



Department of  
Environmental  
Conservation

# Strategic Plan for Forest Management on Wildlife Management Areas

2021-2030

Andrew M. Cuomo, Governor | Basil Seggos, Commissioner



# Acknowledgements

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## Cover page photos: (clockwise from top left)

Seed tree cut at Tug Hill WMA. Photo by Rachel Hillegas, DEC  
Regeneration at Rattlesnake Hill WMA. Photo by Mike Palermo, DEC  
Seed tree cut at Mongaup Valley WMA. Photo by Malcolm Grant, DEC  
Seed tree cut at Rattlesnake Hill WMA. Photo by Gary Koplun, DEC

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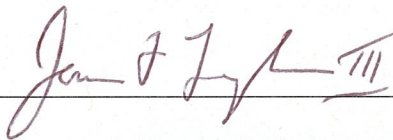


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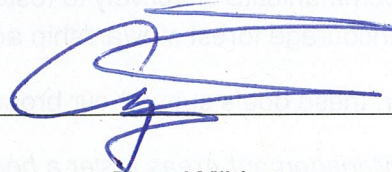


## Strategic Plan for Forest Management on Wildlife Management Areas

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## Preface

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The Strategic Plan for Forest Management on Wildlife Management Areas (WMAs) continues and builds upon the intentions of New York State Department of Environmental Conservation (DEC) Division of Fish and Wildlife's (Division) Young Forest Initiative. Over the next 10 years, we will work towards the following goals:

- Manage forests for wildlife on WMAs effectively, efficiently, consistently, and responsibly.
- Maintain or improve woodland habitat for wildlife throughout the WMA system by supporting a landscape mosaic composed of a diversity of forest types and age classes, prioritizing young forest.
- Lead by example in planning and conducting active forest management for wildlife while protecting sensitive resources.
- Effectively demonstrate successful forest management outcomes and determine whether adjustments are needed to improve outcomes.
- Communicate effectively to foster understanding of WMA management and to encourage forest stewardship across New York.

Together, these goals support our broader vision for forests:

*Wildlife Management Areas foster a healthy, resilient, and diverse forested landscape composed of a mosaic of forest types, age classes, and stand-level characteristics that provide high-quality wildlife habitat, now and in the future. Wildlife species tangibly benefit from our enduring commitment to sustainable, scientifically-sound forest stewardship guided by current silvicultural and best management practices.*



A forest stand at Canadaway Creek WMA marked for habitat improvement. Photo by Justin Kindt.

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## Introduction

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The Division's Bureau of Wildlife (Bureau) manages approximately 250,000 acres of state Wildlife Management Areas, Multiple Use Areas, and Unique Areas collectively known as the WMA system. We manage these lands for two primary purposes: conservation and management of wildlife and their habitats and providing opportunities for people to hunt, trap, fish, and observe wildlife. Over half of the WMA system is forested.

The Bureau created the Young Forest Initiative (YFI) in 2015 to address concerns about declines in young forest and the corresponding impacts to populations of associated wildlife. The intention was to focus our funding and effort to meet an immediate need to improve the quantity and quality of young forest habitat on WMAs. Our goal was to increase the amount of young forest from approximately 3% to 10% of the total forested acreage on select properties in the WMA system (approximately 12,000 acres on 91 WMAs). The YFI complemented a collaborative effort by numerous conservation partners throughout the Northeast and Midwest to restore young forest on public and private lands. Initial program development and implementation was guided by a five-year strategic plan.<sup>1</sup>

Below, we summarize key accomplishments and challenges in *YFI Program Review 2015-2020* and establish a roadmap for transitioning to a comprehensive forest management program on WMAs in the *Strategic Plan for Forest Management 2021-2030*. Our program on WMAs supports the State Wildlife Action Plan and State Forest Action Plan's goals of keeping New York's forests healthy by promoting forest regeneration and improving forest structure to benefit wildlife populations.<sup>2, 3</sup> We will also continue to work with our conservation partners to actively manage forests for wildlife throughout New York and the Northeast.



Active forest management promotes a diversity of wildlife habitats and fosters healthy forests for the future. Photo by Adam Perry.

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<sup>1</sup> The DEC Strategic Plan for Implementing the Young Forest Initiative on Wildlife Management Areas 2015-2020 is available online at [www.dec.ny.gov/outdoor/104218.html](http://www.dec.ny.gov/outdoor/104218.html).

<sup>2</sup> The State Wildlife Action Plan and list of Species of Greatest Conservation Need are available online at [www.dec.ny.gov/animals/7179.html](http://www.dec.ny.gov/animals/7179.html).

<sup>3</sup> The Draft New York State Forest Action Plan is available online at [https://www.dec.ny.gov/docs/lands\\_forests\\_pdf/nysfap.pdf](https://www.dec.ny.gov/docs/lands_forests_pdf/nysfap.pdf).

## YFI Program Review 2015-2020

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The direction of the original strategic plan was to provide habitat for wildlife that depend on young forest by establishing a minimum of 10% of the forested acreage on each WMA in the program as young forest, in perpetuity. Working towards that goal, we made steady progress in the past five years in the following core areas: Program Development and Coordination, Forest Management, Assessing Wildlife and Vegetation Response, and Communication and Outreach. Below, we discuss accomplishments in each of these program areas.

### Program Development and Coordination

In 2014, we began developing the YFI program in collaboration with DEC's Division of Lands and Forests (DLF) and partners outside DEC, including experts in wildlife habitat management, forestry, and communication and outreach.<sup>4</sup> The Bureau hired 19 new biologists, foresters, and technicians who comprise the core of the program. This team works closely with the Land Management and Habitat Conservation Team biologists who oversee all other habitat management and access on WMAs; other regional and administrative staff contribute significantly as well. Having foresters in the Bureau was a significant step forward because, for the first time, we had dedicated staff to plan and oversee forest management on WMAs. While each DEC Region experienced different challenges and opportunities related to forest management, we strove to build a cohesive team and deliver the program as consistently as possible across the state.

Key accomplishments we achieved during the first five years included:

- Developed program structure and hired staff.
- Wrote the YFI Strategic Plan and internal guidance documents.<sup>5</sup>
- Developed a database to track program progress.
- Updated the statewide Programmatic Environmental Impact Statement (EIS) for habitat management on WMAs.
- Obtained an Article 24 General Permit to allow certain restricted habitat management in wetlands in the WMA system (e.g., alder management for woodcock habitat).
- Secured state (Conservation Fund and Habitat & Access Stamp program) and federal funding (U.S. Fish and Wildlife Service's Wildlife and Sportfish Restoration program).

### Forest Management

Creating young forest requires significant planning prior to implementation. Habitat inventory, or "cover typing," classifies current conditions of all habitats on each WMA, delineates individual stands, and calculates stand acreage using a combination of aerial imagery interpretation and

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<sup>4</sup> Audubon New York, Ruffed Grouse Society, National Wild Turkey Federation, National Deer Association, Wildlife Management Institute, Cornell University's Center for Conservation Social Sciences, New York State Fish and Wildlife Management Board, Natural Resources Conservation Service, The Nature Conservancy, and the U.S. Fish and Wildlife Service.

