PLANTATIONS

To perpetuate a plantation, it is necessary to plant trees. Some species of conifers may not be prevalent in the landscape and may also be difficult to regenerate naturally without significant site preparation. Therefore, natural regeneration of some species may require intensive site preparation to prepare a seed bed that will allow regeneration to become established. Therefore, planting on some sites will be the best ecological decision where maintaining a softwood component in the landscape is the desired goal for biological diversity of habitat types.

ADDITIONAL RESOURCES

Stocking Guides for Plantation Management:

Gilmore, Daniel W. and Briggs, Russell D.; NJAF 20(1) 2003; A Stocking Guide for **European Larch** in Eastern North America.

Gilmore, Daniel W. and Palik, Brian J.; NC-246 2005; A Revised Managers Handbook for **Red Pine** in the North Central Region.

Halligan, J.P. and Nyland, R.D.; NJAF 16(3) 1999; Relative Density Guide for **Norway Spruce** Plantations in Central New York.

Lancaster, Kenneth F. and Leak, William B.; NE-41 1978; A Silvicultural Guide for **White Pine** in the Northeast.

Converting to Natural Forest Conditions through Even-aged Silviculture

Converting a plantation stand to a natural forest condition through even-aged silviculture can be accomplished in a number of ways. The plantation can be managed over time to stimulate the establishment of desired regeneration under the mature plantation trees. This regeneration may germinate from the plantation overstory or from trees in nearby stands. There are many techniques foresters use to stimulate this regeneration potential including thinning the plantation overstory by removing poorly formed and stressed trees to allow sunlight down to the forest floor and, in certain conditions, by weeding out undesirable trees and vegetation in the understory. Silviculturally, the methods of overstory preparation for regeneration can include thinning, seed tree, and shelterwood cuts. Eventually, the plantation should develop a dense “carpet” of seedlings ready to be released. At this point, an overstory removal may be conducted to release the newly established regeneration.

Foresters may employ variations on these models, including expanding gap shelterwoods, a technique the Germans refer to as “femelschlag”. These variations result in a patchwork of new regeneration, both from plantation species and naturally occurring trees within and near the stand. Such variations give foresters more options for naturally regenerating stands on a variety of sites (Belair et al, 2018).

Converting to a New Plantation through Even-aged Silviculture

In some circumstances, plantation trees should be removed before advanced regeneration has been established. This removal, referred to as clearcutting, may occur on State Forests in one of two cases; either the action has been identified in a UMP or other formal public process or the action becomes necessary when the condition of the majority of plantation trees meets one or more of the following criteria:

- More than 75% of the plantation species basal area (BA) exhibits declining health and vigor, caused by one or more biotic or abiotic factors;
- More than 75% of the plantation species BA is susceptible to excessive wind and weather damage or insect and disease damage within the next five years;
- More than 75% of the plantation species BA exhibits excessive wind and weather damage or insect and disease damage;
- A combination of decline, susceptibility and damage affects more than 75% of the plantation species BA (ex. 25% showing signs of decline, 25% susceptible to wind throw, and 30% with broken tops);
- The plantation poses a forest health or public safety risk.

Evidence of decline, susceptibility, or damage must be documented in the stand prescription with justification of why alternatives (i.e. do nothing, thinning, herbicide, or other alternative option) are not appropriate.

Artificially Regenerating a Plantation

The Bureau recognizes that conditions may require planting seedlings after a clearcut. This is called artificial regeneration. Conditions that may result in the decision to plant trees may include the presence of undesirable vegetation in surrounding stands, high deer browse hindering the success of natural regeneration, the lack of a seed source for desirable species, evidence of repeated intermediate treatments that have not resulted in adequate desirable regeneration, or other unique conditions.

If the forester decides to artificially regenerate a stand after a clearcut they should consider establishing native species over non-native species and a mixture of species types over a monoculture (single species). However, in clearcuts where high deer browsing has prevented natural native species from regenerating successfully foresters may decide to choose non-native, non-invasive species that are less palatable by deer and are more likely to successfully grow. Mixed-wood plantations utilizing appropriate species selection generally show more resilience to pests and pathogens, can reduce the transmission rates of disease (Keesing et al, 2010), and helps facilitate adaptive response for greater adaptability to climatic changes (Nagel et al, 2017).

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Artificial regeneration of approved non-native species (species not native to North America prior to European settlement) may be considered only if it is determined the non-native species does not have invasive properties (outcompetes native species in a natural state), has a New York invasive risk assessment of medium or less, is more suited for the site due to soil and other properties, is resistant to wildlife impacts, can outcompete undesirable vegetation, is most appropriate to reach desired ecological goals, and is available.

Norway spruce seedlings being planted by a contractor through sale related work on Leonard Hill State Forest, 2019.

List of approved non-native species - January, 2021:

- Norway Spruce (*Picea abies*)
- Scots (Scotch) Pine (*Pinus sylvestris*)
- Japanese larch (*Larix kaempferi*)
- European larch (*Larix deciduas*)
- Hybrid larch (*Larix x europlepis* Henry)

Converting to Natural Forest Conditions through Uneven-aged Silviculture

Uneven-aged management may be used to manage plantations of native softwoods, Norway spruce or to convert even-aged plantations into uneven-aged hardwood stands over time. Uneven-aged management may be desirable in highly visible stands or stands adjacent to high use recreation areas.

Uneven-aged vs Even-aged

Both even-aged and uneven-aged silvilcultural systems may result in stands that contain significant species and structural diversity. Single age class monocultures, which can be prone to environmental, insect and disease damage, do tend to create highly operable stands with trees of uniform sizes in consistent densities, are relatively simple to administer, and maximize timber volume per acre in stands. These factors also lend themselves to producing high value forest products such as utility poles, which depend on minimizing branch size and increasing the distance between internodal branch whorls. Some shade-intolerant species will naturally self-prune under high stem densities. Increasing biodiversity will result in mixed species stands which may produce challenges for future stand management. Trees grown in fuller light conditions may have higher live crown ratios, which can reduce the value of the tree. Stands which contain mixed conifers and hardwoods may also pose challenges to marketability in the future, as logging contractors often specialize in hardwoods or softwoods, but seldom both.

Such considerations should be evaluated, because changing the way we manage plantations will come with a trade-off. There may be room for both of these paradigms. Trending away

from monocultures does not necessarily mean there cannot be room for them. For example, managers in the lake states have been successful in propagating jack pine and red pine stands for multiple rotations (Gilmore, et al, 2006), and in some cases, possibly for thousands of years (Mann, 2006).

Future Needs for Plantation Management

Resources to Establish and Maintain Plantations

Funding and manpower are needed to manage existing plantations and establish new ones. Non-commercial treatments such as site preparation, tree planting, and non-commercial thinning are currently accomplished through sale related work due to lack of staff and funding. Non-commercial thinning can be done with acceptable success through sale related work. However, in some areas of the state site preparation and tree planting have only a moderate to poor success rate when accomplished through sale related work. In addition, a lack of Foresters available to conduct sales on State Forests severely limits the amount of plantation management that can be done through sales. Release of young plantations generally cannot be included in sale related work, leaving very few options to accomplish this necessary treatment. Having Department resources dedicated to the establishment and management of plantations would allow for all these activities to be conducted much more effectively because there would be significantly more freedom to plan and conduct the necessary treatments.

State Tree Nurseries

Seedlings can't be planted without nurseries to grow them. At its peak, the State operated 17 nurseries across the state and provided millions of seedlings across the state. If DEC is committed to maintaining plantations on State Forest Lands, the Colonial William F. Fox Memorial Saratoga Tree Nursery must remain open as a reliable source of quality tree seedlings. Currently, the Nursery is suffering from the same effects of a lack of funding and manpower that all State Forests are experiencing. Implementing a vigorous statewide plantation management program would require not only an investment in the Saratoga Tree Nursery, but also an investment in the establishment of other state-operated tree nurseries located across the state.

Interesting Background on Black Locust

Black locust was historically planted on State Forests, primarily in the 1930s and 40s. It was used to reclaim abandoned agricultural sites and planted both in pure stands and intermixed with other species. Black locust is endemic to the United States, including New York, and has been mentioned in records dating back to the 1600s. It was widely cultivated throughout the United States and has naturalized in many areas.

Black locust is in the legume family and as such has the ability to fix atmospheric nitrogen into the soil, both restoring degraded lands and enriching the soil to allow other species to become established. Few other trees can even come close to its bending strength, hardness, stiffness, compression and natural resistance to decay. It has been used for generations as fence posts, lumber, and fuelwood. A particular strain of black locust called shipmast locust *(Robinia pseudoacacia var. rectissima*) has a remarkably straight and tall form and was used to create the ribs and planking for ships. The flowers of black locust are also highly attractive to pollinators and produce an excellent honey (McLane, 2004).

Black locust was introduced on Long Island and in the Hudson Valley as early as the late 1600s. It has since become problematic in those areas due to its fast growth rate and vigorous root suckering and sprouting, resulting in other native species being outcompeted. Other areas of the state do not see the same aggressive behavior. Without disturbed areas to colonize, black locust tends to diminish and decline in a forested setting.

In 2014, black locust was listed as a regulated invasive species, despite being a native tree, and is no longer being planted on state lands. Foresters in many parts of the state have expressed interest in removing black locust from the invasive species list and once again planting this useful tree, though not perhaps in areas where it is known to rapidly colonize a site and outcompete other native species. It is likely there will be continued demand for this tree as an alternative to pressure treated lumber, and it could be valuable in meeting management goals of site enrichment and interspecies planting.

PLANTATION MANAGEMENT OBJECTIVES, ACTIONS AND SEQR ANALYSIS

Plantation Management (PM) Objective I – Provide guidance to regional staff regarding the management of plantations on State Forests.

