, conservation organizations, and unincorporated clubs and partnerships, own the remaining 25 percent of private land in the state. The amount of acreage classified as family forest decreased by 880,000 acres from 2006 through 2017, representing a 6 percent decline. The number of family ownerships also fell by an estimated 11.9 percent. Conversely, corporately owned forest acreage increased by 700,000 acres.

Family forest owners find it increasingly difficult to keep their forests as forests. The reasons for these difficulties are numerous. There are many economic factors related to the costs of buying, holding and managing forestland. Property values, mortgage interest rates, taxes, costs of management, and management services are all important drivers. Local, national, and global market factors also affect the returns from direct investments in forestlands. Availability and viability of buyers and consumer trends for all manner of forest products, market preferences, and housing starts all influence wood markets and economic returns.

Many landowners created limited liability corporations (LLCs) as legal protection for their assets, including forestland. This could explain some of the rise in the number of acres categorized as corporate. These LLC's essentially operate as "family forests," but it is difficult to differentiate between this category and true corporate ownership, such as a Timber Investment Management Organization or lumber company.

Regulatory factors can affect what family forest owners can and cannot do with their forests, and the benefits they might receive from them. Societal factors come into play as the attitudes of neighbors and others who do not own forestland weigh in on whether they support or even accept tree cutting within their sight or knowledge. Ultimately, some factors are individual, related to the age of the forest owner, their personal and financial situation, and the interest of their heirs in continuing to own the family forest and keep it as forested open space.

Threats

Increasing property ownership burdens, especially the traditional practice of assessing land for "highest and best use." This makes buying and holding on to forestland expensive for private citizens, and can pressure current owners to sell their forestland to capture that value and reallocate the assets into other investments or uses.

When forests are valued or assessed for their "highest and best use," that use is generally not considered to be as forest. New York's Forest Tax Law seeks to address this issue; however, not all forest landowners are eligible, and many have different goals for their forestland than the law currently provides. Other ownership costs, including maintaining boundary lines and property security, preparing and following management plans, timber stand improvement, and invasives control, as well as developing and maintaining forest infrastructure, also add up and increase over time.

Timber management is not a top reason why most landowner's own land, but decisions about harvesting are often made when opportunity arises without the assistance of a forester (NWOS, 2013). Only 30 percent of private land owners have used a forester. Having a professional forester involved in forest management activities on private land increases the likelihood of deliberate forest management with long-term goals that are addressed with the landowner.

State and federal income tax policies that favor or support development and change of land use away from forested open space often influence or drive behaviors and investments in ways that conflict with forest retention, especially retention of large, unfragmented forest blocks.

Federal capital gains tax policies affecting timber assets and income, as well as timber investment tax treatment, have also been cited as potential threats to long-term private forest ownership.

An aging landowner population is illustrated in U.S. Forest Service Forest Landowner Survey data, and largely is following overall demographic trends. Recent statistics indicate that the average New York private forest owner is 61 years old. Similar to demographic issues facing farmers and agriculture, the state is rapidly approaching a significant "intergenerational transfer" of ownership as forestland estates pass to heirs or are sold off to cover increased medical expenses of aging

owners. In many cases, the offspring and heirs of forest landowners do not share their parents' interest in holding onto the family forest or practicing sustainable management.

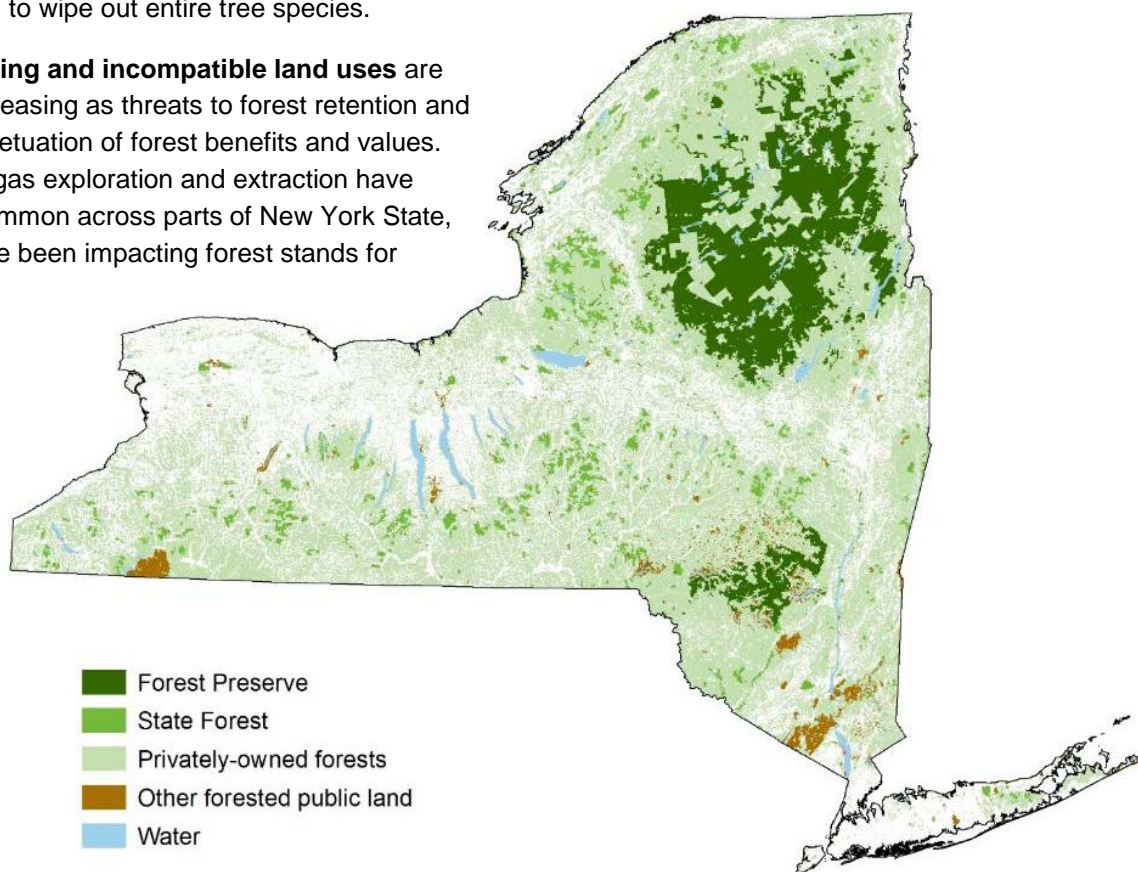
The cost of owning and managing private forestland can be prohibitive. Development pressure can entice landowners to sell and fragment their forestland for economic benefit. This is often due to financial stress, complex family dynamics, or a lack of a plan for the land after a landowner passes away. All these pressures are counterproductive to private forest landowners keeping their forests as forests and managing them in a healthy, productive way.

Invasive forest pests also pose significant threats to forest retention and other forest values articulated elsewhere in this report. In urban forests especially, pests like the emerald ash borer or Asian longhorned beetle can cause extensive losses of trees and forest canopy. Rural forests are also threatened economically and ecologically by invasives, which have the potential to wipe out entire tree species.

Competing and incompatible land uses are also increasing as threats to forest retention and the perpetuation of forest benefits and values. Oil and gas exploration and extraction have been common across parts of New York State, and have been impacting forest stands for

decades. Exploration and extraction, with the associated road construction, well-site clearing, and transportation pipeline development, can impact the integrity of forests and lead to direct loss in some cases. Finally, surface mineral extraction and expansion of existing mines for sand, gravel, bluestone, and other mineral resources may also impact forest retention and integrity through long-term, land use change.

Lack of public awareness and support. The public uses the ecosystem services provided by private forests, but may be unaware of what it takes to keep private forests as forests and the critical role that sustainable management plays. The pressures and threats identified above mean that privately owned forests won't always just stay as forests unless landowners can afford to keep them as such. Laws or local regulations that limit the ability of owners to practice sustainable forest management, or significantly increase the costs of doing so, can have the opposite result from what was intended.



Map of New York State's Forests by Ownership

Potential adverse impacts

The threats articulated by New York forest stakeholders all have the potential, at their core, to change land use away from forested open space. Even if forests remain, they may be impacted in a variety of ways that reduce their ability or capacity to sustainably provide benefits and services. Forested open spaces may be parcelized (i.e., single large ownerships broken up through subdivision and sale into multiple parcels with individual owners), fragmented (solid blocks are broken apart by deforested areas, such as farm fields, roads, or developments), or perforated (where smaller holes are punched in a contiguous forest canopy for dispersed house lots).

Loss of forestland or changes within forests can have a wide variety of impacts. New York stakeholders have identified the following imminent impacts of concern to New York's forest:

- Poorer water quality and altered hydrology (quantity and flow issues)
- Long-term modifications to and reductions in water quality, hydrology, and aquatic diversity.
- Alterations in forest structure and function that can derail ecological processes on which forests and forest dwellers depend
- Decreased native fish and wildlife populations and habitats.
- Increased tree mortality.
- Increased fire risk because increased housing densities in forested landscapes generate more potential for ignitions; make firefighting and fire preparedness in such areas more difficult, dangerous, and expensive; and restrict available management options for mitigating threats to forestlands
- Increased wildfire impacts and associated losses (ecological, social and economic).
- Increased risk of the introduction and spread of invasive species
- Decreases in timber production and associated direct and multiplier economic activity.
- Changes in scenic qualities and related social and economic benefits.
- Changes in quantity, quality, diversity, and cost of forest-based recreational opportunities.
- Landowners selling their forestland for development.

(Forest Action Plan Assessment: Private forestland)

Historic and Traditional Uses of Forest Areas

New York defines "Traditional forest uses" as activities commonly associated with the use of forest land in New York. These activities include, but are not limited to: public access, hiking, camping, hunting, timber harvesting, trapping, snowmobiling, and cross-country skiing.

Forest land leasing has been an historic practice in many areas of New York, especially on large ownerships formerly held by forest products industries and now held mostly by Timber Investment Management Organizations (TIMOs). Like hunting, fishing is a traditional outdoor sport and our state is recognized around the world for having an amazing range of freshwater and marine fishing opportunities. On public lands and easements, it is possible to fish for native brook trout, large- and smallmouth bass, panfish, and many other species. It is a stated goal of the state's Open Space Conservation Plan to protect habitat to sustain the traditional pastimes of hunting, fishing, trapping, and wildlife viewing. Lands protected through the FLP help to meet that goal.

Forest land conversion and changes in ownership patterns have impacted traditional forest uses (see sections on those topics for more details). New York State, through its land acquisition of

fee and conservation easements, has worked to protect and continue traditional uses of forest lands and will continue to do so into the future, using both state and federal funding sources.

One potential future forest use is for carbon sequestration to mitigate the effects of climate change. In 2019 New York passed the Climate Leadership and Community Protection Act (CLCPA). Implementation of CLCPA will inform and determine the role New York's forests will play in addressing climate change, potentially through participation in carbon markets and/or forest management practices to sequester carbon and adapt to climate change.

Current Ownership patterns and size of tracts, and trends and projected future ownership patterns

See Private Forestland section above.

Cultural Resources That can be Effectively Protected

Human occupation of New York State extends as far back as immediate post-glacial times, perhaps as early as 15,000 years ago. Evidence of the human past includes a wide range of resources, ranging from pre-contact Native American camps and villages to Euro-American homesteads, cemeteries, and graves, as well as mills and other industrial sites. Such sites can be entirely subsurface or can contain above ground remains such as foundation walls or earthwork features. Although Native American (pre-European contact) people focused their activities close to river and lake basins, upland areas were exploited on a seasonal basis for specific food resources and raw materials. These sites are small and for short-term occupation.

Many episodes of life in the historic period of settlement (post-European contact), such as farming, commerce, industry, and transportation, exist today only as archeological sites. Evidence of these types of activities is typically contained within upper layers of soil, or buried within floodplain deposits. Entire communities and thousands of isolated farmsteads lie abandoned throughout the state. The most noticeable remnants of these are

often cellar holes and stone walls. These sites are fragile and nonrenewable resources and are often our only source of information regarding how people adapted to various changes. Due to the predominance of private lands in New York, a great deal of this pre-contact and historic information is held on forested private lands.

When siting recreation and timber harvesting infrastructure, and any other substantive land disturbance activity, on parcels protected through fee or conservation easement purchase, cultural resources will be protected through a site assessment, followed by steps to minimize the impact of the infrastructure on any cultural resources found on the site.

Forest Dependent Species of Greatest Conservation Need

Nearly half of the 366 species identified as Species of Greatest Conservation Need (SGCN) in New York's State Wildlife Action Plan (SWAP) depend upon forest habitats, totaling 180 different species. This includes representatives of all taxonomic groups that rely on terrestrial habitats. The species assessment documents developed for the SWAP include details on forest habitat needs of these SGCN, such as tree species, canopy or ground layers, edge or interior, and size of forest blocks. The species assessments are available at <https://www.dec.ny.gov/animals/7179.html>.

Seventeen forest habitat types that support SGCN were identified, but this does not include some early successional forests categorized as shrublands, nor aquatic habitats in streams flowing through forests. Some of these forest habitats, especially those restricted to coastal locations, are limited in distribution, while other forest types are widespread throughout the state.

Protection of key forested lands through purchase of fee title or conservation easement is a recommended action in the SWAP. Protection of floodplain forests is especially important for the multiple conservation benefits that these riparian areas provide; habitat, flood protection, and connectivity.

The process of drafting the SWAP assessed threats to species, but did not directly evaluate threats to habitats. Loss of habitats, including forest habitats, is one of the major threats to the populations of SGCN. Most often, forest habitat is lost to development, but for species that depend on young forests, habitat is also lost to natural forest succession. Natural system modifications through alteration of fire regimes threatens 35 SGCN, especially those dependent on pine bush habitats. Logging is a threat to 51 SGCN, mostly related to siltation of aquatic habitats that can result from improper silviculture practices. Other threats to forest-dependent SGCN include gypsy moth, spruce budworm, and hemlock wooly adelgid infestations; deposition of atmospheric pollutants; invasive species, climate change-induced habitat shifts; excessive human recreation; and overabundant white-tailed deer.

Carbon storage

Forestlands are increasingly under pressure from the development of wind and solar infrastructure to provide New Yorkers with clean power. The installation of this infrastructure can result in forest clearing and could contribute to significant forest loss in New York State. There are many questions regarding the impact on our forests and forest resources. As in the case of land conversion for development, the negative impacts of such energy infrastructure could be managed if the values that forests provide are recognized fully and balanced appropriately.

Forests are the most productive terrestrial vegetation able to absorb carbon from carbon dioxide, and they have the greatest potential for keeping that carbon out of the atmosphere long term. New York's forests help to control global climate change and in doing so, they are providing a critical service to all New Yorkers and the global community. Carbon sequestration in New York's forests is also vital to achieving the state's net zero carbon emissions goal. Based on Forest Inventory and Analysis (FIA) data, New York's forests are storing approximately 1,976 million metric tons of carbon. However, according to the FIA, the net

| Class | Number of forest habitat-dependent SGCN |
|-------------|---|
| Amphibian | 10 |
| Birds | 42 |
| Insect | 64 |
| Lepidoptera | 28 |
| Mammal | 18 |
| Reptile | 18 |

| Forest Habitat | Number of SGCN |
|-----------------------------------|----------------|
| Atlantic White Cedar Swamp | 4 |
| Boreal Forested Peatland | 15 |
| Boreal Upland Forest | 2 |
| Coastal Coniferous Barrens | 19 |
| Coastal Hardwoods | 7 |
| Coastal Red Maple-Black Gum Swamp | 3 |
| Conifer Forest Swamp | 6 |
| Floodplain Forest | 16 |
| Hardwood Swamp | 7 |
| Mixed Hardwood Swamp | 6 |
| Mixed Northern Hardwoods | 20 |
| Mountain Spruce-Fir Forests | 3 |
| Northeast Upland Forest | 11 |
| Oak Forest | 12 |
| Oak-Pine Forest | 22 |
| Pine Barrens | 20 |
| Riparian Forest | 7 |

amount of carbon dioxide absorbed each year by New York's forests has been steadily decreasing in recent decades. If this trend were to continue, the annual uptake of carbon dioxide would be 20 percent lower in 2050 compared to 1990. This trend could reflect both decreasing forest area and reduced productivity. The latter may be caused by various factors, including invasive species and unsuccessful regeneration.

As the value of carbon sequestration for reducing greenhouse gas levels is becoming better understood, the role of forests in addressing climate change is gaining widespread attention. During photosynthesis, plants use carbon sequestered from the air to grow new tissue, effectively storing carbon. That carbon stays locked up in the plants as they grow, and in the case of wood products, long after the plants have been harvested. When forest biomass is combusted, such as in a wildfire or as a fuel source, this releases the carbon that had been stored. The proper management of combustion is also a key component of maintaining carbon sequestration levels.

Forest stewardship to protect forests from land-use changes, as well as to encourage productive forest growth and regeneration, could increase carbon sequestration. Stewardship actions already taken by DEC include dual certification through both the Forest Stewardship Council (FSC) and Sustainable Forestry Initiative (SFI) on public lands that are not part of the Forest Preserve.

Importantly, the value of carbon sequestration is additive—it is a benefit that forests and forest products naturally provide, in addition to all other social, health, environmental, and economic benefits.

This means that the total value of healthy forests is that much higher. It also means that the same strategies that are described throughout this Plan to preserve healthy forests are also strategies for maintaining carbon sequestration.

Community adaptation

Many New Yorkers place a high value on forestlands, whether for recreation; human health; watershed protection; diversity of plants, wildlife, and habitats; or for preserving local markets for forest products such as timber. Forests also aid community adaptation and resilience to climate change. (See also *Carbon markets and TNC's Working Woodlands Program*. <https://www.nature.org/en-us/about-us/where-we-work/united-states/new-york/stories-in-new-york/new-york-working-woodlands/>.) Sometimes the value of the land may be treated as higher than the forest that grows on it, such as when assessing the property for development or conversion to other uses. Unfortunately, this disregards the cumulative value that forests provide to local and global communities alike for centuries. For example:

- Forests stabilize the surrounding air temperatures and alleviate extreme heat and desiccation for nearby buildings by providing shade and moisture from evapotranspiration.
- Heavy precipitation and extreme weather events are projected to become more frequent in New York⁷. For communities, forests are buffers because they absorb stormwater, reduce flooding, and create windbreaks against damaging gusts.
- If sea-level rises 0.33 to 0.63 m between 2080 and 2100, as it is projected to increase under the RCP 6.0 scenario, there will be approximately 1,886,000 people living under the high-tide lines in New York⁸, using 2010 census data. Forests reduce coastline flooding and erosion by anchoring soil and absorbing water; thus, they protect threatened communities.

(Forest Action Plan, Assessment: Valuing forests for carbon storage and community adaptation)

⁷ New York State's 'ClimAID' report is the authoritative resources for observed and projected climate change in the state and is updated based on the global models produced by the Intergovernmental Panel on Climate Change.

⁸ Strauss, B. H., Kulp, S., & Levermann, A. 2015. Carbon choices determine US cities committed to futures below sea level. *Proceedings of the National Academy of Sciences*, 112(44), 13508-13513. doi:10.1073/pnas.1511186112

Mineral Resources

New York State is rich in minerals, which are extracted for industrial and construction uses throughout the state. Sand and gravel account for the vast majority of the state's 2,200 active mines. Oil, gas, and solution salt-mining wells are also economically important in New York State with more than 75,000 wells drilled in the state since the late 1800s, including about 14,000 that are still active, and new drilling continues.

Minerals and Property Rights – The “Split Estate” Case – Minerals, as with any other property right, can be severed from the fee estate. This is usually done by means of a mineral deed or mineral rights reservation, thus creating a split estate. (Leases do not confer permanent rights to the lessee. A deed or reservation, on the other hand, permanently transfers rights from the grantor to the grantee.) In these situations, mineral rights are considered the dominant estate, meaning they take precedence over other rights associated with the property, including those associated with controlling the surface. However, the mineral owner must show due regard for the interests of the surface estate owner and occupy only those portions of the surface that are reasonably necessary to develop the mineral estate. In some areas of the state, there are significant issues with “split estate” mineral control. When another party controls the subsurface minerals, there is potential for impacts to the surface estate, including forests.

Exploration and Production of Oil, Natural Gas and Solution Salt

Oil, natural gas and solution salt drilling has been historically centered in the southern tier of western New York.

Oil

The first commercial oil well drilled in New York was the “Job Moses #1” well, drilled in 1864, near Limestone, New York. The oil industry expanded rapidly in the late 19th century leading to the development of numerous oil wells across the landscape, especially in Cattaraugus and Allegany counties. In the early days of the industry, these wells were unregulated and un-inventoried.

Natural Gas

Oil and gas exploration and extraction have been common across parts of New York State, and have impacted forest stands, for decades. Exploration and extraction, with its associated road construction, well-site clearing, and transportation pipeline development, can impact the integrity of forests and lead to direct loss in some cases.

Recent economic and global energy conditions have led to a surge in interest in exploiting the Marcellus Shale formation, which underlies much of New York State south of the New York State Thruway and west of the Hudson River. Marcellus shales are not naturally porous enough for gas to be extracted without employing horizontal drilling and high-volume hydraulic fracturing.

Questions have been raised about possible environmental and natural community impacts of horizontal drilling and high-volume hydraulic fracturing. Most concerns are related to water use and management, and the composition of the fluids used for fracturing the shale. Under executive action. In 2014, Governor Cuomo instituted a ban on high-volume hydraulic fracturing.

Solution Salt

Solution salt mining is a process whereby salt is removed from underground reservoirs using water that is pumped in and out. The first solution salt well in New York drilled to exploit salt as a mineral resource was drilled near Syracuse. Solution salt mining is currently happening in the western part of the state.

Mining

New York is rich in minerals that are mined for industrial and construction uses. Historically “common variety” minerals, including limestone, sand, gravel, shale and other aggregate materials, have been produced

Metal ores and gem minerals, such as garnet, are mined chiefly in mountainous regions. Salt is extracted from rich deposits in central and

western New York where extensive mines occur; both active and historic. zinc, fibrous talc, and wollastonite are still being actively mined in the North Country region. Underground mining of lead, iron (in several forms) and graphite also occurred in both the North Country and Hudson Valley regions. Historically, some limestone (for cement) was mined from underground locations in the Hudson Valley region.

(Strategic Plan for State Forest Management)

Protected Lands – Federal, State, Municipal

The state of New York has a long and impressive history of forest resource protection that traces its origins to the Forest Preserve legislation of 1885, the intent of which was later included in Article XIV of the State Constitution. Any changes to Article XIV require a Constitutional amendment. Dedicating the Adirondack and Catskill Forest Preserves as forever wild, that early legislation also called for state-provided technical forestry assistance to private landowners. Throughout the twentieth century, these early measures, have been expanded to include an active land acquisition program, forest tax laws and land use regulations, participation in federal cost share programs, and a growing cooperation with New York's not-for-profit land conservation community.