<sup>5</sup> Available online at [www.dec.ny.gov/outdoor/104218.html](http://www.dec.ny.gov/outdoor/104218.html): Young Forest Initiative Monitoring Plan 2016-2025, Rutting Guidelines for Timber Harvesting on Wildlife Management Areas, Retention Guidance on Wildlife Management Areas, Plantation Management Guidance on Wildlife Management Areas, and Special Management Zones on State Forests and Wildlife Management Areas.

field reconnaissance. In forest stands, foresters documented forest type, tree species composition, size class, age class, and other stand characteristics.<sup>6</sup> This information, along with the occurrences and habitat preferences of the target wildlife, provided a foundation for management planning. We developed a new Habitat Management Plan (HMP) format and process to standardize 10-year plans for each WMA. Forest management was an integral component of each HMP. In addition, foresters prepare site-specific silvicultural prescriptions for each project area.

Prior to on-the-ground implementation, staff screened projects to identify and avoid negative effects to historical and cultural resources, threatened and endangered species, wetlands and streams, and other sensitive areas. We followed an annual work planning process to prioritize and track progress on projects, which often span several years. With HMPs and work plans in place, we utilized commercial timber sales to complete the habitat management. When timber sales weren't feasible, we either hired a contractor or completed the work with agency staff. Some projects also entailed auxiliary work such as creating access roads; managing non-native, invasive, or interfering vegetation; planting or seeding; or conducting prescribed burns.



Planting pitch pine seedlings at Louise E. Keir WMA to restore an oak heath pitch pine community. Photo by Mike Echtner.

Key accomplishments we achieved during the first five years included<sup>7</sup>:

- Inventoried nearly 95,000 acres of habitat on 65 WMAs.
- Wrote 77 HMPs (60 final, 17 draft).
- Prepared 85 silvicultural prescriptions for over 3,000 acres of forest management.
- Completed over 1,700 acres of forest management, including the creation of 1,215 acres of young forest.<sup>8</sup>
  - Treated 521 acres of non-native invasive, interfering, or undesirable vegetation.
  - Planted 42 acres of trees and shrubs.
  - Conducted 68 acres of prescribed burns to restore fire-dependent forest communities.
- Executed contracts for an additional 1,700 acres of forest management (typically completed within three to five years).

<sup>6</sup> Inventory data are managed via the State Forest Inventory Database (SFID) and are typically updated every ten to fifteen years to reflect changing conditions on the WMA.

<sup>7</sup> Numbers current as of end of state fiscal year 2020-21 (3/31/21).

<sup>8</sup> Including several projects that were started before the YFI program began in 2015. Young forest acres reported here are completed projects and do not necessarily already have established regeneration.



## Assessing Wildlife and Vegetation Response

To evaluate wildlife response to forest management, we surveyed for eight target species (American woodcock, ruffed grouse, wild turkey, golden-winged warbler, whip-poor-will, New England cottontail, snowshoe hare, and white-tailed deer) from 2016 to 2020. Most surveys conducted during this period were pre-treatment surveys at proposed young forest project areas to establish baseline data. Surveys included both road-based and walk-in routes as appropriate for the size of the WMA, size and location of the project area, and survey protocol.

To evaluate vegetation response to management, we established photo points, conducted regeneration assessments, and surveyed vegetation plots to track changes in vegetation over time. Additionally, periodic habitat inventory tracks progression over time from the initial treatment.

Key accomplishments we achieved during the first five years included:

- Wrote the *YFI Monitoring Plan: 2016-25*.<sup>9</sup>
- Surveyed target wildlife at 57 WMAs.
- Conducted surveys for bats and woodland raptors to determine whether special management considerations were needed to avoid adverse impacts during forestry operations.
- Established 116 photo point monitoring locations.
- Conducted pre- and post-treatment regeneration assessments to evaluate establishment of new growth and determine whether corrective actions were needed.
- Summarized results from three years of surveys (2016-18) in a Wildlife Report Card.<sup>10</sup>



A photo point location at Mongaup Valley WMA showing regeneration one year (left) and three years (right) after treatment. Photos by Malcolm Grant.

<sup>9</sup> Available online at [www.dec.ny.gov/docs/wildlife\\_pdf/yfimonitoringplan.pdf](http://www.dec.ny.gov/docs/wildlife_pdf/yfimonitoringplan.pdf).

<sup>10</sup> Available online at [www.dec.ny.gov/docs/wildlife\\_pdf/yfirepcard.pdf](http://www.dec.ny.gov/docs/wildlife_pdf/yfirepcard.pdf).

## Communication and Outreach

The Bureau is committed to providing the public with clear and timely communication. It is important for the public and WMA visitors to understand why we are doing forest management. We shared key messages such as *cutting trees to create young forest habitat is good for wildlife* and *habitat diversity supports wildlife diversity*. We used several methods to share information and updates with the public.

Key accomplishments we achieved during the first five years included:

- Held 41 public meetings to provide information on 53 completed HMPs.
- Created a young forest webpage.<sup>11</sup>
- Designed and installed informational signs at demonstration areas<sup>12</sup> that highlight the YFI program, summarize management history at the site, and describe future management.
- Created young forest signs for WMA kiosks and “Habitat Coming Soon” signs to put near habitat work.
- Created a young forest standing banner display for use at meetings and events.
- Wrote a full issue on young forests in *New York State Conservationist for Kids*.
- Wrote articles for the New York Hunting and Trapping Regulations Guide.
- Created a young forest fact sheet.
- Collaborated with Cornell University’s Center for Conservation Social Science (CCSS) to conduct public surveys on perceptions of various habitat management methods.
- Offered guided tours and talks for the public.
- Put up displays at the New York State Fair, county fairs, outdoor/hunting expos, and other events.
- Met with regional partners and collaborated on publications to guide habitat management.



Demonstration areas at Rattlesnake Hill WMA (left) and Upper and Lower Lakes WMA (right) showcase forest management for target wildlife including ruffed grouse and golden winged warbler. Photos by John Mahoney (left) and Joe Lydon (right).

<sup>11</sup> [www.dec.ny.gov/outdoor/104218.html](http://www.dec.ny.gov/outdoor/104218.html)

<sup>12</sup> Demonstration areas include: Bear Spring Mountain, Connecticut Hill, Cranberry Mountain, Erwin, Hanging Bog, Kabob, Partridge Run, Rattlesnake Hill, Three Rivers, and Upper and Lower Lakes WMAs.

## Adapting and Moving Forward

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Following the adaptive management approach articulated in the 2015 Strategic Plan, we assessed goals, processes, achievements, and obstacles encountered over the past five years.

### **How close are we to meeting our 10% goal?**

When the YFI began, managers hoped to reach 12,000 acres by 2025. Current trends based on executed timber sale contracts indicate we would reach the 12,000-acre goal by 2030 at the earliest, taking into account contracts on state lands often span three to five years. While trends based on completed acres indicate an even longer timeline, these are based on modest project completion while the program focused primarily on management planning and project initiation. We expect this rate to accelerate over the coming years. Note that this forecast does not include all current, existing young forest due to incomplete WMA inventories, nor does it account for the ecological reality that as some young forest is created, other young forest ages out. The amount of young forest on WMAs will never be static as we gain and lose habitat due to management and succession, respectively.