PM Action 1 – Revise Program Policy ONR-DLF-1 Plantation Management on State Forests to reflect knowledge gained since it was adopted.

PM Action 2– Explore the removal of black locust from the regulated invasive species list and incorporating this species into plantation options.

PM Action 3 – Commit more resources to the management of plantations by hiring more Foresters to manage them and providing funding sources Foresters can use to implement plantation management activities.

PM Action 4 – Commit more resources to the Saratoga Tree Nursery to support their efforts to provide quality tree seedlings for planting on State Forests.

PM Action 5 – Explore the possibility of establishing a formal statewide plantation management program.

PM SEQR Alternatives Analysis and Thresholds

The **no-action alternative** as regards plantation management, would involve a "business as usual" approach. This approach has not been adopted because there is a wide variation in management approaches between DEC regions where some regions are converting a majority of plantations to natural forest cover while others are re-establishing new plantations, and a more balanced approach is preferred.

Another alternative is to allow plantations to naturally decline, without active management, and transition to natural forest cover. This alternative has not been adopted because this would elevate risks from disease and insect infestations as well as introduce some risk of wildfire due to poor health in overmature stands. Also, the failure to produce forest products would affect local economies and would drive many small sawmills, which specialize in softwoods, out of business. An indirect impact would result from shifting existing demand to other forests, regions or countries where harvesting methods may not be sustainable. Another impact would be our failure as a State to complete the restoration of State Forests, which were originally acquired for reforestation.

The **preferred alternative** is to establish formal program policies for the management of plantations on State Forests. Under this alternative, plantations will be more uniformly managed across the state to protect sensitive sites, rare and endangered species and to meet other ecological goals while continuing to produce forest products and stimulate local economies; following retention standards, a clearcutting policy and an overall plantation management policy.

No other alternatives have been considered.

SEQR Analysis Threshold: Plantation management strategies established in this section will avoid and minimize potential impacts to the maximum extent practicable and no further SEQRA review will be conducted. However, SEQR analysis and thresholds for specific harvesting methods and use of pesticides to accomplish plantation management goals have been addressed in the section titled Active Forest Management.

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FOREST AND ECOSYSTEM HEALTH

Threats and challenges to New York's forest health are principally: global climate change, invasive plant and animal species, loss of habitat connections across the landscape, and poor reestablishment of desired trees and plants following natural or human caused disturbances, and native pests and diseases.

Change is inevitable. Scientists have come to understand that disturbance is necessary for many kinds of forests and that it is the frequency, kind, degree and rate of change that is important, not necessarily the change itself (Botkin 1990). Not all changes are beneficial, especially those not integral to natural processes. Human introduced changes, such as those caused by the introduction of invasive species can cause drastic, sudden and permanent changes to the ecosystem and seriously disrupt forest health.

New York's forests are remarkably resilient, as demonstrated by how well they have reestablished themselves following large scale land clearing associated with European colonization. However, trends in economic globalization combined with exponential growth in human population continue to significantly impact the species composition, resiliency and function of New York's forest ecosystems.

Forest health will be pursued with the goal of maintaining biodiversity. Any agent that decreases biodiversity can have a deleterious effect on the forest as a whole and its ability to withstand stress.

Forest health in general should favor the retention of native species and natural communities or species that can thrive in site conditions without interrupting biodiversity.

The ecological health and function of forests is dependent on a carefully balanced interdependence of species. Degradation caused by a disturbance such as invasive insect activity or improper forest management can leave forests prone to further mortality. New York's forests are under constant stress from native pests such as pine beetles and tent caterpillars. These stresses are increasing due to changing site conditions caused by climate change, as well as the threat of damage from invasive species.

Native Pests and Diseases

While invasive species are often the focus of land managers native pests and diseases can also have a significant impact on the health of forests. Native pests such as southern pine beetle and forest tent caterpillar often cause damage on a cyclical basis and can lead to tree mortality. Managers should plan for growth loss, mortality and possible salvage sales when managing stands that have a history of impact from native pests. Furthermore, as climatic changes continue to occur the cycles, ranges, and impacts of these native pests will likely change over time leading to increased stressors on New York forests. In order to continue monitoring and

tracking these pests over time, land managers should report outbreaks and any changes to the cycles to BISEH staff.

INVASIVE SPECIES

Economic globalization has brought tremendous benefits to many people. Unfortunately, those benefits have also come with a high cost. As global trade and travel have increased, so have the introduction of non-native species. While many of these non-native species do not have adverse effects on the areas in which they are introduced, some become invasive in their new ranges, disrupting ecosystem function, reducing biodiversity and degrading natural areas.

Invasive species have been identified as one of the greatest threats to biodiversity, second only to habitat loss. Invasive species can damage native habitats by altering hydrology, fire frequency, soil fertility and other ecosystem processes, or even remove entire species from an ecosystem. Some invasive species can also be harmful or poisonous to humans or livestock and can have negative impacts on agriculture.

In addition to causing environmental damage, invasive species can have a tremendous economic impact as well. It is estimated that invasive species cost the US over a hundred billion dollars a year in agriculture losses and control costs. Invasive species can also hamper recreational opportunities by reducing access, degrading the quality of recreational areas and altering the aesthetic beauty of scenic natural areas.

The leafless trees in this photo are dead ash trees, infested by the Emerald Ash Borer. A forest that is composed of a single species majority is more prone to attack.

Newly found populations of invasive species may be controlled or even eradicated. If an invasion is detected when the population is small and manageable, eradication may be possible. However, if an infestation goes undetected and the population becomes well established, the best option may be to enact control efforts with the goal of lessening its impact or preventing its spread.

Insects and Disease

When a non-native insect or disease is introduced from another country, the natural controls in its native range are often lacking in its new "home" causing epidemic population levels and rampant infestations. The introduction of American chestnut blight fungus *(Cryphonectria parasitica)* in the United States illustrates this point. "The blight fungus disease was first observed in the U.S. [at the Bronx Zoo] killing American chestnuts *(Castanea dentata)* in 1904…

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after being imported … to the US from Asia on imported chestnut trees. …The disease spread like fire throughout the eastern states, and across the entire natural range of the American chestnut. By the 1920s, the disease had even reached southern Ontario, and by the 1930s, the entire stock of American chestnuts was infected, with most of them dying. By 1940, over three and a half billion American chestnuts had been lost to the fungus. In less than four decades, a dominant American tree species had been converted to a threatened species." (Rellou 2002).

Over the past 80 years similar situations with exotic diseases and insects have dramatically altered New York State Forests including:

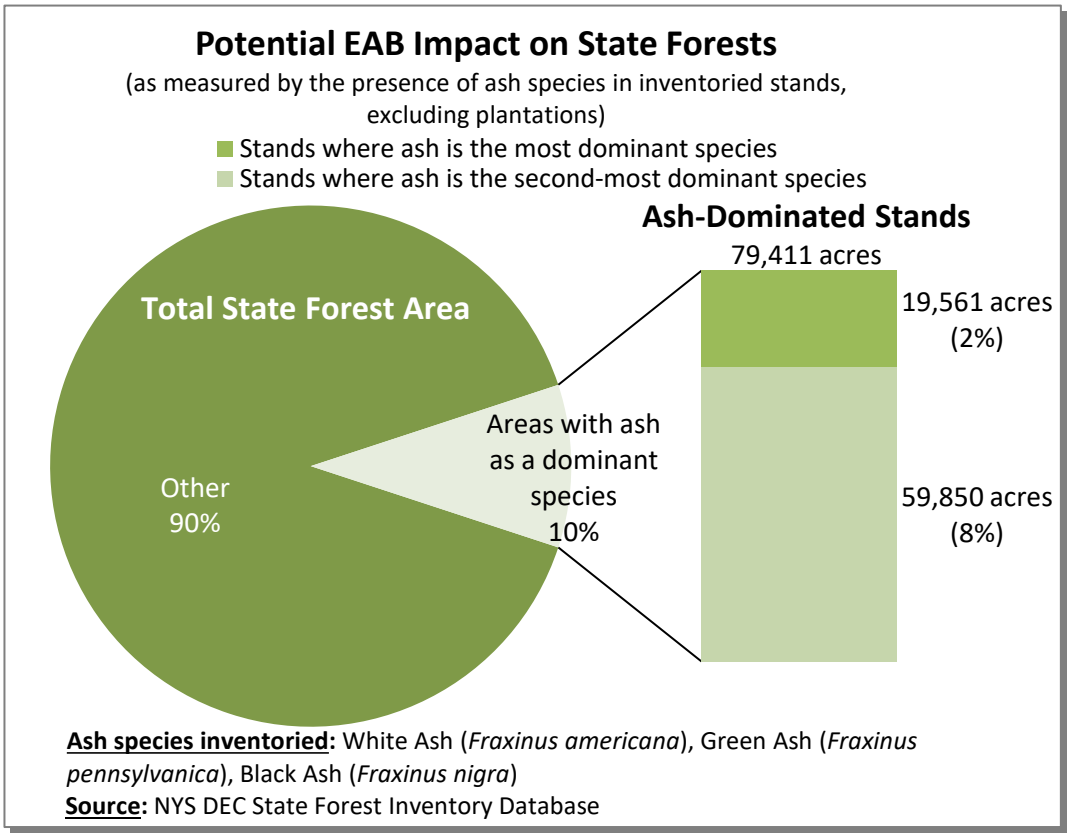
- Dutch elm disease *(Ophiostoma novo-ulmi)* devastated American Elm *(Ulmus americana)*;
- Beech bark scale (*Cryptococcus fagisuga*)/ nectria fungus complex (*Nectria galligena* and *N. coccinea* var. *faginata*) has caused a dramatic dieback of American beech trees;
- Butternut canker caused by an exotic fungus (*Sirococcus clavigignenti-juglandacearum)* is pushing Butternut (*Juglans cinerea*) into a threatened status.
- European gypsy moth (*Lymantria dispar)* caterpillars' repeated defoliation of oaks, apple, basswood, birch, poplar and willow trees can lead to widespread mortality.