Today, more than 63 percent of New York State is forested, up from 25 percent in 1900 and up by nearly 30 percent in the last 40 years alone. Twenty percent of this forested land is in protected public ownership, while the balance remains in private hands. Other protected forest land in the state is owned and/or managed by the U.S. Forest Service, U.S. Fish and Wildlife Service, municipal governments, and not-for-profit organizations, including land trusts, private nature preserves and universities.

State

For more than a century, New York State has had an active acquisition program that has resulted in expansion of the Forest Preserve, as

well as the creation of new wildlife management, reforestation, and multiple use areas throughout the state. Today, DEC manages nearly 3 million acres of Forest Preserve, 202,000 acres of wildlife management areas, and more than 800,000 acres of reforestation areas. The Office of Parks, Recreation and Historic Preservation manages more than 341,000 acres, a significant portion of which is forested. From the 1970s through the 1990s, New York funded its forest acquisitions, both fee and easement interests, with funds from Environmental Quality Bond Acts (EQBA). The last EQBA passed in 1996. In 1993, the New York State Legislature passed the Environmental Protection Fund (EPF), which currently provides the bulk of state land acquisition funding.

Environmental protection, land use, and conservation-related legislation, both state and federal, often result in the protection of New York's forest resources. These include: the Water Resources Law, Stream Protection Act, Wild, Scenic and Recreational Rivers Act, Endangered Species Act, Freshwater Wetlands Act, and the Environmental Quality Review Act.

Real Property Tax Law, Section 480 and 480-a: Section 480 was enacted in 1926 (and properties could enroll through 1974) to encourage reforestation of abandoned farmlands. It is a yield tax, where tax payments on timber are deferred until the time of harvest, with a modified assessment. The value of standing timber is excluded from the annual assessment of property taxes, and the tract is assessed on its bare land value. A 6 percent yield tax is assessed in a year when timber is harvested. Since the yield tax is usually lower than the annual tax on timber value, the law provides some tax reduction to forest landowners with a minimum of 15 acres. Forest Tax Law or RPTL Section 480a was enacted in 1974 to bolster a faltering forest products industry by incentivizing private forest landowners to harvest their timber under the supervision of a professional forester through a DEC-approved forest management plan. The eligibility requirements are somewhat stricter: tracts must be at least 50 acres and committed

to a 10-year management plan. Forest owners can apply for a partial property tax exemption of up to 80 percent; the 6 percent yield tax still applies. There is a penalty for withdrawing from the program, converting the land use, or failing to harvest according to the management plan.

New York State Open Space Conservation Plan (OSP): New York's open space conservation program began in 1990, and was designed to ensure citizen input into the land acquisition decisions made by the DEC and the State Office of Parks, Recreation and Historic Preservation (OPRHP). Since its beginning, the program developed a comprehensive statewide Open Space Conservation Plan (OSP) that represents current open space conservation actions, tools, and programs administered by DEC, OPRHP, the Department of State (DOS), the Adirondack Park Agency (APA), the Department of Agriculture & Markets (DAM), and the Department of Transportation (DOT). The OSP has become an important and popular advocacy voice for conserving our state's open spaces, and the quality of life they provide us. Any state land acquisition that uses funding from the Environmental Protection Fund must be within a priority conservation project listed in the Open Space Conservation Plan.

Federal

In general, federal ownership is relatively limited in New York State, totaling only 260,000 acres among U.S. Fish and Wildlife, the National Park Service, the U.S. Forest Service, and the Department of Defense. Federal land with significant forested acres includes the Finger Lakes National Forest (US Forest Service, 16,212 acres), Montezuma National Wildlife Refuge (US Fish and Wildlife Service, 7,068 acres), West Point (US Army, 12,736 acres), and Fort Drum (US Army, 107,265 acres).

Nonprofit

New York State enjoys a well-established, active, and effective not-for-profit land conservation community. New York is home to approximately 90 local land trusts; state and regional

organizations such as the Open Space Institute and Scenic Hudson; and several national organizations, including The Nature Conservancy, the Conservation Fund, and the Trust for Public Land. Included in that number are 38 accredited land trusts, the greatest number of accredited land trusts in any state except California. These organizations own, advocate for, and participate in joint efforts to protect forest land throughout the state. In total, land trusts own more than 505,000 acres in fee and more than 706,000 acres of conservation easements (2015 Land Trust Census), much of which is forested. Land trusts have been partners with New York State on several Forest Legacy Projects, including The Nature Conservancy, the Open Space Institute and the Rensselaer Plateau Alliance.

Issues Identified by the State Forest Stewardship Coordinating Committee and Through Public Comment Process

New York's forested landcover

The most heavily forested parts of the state remain the Western Adirondack, Eastern Adirondack, and the Northern Adirondack/St. Lawrence regions. Other large forest blocks include the Catskills and the Allegheny area.

Forest composition and structure

New York's forests are almost entirely of natural origin, meaning they developed from seed dispersed by surrounding mature forest or from seed sources stored in the soil. Over 100 species of trees (commercial and non-commercial) populate New York's forests. New York forestland continues to be dominated by the maple/beech/birch (55 percent), followed by the oak/hickory group (17 percent) with the remaining types each having less than 10 percent of the remaining area. The maple/beech/birch type can be found in all inventory units across the state, but it is most prevalent in the Adirondack Unit (71 percent). Oak/hickory is most ubiquitous in the Lake Plain, Capital District, and Catskill Units where the maple/beech/birch type are least dominate.

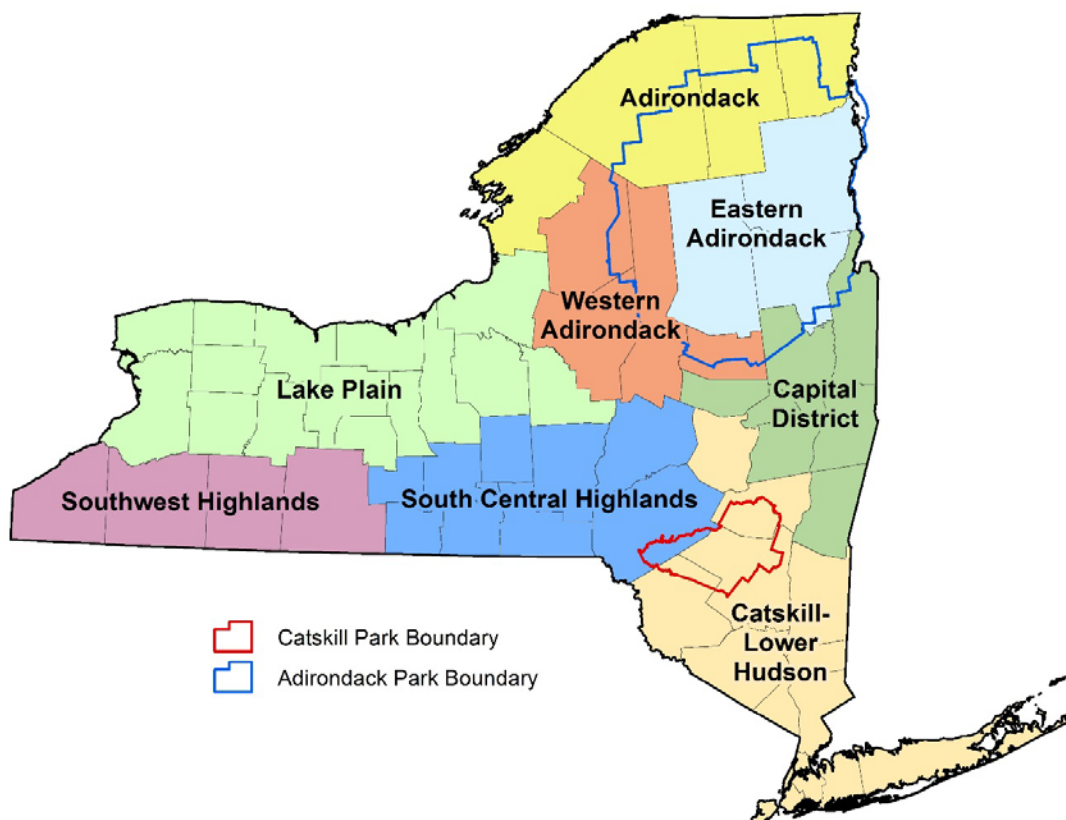
Approximately 66 percent of New York's forests are in a large diameter size class (minimum 11.0 inch dbh for hardwoods and 9.0 inch dbh for softwoods); 25 percent are classified as medium diameter size class (5.0 to 10.9 inch dbh. for hardwoods and 5.0 to 8.9 inch dbh for softwoods); only 8 percent are in a stage where seedling and sapling size trees (less than 5.0 inch dbh). predominate. This indicates that New York's forests are growing and maturing. The low percentage of seedling and sapling size trees can affect the balance of other forest attributes such as wildlife populations.

Specifically, the lack of early successional stages has led to the decline in bird populations, such as the Golden-winged Warbler, Whip-poor-will, Canada Warbler, Yellow-breasted Chat, American Woodcock, and Ruffed Grouse.

This condition can be due to the prevailing timber management methods utilized in the state, the slowdown in acres reverting from an idle condition into a forested condition, and the high value of agricultural land remaining in cultivation.

Timberland is defined by the FIA Program of the Forest Service, U.S. Department of Agriculture as forestland producing or capable of producing crops of industrial wood (more than 20 cubic feet per acre per year) and not withdrawn from timber utilization (i.e., not in reserved forest status). Approximately 83 percent of all forestland in New York is currently considered timberland. This is an important distinction to make for policymakers, landowners, and land managers, as this is the percentage of forest resource that potentially could be under active forest management.

Privately-owned forestlands cover 13.9 million acres and represent 74 percent of New York's forests, with 10.4 million acres considered family-owned or non-corporate forests. Nearly 700,000 private forest landowners provide the public with the benefits of clean air and water, carbon sequestration, wildlife habitat, and a forest-based economy. Around 197,000 landowners own 10 acres of forestland or more. It is on these lands that it is most practical to conduct forest management and conservation practices.



Map of New York State's Inventory Units, U.S. Forest Service, Forest Inventory and Analysis Program

State-owned forestlands. Since 1885, New York State has invested in acquiring and managing a significant amount of forested land in all regions of the state. These state lands are held as state forests, wildlife management areas, forest preserves, and state parks—each providing its own unique and complementary benefits, values, and public good. The Adirondack and Catskill Forest Preserves (managed by the DEC) and the New York State Park system (managed by OPRHP) provide nearly 3.1 million acres of mostly forested open space on which timber harvesting is not allowed. Forest preserves are constitutionally protected from harvesting, and State Parks in New York are protected under policy from commercial tree cutting.

DEC manages more than 787,000 acres of state forests. State forests are located throughout New York—excluding the Adirondack and Catskill Preserves—and include reforestation areas, multiple-use areas, unique areas, nature preserves, and historic preserves. On some of these lands, timber management is used as a tool to enhance biodiversity and to create habitat features that might be lacking in the landscape. Managed State Forests provide timber for various markets, and, in turn, jobs from loggers to finish carpenters. Timber harvesting also creates additional financial opportunities.

Less than one million acres of forest originated as plantations planted by various landowners, mostly from the 1930s through 1970s. Approximately 350,000 acres of those plantations exist on state reforestation, unique, and wildlife management areas. The number of acres planted has waned substantially in recent decades, and some older plantations are being converted back to a natural forest condition. (State Forest Action Plan Assessment: New York's Forested Landcover)

Forest Legacy Eligibility Criteria

The New York State Stewardship Coordinating Committee established a Forest Legacy Committee to work with DEC on matters related to the Forest Legacy Program. Six members of the stewardship Committee also serve on the Forest Legacy Committee.

The Forest Legacy Committee and DEC have determined that the Forest Legacy Program in New York should focus on acquisition of development rights and other such rights and interests that, if exercised, could threaten the traditional uses and values of the forests, including timber harvesting, public recreation, water and scenic quality, and wildlife habitat. With these objectives in mind, it was determined that a Forest Legacy Area in New York should:

1. include forested land threatened by present or future conversion to a non-forest use;
2. provide opportunities for the continuation of traditional uses;
3. contain three or more of the following public values:
 - a. Timber and other forest commodities;
 - b. Scenic resources;
 - c. Public recreation opportunities;
 - d. Riparian areas;
 - e. Fish and wildlife habitat;
 - f. Known threatened and endangered species;
 - g. Known cultural resources,
 - h. Other ecological values;
4. contain at least 50 percent land that meets the definition of forest land; and
5. be identified in the state Open Space Plan as a priority conservation project.

"Threatened by conversion to non-forest use" Land which has characteristics that make it attractive to changes such that traditional uses and values of the property are reasonably expected to be at risk. These characteristics may include, but are not limited to: proximity to roads, short travel time to population centers, existence of water resources and the presence of outdoor recreation opportunities.

"Environmentally important forest area" Land which includes at least three of the public values listed in 3.a through 3.g. above.

"Traditional forest uses" Activities commonly associated with the use of forest land in New York. These activities include, but are not limited to: public access, hiking, camping, hunting, timber harvesting, trapping, snowmobiling, and cross-country skiing.

"Forest land" Land capable of growing a regular crop of trees but not including ledge, marsh, open swamp, bog, slopes of more than 35 percent, fields, rock outcrops or similar areas.

Goals and objectives of Forest Legacy Program in New York

The goal of New York's Forest Legacy Program is to implement the goals of New York's Forest Action Plan, including to maintain forestlands at risk of conversion to other uses primarily using conservation easements with willing owners. The overall purpose of the program is to sustain the economic, ecological, and social values of forests, including productive working forests; habitats and natural communities for native plants and wildlife; clean water and fish habitat; capacity to mitigate and adapt to climate change; public recreational opportunities including fishing and hunting; culturally significant resources; and scenic landscapes.

Project Evaluation Process

Forest Legacy Acquisitions in New York must:

1. be located within an approved Forest Legacy Area
2. be included in a Priority Conservation Project in the state's Open Space Conservation Plan
3. include forested land threatened by present or future conversion to a non-forest use;
4. provide opportunities for the continuation of traditional uses;

5. contain three or more of the following public values:
 - a. Timber and other forest commodities;
 - b. Scenic resources;
 - c. Public recreation opportunities;
 - d. Riparian areas;
 - e. Fish and wildlife habitat;
 - f. Known threatened and endangered species;
 - g. Known cultural resources,
 - h. Other ecological values; and
6. be nominated by the landowner in writing or with the written permission of the landowner.
7. be approved by the local government
8. have a forest stewardship plan or other similar multiple use management plan in place at the time of closing if a landowner is retaining the right to harvest timber or the right to conduct other land or resource management activities. A management plan will not be required if the aforementioned rights are not retained. If a fee interest is being acquired the state will incorporate the parcel(s) into its management planning. Preparation of the plan is the responsibility of the landowner.

Parcels meeting the above criteria will be prioritized based on the Resource Value Rating System included in the current New York State Open Space Conservation Plan: <http://www.dec.ny.gov/lands/317.html>.

Forest Legacy Areas

The Open Space Plan identifies the state's regional priority conservation projects and recommends that land protection efforts in New York be concentrated in those areas. The priority projects that meet FLP eligibility criteria are listed here and shall constitute the New York Forest Legacy Areas (FLAs), which have been approved by the Forest Legacy Sub-committee of the State Stewardship Coordinating Committee.

Current Forest Legacy Areas:

1. Northern Forest Lands Study Area (1992)
2. Taconic Ridge (1994)
3. New York Highlands and Sterling Forest (1993)
4. Central Long Island Pine Barrens (1994)
5. Catskill/Delaware New York City Watershed (1998)
6. Rensselaer Plateau (2010)
7. Catskill Park Expansion to Catskill/Delaware New York City watershed (2010)

Proposed Forest Legacy Areas:

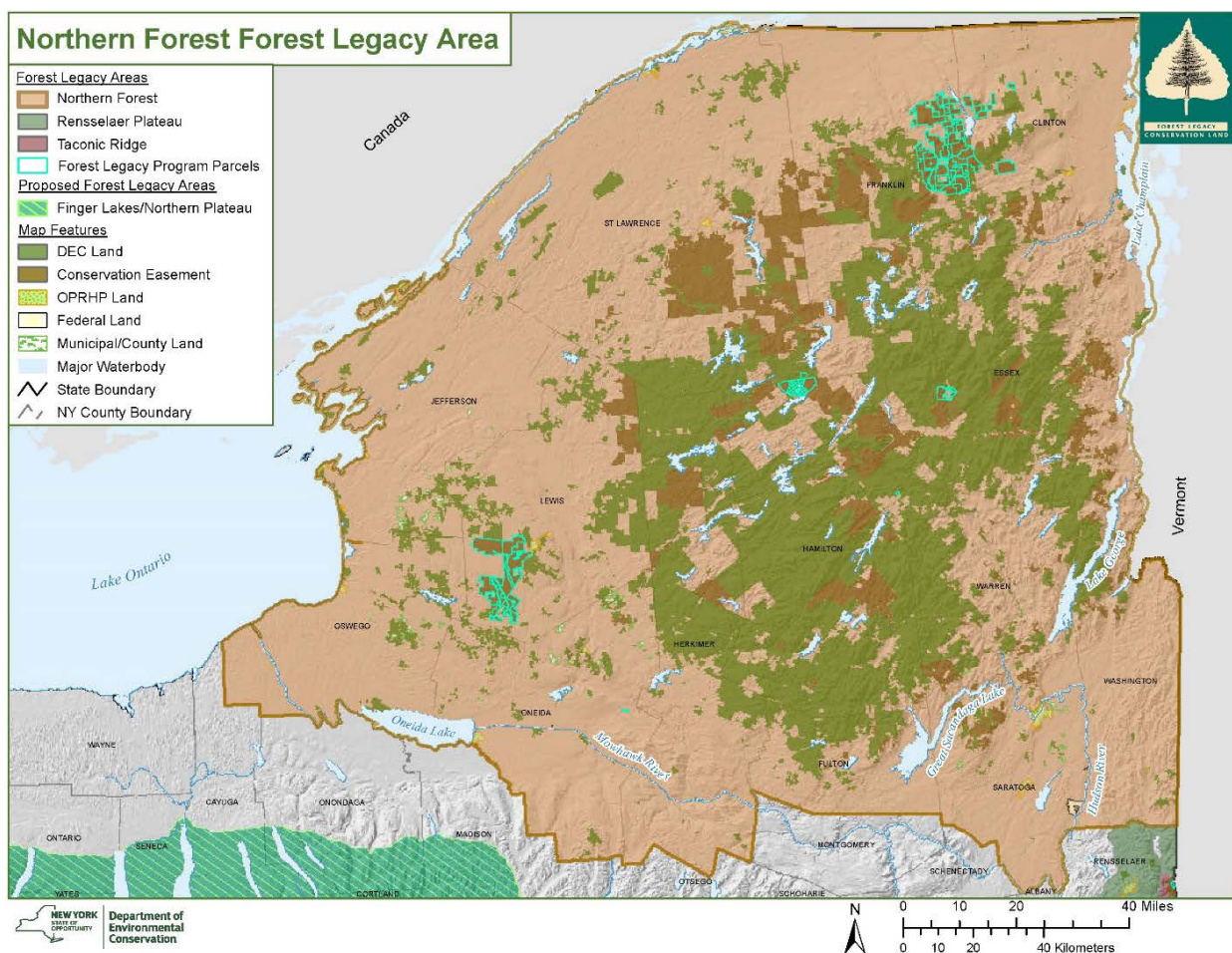
8. Allegheny Plateau
9. Shawangunk Ridge
10. Finger Lakes/Northern Plateau

Notwithstanding limitations within specific FLAs, the FLP in New York will employ a full range of conservation tools, including fee acquisition, restricted deeds, and conventional conservation easements, including development rights, recreation rights and other such rights necessary to achieve the goals of each of the FLA.

Northern Forest Lands Study Area Forest Legacy Area

The 26 million-acre Northern Forest Lands Study Area, which stretches from Lake Ontario in New York to Maine's Atlantic coast, is one of the largest tracts of continuously forested land in the nation. It is characterized by expansive, remote tracts of transitional spruce-fir and hardwood forest, rugged mountain ranges, pristine lakes, rivers and streams, and a vast abundance and variety of wildlife. New York's portion encompasses 7.6 million acres in 14 counties: Clinton, Franklin, St. Lawrence, Jefferson, Herkimer, Hamilton, Essex, Warren, Saratoga, Washington, Lewis, Oswego, Oneida, and Fulton.

The health and future of New York's Northern Forest is seriously threatened by increasing demands for recreational property, escalating land values and economic pressure facing the region's landowners. These trends are causing traditional uses, such as open space, forestry, farming, and public recreational use, to give way to residential and private recreational development. Land with access to lakes, rivers and scenic ridges or near interstate highways and secondary roads is particularly vulnerable. The result is fragmentation of huge forest holdings, reduced public recreation opportunities, and degradation of the water, habitat and scenic quality of the region.



Environmental values and how they will be protected

The transitional spruce-fir and hardwood forest is a unique ecosystem in the United States and is ecologically significant on an international scale. The Lake Champlain basin and large portions of the Adirondacks are part of an 11-million-acre International Biosphere. Acquisition of fee and easement interests will help prevent fragmentation, development and other deleterious land uses that would compromise this unique ecosystem or degrade its component natural resources.

The forest is interspersed with wetlands, bogs, rocky ridges, glacial erratics, lakes, rivers and distinct mountain ranges, making it one of the

wildest and most scenic areas in the country. Employment of various FLP mechanisms, including the purchase of development rights⁹, which will prevent construction on mountainsides and in river valleys that would ruin panoramic views and wilderness setting of the Northern Forest.

Recreational opportunities include, but are not limited to, fishing, hunting, trapping hiking, primitive camping, swimming, whitewater rafting and canoeing, snowmobiling and cross-country skiing. The spectacular landscape offers clean rivers, pristine lakes and many of the most rugged mountains in the northeast. Forest Legacy acquisitions, whenever possible and appropriate, will provide for public access to rivers, lakes, trails, mountains and forests for recreational purposes.

⁹ development rights - The purchase of development rights may vary depending upon 'the goals for the Forest Legacy Areas and the importance of those goals to an individual tract. In the strictest sense, the acquisition of development rights thru a conservation easement could prevent any subdivision and improvements of any kind. This will not be necessary on all tracts. In all cases, the extend of development restrictions must be reviewed with and approved by the Forest Service and the State Stewardship Committee.