### **What have we learned?**

During the first year, we invested heavily in program development, planning, and training. While this effectively delayed the envisioned timeline from the outset, it also enabled us to build a strong foundation for moving forward. The accomplishments listed above illustrate the program strengths: collaboration with numerous partners, statewide coordination and consistency in program delivery, avoidance of adverse effects to at-risk species and other resources, comprehensive and holistic habitat planning, emphasis on outreach and communication, centralized tracking and reporting, and dedicated program staff. Additionally, the opportunity to improve forest health, composition, and resilience while creating young forest habitat for wildlife is one of the program's greatest long-term benefits.

Certain considerations have necessitated adapting and adjusting our expectations. Factors such as distance or seasonal accessibility delayed inventory needed for management planning. Additional surveys required for historical and cultural resources delayed, modified, or cancelled some projects. The listing of the northern long-eared bat (threatened) in 2015 affected every future project, requiring surveys and/or seasonal restrictions. Fluctuations and geographic variation in the timber market affected our ability to use commercial timber sales to complete habitat management (e.g., difficulty obtaining bids or needing extensions on existing contracts). In addition, the WMA system continues to expand and new acquisitions must be inventoried and incorporated into management plans. Looking ahead, declining trends of the program's federal funding may limit noncommercial habitat treatments, and oversight of a growing number of commercial contracts may eventually exceed staff capacity.

We also identified numerous challenges that need to be addressed going forward. Efforts to mitigate pervasive forest health issues such as deer overbrowse, forest pests and pathogens,

and invasive or undesirable plants can be costly, time-consuming, and potentially ineffective in severe cases. Nonetheless these are an essential component of any forest management program. Additionally, incorporating climate change adaptation strategies into management planning is necessary both to address short-term challenges (e.g., unpredictable weather can reduce the number of days with suitable conditions for contractors to work) and to support our long-term vision of sustainable forest habitat for the future. Finally, fostering healthy forests, including a late-successional component, directly relates to carbon cycling, climate change, and public perception of forest management, as well as wildlife habitat quality.

## Where do we go from here?

We identified opportunities for improvement in multiple program areas, resulting in the following recommendations:

- Utilize all practices needed to manage habitat for target species (i.e., incorporate uneven-age management and other methods needed for complex best management practices [BMPs] for golden-winged warbler and new BMPs for New England cottontail).
- Expand the age class definition of young forest from 0-10 to 0-20 years. Development of the ideal habitat structure varies greatly due to site conditions and many areas continue to support target species beyond 10 years (e.g., ruffed grouse).
- Include shrublands and old, regenerating fields—which are needed to provide habitat for target species—in the definition of young forests.
- Bundle forest management projects to facilitate timber sales (e.g., not just young forest).
- Provide support in Region 5 to implement forest management and in the Division of Lands and Forests to administer contracts.
- Incorporate Region 1 (which has no WMAs) into the program via forests on other lands managed by the Bureau.
- Update the monitoring plan to include a strategic sampling design for surveys.
- Improve our understanding of habitat needs for whip-poor-will in New York.
- Increase collaboration with partner organizations.
- Develop and implement "priority area siting tools" for target species (such as ruffed grouse) to identify high priority parcels for habitat management that have the greatest likelihood for success.
- Incorporate the regeneration debt/forest sustainability index into project planning and monitoring at WMAs that are most vulnerable to deer overbrowse, invasive plants, and development.<sup>13</sup>
- Provide technical assistance beyond the WMA system (e.g., privately-owned lands), particularly for range-limited species including New England cottontail, snowshoe hare, and golden-winged warbler.

Restoring and maintaining young forest remains a critical ecological need and will continue to be our top forest management priority. However, in light of challenges encountered and lessons learned during the past five years, we plan to broaden the scope and goals of the program to

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<sup>13</sup> Miller, K.M. and B.J. McGill. 2019. Compounding human stressors cause major regeneration debt in over half of eastern US forests. *Journal of Applied Ecology* 56(6): 1355-1366.

include a more holistic approach to forest management on lands in the WMA system. The proposed changes are intended to formalize what has already been identified in individual HMPs, prescriptions, and contracts; to respond to concerns expressed by stakeholders including the public; and to fully implement BMPs for our target wildlife species. In the following section, we identify goals, objectives, and strategies to achieve our vision for forest management on WMAs.

## Strategic Plan for Forest Management 2021-2030

### Program Need

Forest habitats are diverse and dynamic, composed of various plant species adapted to existing environmental conditions (e.g., slope, soil, moisture) and the local disturbance history. Some forest types are fast-growing and short-lived (aspen-birch), others slow-growing and shade-tolerant (northern hardwoods), some require recurring disturbance such as fire (oak-pine), while others need periodic inundation (forested wetland). Age also contributes to habitat diversity as an individual forest stand transitions over time from the seedling-sapling stage (young forest), to

Forest age classes	
 <p>Layers of vegetation from grasses/forbs, to shrubs, to pole sized birches, adjacent to mature forest</p>	<p><b>Young forest</b></p> <ul style="list-style-type: none"><li>• Generally 0-20 years following a disturbance.</li><li>• Seedling-sapling sized trees (&lt;5" DBH).</li><li>• Includes the stand initiation and beginning of stem exclusion phases of stand development.</li><li>• For some target species, shrublands and old fields are functionally similar to young forest and also provide habitat.</li></ul> <p><b>Intermediate forest</b></p> <ul style="list-style-type: none"><li>• Generally 20-50 years following a disturbance.</li><li>• Poletimber sized trees (6-11" DBH).</li><li>• Even-aged structure.</li><li>• Includes the later stem exclusion and early understory re-initiation phases of stand development.</li></ul> <p><b>Mature forest</b></p> <ul style="list-style-type: none"><li>• Generally 50-140 years old.</li><li>• Sawtimber sized trees (≥12" DBH).</li><li>• Understory re-initiation phase of stand development is ongoing or complete.</li><li>• Stand can be even-aged or uneven-aged.</li></ul> <p><b>Late successional forest</b></p> <ul style="list-style-type: none"><li>• Generally &gt;140 years old.</li><li>• Large live and dead trees (&gt;24" DBH) composed of climax tree species characteristic of the site.</li><li>• Complex vertical structure, an uneven canopy, and an abundance of downed wood are present.</li><li>• Evidence of past human-caused disturbance may or may not be present.</li></ul>

intermediate (pole stage), to mature (sawtimber), and finally to late succession forest. These variations in vegetation composition, age classes, as well as stand-level habitat structure (e.g., snags, downed wood, understory) are critical to support a diversity of wildlife.