More recent introductions threaten New York State Forests as well, including;

- Asian long-horned beetle (ALB), *Anoplophora glabripennis,* which kills all maple varieties, alder, birch, elm, horse chestnut, poplar and willow;
- Emerald ash borer(EAB), *Agrilus planipennis,* which kills all ash species;
- Hemlock woolly adelgid (HWA), *Adelges tsugae,* which kills eastern hemlock (*Tsuga canadensis)*;
- Southern pine beetle (SPB), *Dendroctonus frontalis,* which kills pitch pine trees;
- Beech leaf disease (BLD), which kills beech trees;
- Spotted lantern fly (SLF), *Lycorma delicatula,* which feeds on a large variety of trees including ailanthus, maples, and apple;
- Oak wilt (OW) *Bretziella fagacearum,* which kills oak trees;

Tunneling damage caused by the Emerald Ash Borer

- Sudden Oak Death, *Phytophthora ramorum,* which infects all oaks, Douglas fir and rhododendrons among its hosts.



Plants

It has been estimated that about 1/3 of all the plant species presently known to occur in New York are non-native. Of these, some have demonstrated the ability to crowd out native vegetation, alter local ecology, or cause harm to people or animals. Some examples include:

- Purple loose-strife (*Lythrum salicaria*) and certain non-native species in the genus *Phragmites*, which displace native wetland vegetation;
- Japanese barberry (*Berberis thunbergii*) , which inhibits regeneration of native species;
- Japanese knotweed (*Fallopia japonica*), which can dominate riparian areas and accelerate erosion;
- Common buckthorn (*Rhamnus cathartica*), which can dominate upland areas;
- Norway maple (*Acer platanoides*), which creates very heavy shade, discouraging herbaceous and understory vegetation.
- Giant hogweed (*Heracleum mantegazzianum*), which reduces the skin's ability to filter sunlight, causing severe burning.

- Japanese Stiltgrass (*Microstegium viminium), spreads rapidly through small seeds on tires or hiking boots can outcompete many native species.*

Invasive Species Management Strategy

Through active management practices, DEC staff and contractors have the potential to unknowingly introduce and spread invasive species, and at the same time, the ability to prevent or reduce their impacts. Silvicultural practices, ranging from wildlife enhancement to land-use conversion influence invasive species growth, reproduction, and dispersal. Recognizing and predicting the response of individual species to these practices will enable managers to take steps to prevent or reduce the impact of invasive species on the State Forests and surrounding lands.

Past management efforts for invasive species on State Forests have primarily focused on minimizing the spread of newly documented and immature infestations before they have the chance to become well-established. The long-term strategy for managing invasive species on State Forest lands uses a combination of the following techniques: prevention, cooperation and collaboration, inventory and monitoring, early detection and rapid response (EDRR), treatment and control, and restoration. The forest as a whole must contain sufficient diversity and vitality to withstand future threats. State Forests must be managed carefully so as not to expose ecological systems to damage. State Forest lands must be monitored for the presence of damaging agents that can include fungi, insects, diseases and harmful plants.

Cooperation with federal, private and state partners helps DEC staff stay ahead of new threats by understanding the biology, symptoms, hosts, and available control strategies of many of the insects and diseases that can harm trees and forests in New York State. DEC's newly created (2017) Bureau of Invasive Species and Ecosystem Health incorporates both the Forest Health and Invasive Species Coordination sections. The Forest health section gathers, analyzes, and reports on tree pest and disease information. The highest priority is placed on early detection of and rapid response to high-impact invasive species that may threaten the health of New York's forests. The Invasive Species Coordination section supports the New York State Invasive Species Council in ensuring that the state has a comprehensive and well-coordinated system for preventing and managing the many ecological, economic and human health threats posed by invasive plants, animals and pathogens.

Preventing an introduction is the preferred strategy and the first line of defense against invasive species. Prevention measures are usually the most cost-effective means to minimize or eliminate the environmental and economic impacts caused by an invasive species.
EDRR is the second line of defense against invasive species. The early detection of a new invasive species can result from formal monitoring systems, such as networks of trained professionals or volunteers, or from public inquiries to agencies or organizations. The rapid

response process begins once a potentially new infestation has been reported to an agency (e.g., state or federal resource agencies, public land managers) or organization (e.g., PRISMs, private land managers) whose mission includes responding to invasions. EDRR of new invasions greatly improves the likelihood of species eradication and eliminates the need for long-term management and control programs. To assist with EDRR, DEC has supported iMap Invasives to provide a universal reporting method for the public and DEC partners to report new invasive species findings. Recently new invasive infestations have been found through public reports through this system.

ADDITIONAL RESOURCES

Invasive Species Guidance Documents

DEC, with assistance from the Invasive Species Council agencies and Advisory Committee member organizations, is in the process of developing several new documents relevant to the management of invasive species. Those documents include:

- Generic Environmental Impact Statement (GEIS) for Rapid Response Actions
- Rapid Response Framework for Invasive Species
- Comprehensive Management Plan for Invasive Species
- Lists of Prohibited, Regulated and Unregulated Non-native Plant and Animal Species

These documents will be posted as they are finalized, at https://www.dec.ny.gov/animals/265.html.

Treatment and control measures are usually the last line of defense against invasive species. If an invasive species goes undetected and the population becomes well established, the most effective action may be controlled to lessen its impact or strategies to slow its spread to unaffected areas. In these cases, populations are typically beyond eradication, but can usually be managed or confined to tolerable levels.

Restoration of lands impacted by invasive species should be focused on restoring native species and resilient habitats found in that ecosystem. After ecosystems are impacted by invasive species desirable communities may not return without active intervention. Restoration activity may include silvicultural applications, planting, fire disturbance or other actions to return an ecosystem to its desired state.

Aquatic Invasive Species

Although water-based activities are not as prevalent on State Forests as land-based activities, there is still a significant risk that recreationists, contractors and other people entering State Forests could contribute to the spread of aquatic invasive species. Of particular concern are the illegal introduction of fish species via the dumping of bait buckets, and the failure to properly clean and disinfect boating and fishing equipment. Other vectors include the use of motorized and non-motorized boats, and boots and shoes which can spread invasive plant species and fish diseases. A complete discussion of these issues and recommended disinfection practices can be found at www.dec.ny.gov/animals/50121.html.

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Invasive Species Management Principles

The call for a management approach that balances sustainable forestry with the need to preserve native or non-invasive plant and animal communities is a challenging and complex task. Understanding the relationship between management practices and invasive species is paramount. Invasive species can eliminate all productive uses on infested sites and can be very expensive to control or eradicate if an inappropriate action is taken.

The following principles will be used to manage invasive species on State Forest lands, and although public education and outreach do not garner their own specific line items below, it is generally assumed that each step can/will include them as an element:

1. Learn to identify invasive plants and animals and address their presence and impact in UMPs

Knowing which invasive plants and animals are likely to invade a region and being able to identify those species aids in preventing their spread and quickly responding to new threats. UMPs should incorporate analysis of current and potential future threats to forests as well as the impact that these invasives might have on biodiversity or timber production.

2. Prevent the introduction of invasive plants and animals to uninfested sites.

Invasive species can be introduced to a site by moving infested equipment, soil, sand, gravel, borrow, fill and other off-site material. Monitoring disturbed areas and proper sanitation of equipment will help prevent new infestations. Best Management Practices (BMPs) to prevent the introduction of invasive species include:

- Clean equipment prior to visiting site.
- Begin activities in uninfested areas before operating in infested areas.
- Use native plants and weed-free seed and mulch (straw, wood fiber).
- Use fill that does not have invasive plant seeds or material.
- Keep equipment on site during the entire project.
- Incorporate invasive plant prevention into road work layout, design, and decisions. Use uninfested areas for staging, parking and cleaning equipment. Avoid or minimize all types of travel through infested areas, or restrict to those periods when spread of seed or propagules are least likely.
- When possible, to suppress growth of invasive plants and prevent their establishment, retain relatively closed canopies.

3. Contain and treat new invasive plants and animals or those not yet well established.

Controlling small infestations is more effective and economical than trying to control well-established, rapidly spreading infestations. Selected control measures need to be based on species biology and the individual characteristics of an infestation.

4. Minimize transport of invasive plants and animals from infested to uninfested areas.

Invasive species can be spread by moving infested materials and equipment. Cleaning vehicles and equipment is an effective method of preventing an introduction. Best Management Practices (BMPs) involving the transport of off-site material and equipment include:

- Determine the need and identify sites where equipment can be cleaned. Seeds and plant parts need to be collected when practical and effectively disposed of (e.g., burned, buried, dried, bagged and taken to landfill, etc.). Remove mud, dirt, and plant parts from project equipment before moving it into a project area and clean all equipment before leaving the project site, if operating in infested areas.
- Inspect material sources at site of origin to ensure that they are free of invasive plant material before use and transport. Treat infested sources for eradication, and strip and stockpile contaminated material before any use.
- Inspect and document the area where material from treated infested sources is used annually for at least three years after project completion to ensure that any invasive plants transported to the site are promptly detected and controlled.
- Minimize roadside sources of seed that could be transported to other areas.
- Periodically inspect system roads and rights-of-way for invasion. Inventory and mark infestations and schedule them for treatment.
- Avoid working in infested areas if possible. Postpone work until invasive plants have been eliminated from the site.
- Perform road maintenance such as road grading, brushing, and ditch cleaning from uninfested to infested areas to help prevent moving seeds and plant material from infested areas into adjacent uninfested areas.
- Clean road graders and other equipment immediately after operating in infested areas.
- Clean all dirt and plant parts from the top and underside of mower decks.