List of public values

In addition to fostering continuation of traditional uses as defined in the Act, the FLP in the Northern Forest will protect or expand the following public values:

- a. recreational opportunities
- b. riparian areas/wetlands
- c. important fish and wildlife habitat
- d. other ecological features (International Biosphere)
- e. scenic resources
- f. important plant communities

Forest Legacy acquisitions will be undertaken anywhere within the 14 county Northern Forest Lands Study Area, but priority will be given to projects within three focus areas: the Adirondack Park, Tug Hill Plateau and the Battenkill Corridor.

Adirondack Park

The Adirondack Park is a contiguous geographical entity consisting of six million acres in 12 counties. It is the largest wilderness area east of the Mississippi River; it has gained fame worldwide as an International Biosphere; and it is the largest reserve of natural communities of plant and animal life in the eastern United States. The largest percentage of both industry-owned and publicly-owned forest land in New York state is in the Adirondacks, where they contribute greatly to the economy of the region.

The Adirondack Park faces the same economic factors and land use changes as the larger Study Area. In the last twenty years, 50,000 to 60,000 newly subdivided parcels were created in the Park, as second home buyers/builders scrambled for lots adjacent to or near forever-wild Forest Preserve land. Homes, condominiums, lawns, septic systems and boat ramps are degrading or destroying water quality, habitat, and the scenic landscape. Public access to rivers and lakeshores is completely severed in some areas. Large private and commercial

tracts that, in the past, were open to the public for recreation, are now closed to recreational users under the new, smaller ownership pattern.

Acquisition of conservation easements, including where necessary, development, recreation, scenic, access, and timber rights, will help individual and commercial landowners to continue traditional uses and will protect the great wilderness setting of the Adirondacks.

Management responsibility for FLP easements/ interests acquired in the Adirondack Park may be assigned to the Department of Environmental Conservation or to local government. Monitoring responsibility may be share by local organization qualifies to conduct monitoring according to LTA Standards and Practices.

Tug Hill Plateau

Tug Hill is a 2,000-square mile region of working farm and forest land located in northern New York, between Lake Ontario and the Adirondack Park. It includes portions of four counties Jefferson, Lewis, Oneida and Oswego - and is among New York's most rural and remote places. Its vast core forest is known for its remote headwaters, wild rivers, gulfs (a local term for gorges several hundred feet deep), scattering of prime farmland, and historic sites that tell the story of how the land was settled and worked. Connecting all are Tug Hill's pristine waters (fed by an average 20 feet of snow each winter) – wetlands, ponds, rivers and groundwaters that sustain the forests, plant and animal habitats and the livelihoods of those who live in the region. The unbroken Tug Hill forest/ watershed is surrounded by small rural communities whose economic survival depends on the area's natural resources—forest, farmland and water. Most of Tug Hill is privately owned forest land in parcels of several hundred to several thousand acres, much of it managed for hunting, fishing, recreation and timber production.

Like most regions within the Northern Forest Lands Study Area, Tug Hill is in constant danger of having its lands converted to nontraditional uses. Through the acquisition of development

and recreation rights¹⁰ and the institution of timber management plans, the Forest Legacy Program will promote the continuation of traditional uses, while permanently protecting water quality and wildlife habitat, public recreational access, and the scenic and rugged character of the area that attracts tourists and recreational users. Fee acquisitions will not be undertaken in Tug Hill without the express approval of the Town Board.

Management responsibility for FLP easements/ interests acquired in the Tug Hill Region may be assigned to the Department of Environmental Conservation or to local government. Monitoring responsibility may be shared by local organization qualifies to conduct monitoring according to LTA Standards and Practices.

Battenkill Corridor

The Battenkill river corridor, which is in the Washington County towns of Jackson and Salem on the New York/Vermont border, has been recognized by the Department of the Interior's Nationwide Rivers Inventory (NRI) for its exceptional fisheries, scenic, geologic, historic and wild values. According to NRI, for this physiographic section of the country, the Battenkill is the most significant natural trout and trout spawning habitat and is a rare example of a "sparsely developed, free-flowing, medium order river." The fish and wildlife habitat is exemplary -- several threatened and endangered species have been identified within the project area including the black-backed woodpecker, osprey, northern harrier, trailing juniper, rose root, lyre leaved rock cress, and Hooker's orchid, and moose are frequently sighted in the wetlands and marshes along the river's edge. The river is heavily used for recreational canoeing and fishing.

Unfortunately, land along the Battenkill is particularly threatened with conversion to nontraditional uses because of its proximity to population centers in Vermont, Massachusetts and New York (it is within commuting distance of Albany) and to prime outdoor recreation lands in the Adirondacks, the Green Mountains and the Berkshires and the Taconics. The highly desirable riverfront properties are subject to subdivision and sale as riverfront lots for houses, condominiums, and private recreational purposes.

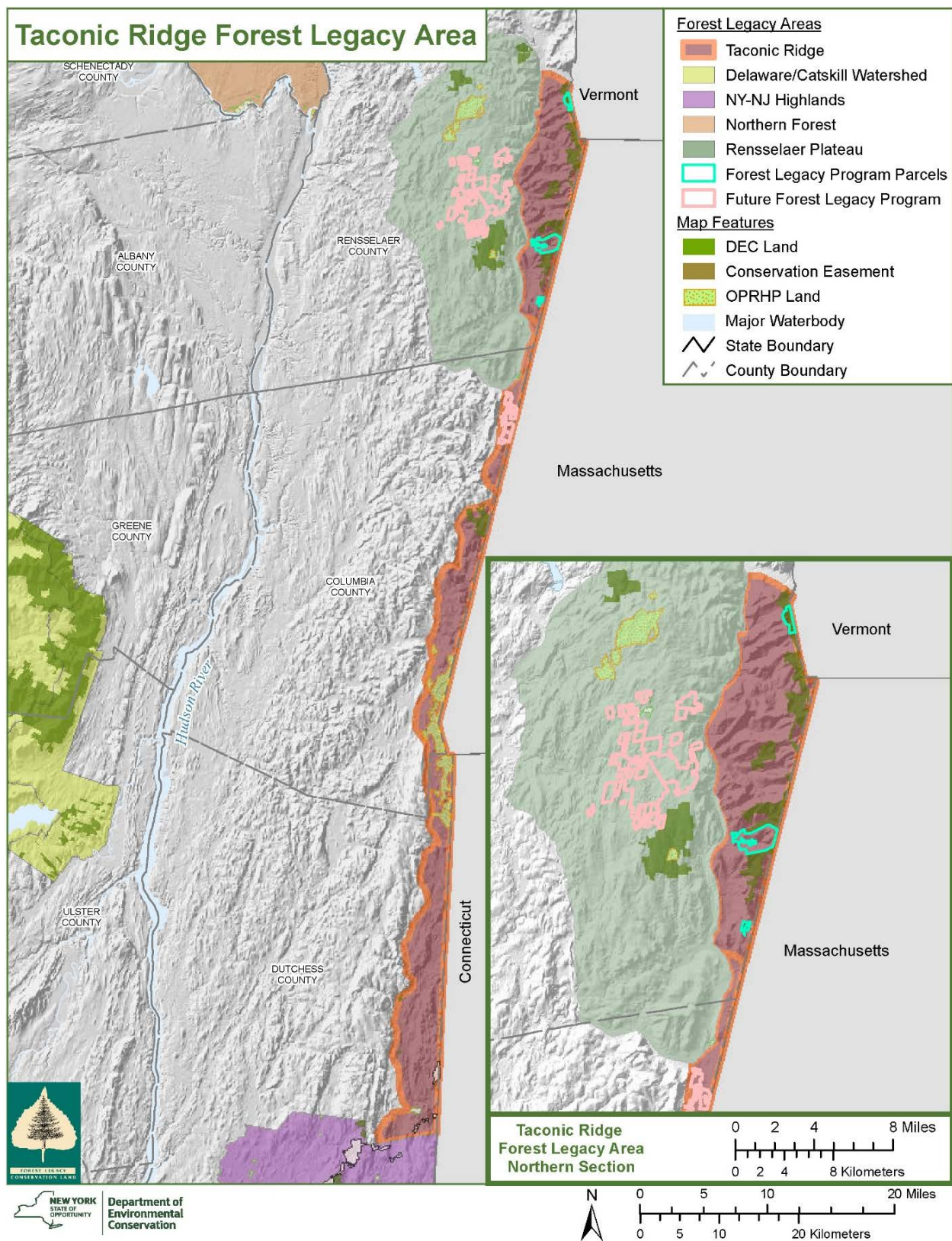
Through FLP, the purchase of development rights along the Battenkill will allow the continuation of forestry, and recreational activities traditionally carried out in the valley. The conservation easement language will also protect the river's scenic integrity, maintain water quality and prevent degradation of wildlife habitat. FLP acquisitions in the Battenkill will be limited to the acquisition of development rights, unless otherwise authorized by the Town Board/s.

It is anticipated that management responsibility for FLP easements acquired in the Battenkill Corridor may be assigned to DEC. Monitoring responsibility may be shared by local organization qualifies to conduct monitoring according to LTA Standards and Practices.

Taconic Ridge Forest Legacy Area

The Taconic Ridge lies along a portion of New York's border with Vermont and Massachusetts. It includes nearly all the eastern boundaries of the Towns of Petersburg, Berlin and Stephentown in Rensselaer County. The Forest Legacy Area boundary is defined by Route 22 on the west, the state line on the east, Route 346 on the north and Route 43 on the south.

¹⁰ recreation rights - The purchase of recreation rights must vary depending upon the goals for the Forest Legacy Areas and the importance of those goals to an individual tract. In some cases, the Forest Service should acquire the right to allow the public to pursue all traditional and legal recreational activities. In other cases, some recreational uses by the public would be inappropriate and in conflict with the goals for the Legacy Area and the surrounding community. In all cases, the specific recreational rights to be acquired or restricted must be reviewed with and approved by the Forest Service and the State Stewardship Committee.



The Taconics are truly representative of a working forest. Much of the private land within the Forest Legacy Area is owned or managed for timber production. Several timber and forest products companies base their operations in or near the Forest Legacy Area, where they contribute greatly to the economy and cultural landscape of the region.

Unfortunately, hard economic times have forced many landowners to use, lease or market their lands for nontraditional purposes. In keeping with the true spirit and purpose of the Forest Legacy Program, the purchase of development and recreational rights in the Taconics will provide landowners with the capital they need to keep their land in private, timber producing ownership, while protecting the scenic and recreational values of the area.

Environmental values and how they will be protected:

- Most of the land in the proposed area is currently in timber production. The area was severely cut in the past due to the local charcoal and tanning industries. The disappearance of these industries from the area has allowed the forest to return, with much of it managed for sustained timber production. Most of the forest is hardwood with patches of spruce here and there on the ridge. There are some scattered softwood plantations. The area between Route 22 and the ridge includes some farmland. Implementation of FLP in the Taconics will enable timber harvesting to continue.
- The Taconic Ridge receives a great deal of public attention and use due to the Taconic Crest Trail, which runs the entire length of the ridge. The area provides good hunting for deer and wild turkey. The Little Hoosic River, which provides excellent trout fishing, is included within the proposed area. Acquisition of fee and easement interests, including recreational rights, will ensure public access to the Taconic Crest Trail and other trails, provide new recreational opportunities and easier access to existing public lands.
- Over 450 plant species exist within the project area, including rare Tinged Sedge Grass. Twelve species of amphibians, 8 reptile species, 117 bird species and 46 mammal species are known to inhabit the area. Recent years have seen increased presence of black bear and moose, and migrations of eagles and osprey. Conservation easements will preclude or limit development and will define acceptable timber management practices so that sensitive habitats are not disturbed or destroyed.
- The Taconics Mountains are situated between the Green Mountains of Vermont, the Adirondacks, the Berkshires and the Catskills. From the Crest Trail, on a clear day, hikers enjoy spectacular views of these neighboring ranges and the scenic valleys between them. Acquisition of development rights will prevent development on the mountainsides, protecting the views from the trail and the Route 22 corridor. In addition, forest management plans may restrict cutting in the viewsheds.

- Throughout the Taconic's forests are the archeological remains of 18th and 19th century agricultural settlements, including farm foundations, old stone walls, charcoal works and carriage paths. Many of the geologic features of the ridge are the subject of local lore including the Snow Hole, an ancient cleft in the earth's surface deep enough to contain snow year-round, and the White Rocks, which were used as milepost by valley travelers from the revolutionary days. FLP implementation will ensure that these cultural assets are accessible and intact for continued enjoyment by the public.

List of public benefits to be derived

Most importantly, FLP implementation in the Taconics will keep large portions of the ridge in timber production. Other public values that will be protected and/or expanded include:

- a. recreational opportunities
- b. important fish and wildlife habitat
- c. scenic resources
- d. historic
- e. important plant communities

Management responsibility for FLP easements/ interests acquired in the Taconic Mountains may be assigned to the Department of Environmental Conservation or to local government. Monitoring responsibility may be share by local organization qualifies to conduct monitoring according to LTA Standards and Practices.

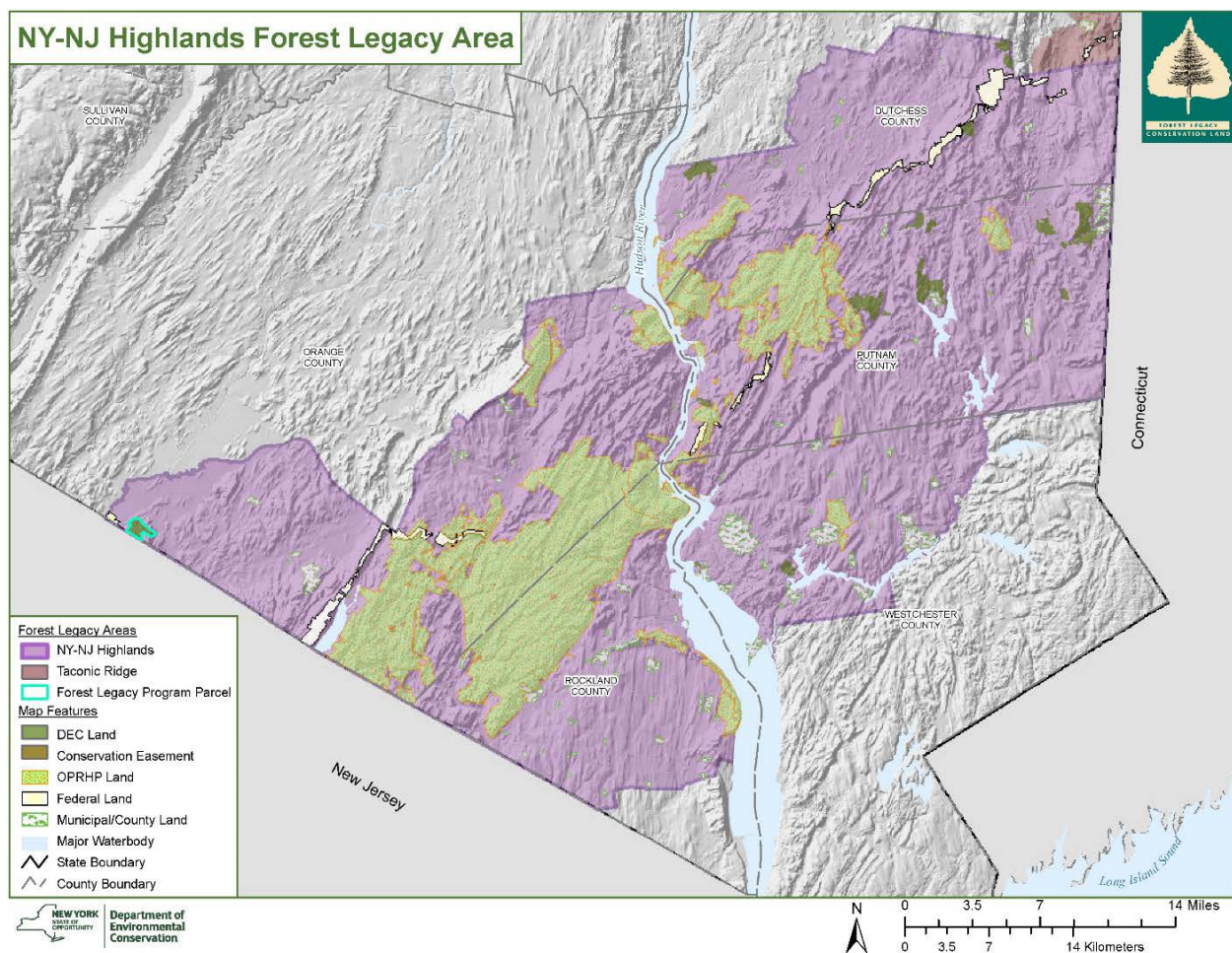
New York Highlands and Sterling Forest Legacy Area

The New York Highlands are part of the larger 1.1 million-acre New York/New Jersey Highlands Region, which lies between the Hudson and Delaware Rivers. The Highlands are comprised of mountains, valleys, river corridors and wetlands, all within 50 miles of the New York metropolitan area. According to the New York-New Jersey Highlands Regional Study, they offer "the last opportunity to provide shape and form to the metropolitan region, delineating where the pavement ends and nature begins."

Important environmental values and how they will be protected:

- Within the Highlands there are 147,800 acres of public open space, which host eight million recreational users each year. Perhaps the most important recreational attraction is a segment of the Maine-to-Georgia Appalachian Trail, which bisects the Highlands and Sterling Forest. FLP implementation will ensure permanent public access to the Appalachian Trail and other hiking trails, buffer existing public land from encroaching residential and commercial development and provide increased public access for recreational opportunities to the 20 million residents of the tri- state region.
- The Highlands' watersheds provide drinking water to 3.8 million residents of New York and New Jersey. Through various FLP protection mechanisms, development on or near waterbodies and drainage systems will be limited or prevented, thus preserving water quality.

- The lands and waters of the Highlands harbor significant populations of fish and wildlife. This includes over 40 species of nesting birds, migrating raptors, and waterfowl, large mammals like bobcat, black bear and river otter, and wild trout fisheries. Threatened and endangered species include the timber rattlesnake, wood turtle, red-shouldered hawk, barred owl, osprey, great blue heron, and eastern wood rat. The presence of this wildlife is more remarkable because of its location at the periphery of the nation's largest city. FLP acquisition of fee interests, development and timber rights, will control development and timber harvesting in the Highlands, thus preserving these important natural communities. Public access may be limited in some areas or at certain times of the year if the habitat is sensitive or easily disturbed.
- The Highlands has many prehistoric archeological sites, as well as historic links to the American Revolution and Civil wars. FLP easements can prevent deleterious development that would disturb and degrade these archeological and historic sites.
- From the Appalachian Trail and other trails and roads in the Highlands, visitors enjoy seemingly endless views of nature, despite their proximity to the City. By limiting development in important viewsheds, the high scenic value of the Highlands will be maintained.



List of public benefits

Implementation of the FLP in the Highlands will protect highly threatened land from conversion to nontraditional uses, namely large-scale development. FLP will also protect/expand the following public values:

- a. recreational opportunities
- b. riparian areas/wetlands
- c. important fish and wildlife habitat
- d. other ecological features (International Biosphere)
- e. cultural resources
- f. scenic resources
- g. important plant communities
- h. water quality/quantity

Implementation of the FLP in the Highlands will protect highly threatened land from conversion to nontraditional uses, namely large-scale development.

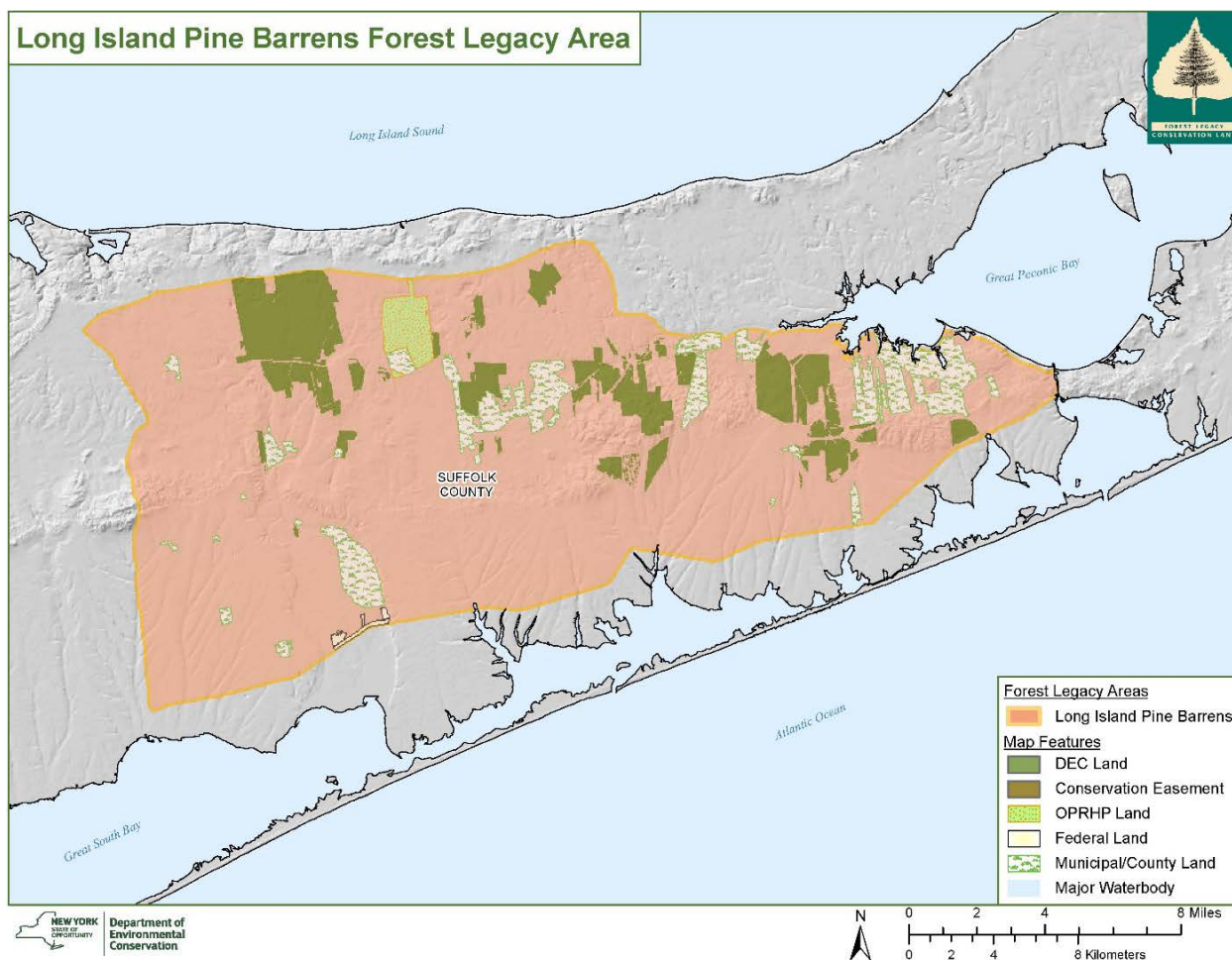
Management responsibility for FLP easements/interests acquired in the New York Highlands may be assigned to the Palisades Interstate Park Commission, the Department of Environmental Conservation, or to local government. Monitoring responsibility may be shared by local organization qualified to conduct monitoring according to LTA Standards and Practices.