Throughout New York and the Northeast, forest maturation, changes in land use, and decades of suppressing natural processes have cumulatively resulted in a forested landscape with an abundance of mature forest but a very low amount of young and late succession forest.<sup>14</sup> As of 2017, an estimated 3% of New York forest land was in the 0-20 year stand-age class and an estimated 8% was in the small diameter (seedlings/saplings <5" DBH) stand-size class (Figure 1).<sup>15</sup>

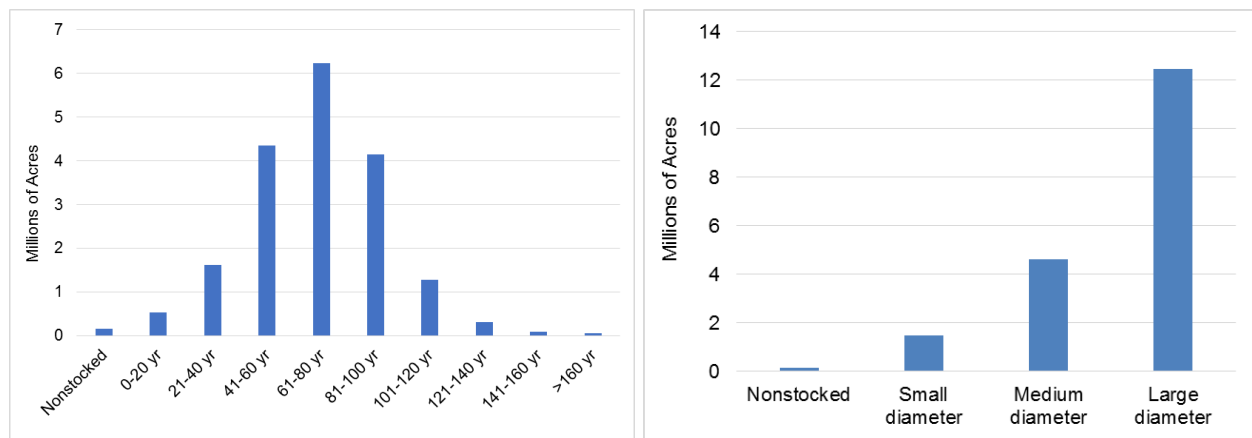


Figure 1. Area of forest land (millions of acres) by stand age class (left) and stand size class (right) in New York State. Data from USDA Forest Service, 2012-2017 Forest Inventory Analysis.

New York’s WMA system shows a similar deficit of young and late successional forest. According to current WMA inventory, nearly 4% of the forested acreage is seedling-sapling and 96% is intermediate or mature (85% natural, 11% plantations). Due to historic logging practices and field abandonment in most of the state, many of these intermediate and mature stands are even-aged and contain insufficient levels of snags (standing dead trees), woody debris, and/or structural complexity. Currently, only a minor portion of stands on WMAs could be considered late successional (only 1% of New York is considered late successional and most is located within the Adirondacks and Catskills). There is no known old growth forest (at least 180-200 years old) on WMAs, although small, isolated pockets may persist in difficult-to-access areas such as steep slopes and deep ravines.

Restoring young forest is a top priority for forest management on WMAs. It is disturbance-dependent and naturally short-lived, so in order to keep young forest on the landscape, some

<sup>14</sup> Widmann, R.H., S. Crawford, C.M. Kurtz, M.D. Nelson, P.D. Miles, R.S. Morin, and R. Riemann. 2015. New York Forests: 2012. USDA Forest Service. Newtown Square, PA.

<sup>15</sup> Albright, T.A. 2018. Forests of New York, 2017. Resource Update FS-170. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 4 p. <https://doi.org/10.2737/FS-RU-170>.

## Silviculture



**Silvicultural management** is the science and art of manipulating woodland habitats into sustainably diverse and healthy forests. An ecosystem's composition including health, structure (age/size), water quality, wildlife inhabitants, vegetative composition (species diversity), soil structure, topography, biological function, as well as any other environmental consideration is taken into account when determining what silvicultural tools are best suited to produce a desired outcome for a specific parcel of forest.

**Silvicultural prescriptions** describe the habitat, goals and objectives, and the management strategy and techniques that will be used to accomplish the goals in a particular forest stand. They also identify and address all potential hazards to ecosystem health, species composition, structure, diversity, and function.

### **Silvicultural techniques can:**

- Create single (even-aged) or multiple (uneven-aged) classes of forests that provide structural diversity for wildlife.
- Prevent forest health problems and reduce susceptibility to disease by expanding species diversity.
- Eradicate unwanted vegetation by using prescribed fire or herbicide treatments.
- Supplement natural regeneration by planting trees and shrubs.
- Promote better tree growth response and productivity through thinning.
- Create light gaps on the forest floor to enhance desirable vegetation response.

forest must be periodically set back by either a natural or intentional disturbance. Active management is intended to mimic natural disturbance while controlling when, where, and how the disturbance occurs to maximize benefits to wildlife. When implemented with appropriate BMPs to protect soil, water, and sensitive natural and cultural resources, young forest management not only provides food and cover for wildlife, but also establishes the seedlings and saplings that are the foundation of future forests. Old fields with woody encroachment and shrublands offer similar habitat structure as seedling-sapling stands for many of the target species. However, these areas do provide slightly different habitat components than regenerating forests and typically either require periodic, long-term management to remain open or, left alone, may eventually transition to young forest. These habitats are generally considered early successional habitat or, more recently, "young forest."<sup>16</sup> <sup>17</sup> While we will continue to classify shrubland and young forest separately during inventory and management planning, we will consider the amount and juxtaposition of all early successional habitat on a WMA when developing forest management plans.

Beyond young forest efforts, forest management is needed to improve habitat quality of intermediate and mature forest stands. Passive management allows plant growth to unfold undisturbed over time. Active management allows us to expedite these natural processes to benefit wildlife associated with mature forest by manipulating dominant plant species and introducing needed habitat features. Actions can increase vertical structure, improve tree quality and vigor, promote hard and soft mast-producing trees (e.g., black cherry, oak, hickory), and introduce conifer (or rarely hardwood) inclusions. Active management can also accelerate the development of late successional stands by promoting tall, large diameter trees, creating canopy gaps, and increasing large downed woody material.

<sup>16</sup> Oehler, J.D., D.F. Covell, S. Capel, and B. Long (eds). 2006. Managing grasslands, shrublands, and young forest for wildlife: a guide for the Northeast. The Northeast Upland Habitat Technical Committee.

<sup>17</sup> More information is available at [www.youngforest.org](http://www.youngforest.org).

Maintaining a diversity of forest types is equally important. Many of the northern hardwood stands on WMAs are lacking in structural complexity and should be enhanced. Most of the oak forests are mature and lack oak regeneration in the understory; the absence of appropriate silviculture could allow oak-dominated stands to decline over the next 50 to 100 years. Conifers are a minor component on many WMAs, mostly represented by mature plantations that are dominated by just one or two species, and in some cases are overcrowded and declining. On some WMAs the primary native conifer is hemlock, which is at risk of mortality from the hemlock woolly adelgid.