5. Minimize soil disturbance.

Invasive plants prefer and often thrive under disturbed conditions. Do not disturb the soil unless absolutely necessary for regeneration specified in the stand's prescription. BMPs for activities involving soil disturbance include:

- Before starting ground-disturbing activities, inventory invasive plant infestations both on-site and in the adjacent area.
- Minimize soil disturbance and retain desirable vegetation in and around area to the maximum extent possible.
- Monitor infested areas for at least three growing seasons following completion of activities. Provide for follow-up treatments based on inspection results.
- Avoid, where possible, grading roads or cleaning ditches where new invaders are found.

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- When it is necessary to conduct soil work in infested roadsides or ditches, schedule activity when seeds or propagules are least likely to be viable and to be spread.
- Quarantine soil from infested area to prevent off-site spread.

6. Maintain desirable species.

Establishing and maintaining competitive, non-invasive desirable plants along roadsides and disturbed areas prevents or slows establishment of invasive plants. Best Management Practices (BMPs) for re-vegetating disturbed areas include:

- Re-vegetate all disturbed soil, except on surfaced roads, in a manner that optimizes plant establishment for that specific site, unless ongoing disturbance at the site will prevent establishment of invasive plants.
- Use local seeding guidelines and appropriate mixes, but realize that many species previously recommended for this purpose are now presenting invasive problems.
- Use native material where appropriate and available. Re-vegetation may include planting, seeding, fertilizing, and mulching.
- Monitor and evaluate success of re-vegetation in relation to project plan.
- When re-vegetating areas that were previously dominated by invasive plants, try to achieve at least 90% control of the invasive before attempting restoration.

7. Accomplish invasive species management work with the "minimum tool" approach.

Management actions will be reviewed to determine the minimum action or tool (practices, tools, equipment, and regulations) that will accomplish the task. Management will seek the approach from available alternatives that will have the least impact on the resources while still being able to accomplish the desired goal. The minimum tool approach has important implications regarding use of **control methods**.

8. Manage invasive species with interdisciplinary scientific skills.

Invasive species management involves acquiring a working knowledge of complex relationships and requires the skills of natural resource professionals and researchers who work as a team in focusing on preserving biodiversity and native ecosystems.

9. Incident Command Structure.

To effectively manage the response to various high priority invasive species and united statewide efforts, an incident command structure will be implemented. This structure will allow for effective communication between, and participation by, DEC central office and regional DEC staff, and partner groups including: Local PRISM's, NYS Office of Parks, Recreation and Historic Preservation and other local partners.

Invasive Species Control Methods

Management options should be selected with consideration for the likelihood of success, the location and size of forest stands, the age of infestation, past methods used at the site, time of year, sensitive native flora or fauna within or adjacent to the target infestation, available resources, adjoining and nearby land uses, and regional priorities as defined by local PRISM (e.g. high risk species, early detection species, etc.).

The application of control methods will be determined using **Integrated Pest Management** (IPM). IPM is a science-based decision-making process that guides land managers when investigating a pest situation. The IPM approach determines the most appropriate and cost-effective management solution for the specific pest situation. IPM includes identification of the pest, understanding the use and significance of a site or the importance of protecting unique resources, and education of the people involved. IPM also establishes pest tolerance levels and monitoring protocols. Then, with the help of technical experts and on a case–by-case basis, DEC foresters develop an effective, site specific and low risk strategy to manage the pest. This includes altering conditions which attracted pests to the site in the first place. IPM often involves changing human behavior as well.

ADDITIONAL RESOURCES

Invasive Plant Control Methods, including information regarding control of specific species of concern can be found at http://www.dec.ny.gov/docs/lands_forests_pdf/sfinvasivecontrol.pdf

The following priorities will guide the application of control methods with varying degrees of environmental impacts. The most impactive methods hold the lowest priority and will not be applied unless all higher priority methods are not effective. Low priority methods will be applied in concert with higher priority methods in order to increase effectiveness. As new technologies and methodologies are developed, they will be incorporated into State Forest management following appropriate review and assessment.

- **Silvicultural Remedies**
  Changes in forest composition and structure may create conditions that are less favorable to some invasive species. Where possible silvicultural applications should be applied to increase the resilience of forest stands to resist native and invasive threats.
- **Hunting**
  Invasive and nuisance species can be kept in balance within the ecosystem by applying hunting as addressed within the Deer Management section of this plan.
- **Mechanical Control**
  Digging, pulling or cutting may be effective in altering site conditions to control invasives and directly controlling some plant species.
- **Grazing**
  Although many invasive plants may be resistant to applied scientific grazing, this

method may be appropriate for some species. Grazing on State Forest lands would require the availability of an agricultural partner along with staff and funding resources.

- **Biological Control**
  Biological control is the science of reconnecting invasive plants with the specialized natural enemies that often limit their density in their native ranges. The U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) is responsible for controlling introductions of species brought into the United States for biological control of plants, in accordance with the requirements of several plant quarantine laws, the National Environmental Policy Act, and the Endangered Species Act. Petitions for release of plant biological control agents are judged by a Technical Advisory Committee, which represents the interests of a diverse set of federal and other agencies. (Van Driesche, et al. 2002)

- **Herbicide Treatment**
  All pesticide/herbicide use will conform to guidelines identified in the Active Forest Management section on *page 95*.

Invasive Species Laws and Policies

The State of New York's official policy, enacted into law, is "to conserve, improve and protect its natural resources and environment..," (ECL §1-0101(1)) and it is DEC's responsibility to carry out this policy. As set forth in ECL §3-0301(1) DEC's broad authority includes, among many other things, the power to:

- Manage natural resources to assure their protection and balanced utilization;
- Protect and manage fish and other aquatic life and wildlife;
- Promote control of pests and regulate use of pesticides;
- Promote control of weeds and aquatic growth, develop methods of prevention and eradication, and regulate herbicides.

ECL § 9-1303 requires DEC to control and prevent the spread of forest insects and forest tree diseases. Similarly, ECL § 11-0325 gives DEC the authority to undertake fish and wildlife control measures to prevent the introduction or spread of a disease which endangers the health and welfare of fish and wildlife populations, domestic livestock, or the human population.

ECL Title 17 of Article 9 essentially requires that New York State agencies implement the recommendations of the 2005 New York State Invasive Species Task Force *Final Report* to the Governor and Legislature. ECL § 9-1705(5)(b) gives the Invasive Species Council the authority to identify actions taken to respond rapidly to and control populations of invasive species; and ECL § 9-1705(5)(c) gives the council the authority to develop a comprehensive plan that will address, among other things, prevention, early detection and rapid response.

CONTROL OF INTERFERING VEGETATION

Foresters manage forests with the goal of improving forest health, promoting biodiversity and enhancing forest productivity. These management goals may, from time to time, be impacted by interfering vegetation – either exotic invasive plants or over-abundant and interfering indigenous plants like hay-scented fern (*Dennstaedtia punctilobula)*, American beech (*Fagus grandifolia*) or striped maple (*Acer pensylvanicum*). Methods are chosen which maximize interfering vegetation control while protecting overall forest health and productivity (growth). For example, interfering vegetation may need to be controlled when: protecting a threatened species like hart's-tongue fern (*Asplenium scolopendrium* var. *americanum*) from an exotic invasive plant; perpetuating pitch pine (*Pinus rigida*) in the Albany Pine Bush; or establishing a desired species mix of Appalachian hardwoods.

Interfering Vegetation: Vegetation that uses the common resources (space, light, water, and nutrients) of a forest site needed by preferred trees for survival and growth (Glossary of Forestry Terms in British Columbia, Ministry of Forests and Range, March 2008)

Foresters have many options for controlling interfering vegetation to increase the success of their management decisions. With all management decisions, each option comes with benefits and drawbacks. However, foresters choose the option that best controls interfering vegetation most efficiently and economically while minimizing negative environmental impacts. Common practices foresters apply to control interfering vegetation include:

- **Do nothing** – When interfering vegetation becomes established, the forester may choose not to take action, for biological, economic or societal reasons. If this option is chosen however, future control measures may be more expensive and may have more of an impact on the site. If this situation occurs the management objective for the site might fail or take much longer to achieve success.
- **Hand pulling** – Foresters may choose to have a crew enter the site and remove the interfering vegetation by hand. This method of control may be successful in removing individual small occurrences of some species. However, this method is very labor intensive and expensive, has the potential for negatively impacting the site by disturbing growing conditions for desired plants, and is therefore typically limited to very small sites of less than two acres. Additionally, this method is not appropriate for removing species that can re-grow from root fragments unless workers can be sure to remove all plant material above and below ground.
- **Chainsaw cutting** – This option is adequate for sites requiring the control of individual large woody stems (typically small trees and shrubs) like hop hornbeam (*Ostrya virginiana*) and ironwood (*Carpinus caroliniana*). Although labor intensive and moderately expensive, chainsaw cutting can target very specific interfering vegetation with minimal site disturbance to surrounding vegetation and soils. Chainsaw cutting to

control interfering vegetation can also be conducted at the same time as other silvicultural activities such as timber harvests and requires little additional expertise beyond the safe use of a chainsaw. Unfortunately, in many circumstances chainsaw cutting does not kill the target plants. Some of the more common interfering vegetation such as American beech (*Fagus grandifolia*) and striped maple (*Acer pensylvanicum*) can actually rapidly re-grow from root and stump sprouts after the main stem has been cut. However, by incorporating herbicide treatments after the cutting, either on the cut stump or on the foliage of the resulting sprouts, may improve the chances of successfully removing of this type of aggressive re-sprouting interference.