Central Long Island Pine Barrens Forest Legacy Area

The Pine Barrens Forest Legacy Area encompasses 100,000 acres in the eastern Long Island towns of Brookhaven, Riverhead, and Southampton. The total acreage of the Long Island Pine Barrens has been significantly reduced over the past century, and most of what remains has been exploited in some way. The hills of the barrens, some of the highest in Suffolk County, are being used for radar and communications facilities. Several electrical transmission corridors pass through the barrens, as do many roads, highways, and the Long Island Railroad. Unplanned development, sand and gravel mines, tree poaching, golf courses, off-road vehicles, and illegal dumping have all degraded or destroyed areas of the Pine Barrens and continue to threaten the remaining forest.

Important environmental values that will be protected include:

- Pine barrens are a rarely occurring forest type in New York State and are extremely important to the state's biological diversity. The pitch pine range in height from 4 feet (dwarf pitch pine) to 60 feet, and oak species include scrub or bear oak, post, chestnut, scarlet, and white oak. The understory usually includes black huckleberry and blueberry, while ground cover includes hudsonia, bearberry, wintergreen, joint weed, stiff-leaf aster, and orange grass. Acquisitions of fee interests, development rights, and timber rights will safeguard the unique plant communities of the Pine Barrens in perpetuity.
- Wetlands, which are common through the forest, include red maple swamps and white cedar bogs. FLP acquisitions will prevent or limit land uses that would negatively impact the wetlands and streams of the Pine Barrens.



- Animals include fox, deer, rabbit, toads, snakes, and insects. It is a favored nesting area for prairie warbler and brown thrasher; pine warbler and ovenbird are other characteristic birds. The community also provides habitat for the buck moth. In fact, New York's most dense population of buck moths occurs in the Long Island Pine Barrens. Fee and easement acquisitions will prevent uses that would destroy habitat; restrictions on human activities may be instituted, when necessary, to protect critical and sensitive areas.
- The Upper Glacial and Magothy Aquifers. These have been tapped for drinking water, and are Long Island's last major reservoirs of uncontaminated groundwater. Acquisition of fee and easement interests will prevent development and other practices that could degrade water quality.
- The scrub forest, berry-laden understory, and sandy forest floors are a uniquely beautiful hallmark of Long Island's east end; they provide a welcome and dramatic visual contrast to nearby residential subdivisions, golf courses, and tourist hubs. By limiting development and other construction within the pine barrens, the Forest Legacy Program will ensure the aesthetic integrity of the region.

- There are several state- and county-owned parks within the proposal area. Acquisition of fee interests and recreational rights will expand existing parkland; acquisition of development rights will buffer parkland from encroaching development.

List of Public Benefits

The Forest Legacy Program will help prevent conversion of the Pine Barrens to nontraditional uses. In addition, the following public values will be protected:

- a. recreational opportunities
- b. riparian areas/wetlands
- c. important fish and wildlife habitat
- d. other ecological values (aquifers)
- e. scenic resources
- f. important plant communities
- g. groundwater

Management responsibility for rights/interests acquired under FLP in the Pine Barrens may be assigned to the DEC, Suffolk County or the towns of Brookhaven, Riverhead, and Southampton. Monitoring responsibility may be share by local organization qualified to conduct monitoring according to LTA Standards and Practices.

Catskill/Delaware Portion of the New York City Watershed Forest Legacy Area

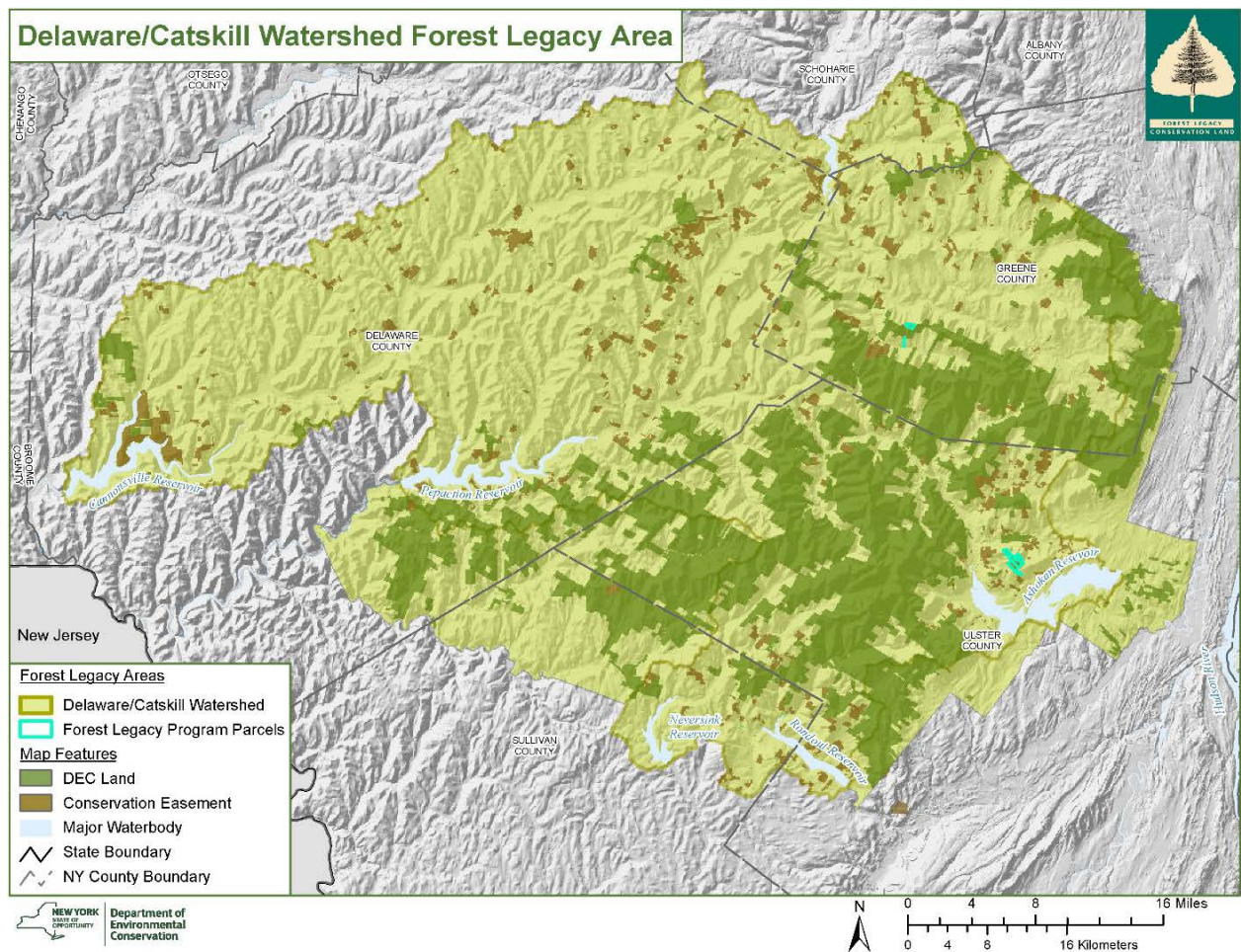
A) Description

The New York City water supply system is an engineering feat of vast proportions. Each day, it reliably provides on average 1.34 billion gallons of high-quality drinking water to approximately eight million residents of New York City and one million residents of Westchester, Putnam, Orange and Ulster counties (USEPA, 1993). The 1,580-square mile Catskill/Delaware watersheds, located west of the Hudson River, contribute approximately 90 percent of New York City's water supply (NYCDEP, 1990).

The population of these watersheds consists of nearly 70,000 permanent residents located in portions of Delaware, Greene, Schoharie, Sullivan, and Ulster counties (NYCDEP, 1993). Forest-based recreation, such as hiking, hunting, trapping, and fishing, attracts thousands of tourists each year, predominantly from New York City, but also from other northeastern cities.

Forests constitute 75 percent of the total land area in the five Catskill/Delaware watershed counties (Alerich and Drake, 1995). These forests are characterized by steep slopes and deep, V-shaped valleys. The Catskill mountains are the remains of a high plateau deeply carved by water erosion. The bedrock, chiefly sandstone and shale, is of sedimentary origin. Soils are exceedingly stony, acidic, arid of medium to low fertility (Stout, 1953).

The watershed forests are commonly referred to as Northern hardwoods (Alerich and Drake, 1995). The principal species include beech, sugar maple, red maple, white ash, black cherry, yellow birch, and red, white and chestnut oak (NYSDEC, 1981). Hemlock, once plentiful, now grows mainly in ravines; white pine and red spruce can be found growing at higher elevations (Eyre, 1980).



B) Map of Proposed Area

List of communities:

- **Delaware County**

- Town of Andes
- Town of Bovina
- Town of Colchester
- Town of Delhi
- Town of Deposit
- Town of Franklin
- Town of Hamden
- Town of Harpersfield
- Town of Kortright
- Town of Masonville

- Town of Meredith
- Town of Middletown
- Town of Roxbury
- Town of Sidney
- Town of Stamford
- Town of Tompkins
- Town of Walton
- Village of Andes (Andes)
- Village of Delhi (Delhi)
- Village of Fleischmanns (Middletown)
- Village of Hobart (Stamford)
- Village of Margaretville (Middletown)
- Village of Stamford (Stamford)
- Village of Walton (Walton)

- **Schoharie County**

- Town of Broome
- Town of Conesville
- Town of Gilboa
- Town of Jefferson

- **Green County**

- Town of Ashland
- Town of Halcott
- Town of Hunter
- Town of Jewett
- Town of Lexington
- Town of Prattsville
- Town of Windham
- Village of Hunter'(Hunter)
- Village of Tannersville (Hunter)

- **Sullivan County**

- Town of Fallsburgh
- Town of liberty
- Town of Neversink

- **Ulster County**

- Town of Denning
- Town of Hardenburgh
- Town of Hurley
- Town of Kingston
- Town of Marbletown
- Town of Olive
- Town of Rochester
- Town of Shandaken
- Town of Wawarsing
- Town of Woodstock

C) Environmental Values that will be Protected

The Catskill/Delaware watersheds consist primarily of extensive forested areas that are interlaced with natural water systems, including wetlands, tributaries, and highly regarded trout streams. These water systems serve as the supply source for six reservoirs supplying 90 percent of the water for the New York City supply system.

In addition to serving as filter forests for the New York City water supply, these woodlands provide scenic and recreation resources for the entire southeastern region of New York State, including the metropolitan region. The forested lands of the watershed are renowned for the fishing, hunting, and hiking opportunities they provide. Conservation easements can be used to protect critical recreational areas and to provide greater access to publicly owned lands.

Because of the extreme size of this watershed, just over one million acres, and because land values are inflated due to their proximity to New York City, long-term watershed protection can only be accomplished by instituting a partnership that promotes sound stewardship of private land. Conservation easements can leverage stewardship funds to a much greater degree than fee acquisitions alone.

D) Means for Protection

- Acquisition of conservation easements is the preferred alternative for long-term forest protection.
- Acquire development rights on all tracts, especially the rights to subdivide, build buildings, and control utility right-of-way locations.

- Timber rights retained by the landowner should be conditioned by using "Best Management Practices" for alleviating soil erosion. All timber harvesting that is allowed shall require a stewardship plan that includes a timber harvesting plan prepared in consultation with a professional forester and accepted by DEC.
- If the seller has no interest in selling a conservation easement, and wishes to sell the fee title, the legacy state grant option provides that ability to the purchasing state government.
- To restrict the development of mining, drilling of material, sand and gravel pits must adhere to the restrictions and conditions in the State's Mined Land Reclamation Law, Environmental Conservation Law, Article 23, Title 27. See Appendix D b.)
- No disposal of waste or hazardous material will be allowed on properties.
- Existing dams or water impoundments, or similar structures, shall be allowed to remain and be maintained. No new construction of dams, impoundments, or other water resource development shall be allowed unless a case-by-case analysis can prove the benefits of such construction to wildlife, forests, and people in the area.
- Industrial, commercial, and residential activities, except forestry and limited mining uses, are prohibited as outlined in the easement language for each individual parcel. Agricultural activities conducted in conformance to a whole farm plan with strict adherence to agricultural best management practices are acceptable. Forest Legacy acquisitions will not include extensive pasture (generally more than 10 percent of the total tract acreage) or cultivated farmland. Instead, farmland protection programs should be used to conserve farmland pasture and similar land uses.

E) Public Benefits from establishing the New York City Watershed as a Forest Legacy Area

- i. Enhanced protection of filter forests that maintain pristine drinking water supply for nine million metropolitan residents.
- ii. Reduced drinking water treatment costs resulting from maintained or improved quality of raw water.
- iii. Maintenance of the scenic appeal of the region.
- iv. Protection of lands critical to maintaining and improving recreational opportunities for the region.
- v. Economic activity based on timber production and recreational uses of forest land can be maintained through private ownership and the working forest philosophy.

F) Watershed Agreement Easement/ Assigned Management Responsibilities

The easements and fee ownership guidelines are thoroughly explained in the Memorandum of Agreement for the New York City Watershed, signed and dated January 21, 1997. Paragraphs 82 & 83 address these details, which are summarized in the following paragraph.

The City of New York is acquiring easements and fee rights in the watershed already. These will compliment lands acquired by the NYSDEC and FLP. On lands where the City acquired an easement they have the inspection responsibility. On lands they buy in fee, they have the management responsibility and DEC holds an easement, which is enforced by the U.S. Environmental Protection Agency and the New York State Department of Health. This transfer of the easement to DEC occurs automatically when New York City purchases fee properties.

G) Legacy Easements/Assigned Management Responsibilities

FLP is designed to keep forest lands from being converted to non-forest uses. The New York City Watershed Agreement is designed to protect the City's water supply through the application of sound, land management techniques. Land treatment is the "battle cry" as opposed to multiple trillions of dollars for water treatment facilities.

The important point to remember about FLP tracts is they'll be around long after the City's watershed agreement has settled the debate over whether land treatment techniques or water treatment plant facilities provide the best protection for public drinking water supplies.

FLP easements are forever. Forested tracts are protected forever. Easement responsibilities and management responsibilities as designed now rest with DEC. Monitoring responsibility may be shared by local organization qualified to conduct monitoring according to LTA Standards and Practices.

The FLP fits the New York City Watershed area perfectly. It protects important forests from non-forest uses. Forests protect soils, and subsequently the water quality. Important forests provide wildlife habitat, water quality protection, offer outstanding recreation opportunities, afford outstanding views, are home to historic sites, and/or provide the chance to continue traditional forest uses. A Federal-State partnership allows landowners to keep their land private, while ensuring it remains forest forever under conservation easements.

H.) Management of Lands Enrolled in FLP & the Existing Lands Already in State Ownership

FLP lands would complement existing lands with conservation easements and lands owned by New York State and the City. DEC already actively manages 8,000 acres of working state forest and 200,000 acres of forest preserve in the watershed. Timber, wildlife habitat,

recreation, and watershed protection are the foundation of the state forest program. Forest protection through preservation and the State Constitution, Article 14 guide forest preserve management. These 208,000 acres complement the present City ownership and serve as a sound basis for additional lands that FLP can assemble.

Timbering is prohibited on forest preserve, but this in no way prohibits harvesting FLP conservation easement properties. FLP can serve to complement those holdings and contribute nicely to the working forest philosophy. The working forest is a necessary component of keeping the area economically viable. The economy and landownership patterns in the watershed can't remain viable by relying exclusively on outdoor recreation enthusiasts. Local, year-round natural resource-based industries will keep the area viable and competitive while still protecting water quality. Timbering, as well as recreational pursuits, are critical to the region's economy. Timber harvests can even be tailored to improve wildlife habitat and recreational uses. These are the preferred uses in the area.

A perpetual forested landscape is guaranteed by the partnering of NYSDEC, New York City Department of Environmental Protection, the FLP, and private woodland owners. A balance of timbering, recreational uses, and preservation ensures high quality water, while allowing for forestry activities and a stable ecosystem.

Acquisition and management of the FLP easements should reside within the realm of the DEC's Division of Lands & Forests. Forest management of FLP tracts is guided as described in section 3)D.) earlier in this Assessment of Need.

I) Eligibility Criteria

During the initial Assessment of Need, the New York State Stewardship Coordinating Committee established a Forest Legacy Subcommittee to work with the State Lead Agency (DEC), on matters related to the Forest Legacy Program.

The Forest Legacy Subcommittee and DEC established Eligibility Criteria, which the Secretary of Agriculture approved upon approval of the Modified Assessment of Need.

The Eligibility Criteria are:

1. include forested land threatened by present or future conversion to a non-forest use;
2. provide opportunities for the continuation of traditional uses;
3. contain three or more of the following public values:
 - a. public recreation opportunities
 - b. riparian areas/wetlands
 - c. important fish and wildlife habitat, including known threatened and endangered species
 - d. cultural areas, such as areas of historical or archeological significance
 - e. other ecological values
 - f. scenic resources
 - g. important plant communities;
4. contain at least 50 percent lands that meet the definition of forest land; and
5. be identified in the State Open Space Plan as a major resource area and/or protection priority.

1. Include Forested Land Threatened by Present or Future Conversion to a Non-Forest Use:

Forest lands in the watershed face extreme pressure of conversion to other uses. Owing to the proximity of the watershed to the New York City metropolitan area, the watershed region has historically been subject to periods of intense land speculation and subdivision. The Watershed Forest Ad Hoc Task Force Policy Recommendations (July 1996) reported that 90 percent of the timberland in the

Catskill/Delaware watershed counties is privately owned. Property tax rates, at four times (4x) the forestry revenues, push landowners to convert land to more profitable uses. One study by the Catskill Center for Conservation reported that ninety-seven (97) parcels of land containing a total of 7,913 acres were subdivided into 1,219 parcels over a six-year period. Looking to the future, large tracts of undeveloped forest land are required for economically viable management. The Watershed Task Force report notes that well-managed forests provide the most beneficial land cover for watershed protection. If development converts significant amounts of forest land, or fragments large blocks of forest land, the economic viability for management could be jeopardized, which, in turn, could affect the ability of the Catskill/Delaware watershed to perform its watershed function.

2. Provide Opportunities for the Continuation of Traditional Uses:

An Act of the Legislature created the Forest Preserve in 1885 to preserve forest land, thus protecting the headwaters of many of the states' major rivers. Within Catskill State Park, there are 279,506 acres of forest preserve land and 330 acres of conservation easements. Outside the Catskill Park, but in the four Catskill forest preserve counties, are 7,803 acres of forest preserve. The forested landscape of the Catskills supports a stable forest industry. According to the Watershed Forest Ad Hoc Task Force Policy Recommendations (July 1996), at least 27 primary producers within the watershed counties process approximately 61.2 million board feet of softwoods annually from sources both within and outside the watershed. In addition, at least 34 secondary producers are within the watershed. More than 130 timber harvesters have expressed their interest in logging within the watershed region.

[FLP conservation easements will ensure traditional uses of forest land and may be targeted toward providing greater access to existing State- and City-owned lands in the watershed.]

3. Contain Three or More of the Following Public Values:

The New York Watershed contains at least four public values.

- a. Recreation Opportunities:** The watershed region has long been known as a major recreational resource area for New York City and New York State. Forest-based recreation, such as hiking, hunting, trapping, and fishing, attracts thousands of tourists each year, predominantly from New York City, but also from other northeastern cities. DEC maintains an extensive trail system within the Catskill Park. The New York State Open Space Conservation Plan identifies one as an important trail: Long Path covers 215 miles from the George Washington Bridge to the northern limit of the Catskill Park. It crosses some of the Catskill's highest peaks.
- b. Riparian areas/wetlands:** As the source of water for six New York City reservoirs, this region contains riparian areas and wetlands that serve as critical filters for 90 percent of the drinking water for nine million metropolitan residents.
- c. Important fish and wildlife habitat:** the region contains fly fishing sites, including world class trout streams, and hunting opportunities that reflect extensive fish and wildlife habitat.
- d. Scenic Resources:** The Catskill Mountains are recognized as a scenic resource for New York State. Scenic resources are areas exhibiting outstanding arrangements of natural or manufactured features, including water features and/or land forms and/or vegetative patterns that provide inspiration, hold interest, and command attention of the viewing public. A 6.8-mile section of New York State Route 214 in the Town of Hunter is designated as a state scenic highway.

4. Contain at Least 50 Percent Land that Meets the Definition of Forest Land:

The Catskill/Delaware Watershed is 75 percent forested, which is 14 percentage points higher than the statewide forested percentage of 61 percent.

5. Be Identified in the State Open Space Conservation Plan as a Priority Conservation Project:

The New York State Open Space Conservation Plan is in its seventh iteration. The 2016 plan includes 140 priority conservation projects. The Forest Legacy Area is in the New York City Watershed Lands project area. The Catskill/Delaware Region includes New York City's primary seven water supply reservoirs, the Catskill Park and forest preserve, and the Upper Delaware River. Protecting farmland, and working forests, and promoting clean water and the uses of water resources are key parts of the priority conservation project.

Rensselaer Plateau Forest Legacy Area

Location & Boundary Description

The Rensselaer Plateau (Plateau) encompasses 196,000 acres of forests east of the Hudson River Valley and west of the Taconic Mountains. Located 10 miles east of Albany, within central and eastern Rensselaer County, the Plateau extends 20 miles north to south and 9 miles east to west (see Map 1). The proposed FLA would start at the junction of State Rte (SR) 22 and the Washington County line, go west to Co. Rte (CR) 114, south to CR 111, south on Parker School Rd to CR 129, southwest to SR 2, east to SR 351, south to SR 66, southeast to US Rte 20, east to SR 22, north to SR 346, east to the Vermont border, north to the junction with the Washington County line, and then west, ending west at the SR 22 starting point.

Towns with jurisdiction in the proposed Rensselaer Plateau FLA include: Berlin; Brunswick; Grafton; Nassau; Hoosic; Petersburg; Pittstown; Poestenkill; Sand Lake; Schaghticoke; and Stephentown in Rensselaer County; and New Lebanon in Columbia County.