In all forest types and age classes on WMAs, there is also a significant need to control non-native invasive plants, monitor and mitigate effects of deer overbrowsing, and prevent forest pests and pathogens from reducing habitat value for wildlife. Finally, future climate projections include conditions that could stress and negatively impact forest habitats; assessing and improving stand resiliency is needed.

Managing forests for wildlife also has a strong human dimensions component. Many people visit WMAs specifically hoping to encounter wildlife, though opportunities are greater for some species than others. Because habitat quality and quantity directly affect wildlife productivity and survival, habitat management on WMAs not only bolsters wildlife populations, but also

### Forest pests and diseases

Forest pests and diseases can be detrimental to the health and function of an ecosystem. Pests generally are insects that attack trees, and diseases are caused by pathogens (fungal, viral, bacterial); however, in many cases insects are the vector that brings the pathogen to the tree. For example, beech bark disease is a fungal canker infection of the tree that follows herbivory by a non-native scale insect.

Concerns about the impacts of natural pests and diseases across the landscape are as relevant now as they have ever been. New threats to our forests are emerging faster than existing ones can be contained and eradicated. A loss of forest function and diversity occurs when forest health declines from pests or other damaging agents. As a result, fewer wildlife species might successfully inhabit an area, further compounding the decline of health, biodiversity, and resiliency.

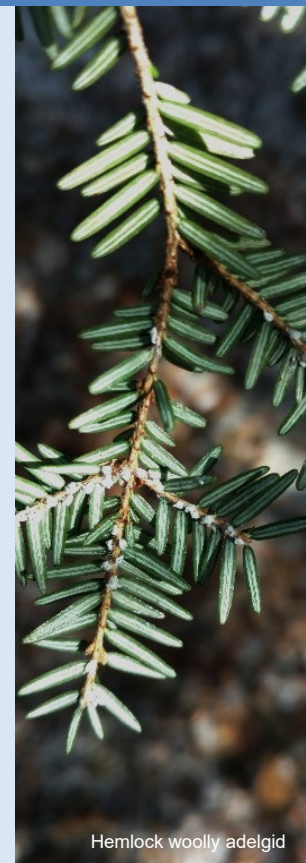
Examples of forest insect pests include:

- Emerald ash borer
- Hemlock woolly adelgid
- Spotted lanternfly
- Asian longhorn beetle
- Sugar maple borer
- Gypsy moth
- Sirex woodwasp

Examples of forest diseases include:

- Oak wilt
- Beech bark disease
- Dutch elm disease
- Chestnut blight

A more diverse forest is less vulnerable to the harmful impacts of pests and diseases. Sound forest management can increase diversity and improve resiliency at the tree, stand, and forest levels by removing infected or susceptible trees and promoting the propagation of genetically strong, healthy stock. This can lead to improved wildlife habitat and a healthier ecosystem.



Hemlock woolly adelgid



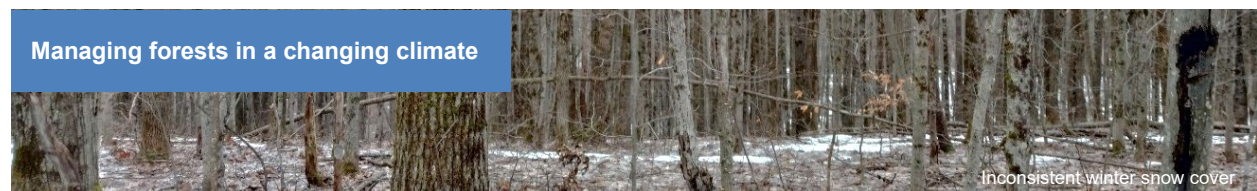
potentially increases chances for hunters, trappers, birdwatchers, and other visitors to connect with wildlife while afield.

## Purpose and Scope

By actively encouraging forest regeneration and managing for a diversity of forest types and age classes on WMAs, we will:

- Uphold stewardship responsibilities for wildlife that depend on forests for all or part of their life cycle;
- Restore and maintain a young forest component that is currently underrepresented in the WMA system (as well as throughout New York and the Northeast);
- Support and contribute to region-wide, landscape-level wildlife habitat conservation initiatives (e.g., the multi-state Young Forest Project);
- Model forest management to encourage forest landowners to manage their woodlands for wildlife;
- Provide and enhance recreational opportunities for WMA users to enjoy both game and non-game species; and
- Foster healthy, resilient forest habitat for the future.

This plan guides management of all forest habitats in the WMA system for 10 years. Forest ecosystem dynamics (e.g., succession, soil processes, carbon cycling) are long-term ecological processes spanning decades or even centuries. The 10-year duration of this plan provides an immediate opportunity to improve wildlife habitat and influence our future forests. The need for habitat management is particularly urgent for Species of Greatest Conservation Need (SGCN) for which habitat loss and degradation has resulted in population declines. However, managing forests for wildlife requires long-term vision, patience, flexibility to adapt, and enduring commitment far beyond the scope of this plan.



Some forest stands on WMAs may be vulnerable to future climate conditions, such as higher temperatures, moisture stress, severe precipitation events, increased invasive plant and pest pressure, late spring frosts, and decreased snowpack. Stands with just one or two dominant tree species and stands dominated by tree species that are projected to do poorly under future climate conditions may be the most vulnerable. It is important to consider these vulnerabilities while planning forest management and, where practical, incorporate actions that can improve stand resilience. In many cases, timber harvests aimed at improving habitat quality can simultaneously improve the adaptability of forest stands by reducing competition among trees, increasing species and age-class diversity, preventing and controlling invasive vegetation, managing herbivory, and promoting the regeneration and retention of tree species projected to be adaptable in the future.

As climate change progresses over the next century, it will be necessary for various plant and animal species to shift their range to where appropriate conditions for their survival and reproduction occur. An obstacle to this range shift is habitat fragmentation, which interrupts the connectivity of habitats with areas of unsuitable land cover. This is particularly problematic for non-flying animals and non-wind dispersed plant seed. It is important to examine the surrounding landscape while planning management on WMAs to ensure that the connectivity of forest cover is maintained or improved where possible.