- **Mechanical removal** – Mechanical removal may include disking or mowing. Disking or mowing by large equipment can effectively and efficiently treat large areas in a short period of time. This option may be expensive but cost-effective compared to other options at a similar scale. The use of disking and mowing in New York is not very common and not readily available as an option for forest management. Additionally, the action of mechanical removal is non-discriminatory (it will destroy desired vegetation as much as interfering vegetation), is extremely site intensive, and may do significant damage to residual trees purposefully left on the site. Most methods of mechanical removal are limited to sites that are relatively flat, dry and free from large obstacles such as boulders – conditions relatively uncommon in New York forests. However, there are times when mechanical removal is appropriate to maintain desired herbaceous forbs and grasses in open land areas or to maintain early successional habitat. Mechanical removal may also improve growing conditions for exotic invasive plants just as well as for the preferred plants.
- **Heat treatments –** Heat (prescribed fires, directed heat/flame, hot water) can be used to control interfering vegetation if the desirable species in the stand can withstand temperatures that will kill the undesirable species. In New York, oak forest types are best suited to being managed using prescribed fire, because oak seedlings and saplings are able to survive fire temperatures that will kill most of the plant species that commonly cause regeneration difficulties. Prescribed fires are only executed when weather and fuel conditions (wind, relative humidity, temperature, fuel levels and moisture content) are optimal to support a manageable controlled burn. There is research (https://business.ct.gov/-/media/CAES/DOCUMENTS/Publications/Fact_Sheets/Forestry_and_Horticulture/Vegetation-Control-Using-Directed-Heat-Treatment.pdf) that directed heat/flame treatment can be used to treat invasives, though it's not currently used much as a tool by BFRM staff, and would need to follow the same precautions used for prescribed fires.

To learn more about fire in New York please refer to the Fire Management section on page 327 of this plan.

- **Herbicide Application** – Herbicide use for the control of interfering vegetation will comply with guidelines identified in the Active Forest Management section on *page 95*.

"FH" OBJECTIVES, ACTIONS AND SEQR ANALYSIS

Forest Health (FH) Objective I – Promote overall forest health on State Forests, using timber sales to improve forest health and the diversity of species, habitats and structure in order to enhance the resiliency of ecological systems and forest sustainability.

FH Action 1 - Harvests will be planned in such a way as to develop a wider range of forest successional stages.
FH Action 2 - Harvest schedules will be developed as part of UMP planning to further this objective.

FH Objective II – Protect State Forests from introduced diseases and invasive plant and animal species through cooperation with the Division's Bureau of Invasive Species and Ecosystem Health.

FH Action 1 – Consult with BISEH staff for species specific response plans.
FH Action 2 – Identify, prioritize and address infestations within each UMP through the use of iMap Invasives program.
FH Action 3 – Invasive species BMP language has been developed and included in all forest product harvest and construction contracts, to protect State Forest lands from the introduction, establishment and spread of invasive species. These forms can be found on SharePoint.
FH Action 4 – Consult, review, and publish an educational brochure about invasive species BMPs for recreational users as needed.
FH Action 5 – Consult and review current species-specific guidelines for control of invasives to be used by all DEC staff undertaking activities on State Forests as needed.

FH SEQR Alternatives Analysis and Thresholds

The **preferred alternative** (also the **no-action alternative**) is to continue to enhance overall forest health following the strategies, guidelines and actions discussed above. This involves the application of all components related to integrated pest management, including the use of targeted pesticide applications when all other options have been exhausted.

Another alternative would involve a hands-off approach to forest health issues. The option of letting nature take its own course is not viable, considering the real and imminent threats from human-introduced invasives and diseases and climate change. Human-induced impacts threaten natural systems and, in some cases, will lead to species extirpation if not controlled or mitigated.
The alternative of pesticide use has been addressed specifically in the active forest management section of this plan.

FOREST HEALTH

SEQR Analysis Threshold: Compliance with the guidelines and strategies of this section will avoid and minimize potential impacts resulting from forest health activities to the maximum extent practicable and no further SEQRA review will be conducted. However, specific mitigations and thresholds for pesticide use have been established in a separate “pesticides and herbicides” section of this plan.

MANAGING DEER IMPACTS

White-tailed deer are arguably the most significant wildlife resource in New York State from an economic, social and ecological perspective. Economically, benefits derived from deer include direct and indirect expenditures on hunting and wildlife observation. Losses are primarily associated with: agricultural crop damage; damage within forests to woody and herbaceous plants; damage in urban areas to ornamental plantings; adverse health impacts associated with deer (e.g., Lyme disease), and deer-vehicle collisions.

Ecologically, deer are considered a keystone herbivore. A keystone species is a species that has a disproportionate effect on its environment relative to its abundance (Paine 1995). The overabundance of deer can lead to the local extirpation of certain preferred herbaceous plant species, alter forest composition by favoring certain tree species over others, and alter habitat structure and food resource availability for other wildlife species.

Deer also have intrinsic value as a native wildlife species. For these reasons, it is unavoidable that deer management, and the setting of goals and objectives related to deer populations and impacts, is complex and often contentious.

The Division of Fish and Wildlife (DFW) is vested with the management of white-tailed deer in the state; as with all wildlife species in New York, deer are property of the state (ECL 11-0105). Deer management in New York occurs at a multitude of scales, ranging from broad-scale statewide management to decisions focused on an individual-property. Land managers try to balance the needs and desires of the public with the possible impacts of deer on biodiversity and forest health.

History

The history of white-tailed deer in New York since 1492 mirrors the history of most other game species, across North America. The deer density in North America at the time of first European contact is hypothesized to have been 3.1 to 4.2 deer/km^2 (8-11 deer/sq. mi) (McCabe and McCabe 1994). Present-day deer population density estimates for much of New York are actually significantly higher. Upon European settlement of the continent, the deer population began to slowly decline. Over the next 350 years, the herd shrank to 35 to 50% of its former

MANAGING DEER IMPACTS

size. In the era following the Civil War, wildlife was under the greatest hunting pressure ever. During this time period, commonly referred to as the "era of exploitation" (1870-1920), deer numbers were reduced to 1 to 2% of their pre-European population (McCabe and McCabe 1994). As a result, deer were extirpated from much of New York.

The devastation wrought on wildlife populations by unregulated market hunting and habitat loss during this period ushered in the beginnings of the modern era of wildlife management – an era during which game populations have largely rebounded and flourished because of the acceptance of science-based management, underpinned by a sound understanding of species' life histories and ecology, and the enactment of federal and state wildlife laws, which established hunting licenses and seasons, bag limits, and means of legal taking. It is extremely likely that deer densities now present in many localities of the state greatly exceed historic densities.

At present, deer populations in New York reflect a number of factors. Annual and short-term variations in populations are largely attributable to winter severity in northern NY and allowable harvest, specifically the allocation of Deer Management Permits (DMPs – permits for antlerless deer) in southern portions of NY. Long-term changes in habitat condition associated with land-use change, ecological succession, and possibly chronic deer overabundance may also have significant effects on deer populations; however, these effects are less obvious and more difficult to understand, quantify, and address when devising deer management strategies. As road density and vehicle use has increased and predator populations have also increased, non-hunting sources of deer mortality have likely also increased over the past 60 years. However, deer populations have also generally grown through this period and mortality associated with these sources is not generally sufficient to control deer populations (Vreeland 2002).

EXISTING CONDITIONS

Currently, DFW manages deer populations on the scale of a Wildlife Management Unit (WMU) and WMU Aggregate. Statewide, there are a total of 92 WMUs, 89 of which are open to deer hunting, and these 89 WMUs are arranged into 23 WMU Aggregates. Relative deer population levels in each WMU are monitored primarily through trends in annual harvests of antlered deer. DFW sets objectives for deer population change for each WMU Aggregate by integrating data of public preferences for changes in deer abundance and data of deer impacts on forests across New York (NYS Deer Management Plan, Appendix 2). Based on surveys gathered from natural resource professionals, DFW sets the number of DMPs available annually to manage the deer population in each WMU consistent with the trajectory objective.

Deer Management Assistance Program

The Deer Management Assistance Program (DMAP) is an additional tool that allows landowners and resource managers to