Eligibility Criteria Analysis

1. Threats of conversion to non-forest uses.

a. Residential Development Pressure

- Close proximity (20 minute drive) and an easy commute from the area to the State's capital city, Albany, and nearby cities, Troy and Schenectady.
- Presence of research and development centers at Rensselaer Polytechnic Institute (RPI), located on the Plateau, and nearby SUNY Albany has drawn high tech businesses to the area.
- Small towns are becoming bedroom communities for the Capital District Area and development pressure is likely to become even more intense as the "Tech Valley" attracts more businesses.
- The area is located in the heart of New York's Capital Region, a region JP Morgan cites as one of the fastest expanding metros in New York State.
- Second home development, often built on multi-acre lots, can produce a particularly insidious form of fragmentation, where sprawl increases disproportionately to population levels, and has gradually been moving farther west and north of the Hudson River into Rensselaer County from Columbia County
- A 2-3 hour driving distance from both the New York City and the Boston metro areas makes it attractive to buyers who have been priced out of Dutchess and Columbia counties.
- Recent ownership changes of large working forest properties may mean conversion to development.

b. Growing Highway Construction Demand for Rensselaer Greywacke Bedstone

- Rensselaer Greywacke, the geological formation of the Plateau, is an increasingly valuable commodity for highway construction because of its hardness, durability, and exceptional skid resistance, making it frequently specified for critical traffic areas such as highway interchanges.
- Six operating mines, totaling 465 acres of permitted surface disturbance during the lifetime of the mines, are currently located on the eastern side of the Plateau, with pressure to open others.
- Potential wider environmental impacts are associated with Greywacke mining because of the frequent and heavy blasting used to extract this hard rock.

2. Provides opportunities for the continuation of traditional forest uses.

a. Timber Products

- Presently, there are five sawmills in Rensselaer County that use wood from the Plateau and other sources.
- A major heat-treated firewood producer is a supplier to a regional chain convenience store and uses wood primarily from the Plateau.
- Wood from the Plateau is transported to mills in neighboring states and Canada.
- Timber on the Plateau supports logging jobs in the associated rural communities.

b. Water Supply & Mill Power

- Streams within the watersheds intersect on the Plateau and provide drinking water serving more than 100,000 people.
- In the past, waterfalls at the edge of the Plateau were used to power mills.

c. Public Access on Private Land

- The Rensselaer County Regional Chamber of Commerce Tourism and Travel website portrays the county, including the Plateau, as: “Life Looks Good From Here,” “Stretching for 30 miles along the scenic and historic Hudson River,... boasts thousands of acres of parks, miles of hiking and walking trails, scores of lakes and ponds ... nature trails, ... cross country ski trails... highlight the beauty of the County.”

3. Contains at least 50 percent land that meets the definition of forest land.

Throughout the Plateau, opportunities for forest connectivity are high because the landscape is 95 percent forested, and there are many landowners with over 1,000 contiguous acres in holdings. Opportunities exist to connect forested corridors from the proposed FLA to the Taconic Ridge FLA on the east of US Rte 22.

4. New York State Open Space Conservation Plan Identification

The Plateau is recognized as “Priority Conservation Project” {55}, on p. 121 of the 2016 Plan.

5. Contains three or more of the identified public values.

a. Important Plant Communities/Natural Communities & Forest Types

Because of the erosion-resistance of the underlying Rensselaer Greywacke bedrock, the Plateau has a steep eastern escarpment with many cliffs. The Plateau ranges from 1000 to 1800 feet in elevation and the summit is hundreds of feet higher than the surrounding areas. Although it is geologically part of the Taconic area, its comparatively level summit is quite different from the more jagged peaks of the Taconic Range. The broad summit has relatively little topographic relief and is mostly covered by glacial till of varying depths. Soils are mostly frigid, acidic, and rather poorly drained. Shallow soils are close to bedrock, and deeper soils may have a fragipan. There are numerous ponds and wetlands, especially fens, and these support many unusual communities. The shallow acidic soils and the cooler climate zone support vegetation closer in type to that of the Adirondacks than to the surrounding lowlands. Despite its location near the cities of Troy and Albany, the forest cover of the Rensselaer Plateau has remained surprisingly unfragmented.

The New York Natural Heritage Program identifies the following communities and species found on the Plateau as significant:

▪ **Communities:**

- Thalus Cave Community
- Hemlock Northern Hardwood Forest
- Oligatropic Dimictic Lake
- Spruce – Northern Hardwood Forest

- Black Spruce Tamarack Bog
- Spruce Fir Swamp
- Inland Poor Fen
- Beech - Maple Mesic Forest
- Shallow Emergent Marsh
- Dwarf Shrub Bog
- Spruce Flats
- **Species:**
 - Michaux's Blue-eyed Grass
 - Farwell's Water Milfoil
 - Marsh Arrow Grass
- **Historic:**
 - New England Cottontail

b. Important Fish & Wildlife Habitat w/known Threatened & Endangered Species

The Plateau has been designated as an Important Bird Area by the National Audubon Society. The area supports a great abundance and diversity of forest breeders, including many at-risk species—Cooper's Hawk, Northern Goshawk, Red-shouldered Hawk, Wood Thrush, and Canada Warbler to name a few—and a characteristic assemblage of more common forest species. Eighteen species of warbler are known to breed in Plateau forests. Red Crossbill, White-winged Crossbill, Pine Siskin, and Evening Grosbeak have also been identified here; and with Bicknell's Thrushes using the area during migration.

Large unfragmented interior forested blocks provide habitat for native mammals that need large continuous ranges, such as bear, bobcat, fisher, and moose. These large blocks also support biodiversity and scope for

natural disturbance to play out in a series of normal ecological processes and plant community successions. Unfragmented forest areas have minimal edge areas and corridor zones, which help protect them from invasive forest pests, diseases, and plants. Fragmentation in the form of roads and development inevitably leads to exploitation by opportunistic invasive species.

c. Other Ecological Values / Ecological Connectivity

Only a few miles of rural land separate the Plateau and the Taconic Ridge from the Northern FLA of both New York (Washington County) and the State of Vermont. The Hoosic River Corridor at the northern portion of the FLA extends through northern Rensselaer County, thereby linking these important forest communities. Although this corridor is predominately in agricultural use, with sizeable patches of forest, it represents the best connectivity between the extensive FLA forests. In the future, as plant and animal populations and biotic communities respond to rising temperatures due to global climate change, we expect species range expansions and contractions. Habitat connectivity will be important for them in making those temperature range adjustments.

Important Environmental Values

Environmental Values to be Protected

- Intact forest landscape – ecological value
- Plateau watershed - recharge area; wetlands and streams; hydrological value
- Biodiversity value to New York State and the region

- Forested Landscape value to large mammal populations
- Interior nesting birds/Important bird area
- Open space value to population centers

Economic Values to be Protected

- Forest products economy
- Outdoor recreation, hunting, fishing, trapping, cross-country skiing, camping, horseback riding, biking
- Other rural economic activities

Conservation Goals & FLA Objectives

Conservation Goals

- Maintain and enhance New York State's 5th largest unfragmented forest and its extensive range of unique wetland communities, including sedge meadow, dwarf shrub bog, spruce-fir swamp, and kettle hole bog.
- Long-term protection of mammal diversity that is atypical of the greater Capital District region, including black bear, fisher, otter, bobcat, and moose.
- Long-term protection of diversity and abundance of forest bird breeders, including many state listed species.
- Protect the Tomhannock Reservoir Watershed, which provides water to over 100,000 Rensselaer County and Columbia County residents.
- Develop the long-range and shared vision of several organizations to establish a public open space corridor and trail system across the area, connecting Dyken Pond Center to Grafton Lakes State Park, Pittstown State Forest, the Capital District Wildlife Management Area, and Dickinson Hill Fire Tower.

- Link the Plateau FLA (54,000-acre area northern portion, referred herein as the Hoosic River Corridor) to existing Northern FLA and adjacent Taconic Ridge FLA.
- Utilize current public and local political support with potential for open space acquisition funding for the FLA.

FLA Objectives

- Acquire conservation easements and working forest conservation easements for long-term forest protection.
- Establish north-south forest connectivity to provide commuting and migration corridors for boreal and high elevation species, which are especially vulnerable to the effects of climate change.
- Link New York State land through forested corridors of private land with existing working forest conservation easements to enhance public recreation opportunities, retain biodiversity, support mammals requiring a large home range. and retain blocks for interior forest nesting bird species.
- Acquire fee title to parcels where:
 - i. the willing seller of a priority parcel has no interest in retaining the property with an easement;
 - ii. properties would be a significant asset to nearby, existing state-owned land; or
 - iii. properties contain significant natural communities and rare species where preservation is the only alternative for protecting the identified elements of biodiversity.

Public Benefits

- Economic activity on the forest land through timber harvesting can be permanently maintained by continued private land ownership and sales of working forest conservation easements to New York State.
- Acquiring public recreation rights when purchasing conservation easements from willing sellers directly enhances public benefits.
- Keeping a regional forested landscape intact provides for significant wildlife habitat, water quality, and biodiversity protection.
- Retaining the rural forested character of the Rensselaer Plateau and Escarpment contributes to the local culture and heritage of eastern Rensselaer County.

Existing Public Lands within FLA at time of establishment

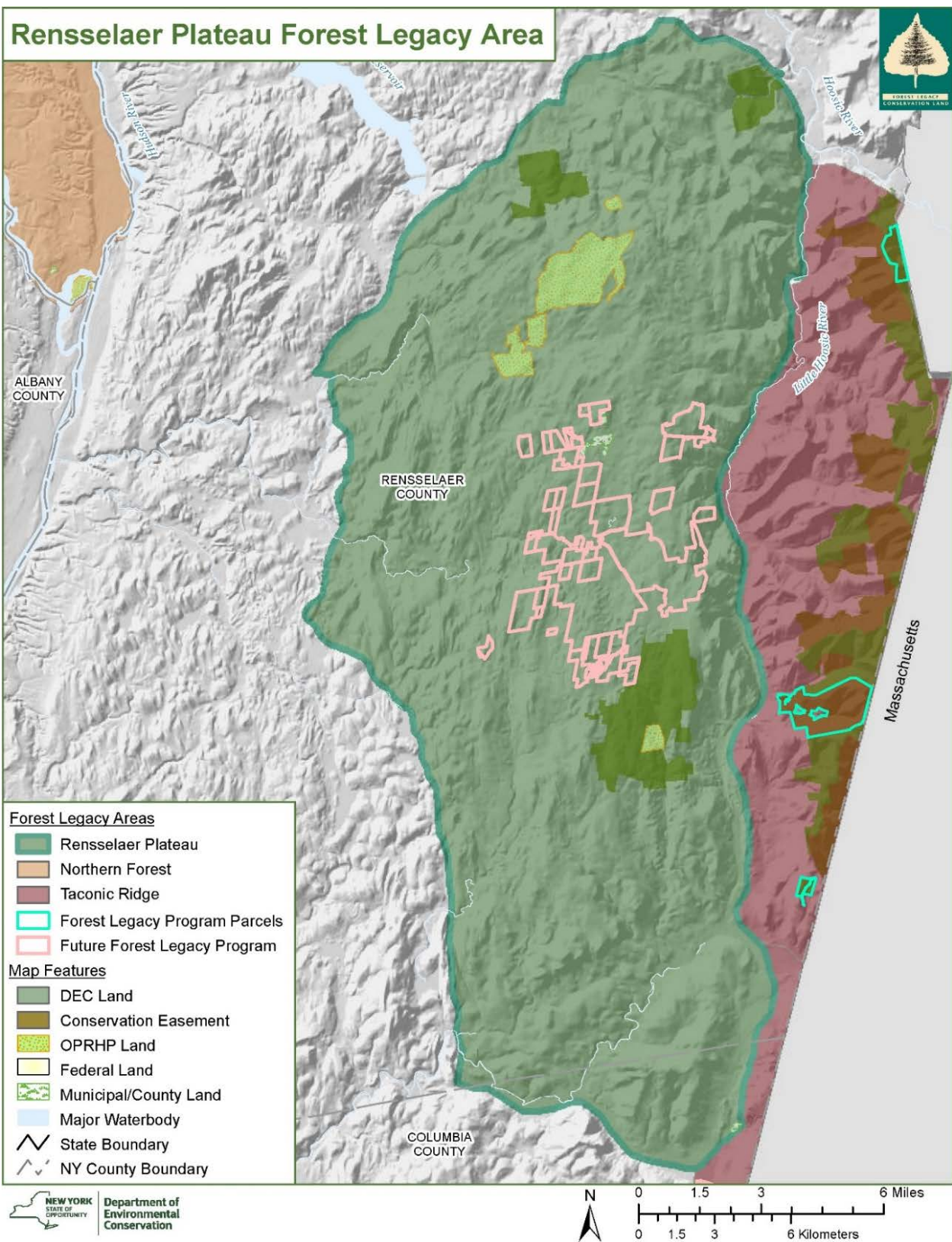
- Two State Parks: Grafton State Park (2,311 ac.); Cherry Plain State Park (150 ac.)
- Capital District Wildlife Management Area (4,043 ac.)
- Two State Forests: Pittstown State Forest (1,191 ac.); Tibbits State Forest (822 ac.)
- Bennington Battlefield State Historic Site (276 ac.)

Public Involvement Process & Analysis of Issues

Prior to DEC's consideration of adding the Rensselaer Plateau to the NYSFLP, all municipalities affected by the proposal were consulted by letter and phone by DEC's Region 4, Regional Director, Gene Kelly. Upon receiving a majority of support from the potentially affected municipalities and local non-profit land conservation organizations, DEC publicly noticed a request for public comment and notification of a local public meeting on the proposal through its weekly Environmental Notice Bulletin (ENB) on its website, http://www.dec.ny.gov/enb/20100317_not4.html. The public information meeting was held on March 24, 2010, where approximately 100 people were in attendance. Nine comments were received and recorded at this meeting and added to the 30-day public comment period summary.

During the public comment period, March 17 to April 16, 2010, 88 total comments were received; 79 written comments, and nine oral comments from the public meeting. The 79 comments received in support of the proposal, were from three potentially affected municipalities, 21 landowners, and 13 special interest groups. Support comments requested DEC to designate the Plateau as a FLA, with a majority of comments expressing the need for future protection of the area's unfragmented forests from development pressure.

Nine comments received did not support the proposal, of which five were received from potentially affected landowners, two from municipalities and one citizen and one special interest group. Their comments expressed disagreement or concern over: i) the use of government funds for open space conservation; ii) increased land restrictions imposed on a designated FLA; iii) the tax burden shifting to other landowners; and iv) development pressure was not seen as a reasonable threat to the area. To address these concerns, DEC will provide a response to public comments in which it will continue to stress the voluntary nature of the FLP.



In addition, DEC received from the Town of Grafton, Rensselaer County, "Resolution #44 of 2010 - Resolution Opposing the Application to the U.S. Forest Service by DEC on for Designation of the Rensselaer Plateau as a Forest Legacy Area," made on April 15, 2010. In response, New York State maintains a long-standing history of working with private landowners willing to sell their lands to the state and with the affected local municipality(ies), as established in the State's Open Space Conservation Program. Further, New York State Environmental Conservation Law, Article 49, Title 2, requires the state to notify all affected municipalities in advance of a private landowner's desire to sell to the state, and where the state may not use New York State Environmental Protection Funds (EPF) to purchase the parcel if one of the affected municipalities does not approve.

In the face of the Town of Grafton's Resolution should any future FLP project be proposed within the town's jurisdiction, DEC and the private landowner will consult with the town and provide them with the appropriate information for them to consider. Should the town continue to oppose any FLP project within their jurisdiction after consulting with the willing seller, DEC will not proceed with the acquisition.

Further, the proposed FLA was a priority project identified in the 2009 OSP and was subject to a 45-day public review and comment period in early 2009. From this comment period, DEC received over 100 emails and letters from the public and regional land conservation groups in support of the protection of the Rensselaer Plateau, and its inclusion in the 2009 OSP. No comments against its inclusion in the 2009 OSP were received at that time.

| II. | HUC_11 | Watershed Name |
|-------|-------------|--|
| III. | 02020006140 | IV. Upper Catskill Creek |
| V. | 02020006150 | VI. Kaaterskill Creek |
| VII. | 02020006200 | VIII. Middle Esopus Creek |
| IX. | 02020006210 | X. Cementon, New York to Rondout Creek |
| XI. | 02020007120 | XII. Vernooy Kill |
| XIII. | 02020007130 | XIV. Vernooy Kill to Rochester Creek |
| XV. | 02040102020 | XVI. Middle East Branch Delaware River |
| XVII. | 02040102030 | XVIII. Upper Beaver Kill |
| XIX. | 02040102040 | XX. Willowemoc Creek |
| XXI. | 02040102050 | XXII. Lower Beaver Kill |

Catskill Park Expansion to the Catskill/Delaware New York City Watershed FLA

Location & Boundary Description

The current Catskill FLA boundary was delineated in 1998 based on the watersheds of the six New York City supply reservoirs located west of the Hudson River. This proposal seeks to modify the current Catskill FLA boundary to include the remaining portions of watersheds in the Catskill Park. The expansion would be located on the southwest and eastern edges of the Park and would add the headwaters of the famous Beaverkill and Willowemoc trout streams and the Great Rondout Wetlands to the existing FLA. See the adjacent table for the watersheds and their 11-digit HUC code, and the second map. The outer boundary is the Catskill Park Blue Line, established by statute in New York's Environmental Conservation Law (ECL) section 9-0101(2). The boundary modification increased the size of the current FLA by 240,924 acres.

Eligibility Criteria Analysis

1. Threats of conversion to non-forest uses.

a. Residential & Commercial Development Pressure

- Encroaching development pressure from resort and second home development because of the area's proximity to New York City.
- Speculative development resulting from proposed casinos in the region and an increasing desire for safe haven from the metropolitan region since September 11, 2001 have resulted in increased rates of forest land conversion.

2. Provides opportunities for the continuation of traditional forest uses.

a. Timber Products

b. Water Supply

c. Agriculture

d. Outdoor Recreation & Tourism

3. Contains at least 50% land that meets the definition of forest land.

The existing forest coverage within the proposed expansion FLA is 87%.

4. New York State Open Space Conservation Plan Identification

The proposed boundary modification adds three priority project areas that were identified in the 2009 OSP. These projects include the Great Rondout Wetlands {24} and the Beaverkill and Willowemoc Headwaters {36}, and remain in the 2016 OSP (with different project numbers).

5. Contains three or more of the identified public values.

a. Public Recreational Opportunities

The areas proposed for addition are well known as recreation areas to outdoor enthusiasts who enjoy hunting, camping, fishing, and hiking. Adding the headwaters of the Beaverkill and Willowemoc will aid in the protection of nationally renowned trout streams.

b. Scenic Resources

The Catskills provide major scenic resources to New York State and serve as the backdrop for the scenic beauty of the entire Hudson Valley region.

c. Riparian Areas and Wetlands

The boundary adjustment will bring in several priority wetlands within the legacy area, including the Great Rondout Wetlands.

Conservation Goals

- Increase protection of a quickly decreasing, unfragmented forest ecosystem within the Catskill region and existing FLA.
- Maintain the area's large, relatively undisturbed forest with extensive hiking trails and historic carriage trails overlooking vistas of unsurpassed scenery.
- Sustain the balance of public and private ownership within the FLA in order to enhance and maintain the recreational and tourism opportunities in the area.
- Long-term protection of several priority OSP wetlands, including the Great Rondout Wetlands.

Public Benefits

- Economic activity on the forest land through timber harvesting can be permanently maintained by continued private land ownership and sales of working forest conservation easements to New York State.
- Acquiring public recreation rights when purchasing conservation easements from willing sellers directly enhances public benefits.
- Keeping a regional forested landscape intact provides for significant wildlife habitat, water quality, and biodiversity protection.
- Economic activity and the scenic viewshed, which draws tourists to this area, will be maintained through the acquisition of key projects within the proposed expansion of the FLA.

Existing Public Lands within the FLA at time of establishment

- The 705,000-acre Catskill Park, a New York State conservation focus for the past century, presently contains more than 290,000 acres of land protected by the state. Management of lands protected with FLP funding in the expanded FLA will rest primarily with DEC.

Proposed Forest Legacy Areas

Allegheny Plateau FLA

Description

The Allegheny Plateau forests of western New York State are diverse and robust. Common community types found in this landscape include rich mesophytic forest, hemlock-northern hardwood forest, beech-maple mesic forest, and maple basswood rich mesic forest. While oak-hickory forests are not present as a forest type and do not dominate the overstory at the stand level, both species are smaller components of each of the hardwood

Public Involvement Process & Analysis of Issues

All municipalities affected by the boundary modification were notified by letter and contacted by phone by DEC's Region 3 and Region 4, Regional Directors. In addition, the proposed boundary modification has been approved by the FLP Sub-committee of the New York State Forest Stewardship Coordinating Committee. The priority project areas located within the Catskill Expansion have been subject to public comment through the 2006 and 2009 OSP regional advisory committee and public hearings. Comments received during the 2006 review, pertaining to projects within the proposed FLA expansion, urged the state to "fully participate in protecting the Catskill River and Road Corridors, as the purchase of these watershed holdings along major road corridors like Route 28, 23, 30 and 10 will protect water resources, improve scenic vistas for visitors to the Catskills, and safeguard critical riparian buffer land." No comments were received that expressed non-support of the listed priority conservation projects within the expansion area.

types listed above. Albeit less common, other significant community types represented in this forest area are: the Allegheny oak forest found on unglaciated summits; floodplain forests along the rivers; and several open wetland types.

The soils of the Allegheny Plateau region could be considered some of the most productive left in native forest cover in the state, in terms of high plant abundance and vigor. These factors, along with landforms and climate, combine to allow for both northern and central Appalachian plants to thrive, providing for a rich diversity of species in both the overstory and understory.

Some plant species of note include cucumber magnolia tree, yellow mandarin, black snakeroot, tulip tree, sugar maple, black cherry, and round-leaved orchids. Several rare species also occur here, including state endangered mountain watercress and wild sweet-william.

The juxtaposition between the central hardwood and northern hardwood forest types is an important consideration in creating an Allegheny Plateau FLA. With components of both, the Allegheny Plateau forests may prove to be of crucial importance in a world dominated by the effects of climate change, providing the necessary connectivity to both plant and animal species as their home ranges move northward.