## Program Management

We are responsible for managing forest and woody early successional habitats (as described in this plan) on WMAs as wildlife habitat. Program Management broadly includes program coordination, staffing, funding, and accountability to facilitate the following goal:

GOAL	
Manage forests for wildlife on WMAs efficiently, consistently, and responsibly.	
OBJECTIVES	STRATEGIES
Facilitate effective communication, collaboration, and consistency across DEC regions and divisions to support forest management goals.	<ul style="list-style-type: none"> <li>Provide standardized templates, processes, and guidance to promote statewide cohesion.</li> <li>Participate in Bureau team meetings.</li> <li>Coordinate with DLF when executing timber sale revenue contracts and with administrative staff when hiring contractors.</li> </ul>
Ensure timely and accurate reporting and accountability.	<ul style="list-style-type: none"> <li>Compile and manage forest management data using a centralized database and maintain habitat inventory and forest stand data in the State Forest Inventory Database (SFID).</li> <li>Develop an annual work plan and budget.</li> <li>Prepare quarterly and annual reports and provide information to the public upon request.</li> </ul>
Secure funding sufficient to implement forest management on WMAs.	<ul style="list-style-type: none"> <li>Renew federal funding through the Wildlife and Sportfish Restoration Program administered by FWS.</li> <li>Promote DEC's Habitat and Access Stamp Program to increase state funding for fish and wildlife programs.</li> </ul>
Maintain staff expertise in managing forested habitats for wildlife.	<ul style="list-style-type: none"> <li>Provide training and professional development opportunities to ensure staff stay current with new developments in wildlife ecology, wildlife habitat management, forestry, and communications.</li> </ul>

### Forests and carbon



Atmospheric carbon dioxide is a compound contributing to climate change. Trees are mostly composed of carbon; they sequester and store carbon as they grow. In 2017, the Bureau assessed the impact of WMA forest management on carbon in the Final Supplemental Program Environmental Impact Statement on Habitat Management Activities. Overall, proposed forest management may result in a small short-term reduction in stored carbon (release carbon to the atmosphere), however this is outweighed by the benefits that managing forests will provide to wildlife and by the improvements to forest health and resilience that can buffer various climate related stresses. Carbon is also discussed in the New York State Forest Action Plan.

## Forest Management

To provide the greatest range of habitat conditions for wildlife, it is important to consider the distribution of various forest types, age-classes, and stand-level characteristics on the WMA and in the surrounding landscape. Restoring young forest continues to be a top priority, however we are shifting focus from a percent of individual properties to a percent of the WMA system as a whole. Land managers will continue to strive for an average of 10% on each WMA, but individual property goals may be higher or lower depending on landscape context or other WMA-specific considerations. While our objectives are structured around broad forest age classes, managing for diverse forest types is equally important and will be incorporated into the following strategies for each age class.

### GOAL 1

**Maintain or improve woodland habitat for wildlife throughout the WMA system by supporting a landscape mosaic composed of a diversity of forest types and age classes (see Appendix A for target species).**

#### OBJECTIVES

Restore and maintain a minimum of 10% of the forested landscape within the WMA system as young forest.

Foster a component of intermediate forest on WMAs that provides habitat and can transition into quality mature forest habitat in the future.

#### STRATEGIES

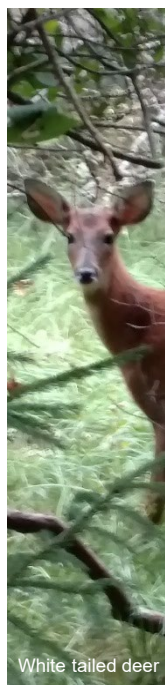
- Utilize commercial timber harvests and noncommercial habitat treatments following wildlife and silviculture BMPs to “reset” portions of intermediate or mature forest to an earlier stage.
- Regenerate even-aged stands of shade intolerant (e.g., aspen, birch, black cherry) and intermediately tolerant species (e.g., oak, hickory, white pine) before they decline and transition to dominance by shade-tolerant species (e.g., maple, beech).
- Convert mature conifer plantations to natural forest to increase species diversity and reduce vulnerability to natural disturbance or disease/pest outbreak.
- Incorporate early successional habitats (i.e., shrublands and reverting fields) into a WMA’s young forest management goal as appropriate, recognizing that stands dominated by shrub species will often provide the desired wildlife food and cover longer than newly harvested stands that have advanced seedling and sapling regeneration in the understory.
- Where appropriate, use prescribed fire to reset succession including, but not limited to, fire-dependent ecosystems.

- Allow young forest to mature as part of a long-term rotation of forest management.
- Perform tending cuts (e.g., thinning) that will release selected tree species of particular wildlife value and/or maintain tree species diversity. Selected species will vary by WMA.
- Implement silvicultural treatments to stimulate vertical structure development and create canopy gaps.

<p>Foster diverse, high-quality mature forest habitat that benefits wildlife associated with various forest types.</p>	<ul style="list-style-type: none"> <li>▪ Allow intermediate forest to mature as part of a long-term rotation of forest management.</li> <li>▪ Implement silvicultural treatments to create canopy gaps and to stimulate vertical structure development.</li> <li>▪ Regenerate northern hardwood stands and other shade-tolerant forest types using uneven-aged silviculture to establish or maintain three or more age classes.</li> </ul>
<p>Where appropriate, establish or maintain a late successional forest component on WMAs to provide habitat for wildlife associated with the complex, unique structure and vegetation of this age class.<sup>18</sup></p>	<ul style="list-style-type: none"> <li>▪ Identify stands that contain the appropriate age, structure, and species composition to be considered late-succession. Inform the New York Natural Heritage Program of potential old growth stands.</li> <li>▪ Avoid cutting treatments in existing late successional areas unless necessary to correct or prevent forest health concerns that would degrade habitat value.</li> <li>▪ Designate a selection of mature forest stands to let succeed to late-successional forest.</li> <li>▪ Implement silvicultural treatments in mature stands to develop complex stand structure mimicking late successional habitat (e.g., large trees &gt;24" DBH, canopy gaps, large snags, large downed logs).</li> </ul>
<p>Promote healthy forests to maintain and/or improve habitat value.</p>	<ul style="list-style-type: none"> <li>▪ In all forest types and age classes, retain specific trees (e.g., cavity trees, flaky barked trees), snags, downed woody material, and other habitat components important for wildlife. Create additional snags and downed woody material where deficient.</li> <li>▪ Plant seed or seedlings of herbs, shrubs, and trees with high wildlife value to improve areas where natural plant diversity is deficient (e.g., native shrubs for New England cottontail), to influence future forest composition (e.g., establish a conifer component), to create wildlife openings, and/or to revegetate log landings.</li> <li>▪ Routinely monitor forest stands and other nearby habitats for pests, pathogens, and invasive species to ensure early detection and rapid response.</li> <li>▪ As resources allow, control known occurrences of pests, pathogens, and invasive species to prevent spread and reduce extent of infestation.</li> <li>▪ Control interfering native vegetation when necessary to ensure desirable regeneration following a timber harvest, natural disturbance, or pest/disease outbreak.</li> <li>▪ Proactively remove infected or susceptible trees when appropriate (e.g., to restrict the spread of oak wilt).</li> </ul>

<sup>18</sup> D'Amato and Catanzaro. A Forest Manager's Guide to Restoring Late-Successional Forest Structure. Available at [https://masswoods.org/sites/masswoods.org/files/pdf-doc-ppt/forest\\_mgr\\_guide\\_ls\\_structure\\_web.pdf](https://masswoods.org/sites/masswoods.org/files/pdf-doc-ppt/forest_mgr_guide_ls_structure_web.pdf).