ADDITIONAL RESOURCES

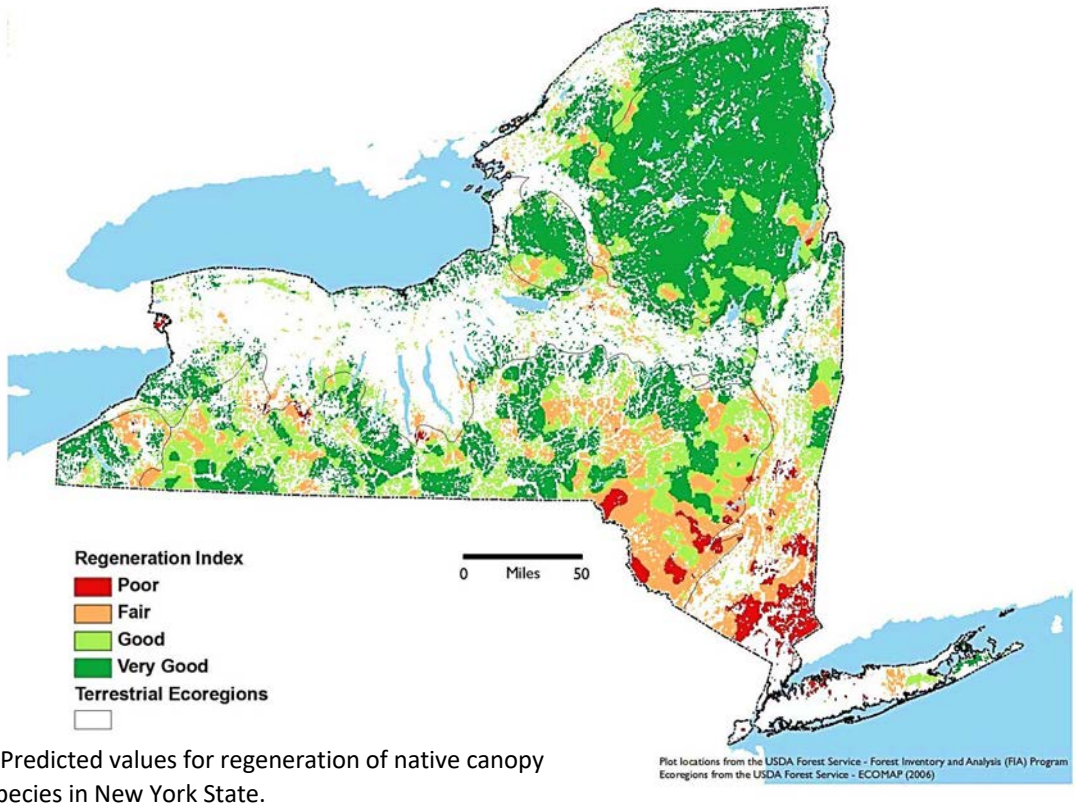
For more information on WMUs and the Citizen Task Forces go to www.dec.ny.gov/animals/7211.html

implement site specific deer management on their lands by allowing the harvest of additional antlerless deer. Applicants must qualify in one of five categories (agriculture, forest regeneration, significant natural communities, municipality, or custom deer management) to be considered for the program. A trial program for using this tool had been successfully implemented on State Forests where deer populations are negatively impacting forest health. The Division of Lands and Forests will continue to keep this tool available to land managers, as necessary.

Deer Impacts on Forest Ecosystems

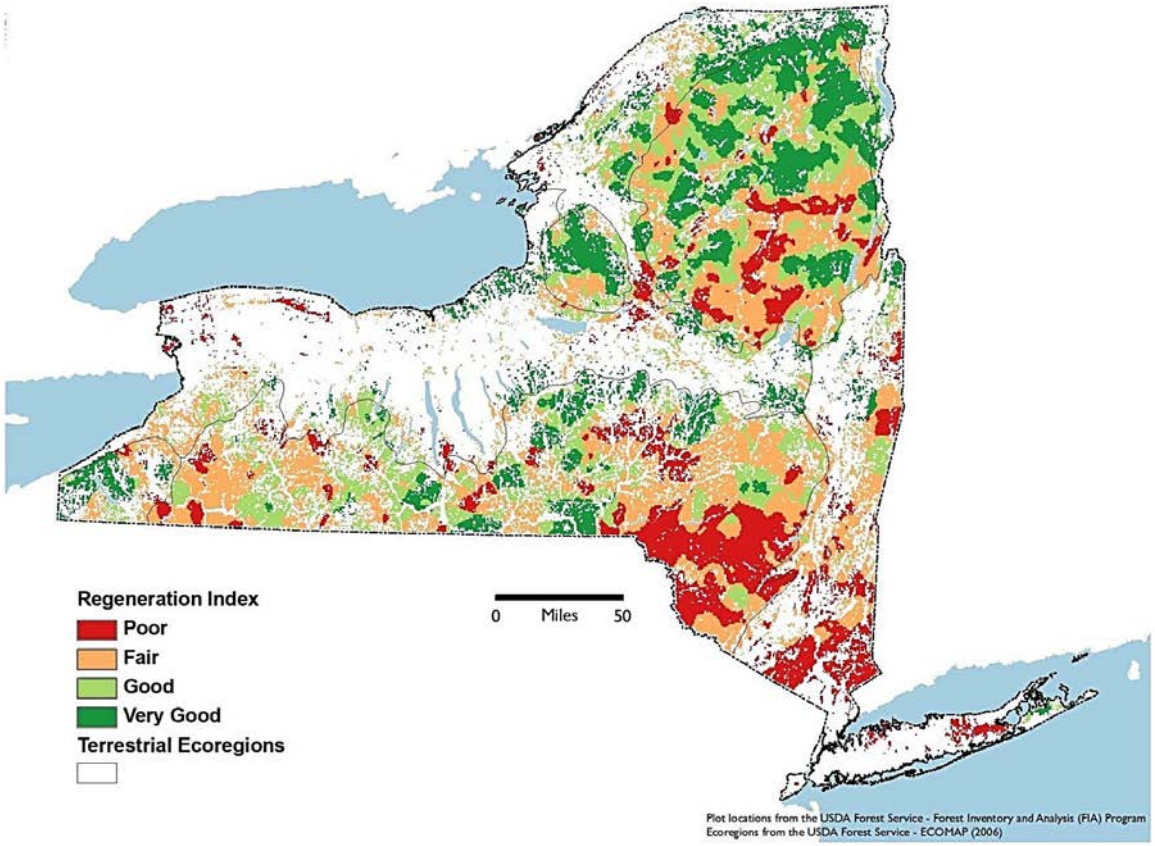
The impacts of deer on forests are very well documented. Deer impacts have been demonstrated in countless instances of primary research and have generated numerous review articles (Waller and Alverson 1997) (Cote, Rooney and Tremblay 2004) (Latham, et al. 2005) and books dedicated solely to the topic (McShea and Rappole, Herbivores and the ecology of forest understory birds 1997). Researchers recognize that as deer populations increase, their impact on the ecosystem structure and function will also increase.

The Nature Conservancy examined this in the 2010 report, Forest Regeneration in New York State. The following maps highlight the regional nature of the deer browse issues and the greater impact to the important timber species of NY's forest canopy.



*Predicted values for regeneration of native canopy species in New York State.

MANAGING DEER IMPACTS



*Predicted values for regeneration of desirable timber species in New York State, The Nature Conservancy, 2010

As deer browse, they select for individual plants in order to meet seasonally-based nutritional needs. Through selective browsing and foraging, deer can dramatically affect herbaceous and woody plant composition of a forest by preferentially selecting highly nutritious and palatable species while avoiding less nutritious or unpalatable species. Direct impacts to individual plants may include reduced growth rates, reduced or absent reproductive output, or mortality. For overstory tree species such as oak, reproductive output may be affected by consumption of propagules, including seeds (acorns), fruits, suckers, stump sprouts etc.; for herbaceous plants, consumption of flowers, seed heads, or fruits may limit reproduction. The selection of preferred specimen within a species may result in the elimination of individual plants with particular qualities. This could have significant impacts on the quality and representative stocking of the species at a population level. Selection by species has negative effects on preferred species and affects forest composition. For herbaceous plants, these effects may include local rarity, genetic isolation, and extirpation. For tree species, regeneration of preferred browse species may be severely impacted or eliminated, threatening the long-term sustainability of a forest cover type following natural disturbance or timber harvest.

Furthermore, non-preferred invasive species, such as Japanese barberry and Japanese stiltgrass, and native species, such as hay-scented fern, Pennsylvania sedge, and mountain laurel, are given a competitive advantage over species preferred by deer and, after many years of overabundant deer, come to dominate the understory of many forested sites. These conditions can persist even after a drastic reduction in deer density occurs.

Aside from direct impacts on vegetation, deer can have indirect impacts on other trophic levels by simplifying forest structure and competing for food resources. Deer browsing can severely degrade the habitat quality for bird species requiring areas of dense understory for nesting or foraging. Overabundant deer degrade the vertical structural diversity of forest habitats by eliminating the shrub/sapling layer and decreasing the diversity of the ground layer.

Deer-attributed changes to forest structure and composition can have significant negative effects on the diversity and abundance of forest-breeding birds (Casey and Hein 1983) (deCalesta, Effect of white-tailed deer on songbirds within managed forests in Pennsylvania 1994) (McShea and Rappole 2000). Declines in bird diversity result from both the loss of ecological niches with habitat simplification and an increased exposure to nest predators as habitat complexity decreases (McShea and Rappole, Herbivores and the ecology of forest understory birds 1997). A decrease in vegetation density may reduce food, cover, and nesting sites, while increasing nest predation rates, even in large forest tracts (Leimgruber, McShea and Rappole 1994). Populations of birds that nest or forage on the ground or in the understory grow after deer reduction, along with increasing vegetation cover and diversity (McShea and Rappole 2000). Bird species of conservation concern in New York that may be impacted by deer browsing include wood thrush, worm-eating warbler, cerulean warbler, black-throated blue warbler, Louisiana waterthrush, ruffed grouse, and Canada warbler. Direct competition by deer for mast crop resources can impact small mammal populations as well (McShea and Rappole 1992) (McShea and Schwede 1993).

MANAGING DEER IMPACTS

The Ripple Effect

Deer impacts on bird species don't end there. Those impacts have a "ripple effect" on other parts of the ecosystem. For example, deer browsing removes the understory habitat of the Yellow-billed Cuckoo, an impact that further affects the forest because the Yellow-billed Cuckoo is one of the few North American birds that readily eat hairy caterpillars (ex. tent caterpillars and forest tent caterpillars). They also eat gypsy moths. This bird species is a natural control for caterpillar species that left unchecked could do serious damage to the tree canopy and affect the forest as a whole. Their population is often abundant when an outbreak of these pests occurs. (Ickes 1992) For example, prior to a major tent caterpillar outbreak that occurred in 2003-05, regular bird surveys indicated that Yellow-billed Cuckoos were scarce on Fort Drum, in northwestern New York. During the outbreak, the population expanded rapidly and although it has since declined, it is still above pre-outbreak levels.