Within the boundaries of the Allegheny Plateau FLA is one of the four largest intact forested landscapes in the state. Animals species of note in these forestlands include: black bear, osprey, timber rattlesnake, goshawk, a diverse array of salamanders (including the rare Wehrle's, Longtail and Hellbender salamanders), and neo-tropical migratory warblers, including the uncommon cerulean, hooded, and yellow throated warblers. Here also lie important tributaries to the Allegheny River. The Allegheny River watershed supports the most diverse stream fish assemblages in New York State and harbors a variety of mussels, including several rare species such as the endangered clubshell mussel and the wavy-rayed lampmussel.

The economic stresses of the region are putting added burdens on its forests. FLP can help provide both immediate relief and long-term stability for forest products-based companies by committing lands to sound forest management principles.

The Allegheny Plateau FLA has been identified by several conservation groups, including The Nature Conservancy, Audubon, Western New York Land Conservancy, and the Nature Sanctuary Society of Western New York, as an important or high priority conservation area. In addition, the Allegheny Plateau region is valued by New Yorkers and non-New Yorkers alike, as reflected in tourism activity within the region's

economy. Attracted in large measure by the natural resources and scenic beauty of the area, tourism in the Allegheny Plateau FLA generates 7.5 percent of all labor income, with this sector accounting for 11 percent of all employment. Tourism in this area generates \$138 million in direct labor income and \$234 million when including indirect and induced impacts. This provides \$64 million in state and local taxes, with sales, property, and hotel bed taxes totaling over \$32 million locally (Tourism Economics, Chautauqua County, 2008).

The FLA is approximately 1.8 million acres and contains all or portions of four counties in western New York. Forest-based recreation, such as hunting, fishing, and hiking, attracts thousands of visitors to the region each year and is vital to the region's economy. Traditional forest products industries report an estimated \$40 million from stumpage values alone to New York's economy (2008 estimate of stumpage values).

Map of Proposed Area

A map in the beginning of this document illustrates the Allegheny Plateau FLA as delineated using GIS technology. The map shows land cover types, interstates, and the location of public lands and large cities. Boundary lines follow public roads or Rights-of-Way to be consistent with eligibility criteria and be identifiable on the ground.

Environmental Values that will be Protected

Forests of the Allegheny Plateau region face multiple threats. Unsustainable forest practices threaten to substantially reduce the supply and quality of forest products, as well as degrade water quality through higher volumes and faster flow rates of overland water. Retention of forest cover slows overland flows and aids water infiltration and percolation into the soils, reducing soil erosion and stream sedimentation. Forest loss has implications for fish habitat quality, as well as consumptive water use. Very quickly, compromises in forest health translate

to both human health and economic concerns, affecting potable qualities, sport fishing, and other water-related recreational activities. These environmental values are protected when our forests are protected.

Fragmentation of native forest cover, which hastens without forest protection incentives, has negative consequences for fish, wildlife, and human needs. A designated FLA in the region will promote sustainable management of our forests, allowing them to realize their maximum potential for ecological and social values. Legacy Forests will help provide needed incentives to usher in a new era of forest stewardship regionally and solidify the intergenerational stability of our natural resources.

Atmospheric deposition, climate change, and the advent of new pests and pathogens, whose arrival to our forests is already occurring, will have more dramatic negative consequences when combined with other stresses. Reducing preventable stress by managing for healthy forests and sustainable practices will help the woodlands of the Allegheny Plateau be resilient in the face of the numerous challenges that lie ahead. The Allegheny Plateau forests also occupy the transition area from Appalachian hardwoods to northern hardwoods. This connectivity area may prove critical for the successful northward movement of species over the coming decades as a changing climate redraws home range maps. It is imperative that we maintain and protect the forests of this region, and thus, the interface zone between major forest types.

Means for Protection

Acquisition of conservation easements or working forest conservation easements, which extinguish all development rights on tracts, is the preferred forest protection strategy. Timber rights may be retained by the owner and should be conditioned by the State of New York's Best Management Practices to minimize soil erosion. Easements that allow timber harvesting shall follow the prescriptions outlined in a timber management plan prepared by a professional

forester and accepted by DEC. Easements shall restrict the pursuit of mining, drilling, and excavation of natural resources subject to the regulations established by the State's Mined Land Reclamation Law and Environmental Conservation Law (Article 23, Title 27), as well as revised laws. Easements shall prevent disposal of hazardous waste or material on subject properties. Easements shall also prevent construction of dams, impoundments, and other water resource developments unless there are proven benefits to wildlife, forests, and the people of the area. If a seller only wishes to sell fee title, the Legacy program allows the state to purchase landholdings for inclusion into state ownership.

Public Benefits in Establishing the Allegheny Plateau FLA

1. Enhanced protection of forests that maintain quality drinking water for millions of regional residents.
2. Reduced drinking water treatment costs resulting from improved quality of untreated water.
3. Maintenance of the scenic appeal of the region, which is vital to the region's economy.
4. Protection of lands critical to maintaining and improving recreational opportunities, such as hunting, fishing, and hiking.
5. Protection of economic benefits provided by the region's forests, such as timber production and recreation.
6. Protection of important fish and wildlife habitat.

Management Responsibilities

The management of lands protected with Forest Legacy funding in New York State rests mostly within the DEC at the present time. In the FLA, the State of New York currently manages approximately 110,000 acres. As additional properties are protected, monitoring responsibility may be shared by local

organization qualified to conduct monitoring according to LTA Standards and Practices. This precedent has already been established with the Tug Hill Tomorrow Land Trust monitoring the Brown Tract on the Tug Hill Plateau.

Eligibility Criteria

The Forest Legacy Subcommittee and DEC established Eligibility Criteria, for which the Secretary of Agriculture approved in the modified Assessment of Need. Eligibility Criteria include:

1. be located within an approved Forest Legacy Area
2. be included in a Priority Conservation Project in the state's Open Space Conservation Plan
3. include forested land threatened by present or future conversion to a non-forest use;
4. provide opportunities for the continuation of traditional uses;
5. contain three or more of the following public values:
 - Timber and other forest commodities,
 - Scenic resources,
 - Public recreation opportunities,
 - Riparian areas,
 - Fish and wildlife habitat,
 - Known threatened and endangered species,
 - Known cultural resources,
 - Other ecological values, and
6. be nominated by the landowner in writing or with the written permission of the landowner.
7. be approved by the local government

8. have a forest stewardship plan or other similar multiple use management plan in place at the time of closing if a landowner is retaining the right to harvest timber or the right to conduct other land or resource management activities. A management plan will not be required if the aforementioned rights are not retained. If a fee interest is being acquired, the state will incorporate the parcel(s) into its management planning. Preparation of the plan is the responsibility of the landowner.

Criteria 2: Identified in the New York State Open Space Conservation Plan as a major resource area and/or protection opportunity.

The Allegheny Plateau region has been identified in the New York State Open Conservation Space Plan as a major resource area and has been recommended as an amendment to the eligible FLA in New York State

Criteria 3: Forestland threatened by present or future conversion to a non--forest use.

Forestlands in the Allegheny Plateau region face extreme pressure of conversion to non-forest uses. Developed recreation sites and new entertainment venues, coupled with the scenic beauty of region, make it highly susceptible to primary and secondary home development. Property taxes in the region are considerably higher than forestry revenues, forcing landowners to convert land to more profitable uses. If large amounts of forestland in the region continue to be converted or fragmented, the ecological viability of the forest resource is in jeopardy. As such, the ability of the forests in the region to maintain water quality is compromised.

Criteria 4: Provide opportunities for the continuation of traditional uses.

The forested landscape of the proposed region supports a stable forest industry. The forest products industry in the FLA produces an estimated 92 million board feet of lumber annually (Directory of Primary Wood Using Industries; DEC 2008). In addition, there are business listings for 78 secondary wood users in the region (Directory of Secondary Wood Using Industries; DEC 2008). Funds from the FLP would help ensure the continuation of economically vital traditional uses of forestlands in the region.

Criteria 5: Contain three or more public values.

The Allegheny Plateau region contains at least five public values.

- **Recreation opportunities:** The Allegheny Plateau region ... "lies within a day's drive of 1/3 of the nation's population" (USDA Allegheny National Forest, 2008), and is utilized by many Canadian visitors as well. It is renowned for its recreational opportunities. Forest-based recreation, such as hunting, world-class fishing, and hiking, attracts millions of visitors to the region each year and is vital to the economy.
- **Riparian areas and wetlands:** The FLA contains numerous riparian areas and wetlands that are vital to maintaining water quality for consumption by millions of people living throughout western New York.
- **Important fish and wildlife habitat:** The Allegheny River, Cattaraugus Creek, and the forests of the Allegheny Plateau region provide some of the best sport fishing and hunting in the United States. Area forests are also critical staging areas for migrating songbirds, as they rest and recharge before and after they cross the Great Lakes. In addition, the region supports many federally listed, forest dwelling animal and plant species, such as the spreading globeflower, bald eagle, and Indiana bat.
- **Important plant communities:** Several rare plant communities can be found in the region, such as the Appalachian oak-hickory forest, rich fens, and peat swamps.
- **Scenic resources:** The Allegheny Plateau is recognized as a scenic resource for New York State. Scenic resources are areas exhibiting outstanding arrangements of natural or manufactured features, including water features and/or land forms and/or vegetative patterns that provide inspiration, and hold interest and command attention of the viewing public.

Shawangunk Ridge FLA

Forest Legacy Area Description

General Description

The Shawangunk Mountains are the roughly 50-mile-long northern section of a 256-mile-long Kittatinny-Shawangunk Ridge and Corridor that runs north from Pennsylvania through New Jersey and into southeastern New York. The proposed Shawangunk Ridge FLA covers roughly 394,000 acres along the spine of the Shawangunks in Ulster, Sullivan, and Orange counties, as well as portions of the adjacent Neversink River, Rondout Creek, and Wallkill River valleys. The area includes one of few remaining ridgetop dwarf pine barrens in the world, one of the largest intact expanses of chestnut oak forest in the state (38,000 acres), and numerous high-quality freshwater streams and rivers.

The Shawangunks have long been recognized as one of the highest priority landscapes for biodiversity conservation in the Northeast and have been designated as one of Earth’s “Last Great Places” by The Nature Conservancy. This highly varied landscape, with its unique geological features, sustains a great diversity of habitat types—including high elevation pine barrens, expansive hardwood forest, grasslands, high gradient headwater streams and a variety of riverine and wetland habitats. The landscape is more than 80 percent forested and includes several large unfragmented forest blocks that provide interior forest habitat for species such as bear, bobcat, coyote, and fisher. The incredible diversity off forest dwelling, shrubland and grassland bird species has led to designation of three Audubon Important Bird Areas and two New York State Bird Conservation areas within the proposed FLA. The ridge is also part of the Appalachian Raptor Migration Corridor. In addition, the wealth of scenic vistas and cultural historical sites around the ridge has led to New York’s designation of an 88-mile scenic byway around the Northern Shawangunks. The 2016 New York State Open Space Conservation Plan specifically identifies the Shawangunks and several other sites within the FLA as Regional Priority Project areas.

Vast areas of large, undisturbed forest laced with hiking trails, historic carriage roads, and climbing cliffs make the ridge a popular destination for many outdoor enthusiasts; more than 500,000 people visit the northern Shawangunks annually. Conservation efforts over the last one hundred years have resulted in more than 30,000 acres of protected and publicly accessible land in the northern Shawangunks, including Mohonk Preserve, Minnewaska State Park Preserve, Witch’s Hole State Forest, and Sam’s Point Preserve. Important protected lands along the southern portion of the Shawangunks in New York include Shawangunk Ridge State Forest, Wurtsboro Ridge State Forest, Bashakill Wildlife Management Area (WMA), Huckleberry Ridge State Forest, and others.

Ecological Significance

The FLA includes more than 100 different species and ecological communities tracked by the New York Natural Heritage Program, including 64 plant and animal species classified as Endangered, Threatened, or Special Concern in New York. At least 20 ecological communities also exist here that are identified as rare or uncommon in the state (state ranking of S1, S2 or S3). Particularly significant ecological resources include three federally listed animal species—dwarf wedgemussel (endangered), Indiana bat (endangered), and bog turtle (threatened)—the globally rare dwarf pine ridge ecological community, and other unique community types, such as ice cave talus, Atlantic white cedar swamp, pitch pine-blueberry peat swamp, and riverside ice meadows.

The landscape includes huge variations in topography, bedrock, soil types, and a disturbance history that have resulted in several particularly significant ecological features within the FLA. High elevation ridgetop pine barrens habitats exist on thin, acidic soils underlain by conglomerate bedrock at Minnewaska State Park Preserve and Sam’s Point Preserve. This highly unique ecological setting includes abundant exposed bedrock and provides habitat for timber rattlesnakes and a huge diversity of shrub nesting bird species, three rare moths, and the only known New York occurrences of the northern barrens tiger beetle and broom crowberry. Adjacent cliff habitats provide nesting sites for peregrine falcons.

The Bashakill wetland complex, including the Bashakill WMA, covers nearly 3,000 acres at the base of the Shawangunk Ridge in eastern Sullivan County. One of the largest freshwater wetlands in southeastern New York, this area provides habitat for over 200 bird species, most notably pied-billed grebe, American bittern, least bittern, osprey, bald eagle, northern harrier, and northern goshawk. The wetland also hosts large migratory populations of numerous waterfowl species, including Canada goose, ring-necked duck, and wood duck. Several other rare species, including long-tailed salamanders, blue-spotted sunfish, ironcolor shiner and spreading globeflower, inhabit the area.

The Shawangunk Grasslands National Wildlife Refuge covers nearly 600 acres near the village of Wallkill in Ulster County. This is one of only two remaining areas in the Hudson Valley region that support the full assemblage of northern grassland birds, and it is an important habitat for wintering raptors. Species of particular note found here include upland sandpiper, Henslow's sparrow, northern harrier, and short-eared owl.

The Shawangunk region also includes portions of several significant river systems, most notably the Esopus Creek, Rondout Creek, Wallkill River, Shawangunk Kill, and Neversink River. Portions of the Delaware River and Mongaup River also lie along the FLA boundary. These waterways provide habitat for important migratory fish, such as the American eel and American shad, as well as rare freshwater mussels, including the dwarf wedgemussel and brook floater.

Table 1. List of significant ecological communities found in the Shawangunk Ridge FLA.

| Ecological Community Type | Global Rarity Rank | State Rarity Rank |
|-----------------------------------|--------------------|-------------------|
| Acidic talus slope woodland | G4? | S3 |
| Calcareous talus slope woodland | G3G4 | S3 |
| Chestnut oak forest | G5 | S4 |
| Cliff community | G5 | S4 |
| Confined river | G4 | S3S4 |
| Dwarf pine ridges | G1G2 | S1 |
| Dwarf shrub bog | G4 | S3 |
| Floodplain forest | G3G4 | S2S3 |
| Hemlock-hardwood swamp | G4G5 | S4 |
| Hemlock-northern hardwood forest | G4G5 | S4 |
| Highbush blueberry bog thicket | G4 | S3 |
| Ice cave talus community | G3? | S1S2 |
| Inland Atlantic white cedar swamp | G2G3 | S1 |
| Limestone woodland | G3G4 | S2S3 |
| Perched bog | G3G4 | S1S2 |
| Pitch pine-blueberry peat swamp | G3? | S1 |
| Pitch pine-oak-heath rocky summit | G4 | S3S4 |
| Pitch pine-oak-heath woodland | G3G4 | S2S3 |
| Red cedar rocky summit | G3G4 | S3 |
| Red maple-hardwood swamp | G5 | S4S5 |
| Red maple-tamarack peat swamp | G3G4 | S2S3 |
| Riverside ice meadow | G2G3 | S1 |
| Shale talus slope woodland | G3G4 | S3 |
| Spruce-fir swamp | G3G4 | S3 |
| Vernal pool | G4 | S3S4 |
| Limestone woodland | G3G4 | S2S3 |

Table 2. List of New York State-listed species documented (current and historical)
by New York State Natural Heritage Program from the proposed Shawangunk Ridge FLA

| Species | New York Listing | | Species | New York Listing |
|---------------------------------|------------------|--|----------------------------|------------------|
| Allegheny Woodrat | E | | Longtail Salamander | SC |
| Alpine Cliff Fern | E | | Lowland Yellow Loosestrife | E |
| Appalachian Sandwort | T | | Michaux's Blue-eyed-grass | E |
| Appalachian Shoestring Fern ddd | E | | Mock-pennyroyal | T |
| Arctic Rush | T | | Mountain Spleenwort | T |
| Bald Eagle | T | | Narrow-leaved Sedge | E |
| Beakgrass | E | | Northern Cricket Frog | E |
| Black-edge Sedge | E | | Northern Harrier | T |
| Bog Turtle | E | | Northern Running-pine | E |
| Bradley's Spleenwort | E | | Northern Wild Comfrey | E |
| Brook Floater | T | | Ovate Spikerush | E |
| Broom Crowberry | E | | Peregrine Falcon | E |
| Button-bush Dodder | E | | Pied-billed Grebe | T |
| Carey's Smartweed | T | | Prairie Wedgegrass | E |
| Clustered Sedge | T | | Primrose-leaf Violet | T |
| Cut-leaved Evening-primrose | E | | Puttyroot | E |
| Davis' Sedge | T | | Reflexed Sedge | E |
| Downy Lettuce | E | | Rhodora | T |
| Dwarf Sand-cherry | T | | Riverbank Quillwort | E |
| Dwarf Wedgemussel | E | | Riverweed | T |
| Eastern Small-footed Myotis | SC | | Roseroot | E |
| Extra-striped Snaketail | SC | | Rough Avens | E |
| Frank's Sedge | E | | Scarlet Indian-paintbrush | E |
| Georgia Bulrush | E | | Sedge Wren | T |
| Golden-seal | T | | Short-eared Owl | E |
| Henslow's Sparrow | T | | Swamp Buttercup | E |
| Hyssop-skullcap | E | | Timber Rattlesnake | T |
| Indiana Bat | E | | Upland Sandpiper | T |
| Inland Barrens Buckmoth | SC | | Violet Wood-sorrel | T |
| Ironcolor Shiner | SC | | Wood Reedgrass | E |
| Large Twayblade | E | | Woodland Rush | E |
| Little-leaf Tick-trefoil | T | | | |

Geology

The Shawangunk Mountains are widely known for the dramatic white cliff faces, deep ice cave crevices, and expansive talus fields. The characteristic Shawangunk conglomerate rock that makes up the spine of the Shawangunks was formed over 400 million years ago, as sand and pebbles eroded from the ancient Taconic Mountains were deposited at the edge of a shallow inland sea. As the inland sea level rose, these sediments were buried by a thick layer of limestone, before a series of folding and faulting events lifted and eventually exposed the resulting quartzite conglomerate. Subsequent glaciation removed any remaining soil and less resistant rock, revealing the stunning landscape that we see today. Conglomerate rocks in many areas of the ridge bear direct evidence of the most recent glaciation in the form of glacial striations and chatter marks.

Erosion of the soft shale underlying this extremely hard and erosion resistant conglomerate rock—along with weathering and faulting of the conglomerate itself—has created numerous fissures and ice caves. These unique geological features retain snow and ice well into the summer months, creating micro-climates similar to higher peaks in the nearby Catskill Mountains. Exposed cliff faces and associated ledges and talus slopes are also ecologically important, providing niche habitat for a variety of plants and animals, such as peregrine falcons and the rare Appalachian sandwort.

A limestone karst system also runs along the base of the Shawangunks through the Roundout Creek Valley. This formation includes numerous caves, which provide important hibernacula for bats, and also provides an avenue for replenishment of natural aquifers in the region.

Human Use

The Shawangunks have a long history of human use and cultural significance, dating as far back as 8,000 years or more. There are numerous early Native American rock shelter sites, as early inhabitants of the landscape frequently

used the ridge areas for hunting and gathering important food items—such as chestnuts, acorns, blueberries, huckleberries and others. Following European settlement, forests of the Shawangunks were cut extensively to support the tanning, barrel making, and charcoal industries, and the durable conglomerate rock was quarried in many areas to make millstones. Groups of residents would also set up seasonal camps on ridgetop areas to pick blueberries, often setting fire to vast swaths of forest and barrens to enhance the crop for future years. In the late 1800s and early 1900s, the Delaware & Hudson Canal was actively used to move coal from Pennsylvania to the Hudson River, supporting a number of small communities in the Neversink River and Roundout Creek valley areas.

At just over an hour from New York City, the Shawangunks have long been a destination for those seeking outdoor recreation. Since the mid-19th century, numerous hotels and resorts have dotted the landscape. Only a small few remain, the most prominent of which is the Mohonk Mountain House, which sits atop the ridge just outside New Paltz. The Shawangunks are still widely visited as a recreational destination, with abundant opportunities for hiking, biking, world class rock climbing, and cross-country skiing. In addition to the numerous historic carriage roads at Mohonk Preserve and Minnewaska State Park Preserve, two long-distance trails—the Long Path and the Shawangunk Ridge Trail—span nearly the entire length of the Shawangunks. The Neversink, Delaware, and Wallkill rivers, Esopus and Rondout creeks, and numerous tributaries provide exceptional fishing and boating opportunities as well. Other more limited recreational activities include hunting, trapping, and snowmobiling. Recreational activity centered on the Shawangunks is still a major economic driver in the region, and many communities actively promote eco-tourism opportunities as a means of supporting local economies.

Lower lying areas in the Wallkill and Rondout valleys have been extensively cultivated for agriculture, and many areas are still actively farmed. Some timber harvesting does occur in

the proposed FLA, but it is limited in scope and mainly takes place on relatively small privately-owned lands in addition to some state lands. Thin acidic soils in most of the upland areas are not particularly productive in terms of timber growth, except where topographic features have allowed deeper soils to develop over time.

Ecological Connectivity

The Shawangunk region has significant value at a regional and continental scale as a wildlife migration corridor, particularly with respect to migrating raptors. The mountain chain—which extends through New Jersey and into Pennsylvania—also functions as a critical linkage between central Appalachian landscapes and large forest blocks to the north and east, including the Delaware/Catskill FLA, Taconic Ridge FLA, and New York-New Jersey Highlands FLA. This kind of ecological connectivity is expected to enhance the ability of wildlife and plants to migrate and disperse to new habitats in response to climate change. In recognition of this, the Wildlands Network has identified the “Shawangunk to Catskills Greenway” as one of 16 essential habitats in the Eastern U.S. in need of protection to link together a 2,500 mile “Wildway” that spans from Florida to maritime Canada.

Significant Threats to Forests in the FLA

Development poses the most urgent and direct threat to forests in the proposed FLA area, particularly along unprotected ridgetop areas in the southern portion of the FLA and in the US Route 209 corridor that flanks the ridge to the west along its entire length. Several significant residential development proposals have been submitted in recent years for areas along the spine of the ridge south of Ellenville. Maintenance of forest cover in these areas is critical for maintaining high quality watersheds for the Bashakill Wetlands and Neversink River. Dispersed suburban and exurban residential development from the city of Middletown also continues to expand into areas to the east of the Shawangunks in the southernmost portion of the proposed FLA.