	<ul style="list-style-type: none"> <li>▪ Promote deer hunting on WMAs and implement timber harvest techniques that will minimize the impact of deer browse (e.g., leave scattered slash, increase harvest acreage).</li> <li>▪ Target degraded stands for timber harvests or other treatments to correct issues while concurrently achieving other habitat goals (e.g., creating young forest, creating uneven-age structure).</li> </ul>
<p>Incorporate long-term planning into management decisions.</p>	<ul style="list-style-type: none"> <li>▪ Consider rotational needs of even-aged forest types to ensure their perpetual presence on WMAs.</li> <li>▪ Consider the distribution of forest types on the WMA and the surrounding landscape.</li> <li>▪ Maintain or increase a conifer component on WMAs where appropriate.</li> <li>▪ Consider future climate conditions and the vulnerabilities of existing forest stands on WMAs and implement management actions that may make them less vulnerable and more adaptable.<sup>19</sup></li> <li>▪ Improve forest health and diversity to foster carbon storage and sequestration.<sup>20</sup></li> <li>▪ Maintain connectivity of WMA forests and the surrounding landscape to allow for future range adjustments of both plant and wildlife species.</li> </ul>



### Deer and regeneration

In some parts of New York, deer are at high enough densities to have significant impact on forest regeneration. Deer preferentially browse on tree species that provide high-value habitat (e.g., oak, black cherry, sugar maple), while avoiding the least beneficial plants (e.g., non-native invasive species). This presents a challenge as older trees die naturally or are harvested and younger trees of the same species are not able to replace them, changing future forest composition. Deer in sufficiently high concentrations can browse so extensively as to leave the understory of a forest nearly devoid of vegetation, limiting the current habitat value for many other wildlife species by preventing structural complexity and cover. This is especially problematic for songbirds that nest on the forest floor or in the understory.

Bringing local deer populations down to a level that corrects these issues is an ongoing challenge and implementing techniques on WMAs that mitigate this degradation is important. Hunting is the primary tool used to reduce the deer population, and participation in the Deer Management Assistance Program (DMAP) can further reduce deer numbers on individual properties. Collaboration with adjacent private landowners can further facilitate efforts to reduce local deer populations. However, proactive forest management is equally important. Techniques include scattering treetops and other slash throughout a stand after a cutting treatment to protect young tree growth, harvesting larger acreages to overwhelm deer with browse, installing deer enclosure fencing, and/or timing forest management treatments to occur only after efforts have been made to reduce local deer numbers.

<sup>19</sup> Swanston, C.W., M.K. Janowiak, L.A. Brandt, P.R. Butler, S.D. Handler, P.D. Shannon A. Derby Lewis, K. Hall, R.T Fahey, L. Scott, A. Kerber, J.W. Miesbauer, and L. Darling. 2016. Forest adaptation resources: climate change tools and approaches for land managers, 2nd edition. Gen. Tech. Rep. NRS-GTR-87-2. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station.

<sup>20</sup> Catanzaro, P. and A. D'Amato. 2019. Forest carbon: an essential natural solution for climate change. UMass Amherst and The University of Vermont.

## GOAL 2

Lead by example in planning and conducting active forest management for wildlife while protecting sensitive resources.

### OBJECTIVES

Promote wildlife diversity and increase populations of species of concern.

Develop a habitat management plan for each WMA that identifies wildlife habitat needs, opportunities, and plans for the future; and communicates our intentions to stakeholders and the public.

Avoid adverse effects to at-risk wildlife.<sup>21</sup>

### STRATEGIES

- Select target or umbrella species and utilize species-specific BMPs when planning forest management to promote the full range of forest habitats needed by a diversity of species. A list of recommended target species is provided in Appendix A.

- Prioritize management for at-risk species within their designated focal areas where applicable.

- Conduct or update habitat inventory of WMAs as needed to provide current (within 10-15 years) cover typing to inform habitat management planning.

- Develop HMPs for WMAs that articulate forest management goals, rationale, methods, and timeframes.

- Amend existing HMPs to address significant changes on a WMA (e.g., acquisition of additional acreage, change in management direction, address major natural disturbance).

- Prepare detailed silvicultural prescriptions for management activities outlined in the HMP. Use inventory data and pre-treatment regeneration assessments to inform how a stand is treated and any special measures that may be needed (e.g., increasing the size of a cut or leaving slash scattered throughout stand to mitigate potential deer browse impacts or pre-treating undesirable or interfering vegetation).

- Review available data and conduct surveys as needed to identify possible presence of at-risk wildlife near or within proposed habitat management locations.

- If warranted, restrict or eliminate management activities in proximity to known occurrences (e.g., establish buffer around a known nest location).

- Apply time-of-year restrictions to management activities to accommodate seasonal use by wildlife (e.g., conduct management during winter months when bats are in hibernation).

- Analyze costs and benefits when unable to avoid all negative impacts of the proposed management, since net benefit may justify short-term impact.

<sup>21</sup> At-risk wildlife includes Threatened and Endangered species, Species of Special Concern, and Species of Greatest Conservation Need.

Protect soil and water resources.

- Follow established forestry BMPs<sup>22</sup> when planning or conducting management activities and stipulate their use in both commercial and non-commercial contracts.
- Limit equipment operation in areas with steep terrain where feasible.
- Limit management activities in Special Management Zones (SMZs) unless necessary to create or improve habitat for a species (e.g., activities in/near wetlands for American woodcock). Document additional measures taken to reduce or prevent damage to soil and water quality, such as limiting activity to exceptionally dry or frozen conditions.
- Include site restoration in contracts to address short-term impacts such as rutting.
- Regularly inspect active timber sales or other management activities to ensure compliance.
- Prioritize the use of biological or mechanical means to control pests, pathogens, and interfering vegetation whenever practicable (e.g., mechanical control, prescribed burn). Utilize chemical control if necessary.



Non-native, invasive plants are a significant challenge to managing healthy forest habitats. Many of these species are widespread and are currently present on WMAs, while others are just beginning to increase. Invasive plants degrade habitats by reducing plant diversity and disrupting ecosystem functions. They are poor food sources for wildlife, providing unpalatable browse and fruit with little nutrition, and host low numbers of invertebrates. Invasive plants also have the potential to suppress the regeneration of desirable trees after a harvest. The detection and management of invasive plants is an important ongoing priority, especially in stands scheduled for a harvest.

Examples of invasive plants include:

- Autumn olive
- Barberry
- Common buckthorn
- Common reed
- European alder
- Garlic mustard
- Glossy buckthorn
- Honeysuckle
- Japanese stiltgrass
- Japanese knotweed
- Mile-a-minute
- Multiflora rose
- Oriental bittersweet
- Swallow-wort

Some native plants also have the potential to interfere with forest regeneration efforts (e.g., beech, ferns, grape, hophornbeam, striped maple). In high numbers these can outcompete and suppress desirable tree species following a harvest, especially in areas with overabundant deer. In this context desirable trees are those species with high wildlife value that are targeted to compose the future forest canopy, which can vary widely by stand/WMA but may include oak, cherry, maple, or pine. Although these interfering species are normally an important component of a forest ecosystem, they should be considered prior to a harvest and if necessary, should be controlled to promote the establishment and regeneration of desirable trees.