The maximum deer density that is acceptable for the successful regeneration of herbaceous and woody plants can vary from property to property depending upon the previous and current forest management regime, site productivity, and availability of forage within the surrounding landscape. In forests that are actively managed for wood products, such as many of State Forests, the managed disturbance regime within such a forest allows for the increased production of forage thus allowing the forest to sustain higher deer populations than a typical unmanaged forest, such as the Adirondack Forest Preserve. Further, the presence of agricultural land in close proximity to forest land increases the ability of that landscape to support deer. However, when deer use of the landscape varies seasonally, such as concentration in and near agricultural areas in summer and fall but concentration in forested areas in winter and spring, deer populations can continue to exert unsustainable levels of browse pressure on those forests. Therefore, land managers need to understand and evaluate landscape context and influences of deer behavior when considering deer impact to a particular State Forest. (Figure 2 below)

Figure 1 (deCalesta and Pierson 2005)

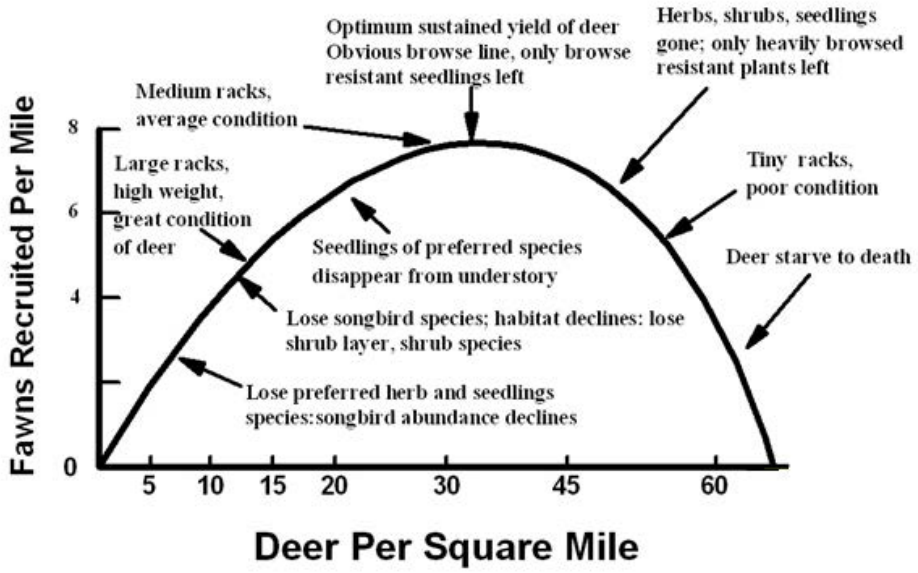
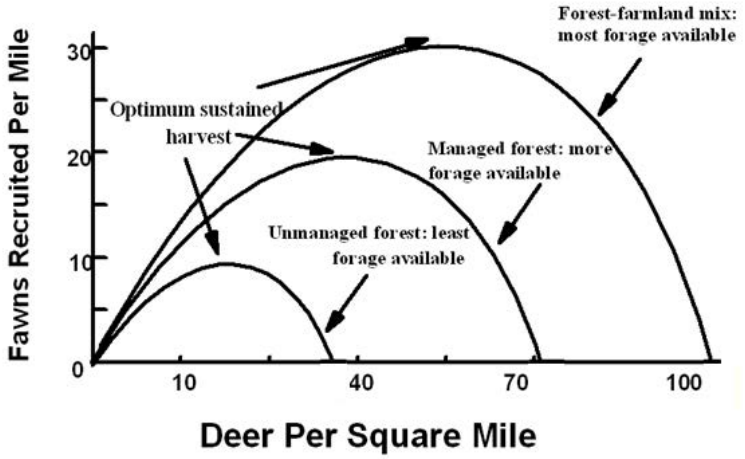


Figure 2 (deCalesta and Pierson 2005)



Smallest curve = unmanaged forest
Middle curve = typically managed forest
Largest curve = forest/farmland mix

MANAGING DEER IMPACTS

STRATEGIES FOR MANAGING DEER IMPACTS

The following recommendations will guide management of deer impacts on State Forests.

Work Planning to Assess Deer Herd Impacts on State Forests and Monitor the Effectiveness of Management Actions:

The ability to manage deer impacts using silvicultural systems often has limited success. The most effective method of keeping deer impacts in line with management objectives is to monitor impacts while observing and managing the herd (Stout 2005). On properties where deer are suspected of impacting values and objectives associated with biodiversity and timber management, such impacts will be inventoried and assessed. Any management actions taken to address deer over-abundance will also need to be assessed to determine if in fact the action taken is accomplishing the stated objective of reducing impacts. This will require a commitment of time and resources by inter-Divisional staff to develop a protocol for assessing the impacts of deer and the appropriate management response needed to address those impacts.

Adopt an Inventory Protocol for the Assessment of Browse Impacts:

Over the past several years, DEC staff have worked with leading experts to develop and test a number of protocols for monitoring deer impacts upon forest regeneration. Staff will continue to work with DFW to roll out these protocols and train land managers in using them during their decision-making processes. One such protocol that is gaining considerable interest is the Assessing Vegetation Impacts of Deer (AVID), which uses citizen science monitoring of deer brose impacts on forests. AVID was created through a collaboration between DEC and Cornell University. It is currently being used to collect data for DEC's Division of Fish and Wildlife. The Division of Lands and Forests will work with Wildlife staff to assess how this protocol can be rolled into the State Forest decision matrix.

Develop a State Land Deer Management Repository

The Division of Lands and Forests will create an online repository for information regarding deer management tools and assessment of deer population/damage. The repository of information will enable the sharing of information across different regions and allow for DEC to keep staff informed of the most current science regarding deer management.

Developing Capacity to Create a State Forest Fencing Program:

The use of high fences to exclude deer from large areas of the forest is the most effective method to mitigate the negative impacts of deer upon understory plants within a forested area. As stated previously, negative impacts associated with deer overabundance can persist even after reduction of deer density occurs. Fencing portions of State Forest lands that have been impacted by excessive deer browse will prevent loss of "high-preference" browse-intolerant

herbaceous plants that may otherwise become locally rare or extirpated from the ecosystem. Such species could include trillium, Indian cucumber, Canada mayflower, etc. (Rawinski 2008). The Bureau of Forest Resource Management has considered a fencing program intended to exclude deer from areas on State Forest properties where the impacts associated with deer browse are contributing to the loss of species diversity and the failure of silvicultural objectives. The state of Pennsylvania and the Allegheny National Forest both have successfully employed temporary deer exclosures to allow establishment of forest regeneration in areas with excessive deer population levels. This is a very effective but very expensive method which is well beyond the existing funding capacity.

The effect of deer browsing is dramatically illustrated in the above pictures where, deer have been excluded from one side of the fencing. Conditions were identical on both sides before construction of the fence.

The only viable means of supporting this program and other needed deer management strategies would be to re-invest a portion of every timber sale's proceeds into a dedicated fund for the purpose of regenerating forest stands and mitigating deer impacts. A similar program in Pennsylvania has been established with part of the income from their State Forest timber sales.

Slash Walls/Fencing

In recent years, an alternative method to fencing known as the "slash wall/fences" has been developed and implemented in areas of high deer populations. The method involves using the slash generated during a timber harvest as a barrier to keep deer out of the harvest area. When implemented correctly, this less expensive alternative to fencing has been shown to accomplish very similar results. Slash walls will continue to be available as a tool for land managers especially for regeneration harvests where the overstory will be disturbed enough to

generate the slash necessary for successful implementation. More information on slash walls can be found at The Cornell Slash Wall Resource Center.

Applying for use of DMAPs on State Forests:

In some cases, WMU-wide deer take objectives are not sufficient to address impacts occurring on a specific property. In these cases, the land manager may seek approval from the DFW Regional Wildlife Manager for participation in the Deer Management Assistance Program (DMAP) until such time as deer impacts can be reduced. As stated previously, DMAP permits are issued to a landowner or land manager for the purpose of reducing the deer herd on a specific property. On state lands enrolled in DMAP, the forester responsible for the management of the subject property will be the designated agent for the distribution of DMAPs and harvest reporting to DFW. The program will utilize a fair, equitable and effective system for issuing permits developed with approval of DFW staff. Regions participating in DMAP will be expected to develop a hunter database intended to keep track of DMAP recipients and conduct follow up surveys/personal interviews with DMAP recipients intended for the purpose of generating harvest reports in accordance with DFW policy. Refer to DFW guidelines for reporting procedure.

Hunter Access and Demographics

It is recognized that DMAPs are not the only answer and may not always provide the solution to the impacts of overabundant deer. Big game hunters can provide an important and viable means of deer population control, which should be enhanced when possible. Issues related to hunter access and demographics can be influential factors related to the effectiveness of a targeted deer reduction program. This means that, on State Forests, land managers must consider provision of maps, web-based information, road access and parking availability. Closely monitoring vegetation response to reduced deer populations on individual properties will offer insight to the land manager regarding other issues that may be impeding hunter success and the subsequent reduction of deer impacts. The land managers can then use such information to implement management strategies to address these factors.

Deer Density

Land managers are encouraged to participate in surveys of deer density on State Forests where negative impacts to vegetation are evident, especially when actions have been taken or may be taken to reduce impacts by reducing deer density. Deer are notoriously difficult to count and there is no widely agreed upon survey method in the scientific community. Survey methods documented in scientific literature, such as pellet surveys, will be supported on State Forests impacted by deer herbivory. These surveys are not intended to nor will provide an exact count of the deer population. Instead, these surveys shall be used to provide an index of abundance that can be tracked over time to analyze population trends and herd response to deer reduction programs.