In addition, commercial development continues to expand along Route 209 in Wawarsing and Rochester, threatening some of the most viable routes for connectivity between the Shawangunk Ridge and Catskill Mountain landscapes. Planned expansions to include gaming activities at one or more resort hotels in Ulster and Sullivan counties may also result in dramatic increases in both commercial and residential development pressure along the ridge, as well as expansion of existing road corridors (Route 17 and Route 209) to accommodate increased vehicle traffic.

Criteria Analysis summary

According to New York’s initial AON for the FLP, any FLA designated in the state must meet five criteria. These criteria are listed below with a brief summary description of how the proposed Shawangunk Ridge FLA meets the criteria.

- 1. Encompasses forests that are threatened by present of future conversion to non-forest uses:** The close proximity of the landscape to New York City, recent population growth trends, and development threats described above all contribute to the significant risk of forest conversion in the Shawangunk region.
- 2. Provides potential opportunities for the continuation of traditional land uses:** A heavy focus of potential future acquisitions would be to enhance and/or expand existing recreational opportunities, particularly long-distance trail corridors in the southern portion of the Shawangunks and provide increased access and trailhead areas. The DEC Draft Shawangunk Ridge Unit Management Plan also includes the continuation of timber harvesting on State Forest lands in this region, and it is expected that timber harvesting would occur on newly acquired State Forest lands or easements, where appropriate and compatible with protection of sensitive ecological resources.

3. Contains at least 50 percent lands that meet the definition of forest land:

Approximately 81 percent of the land within the proposed FLA meets the definition of “forest land” as described in the AON.

4. Identified in the most recent version of the Open Space Conservation Plan as a major resource area and/or priority project area:

According to the 2016 New York State Open Space Conservation Plan, the Shawangunk Ridge FLA contains two Regional Priority Conservation Project areas— Shawangunk Mountains Region—and overlaps portions of nine others—Neversink Highlands, Lower Neversink River Valley, Karst Aquifer Region, Great Rondout Wetlands, Plutarch/Black Creek Wetlands, Bashakill Wetland System, Hudson Valley/ New York City Foodshed, New York Highlands, and the Wallkill Valley.

5. Contains three (3) or more of the following identified public values:

- public recreation opportunities
- riparian areas and wetlands
- important fish and wildlife habitat with known threatened and endangered species
- cultural areas such are areas of historical or archeological significance
- other ecological values
- scenic resources
- important plant communities

As detailed in the FLA description above, the proposed Shawangunk Ridge FLA contains outstanding examples of each of these seven identified public values. Designation as an FLA would provide support to further enhance these values and the benefits they provide to local communities.

Boundary of the Shawangunk Ridge FLA

With the exception of Wawarsing and Rochester, the FLA boundary follows the municipal boundaries of the towns listed below. Wawarsing and Rochester are already partially included in the Delaware/Catskills FLA, and therefore, only the portions of these towns that fall outside of the Delaware/Catskills FLA will be considered in the Shawangunk Ridge FLA. This includes any parts of these towns not within either the New York City watershed area or the Catskill Park boundary (i.e. the “Blueline”).

List of Towns in the Proposed Shawangunk Ridge FLA

- Marbletown
- Rosendale
- New Paltz
- Gardiner
- Shawangunk
- Rochester (not including areas within the New York City Watershed or Catskill Park boundary)
- Wawarsing (not including areas within the New York City Watershed or Catskill Park boundary)
- Mamakating
- Mount Hope
- Greenville
- Deer Park

Means of Protection

The preferred method of protection would be acquisition of conservation easements or working forest conservation easements by DEC. Fee acquisition of property may also be appropriate when a) the seller of a priority parcel does not wish to retain any ownership interest in the property; b) the parcel represents a worthwhile addition to existing state-owned land; or c) significant natural communities or rare species exist on the property and fee acquisition represents the only viable means of protection.

Goals & Benefits of the Shawangunk Ridge FLA

The overarching goal of the Shawangunk Ridge FLA is to maintain high levels of forest cover within the FLA (>75 percent), with a focus on expanding and connecting important forest blocks in order to protect important forest habitats and maintain water quality.

Ecological & Public Benefits of the Shawangunk Ridge FLA

The Shawangunk Ridge FLA and maintenance of a high level of forest cover via expanded land protection efforts would protect and/or enhance the myriad benefits that forest lands currently provide in the region, including habitat for wildlife, clean air and water, quality-of-life attributes, and economic returns for local communities. Specifically, additional protected lands within the FLA would substantially contribute to the following:

- Expansion of core forest habitat for wildlife and species migration/dispersal routes within the FLA landscape and with adjacent landscapes
- Protection of high-quality drinking water sources and important aquifer recharge areas

- Protection of water quality and biodiversity in headwater tributaries, wetlands, and critically important waterways (i.e., Neversink River, Delaware River, Shawangunk Kill, Wallkill River, Esopus Creek, Rondout Creek) within the FLA and in downstream areas
- Maintenance of important ecological communities and rare species that exist within the FLA and contribute to regional and continental scale biodiversity
- Enhancement of existing high-quality recreational experiences, including unfragmented, long-distance trail corridors and connections with adjacent communities and off-ridge recreational resources, such as rail trails and the D&H Canal corridor
- Where appropriate and compatible with protection of ecological resources, maintenance of working forest landscapes and sound timber management practices that facilitate forest regeneration.

Existing State-Owned Conservation Lands in the Proposed FLA

There are a number of existing state-owned conservation lands within the proposed Shawangunk Ridge FLA area, including:

- Minnewaska State Park Preserve and Sam's Point Preserve (New York State Office of Parks, Recreation & Historic Preservation/Palisades Interstate Park Commission)
- Huckleberry Ridge, Graham Mountain, Wurtsboro Ridge, Roosa Gap, Shawangunk Ridge, and Vernooy Kill State Forests (DEC)
- Witch's Hole, Shawangunk, Oak Ridge and Painter Hill Multiple Use Areas (DEC)

- Bashakill, Cherry Island and Mongaup Valley Wildlife Management Areas (DEC)
- Several detached parcels of Forest Preserve (DEC)

Public Involvement Summary

The amendment to the New York State Forest Legacy Program Assessment of Need to include a Shawangunk Ridge Forest Legacy Area were subject to public comment through the hearings conducted during the development of the 2016 New York State Open Space Conservation Plan. Descriptions of the Forest Legacy Program are found in the document's *Chapter VII. Resource Inventory / Programs & Partnerships*. This proposed FLA designation was reviewed and approved by the New York State Forest Legacy Subcommittee of the State Stewardship Advisory Committee.

Finger Lakes/ Northern Plateau FLA

FLA Description

The Finger Lakes in central and western New York State feature glacier-formed lakes that provide important ecological and economic benefits to the region, the State of New York, and the United States as a whole. The Finger Lakes provide a clean and reliable source of drinking water for numerous municipalities in New York, including Rochester, Syracuse, and Auburn. While the approximately one million people in the proposed area do not all reside within the Finger Lakes watershed, they are within commuting distance of the lakes. In addition, the Finger Lakes region is valued by even greater numbers of New Yorkers, as well as non-New Yorkers, as reflected in tourism activity within the region's economy. Attracted in large measure by the natural resources of the area, tourism in the Finger Lakes Region generates roughly \$1.5 billion annually with approximately 22 million visitations per year (Finger Lakes Association, 2003).

The Finger Lakes lie mostly within the Great Lakes Plain ecoregion, consisting of moderate to very steep slopes separated by creeks and narrow valleys with stately bluffs. Many of the area's creeks have cut deep gorges through the shale bedrock. The northern region of the High Allegheny Plateau ecoregion (Northern Plateau hereafter) is characterized by low to mid elevation hills whose summits form a plateau, dissected by numerous rivers and small streams. This region forms the headwaters region of the Genesee and Susquehanna Rivers. The forest community types are commonly referred to as Northern Hardwoods with principal species including beech, red and sugar maple, white ash, black cherry, and northern, white, and chestnut oak (NYSDEC, 1981). Hemlock grows mostly in ravines and white pine can be found growing at higher elevations.

The Forest Legacy Area is approximately 3 million acres and contains all or portions of 15 counties in central and western New York. Forest-based recreation, such as hunting, fishing, and hiking attracts thousands of visitors to the region each year and is vital to the region's economy. Recent polling results indicate people of the Finger Lakes are most concerned about maintaining clean air and water, productive farms and vineyards, healthy communities, scenic vistas, and some of New York's finest opportunities for outdoor recreation.

Map of FLA. A map in the beginning of this document illustrates the proposed Finger Lakes/Northern Plateau Forest Legacy Area as delineated using GIS technology. The western boundary is primarily Interstate 390; the northern boundary is Interstates 5, 20, and 20A; the eastern boundary includes the headwaters region of the Chenango River (Susquehanna River system); and the southern boundary includes portion of Interstate 88 and the southernmost extent of the Finger Lakes watershed.

Environmental Values that will be Protected.

The ecology and nationally significant forest communities in the Finger Lakes region are under considerable stress. Water quality is being degraded and forests are being lost in the Finger Lakes region to incompatible agricultural, development, and forestry practices. These practices are also rapidly fragmenting the forested landscape important to fish and wildlife. The United States Fish and Wildlife Service and the United States Geological Survey have issued a preliminary report that identifies three primary Finger Lakes watershed issues - degraded water quality, degraded fish and wildlife habitat, and danger of flooding. Many of the streams that flow into and out of Finger Lakes also contain forested wetlands that are important to maintaining water quality.

Means for Protection

Acquisition of conservation easements or working forest conservation easements which extinguish all development rights on tracts is the preferred forest protection strategy. Timber rights may be retained by the owner and should be conditioned by the State of New York's Best Management Practices to minimize soil erosion. Easements that allow timber harvesting shall follow the prescriptions outlined in a timber management plan prepared by a professional forester and accepted by DEC. Easements shall restrict the pursuit of mining, drilling, and excavation of natural resources subject to the regulations established by the State's Mined Land Reclamation Law and Environmental Conservation Law (Article 23, Title 27). Easements shall prevent disposal of hazardous waste or material on subject properties. Easements shall also prevent construction of dams, impoundments, and other water resource developments unless there are proven benefits to wildlife, forests, and the people of the area.

- If seller only wishes to sell fee title, FLP allows the State to purchase land holdings for inclusion into State ownership.

Public Benefits in Establishing Finger Lakes/Northern Plateau FLA

- Enhanced protection of forests that maintain quality drinking water for millions of regional residents.
- Reduced drinking water treatment costs resulting from improved quality of untreated water.
- Maintenance of scenic appeal of the region, vital to the region's economy.
- Protection of lands critical to maintaining and improving recreational opportunities such as hunting, fishing, and hiking.
- Protection of economic benefits provided by the region's forests, such as timber production and recreation.
- Protection of important fish and wildlife habitat.

Management Responsibilities

The management of lands protected with FLP funding in New York State rests mostly within DEC at the present time. In the proposed area, the State of New York currently manages approximately 250,000 acres and the US Forest Service manages approximately 16,000 acres in the Finger Lakes National Forest. It may evolve over time, as additional properties are protected, that easement could be monitored one of many land trusts that own property in the area. This precedent has already been established with the Tug Hill Tomorrow Land Trust monitoring the Brown Tract on the Tug Hill Plateau.

Eligibility Criteria

The Forest Legacy Subcommittee and DEC established Eligibility Criteria, for which the Secretary of Agriculture approved in the Assessment of Need. Eligibility Criteria include:

1. be located within an approved Forest Legacy Area
2. be included in a Priority Conservation Project in the state's Open Space Conservation Plan
3. include forested land threatened by present or future conversion to a non-forest use;
4. provide opportunities for the continuation of traditional uses;
5. contain three or more of the following public values:
 - a. Timber and other forest commodities;
 - b. Scenic resources;
 - c. Public recreation opportunities;
 - d. Riparian areas;
 - e. Fish and wildlife habitat;
 - f. Known threatened and endangered species;
 - g. Known cultural resources,
 - h. Other ecological values; and
6. be nominated by the landowner in writing or with the written permission of the landowner.
7. be approved by the local government
8. have a forest stewardship plan or other similar multiple use management plan in place at the time of closing if a landowner is retaining the right to harvest timber or the right to conduct other land or resource management activities. A management plan will not be required if the aforementioned rights are not retained. If a fee interest is being acquired the state will incorporate the parcel(s) into its management planning. Preparation of the plan is the responsibility of the landowner.

Criteria 2

Identified in the New York State Open Space Conservation Plan as a Priority Conservation Project. The Finger Lakes region has been identified in the 2016 New York Open Space Plan in several priority conservation projects: Southern Skaneateles Lake Forest and Shoreline {100}, State Parks Greenbelt/ Tompkins County {101} Summerhill Fen & Forest Complex {102}, Emerald Necklace {103}, Finger Lakes Shorelines and Riparian Zones {104}, High-Tor/Bristol Hills/Bare Hill State Unique Area {108}, Seneca Army Depot Conservation Area {109}, Wolf Gully {111}.

Criteria 3

Forest land threatened by present or future conversion to a non-forest use. Forest lands in the Finger Lakes region face extreme pressure of conversion to non-forest uses. Rich soils and gently rolling topography make the area prime for agriculture. The scenic beauty of region make it highly susceptible to primary and secondary home development. Property taxes in the region are considerably higher than forestry revenues, forcing landowners to convert land to more profitable uses. If large amounts of forest land in the region continue to be converted or fragmented, the economic viability of the forest resource is in jeopardy. As such, the ability of the forests in the region to maintain water quality are compromised.

Criteria 4

Provide opportunities for the continuation of traditional uses. The forested landscape of the proposed region supports a stable forest industry. The forest products industry in the proposed area employs approximately 4,500 people at more than 140 establishments. The largest industry sector is lumber and wood products, with more than 1,500 employees (SUNY-ESF, 2014). Funds from the Forest Legacy Program would help ensure traditional uses of forest land in the region.

Criteria 5

Contain three or more public values.

The Finger Lakes/Northern Plateau region contains at least five public values.

1. Public recreation opportunities: The Finger Lakes region is world renowned for its recreational opportunities. Forest-based recreation, such as hunting, fishing, and hiking attracts thousands of visitors to the region each year and is vital to the region's economy. The Finger Lakes Trail Conference maintains a 562-mile long trail that connects the Catskill Mountains with the Allegheny Mountains by passing through remote areas of the Southern Tier of New York State.
2. Riparian areas: The FLA contains numerous riparian areas and wetlands that are vital to maintaining water quality for consumption by millions of people living throughout central and western New York.
3. Fish and wildlife habitat: The Finger Lakes and the Chenango River provide some of the best sport fishing and hunting in the United States. The Finger Lakes are also critical staging areas for migrating waterfowl. In addition, the region supports many federally listed, forest dwelling animal and plant species, such as the spreading globeflower, bald eagle, and Indiana bat.
4. Other ecological values: Several rare plant communities can be found in the region, such as the Appalachian oak-hickory forest, silver maple-ash swamp, rich fens, peat swamps, perched swamp white oak, and spruce fir swamp.
5. Scenic resources: The Finger Lakes are recognized as a scenic resource for New York State. Scenic resources are areas exhibiting outstanding arrangements of natural or manufactured features, including water features and/or land forms and/or vegetative patterns that provide inspiration, and hold interest and command attention of the viewing public.

Appendix B:

Partner and Stakeholder Outreach and Participation

Early on in the planning process (March – April 2019), the DEC planning team polled stakeholders' views on a wide range of topics. Among overall takeaways, the team learned that invasives were identified as the biggest threat to forests, with runners-up being fragmentation, deer, and climate change. Survey participants recognized natural benefits—habitat, clean water, etc.—as the most important benefits from forests.

These responses informed the strategies of the Forest Action Plan. As this Plan was being developed, DEC repeatedly collected feedback from a variety of interested entities.

1. **March 21 – 22, 2019: PowerPoint presentation at State Fish and Wildlife Management Board bi-annual meeting**, Syracuse, New York:
https://www.dec.ny.gov/docs/wildlife_pdf/fwmbpresentmar19newp2.pdf.

Note: The Fish and Wildlife Management Board (FWMB) is not to be confused with New York State's wildlife agency, which is NYSDEC's Fish and Wildlife Division. The State FWMB is comprised of three elected voting representatives from each regional FWMB, along with advisory members from the NYSDEC and a multitude of other organizations:
<https://www.dec.ny.gov/about/564.html>.

2. **March – April 2019: Online survey**
 - March 28 (Thursday) – April 15 (Monday), 2019 – Division of Lands and Forests statewide staff;
 - April 1 (Monday) – 24 (Wednesday), 2019 – Stakeholders.

Stakeholder list included:

- Federal land management agencies, such as
 - U.S. Forest Service, including Finger Lakes National Forest,
 - U.S. Fish and Wildlife, including Montezuma National Wildlife Refuge, Iroquois National Wildlife Refuge, Long Island National Wildlife Refuge Complex, and Wallkill River National Wildlife Refuge; as well as
 - NPS, including Fire Island National Seashore and Appalachian Trail monitoring.
- Military installations, such as Fort Drum and West Point,
- Other federal agencies, such as USDA NIFA,
- NYSDEC Division of Fish and Wildlife, which is New York's state wildlife agency,
- NRCS NY (New York State's Technical Committee),
- Other state agencies, such as OPRHP, and New York State Ag and Markets,
- Broad spectrum of additional relevant organizations and entities.

Survey results. A wide range of stakeholders and the entire DEC Lands and Forests staff had the opportunity to complete a survey, sharing their priorities for New York's forests. The participation rate was high as was the extent and quality of the thoughtful comments. Stakeholders

shared their views on a wide range of topics from the threat of invasives; need for better tax laws; better enforcement; challenges of Preserve management; reintroduction of the American chestnut; deer; education efforts; etc. Among the overall takeaways, the planning team concluded that stakeholders:

- Consider the biggest threat to forests: invasives! Runner-ups: fragmentation, deer, and climate change,
- Find the most important benefits from forests are natural benefits – habitat, clean water, etc.
- Most find the Forest Action Plan somewhat relevant,
- Are familiar with most forest protection efforts,
- Most find regulations sufficient,
- See taxation and lack of knowledge as the biggest challenges to private forestland-owners,
- In their opinion, every forest protection tool is important, there is no single ‘magic wand,’
- In their perception, state agencies and non-profits have the highest land conservation ethic, while urban and suburban residents have the lowest.

3. May 23, 2019: *Presentation at EPA, DEC, and Indigenous Nations meeting*

Embassy Suites at Destiny USA,
Syracuse, New York

4. June 24, 2019: *Stewardship Committee meeting*

NYSDEC headquarters, 625 Broadway,
Albany, New York 12233

- Stewardship Committee members included:
 - Federal land management agencies, such as NPS, U.S.F.S., and U.S. Fish and Wildlife;

- Military installations, such as Fort Drum;
- Natural Resources Conservation Service, New York;
- NYSDEC Division of Fish and Wildlife, which is New York’s state wildlife agency;
- Other state agencies, such as New York State Ag and Markets.

5. June 25, 2019: *Meeting with SUNY ESF, Center for Native People and the Environment*

SUNY ESF, Syracuse, New York 13210

6. July 18, 2019: *Meeting with TNC NY*

The Albany Pine Bush,
195 New Karner Rd 1, Albany, New York 12205

7. July 19, 2019: *Meeting with SUNY ESF, Center for Native People and the Environment*

SUNY ESF, Syracuse, New York 13210

8. August 20, 2019: *Meeting with Hudson River Estuary Program*

NYSDEC headquarters, 625 Broadway,
Albany, New York 12233

9. September 19, 2019: *Stewardship Committee meeting*

NYSDEC headquarters, 625 Broadway,
Albany, New York 12233

10. October 2019: *Assistant Director for the Saint Regis Mohawk Tribe’s Environment Division joins the Stewardship Committee.*

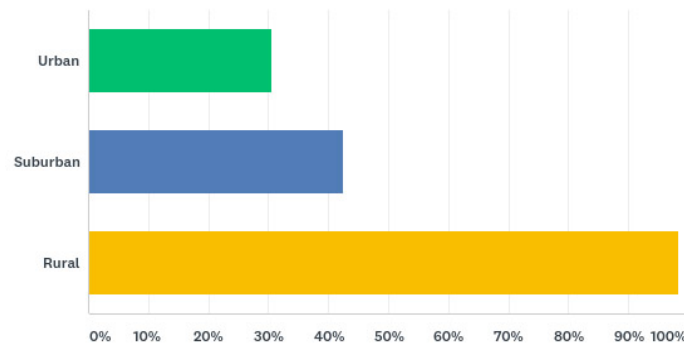
11. December 11, 2019: *Meeting with Assistant Director for the Saint Regis Mohawk Tribe’s Environment Division.*

NYSDEC headquarters, 625 Broadway,
Albany, New York 12233

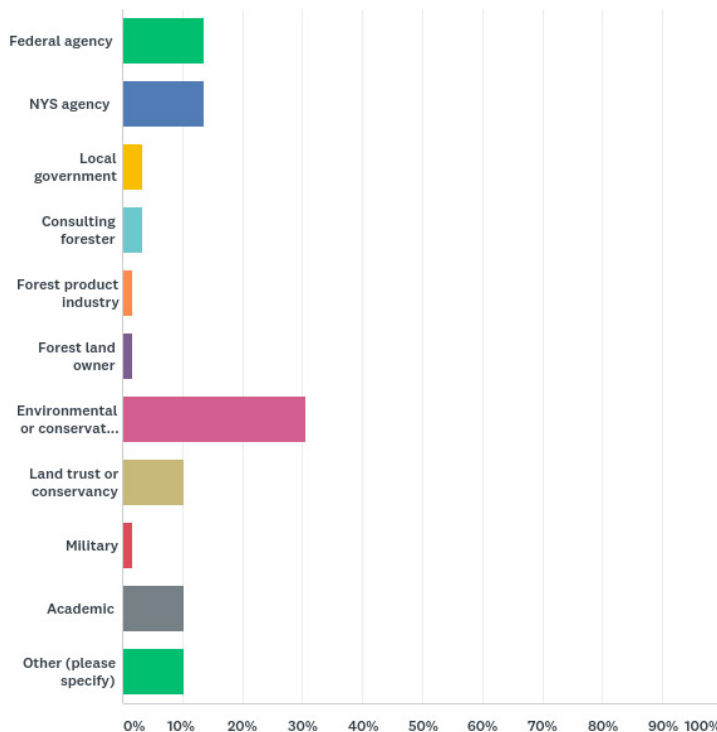
Appendix C:

Survey of Stakeholders and DEC's Division of Lands and Forests Staff

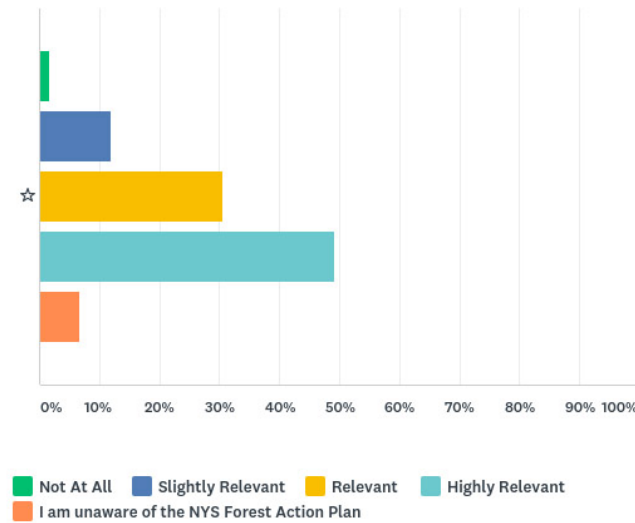
Q2 Please indicate the type of area(s) that you work in. Check all that apply.