<sup>22</sup> NYS Forestry Best Management Practices for Water Quality

## Monitoring and Evaluation

Assessing wildlife and vegetation responses to habitat management allows us to evaluate the effectiveness of the program and, if necessary, adjust our management. Wildlife monitoring can document changes in distribution, occupancy, or population trends for various species as a result of habitat management activities. Target species use will continue to be the primary indicator of the effectiveness of forest habitat management. Monitoring changes in the composition and structure of forest stands and overall forest health over time will help document the success or shortcomings of management actions. It also increases the potential for early detection of pests or the establishment of undesirable species. This will give staff the opportunity to carry out corrective actions that promote the regeneration of desired species at an early stage of stand development, which is more efficient and cost effective long-term.

<b>GOAL</b>	
<b>Effectively demonstrate successful forest management outcomes and determine whether adjustments are needed to improve outcomes.</b>	
<b>OBJECTIVES</b>	<b>STRATEGIES</b>
Monitor and assess wildlife response to forest management.	<ul style="list-style-type: none"> <li>Survey target and non-target wildlife pre- and post-treatment using standardized survey protocols.</li> <li>Update the monitoring plan.</li> </ul>
Assess vegetation response to forest management.	<ul style="list-style-type: none"> <li>Maintain current habitat and forest stand inventory in SFID (e.g., update stand data every 10-15 years or after management actions).</li> <li>Monitor habitat change using qualitative regeneration assessments (e.g., structure, composition, invasives, forest health<sup>23</sup>) and, at select areas, quantitative regeneration plots.</li> <li>At select WMAs including demonstration areas, assess deer impacts on regeneration using the Assessing Vegetation Impacts from Deer (AVID) protocol.<sup>24</sup></li> </ul>
Adapt future management and/or implement corrective actions based on regeneration assessments.	<ul style="list-style-type: none"> <li>If needed, plant, seed, install deer fencing, manage invasive/undesirable plants, or otherwise re-treat the project area to establish the desired habitat structure and composition.</li> <li>Continue post-treatment assessments until forester determines that desirable regeneration has established.</li> </ul>
Manage data and share results.	<ul style="list-style-type: none"> <li>Compile and manage all survey data in a centralized database.</li> <li>Prepare periodic qualitative and quantitative reports summarizing survey effort and results.</li> </ul>

<sup>23</sup> Regeneration assessments are conducted at years 1, 3, and 5 after management, longer if issues are identified. Metrics include forest type; treatment method and timing; species composition (desirable and undesirable regen); regen stocking/spatial distribution; regen size classes; undesirable vegetation, stocking, and size; invasive plants; special management zones; features for retention; forest health concerns; and deer browse severity.

<sup>24</sup> Available online at <https://aviddeer.com/>



## Communication and Outreach

We cannot overstate the importance of exceptional communication and outreach to maintain public support of active forest management and to continue collaboration with conservation partners. Increased awareness about why we are managing forests can lead to greater support and understanding.

GOAL	
Communicate effectively to foster understanding of WMA management and to encourage forest stewardship across NY.	
OBJECTIVES	STRATEGIES
Raise awareness, increase understanding, and encourage a positive public perception of forest management for wildlife.	<ul style="list-style-type: none"> <li>▪ Continue to maintain and develop website, signs, articles, and other outreach materials.</li> <li>▪ Showcase forest management techniques for wildlife at demonstration areas.</li> <li>▪ Continue to meet with stakeholders (e.g., HMP meetings, workshops, demonstration area tours, or other outreach events).</li> <li>▪ Engage volunteers to assist with management activities such as planting native tree/shrub seedlings or controlling invasive species.</li> </ul>
Foster beneficial relationships and a collaborative approach with conservation partners.	<ul style="list-style-type: none"> <li>▪ Continue participation in partnerships and working groups.</li> <li>▪ Work with Partnerships for Regional Invasive Species Management (PRISMs) on invasive species issues.</li> <li>▪ Host and participate in volunteer workdays.</li> <li>▪ Seek to establish new partnerships.</li> </ul>
Promote forest management for wildlife on other state and private lands.	<ul style="list-style-type: none"> <li>▪ Provide technical support for forest landowners, DLF, Natural Resource Conservation Service, Farm Service Agency, and others upon request to integrate wildlife objectives into their forest management opportunities where appropriate.</li> <li>▪ Collaborate with partners to provide woods walks, workshops, and other outreach events.</li> <li>▪ Prioritize these efforts within target species focus areas (for New England cottontail, whip-poor-will, and golden-winged warbler).</li> </ul>



A photo point monitoring location at Bear Spring Mountain WMA. Photo by Paul Farley.

## Appendix A. Target Species

Target Species	Conservation Need	Age Class Association	Key Habitat Features	Silvicultural Systems	Associated Wildlife
American Woodcock	Game Species, SGCN	Young	High stem density areas adjacent to small clearings, moist soils, alder and aspen especially valuable	Even-aged	Wood Turtle
Canada Warbler	High Priority SGCN, Range-restricted	Young	Dense understory, canopy gaps, moist forest e.g. riparian, swamps, bogs	Even-aged Uneven-aged	Black-billed Cuckoo Spotted Turtle Yellow-breasted Chat
Cerulean Warbler	SGCN, Species of Special Concern, Range-restricted	Mature, Late-successional	Large diameter deciduous trees with large crowns, low forest stocking with canopy gaps, dense understory	Even-aged Uneven-aged	Kentucky Warbler Worm-eating Warbler
Eastern Whip-poor-will	High Priority SGCN, Species of Special Concern, Range-restricted	Young, Intermediate	Open forests adjacent to clearings, sandy soils, oak-pine forest especially valuable	Even-aged	Karner Blue Butterfly Prairie Warbler Eastern Box Turtle
Golden-winged Warbler	High Priority SGCN, Species of Special Concern, Range-restricted	Young, Mature	Young deciduous forest adjacent to mature forest, herbaceous openings, scattered leaf trees	Even-aged	Blue-winged Warbler Brown Thrasher
New England Cottontail	High Priority SGCN, Species of Special Concern, Range-restricted	Young	High stem density, herbaceous openings, moderate canopy cover, brush piles	Even-aged Uneven-aged	Eastern Cottontail Bobcat
Ruffed Grouse	Game Species, SGCN	Young, Intermediate	High stem density, drumming logs, aspen especially valuable	Even-aged Uneven-aged	
Snowshoe Hare	Game Species, Range-restricted	Young, Intermediate, Mature	Coniferous and deciduous forest with seedling-sapling patches, herbaceous openings, and woody browse, spruce-fir especially valuable	Even-aged	American Marten Bobcat Olive-sided Flycatcher Moose Rusty Blackbird
White-tailed Deer	Game Species	Young, Intermediate, Mature	High stem density, mast trees, softwood inclusions especially valuable in winter	Even-aged Uneven-aged	
Wild Turkey	Game Species	Young, Intermediate, Mature	High stem density or dense woody debris, mast trees, scattered herbaceous openings	Even-aged Uneven-aged	
Wood Thrush	SGCN	Mature, Late-successional	Large forest blocks, closed canopy, layered vertical structure, moist soil, leaf litter	Uneven-aged	Black-throated Blue Warbler Scarlet Tanager Northern Goshawk