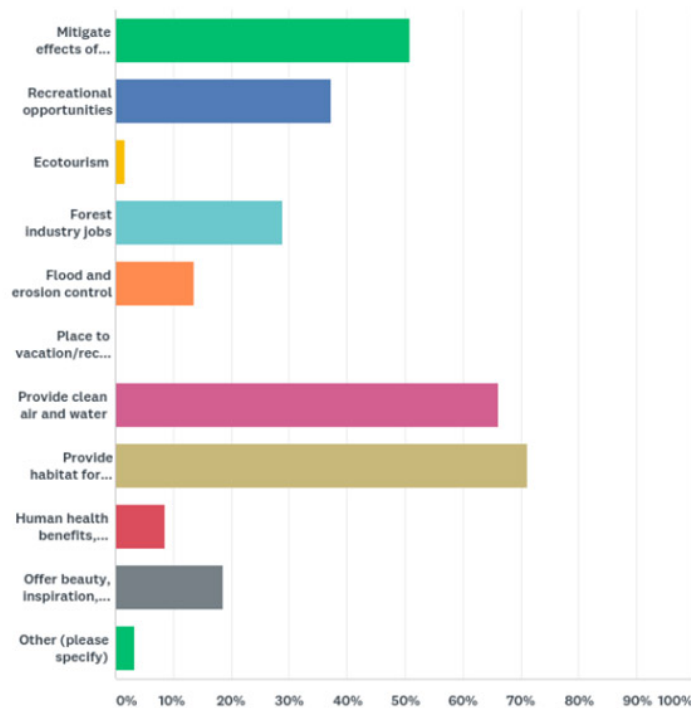
Q3 Please select the type of organization/entity you represent.



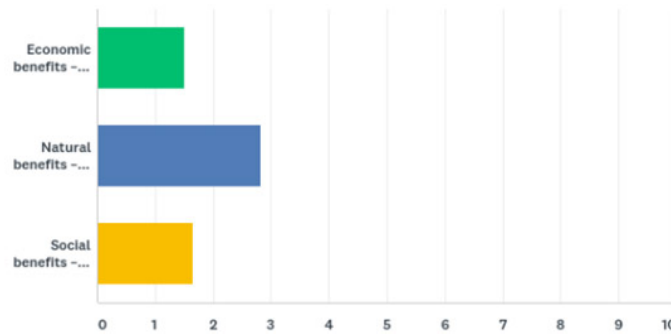
Q4 How relevant is the NYS Forest Action Plan to your work?



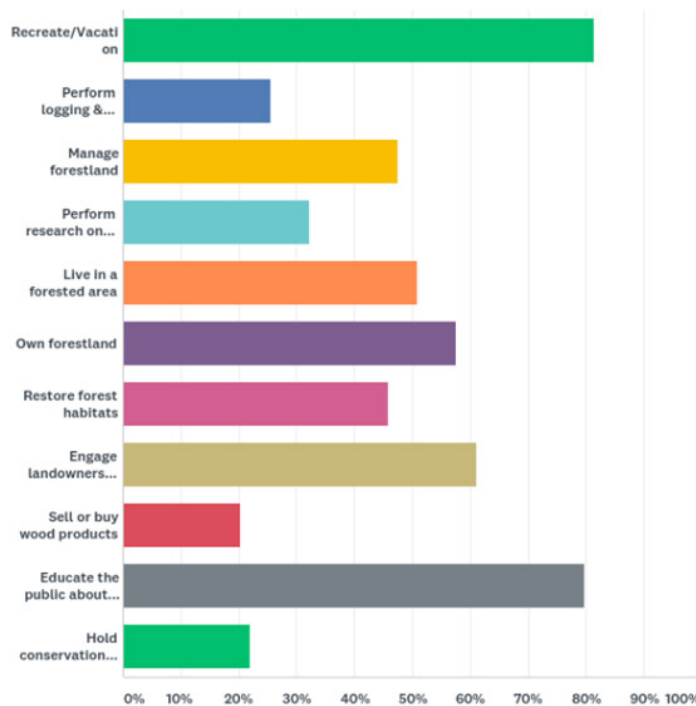
Q5 What do you consider to be the most important benefits of NY's forests? Check only the top three.



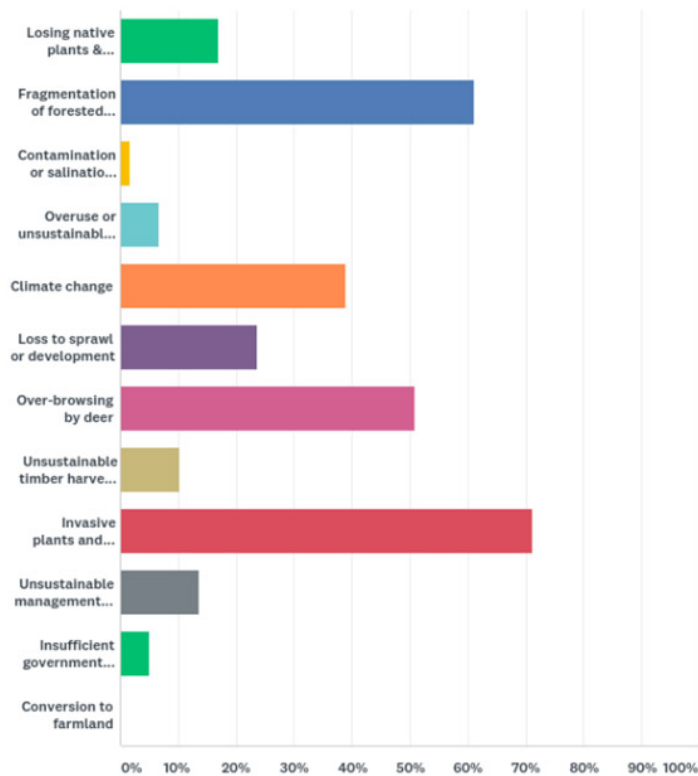
Q6 Please rank in order of importance the benefits you would like to see from NY's forests with 1 being your most desirable choice.



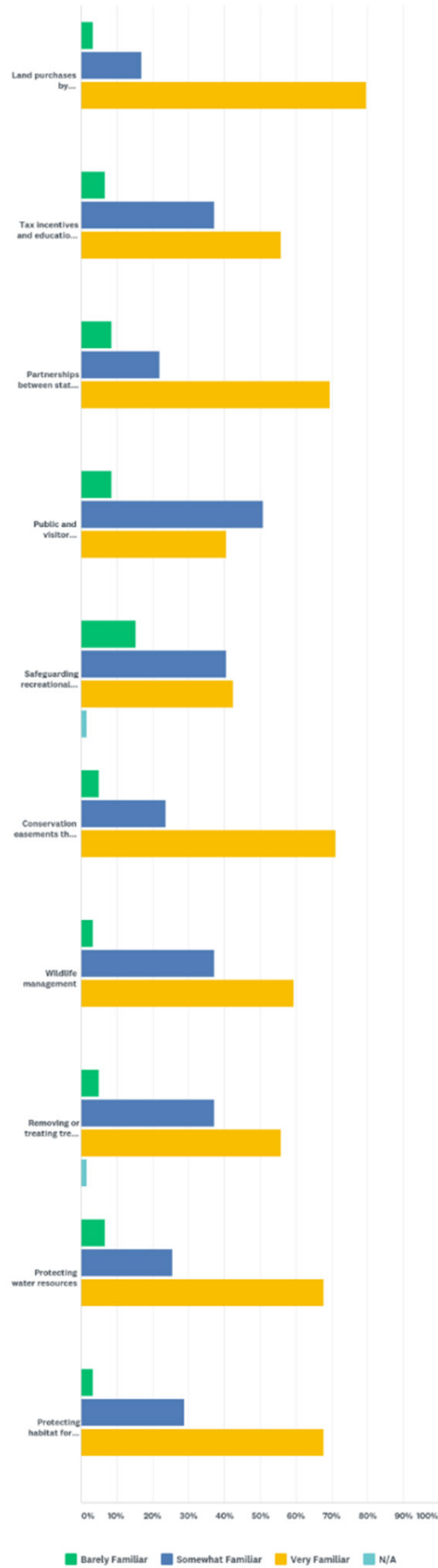
Q7 How do you engage with NY's forests? Check all that apply.



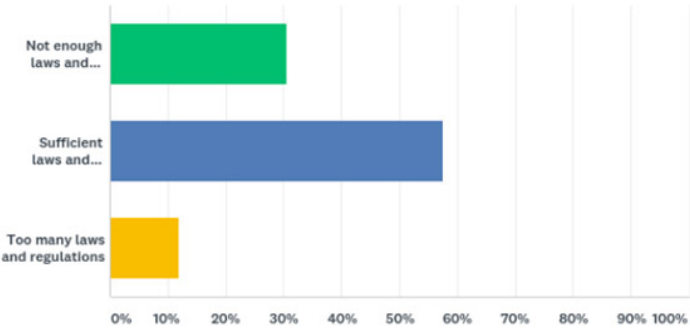
Q8 What do you feel are the biggest threats facing NY's forests today? Check only the top three.



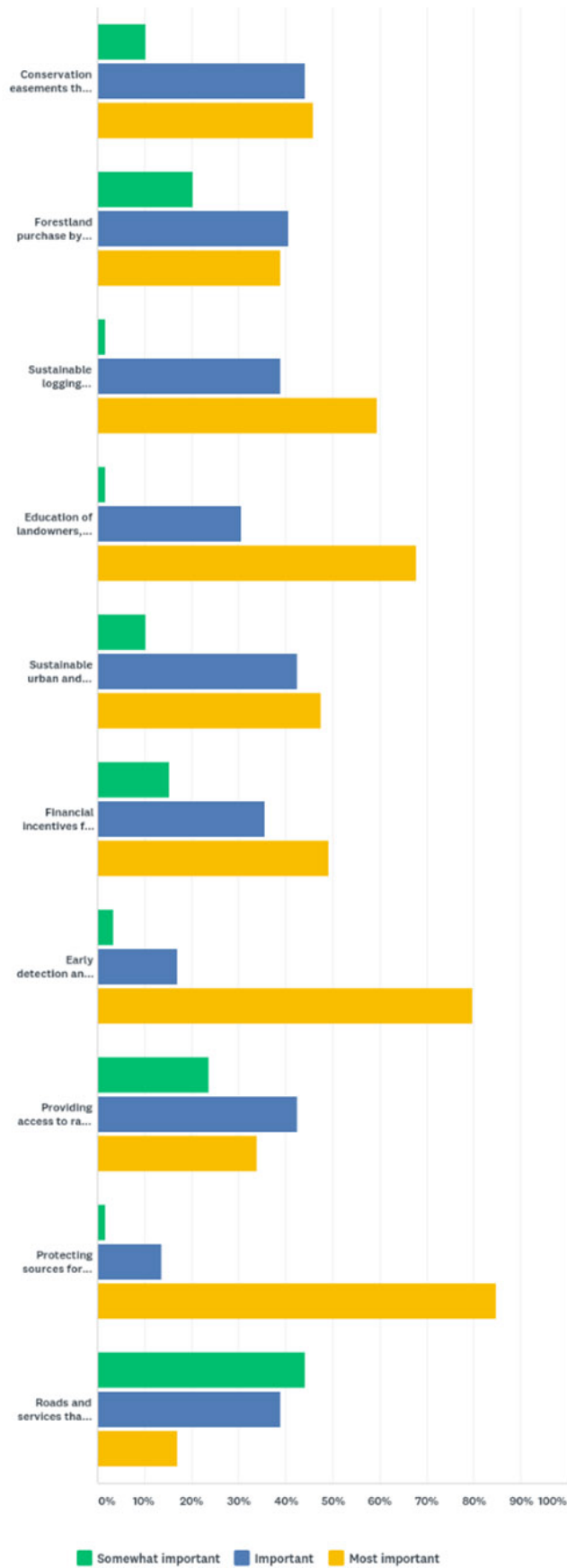
Q9 Please rate how familiar you are with the many types of forest protection efforts in NY.



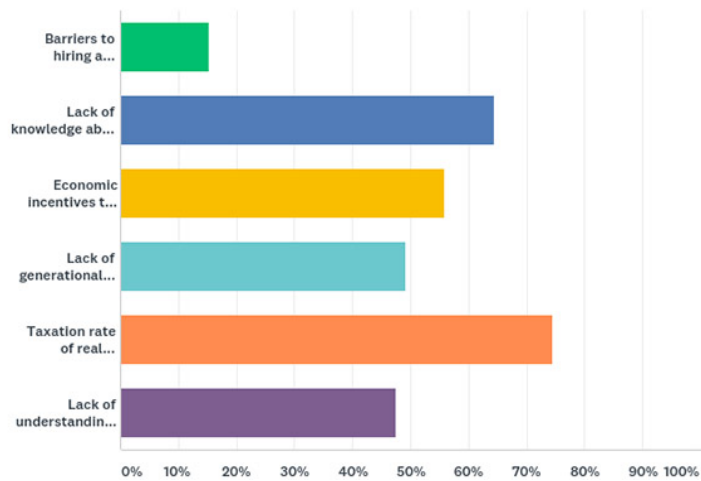
Q10 What do you think about NY’s laws and regulations to protect its forests?



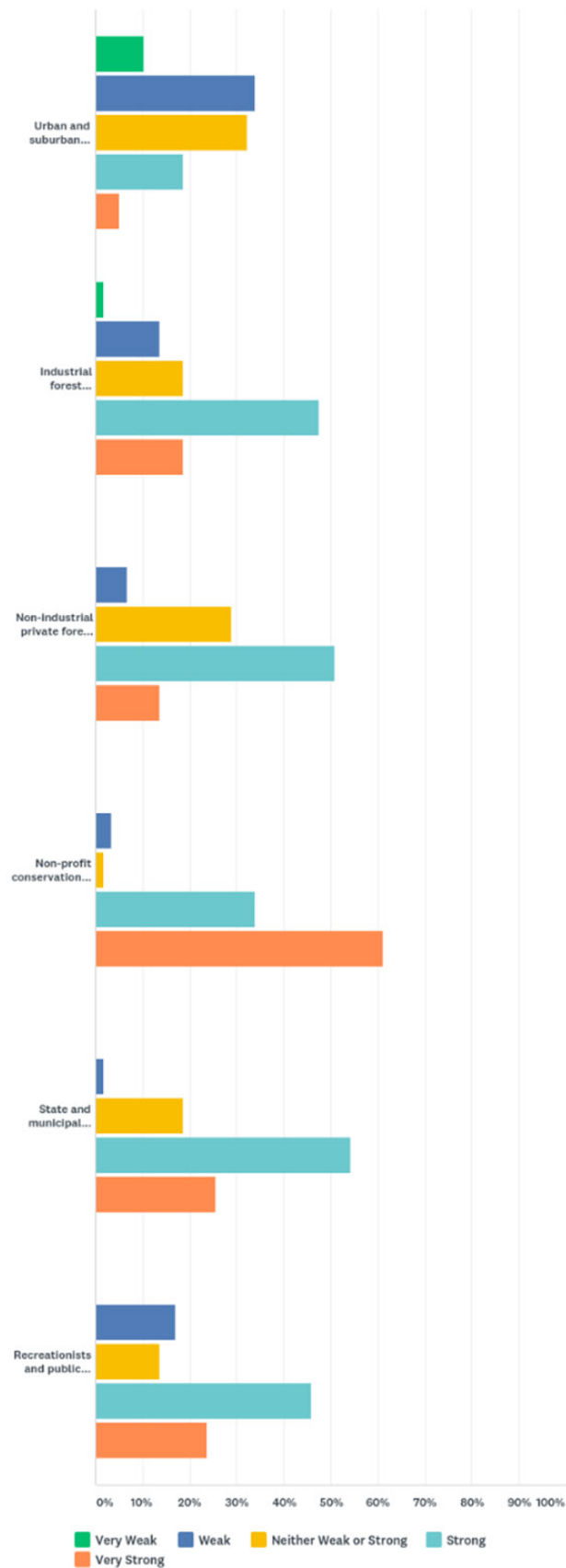
Q11 How important to you are the following tools to ensure forests remain healthy and intact?



Q12 What do you think are the biggest challenges for NY's private forest landowners to keep their forests as forests? Check all that apply.



Q13 Among the following groups, how strong do you think the desire is for sustainable use of resources and the respect for forestland?



Appendix D:

New York's Forest and Woodland Community Types

Community types (and species; below) are assigned conservation status ranks reflecting their degree of rarity or imperilment, see tables 1 and 2 below.

Forests ranked S1 through S3 are considered rare in New York with those ranked S1 being the rarest and/or the most vulnerable to various stressors (Appendix E, Table 1).

Table 1. Forest and woodland community types described in Edinger 2014 and documented in the New York Natural Heritage Program Databases. For S1 to S3 community types, all known examples are documented; for S4 and S5 community types only the highest quality examples in the state are documented.

| Forest Community Type | Rarity | Number of Locations Documented by New York Natural Heritage Program |
|--|--------|---|
| Coastal oak-holly forest | S1 | 1 |
| Coastal plain Atlantic white cedar swamp | S1 | 4 |
| Inland Atlantic white cedar swamp | S1 | 6 |
| Maritime beech forest | S1 | 3 |
| Maritime holly forest | S1 | 1 |
| Maritime pitch pine dune woodland | S1 | 4 |
| Maritime red cedar forest | S1 | 2 |
| Pitch pine-blueberry peat swamp | S1 | 2 |
| Red maple-sweetgum swamp | S1 | 7 |
| Perched swamp white oak swamp | S1S2 | 5 |
| Allegheny oak forest | S2 | 9 |
| Alvar woodland | S2 | 6 |
| Mountain fir forest | S2 | 14 |
| Red maple-blackgum swamp | S2 | 12 |
| Red maple-swamp white oak swamp | S2 | 3 |
| Calcareous pavement woodland | S2S3 | 3 |
| Floodplain forest | S2S3 | 53 |
| Limestone woodland | S2S3 | 26 |
| Maritime oak forest | S2S3 | 5 |
| Mountain spruce-fir forest | S2S3 | 13 |
| Northern white cedar swamp | S2S3 | 52 |
| Oak-tulip tree forest | S2S3 | 13 |
| Pitch pine-oak-heath woodland | S2S3 | 9 |
| Red maple-tamarack peat swamp | S2S3 | 22 |

Table 1. Forest and woodland community types described in Edinger 2014 and documented in the New York Natural Heritage Program Databases. For S1 to S3 community types, all known examples are documented; for S4 and S5 community types only the highest quality examples in the state are documented.

| Forest Community Type | Rarity | Number of Locations Documented by New York Natural Heritage Program |
|----------------------------------|--------|---|
| Rich hemlock-hardwood peat swamp | S2S3 | 21 |
| Rich mesophytic forest | S2S3 | 10 |
| Acidic talus slope woodland | S3 | 11 |
| Black spruce-tamarack bog | S3 | 47 |
| Calcareous talus slope woodland | S3 | 22 |
| Coastal oak-beech forest | S3 | 6 |
| Coastal oak-heath forest | S3 | 7 |
| Coastal oak-hickory forest | S3 | 8 |
| Coastal oak-laurel forest | S3 | 3 |
| Maple-basswood rich mesic forest | S3 | 31 |
| Shale talus slope woodland | S3 | 5 |
| Silver maple-ash swamp | S3 | 38 |
| Spruce-fir swamp | S3 | 31 |
| Balsam flats | S3S4 | 4 |
| Spruce-northern hardwood forest | S3S4 | 13 |
| Appalachian oak-hickory forest | S4 | 28 |
| Appalachian oak-pine forest | S4 | 9 |
| Beech-maple mesic forest | S4 | 26 |
| Chestnut oak forest | S4 | 22 |
| Hemlock-hardwood swamp | S4 | 22 |
| Hemlock-northern hardwood forest | S4 | 62 |
| Pine-northern hardwood forest | S4 | 7 |
| Pitch pine-oak forest | S4 | 12 |
| Spruce flats | S4 | 6 |
| Red maple-hardwood swamp | S4S5 | 22 |

Table 2. Categories of Rarity or Imperilment. These categories are used by Natural Heritage Programs in the United States and Canada to track the status of species in each jurisdiction (S1-S5, SX, SH) and by the international non-profit organization NatureServe to track the status of species globally (G1-G5, GX, GH).

| Heritage Rank | |
|---------------|---|
| G1, S1 | Critically Imperiled —Critically imperiled globally or in the state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extinction or extirpation from the state/province. |
| G2, S2 | Imperiled —Imperiled globally or in the state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to global extinction or extirpation from the state/province. |
| G3, S3 | Vulnerable —Vulnerable globally or in the state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation. |
| G4, S4 | Apparently Secure —Uncommon but not rare; some cause for long-term concern due to declines or other factors. |
| G5, S5 | Secure —Common, widespread, and abundant globally or in the state/province. |
| GX, SX | Presumed Extinct or Extirpated —Species is believed to be extinct in the wild (GX) or extirpated from the state/province (SX). Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered. |
| GH, SH | Possibly Extinct or Extirpated (Historical) —Species or community occurred historically in the state/province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years. A species or community could become SH without such a 20-40-year delay if the only known occurrences in the state/province were destroyed or if it had been extensively and unsuccessfully looked for. The SH rank is reserved for species for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurrences. |



Department of
Environmental
Conservation

www.dec.ny.gov