While the measurement of deer abundance may provide insight to the relationship between a property's deer density and corresponding impacts, ultimately, the success of measures enacted to reduce deer density on a specific property should be measured in terms of any changes in impact levels to the vegetation. Vegetation monitoring, via protocols such as AVID, possibly augmented by browse surveys, permanent plots studies, and/or deer exclosures, shall be conducted to evaluate changes in vegetation impact relative to the effectiveness of DMAP or other mitigation strategies.

Strategies for Mitigating Deer Impacts on State Forests

In addition to hunting, deer impact mitigations should include but not be limited to deer exclosures, invasive species removal and site preparation. Another mitigation strategy is to adapt silvicultural practices that utilize more even-aged management, particularly by converting plantations to early successional seedling/sapling hardwood stands; use large group and patch cutting instead of single tree or small group selection harvests in stands with uneven-aged management directions; and group treatments or harvested areas to overwhelm the existing deer population.

Additionally, if a State Forest is enrolled in DMAP the timing of silvicultural treatments also should be considered. The temporary reduction in deer density created by the focused hunting effort of DMAP creates a window of opportunity to establish and grow tree regeneration. Harvests should be scheduled in anticipation of enrolling a property in DMAP and throughout the period deer densities are reduced as a result of DMAP. This increase in forest management will not only overwhelm the ability of the remaining deer to significantly impact subsequent regeneration, but will result in habitat that is more capable of supporting the new deer population.

"DM" OBJECTIVES, ACTIONS AND SEQR ANALYSIS

Deer Management (DM) Objective I – Monitor the impact of deer browsing on forest health and regeneration.

DM Action 1 – Work with DFW to develop the use of AVID on State Forests as the primary tool for assessing deer damage.

DM Action 2 – Develop/maintain a list of strategies appropriate for addressing unsustainable levels of deer density on State Forests. Continue to monitor, evaluate, and if necessary, adjust impact thresholds, for assisting deer management decision models.

DM Action 3 – Conduct deer density and browse impact inventories on State Forests using protocol developed in DM Action 1. These assessments will be utilized on an as needed basis and at the discretion of the land manager to support further actions, if necessary

DM Action 4 – Develop a repository for information on the DLF webpage that includes policies and protocols for assessing deer damage and tools available for land managers to address deer herbivory.

MANAGING DEER IMPACTS

DM Objective II – Address issues of over-browsing.

DM Action 5 - Continue to improve hunter access and success rates by providing web-based information and maps, and by enhancing road access and parking availability.
DM Action 6 – Work with DFW biologists to identify and employ active deer population control measures, such as DMAP issuance, fencing to mitigate impacts when and where excessive browsing is identified.

DM SEQR Alternatives Analysis and Thresholds

The **no-action alternative**, or in other words, continuing with current management approaches, has not been selected. There are a few areas of the state where the above actions are being implemented, but throughout the State Forest system as a whole, noticeable deer browse impacts continue to occur. This alternative is not acceptable, considering the severe impacts deer over-browsing can have on future forest structure as well as some protected species.

The overall **preferred alternative** is to enhance monitoring and actively manage deer populations in conjunction with DFW biologists. The preferred alternative also considers the interests of deer hunters and will lead to sustainable deer population levels.

There are a number of individual deer population control methods which have been considered as alternatives and listed under DM Objective II. Of these, the preferred alternative is to implement DM Action 5. This alternative is preferred as it has been proven to be effective and furthers other recreational goals. Only when this action has been fully implemented and monitoring still shows excessive browsing, shall additional population control methods under DM Action 6 be employed.

SEQR Analysis Threshold: Compliance with the guidelines and strategies of this section will avoid and minimize potential impacts resulting from managing deer impacts. Use of any deer population control methods other than those actions proposed within this section would likely be unproven and controversial, requiring additional site-specific environmental review under SEQRA.

FIRE MANAGEMENT

Statewide, fire currently plays a small role in shaping New York's forests; but in some areas it is an ever-present danger, and in some ecological regimes, it is a necessary component. Some natural communities are dependent on fire for renewal and growth.

Public education, laws, and changes in technology, have reduced the incidence and extent of wildland (forest) fires in New York over the past 100+ years. When fires do break out, New York's climate and vegetation tend to make them relatively easy to suppress. However, during periods of drought, New York has seen historically significant wildfires that have caused serious damage to forest soils and human settlements.

Fire management on State Forest lands will entail the suppression of fires, both natural and human-induced as well as the application of prescribed fire under appropriate conditions. The goal of this is to maintain fire-replicated natural communities and prevent extreme fire danger that could threaten natural and human communities. The cumulative impact related to suppression of fire over time can lead to excessive fuel loads that can be dangerous in drought conditions. Maintaining the presence of fire in appropriate areas can keep fuel loads in check.

Prescribed Fire is used to approximate the natural vegetative disturbance of periodic fire occurrence. This vegetative management tool is used to maintain fire dependent ecosystems and restore those outside their natural balance. Generally, low intensity prescribed fire, is applied by trained experts to clear ground of dangerous fuels like dead wood and brush. This low-intensity fire is vital to the life cycles of fire-dependent range and forest lands. (USFS, website www.fs.fed.us/fire/fireuse/rxfire/rx_index.html) Prescribed fires are also used as a tool to control the buildup of excessive fuel levels which could contribute to disastrous and uncontrollable wildfires. Prescribed fires are only executed when weather and fuel conditions (wind, relative humidity, temperature, fuel levels and moisture content) are optimal to support a manageable controlled burn.

The Division of Forest Protection and Fire Management (Forest Rangers), review fire plans for state lands, help oversee and develop prescribed fire programs and are responsible for maintaining an organization which is capable of responding to wildland fire. In the protected areas of fire districts and fire towns, Forest Rangers share dual jurisdiction with village and town fire departments under the General Municipal Laws.

NEW YORK'S FIRE HISTORY

Prior to European settlement in New York State, use of fire was widespread among hunting and gathering societies. Fire was used to encourage berries, harvest natural grains and nuts, and shape a habitat rich in game. Fire hunting was a common practice in the fall, and fires sustained the herbaceous landscape frequented by elk, deer, buffalo and turkey. The forests around native settlements were periodically burned to eliminate underbrush and other herbaceous

FIRE MANAGEMENT

cover. This practice effectively thinned out the forest, creating areas suitable for agriculture and reducing the opportunity for ambush by marauding enemies. Early European explorers often referred to clearings by fire as “barrens” or “deserts,” and they were common sights. However, in New York, mountains, river bottoms, swampy lowlands and denser boreal forests were more or less spared from annual fire setting.

European settlement expanded the process of agricultural reclamation begun by Indigenous peoples. More forested land was cleared, and new villages were created. Domestic grasses and managed pastures replaced the harvesting of natural foodstuffs and wildlife. Forest land was also cleared to satisfy the ever-increasing demand for lumber. Slash-heavy logging practices, widespread logging and dry weather between 1880 and 1910 led to intense wildfires, especially in the Adirondack and Catskill mountains.

During this era, New York State initiated a fire protection system, led by fire wardens and a newly formed group known as forest rangers, covering the most fire prone areas. From the 1880s to the present time, the state’s fire management activities were focused on fire suppression. Except for occasional regional fires and outbreaks in the early 1940s and 1960s, favorable climatic conditions, along with the state’s suppression and prevention efforts have led to reduced numbers of fires and acreage burned in recent years.

New York first enacted stringent restrictions on open burning in 2009 to help prevent wildfires and reduce air pollution. The regulations allow residential brush fires in towns with fewer than 20,000 residents during most of the year but prohibit such burning between March 16 and May 14 of each year. Burning garbage or leaves is prohibited year-round. As a result of these changes, the number of spring fires has decreased by over 40%.

Causes of Wildfire

There are many different causes of wildland fires. The leading cause of wildland fire on New York State’s public lands is unattended campfires. Overall, in New York State, human caused wildfires are the leading category of reported fires and debris burning is the leading human cause. Over the past 20 years, lightning strikes have accounted for approximately four percent of the total reported fires in the state. However, in 2002, at the end of a five-year drought, lightning caused 12 percent of the total fires reported.

Wildfire Detection

Wildfire detection and reporting has evolved over time, since the first fire tower in New York was constructed in 1905 on Balsam Mountain in the Catskills. Through the late 1980s fire towers manned by fire tower observers were the principal tool used to report smokes. A number of fire towers were constructed amidst large holdings of State Forest lands in the Southern Tier and Hudson Valley in order to protect those lands from fire. Additionally, the CCC's built many miles of truck trails and fire breaks and hundreds of water holes for better access, to prevent fire spread and to aid in extinguishment when fires occurred.

Today, none of the fire towers are manned for the express purpose of fire detection. DEC uses aerial detection flights, flown as conditions warrant during fire season, detection by DEC staff and reports from civilian aircraft and the public.

Trends

The number of prescribed burns is anticipated to increase throughout the state, focusing primarily on perpetuation of fire dependent communities, along with increasing interest in hazard fuel reduction and habitat manipulation projects. This trend is dependent on the availability of DEC resources and assistance from other partners such as The Nature Conservancy.

Fire Danger Rating Areas

Fire Danger Rating Areas (FDRA) are zones with similar climatic and vegetative conditions that are monitored for susceptibility to wildfire. Monitoring is achieved with the assistance of Remote Automatic Weather Stations (RAWS), that provide real-time weather conditions, allowing the fire danger to be updated daily. The following FDRAs contain significant amounts of State Forest lands and have a tendency for elevated fire danger.

Long Island

The central portion of the area, or as it is known locally, the Central Pine Barrens, has large tracts of forests consisting of pine barrens species such as: pitch pine, white pine, scrub oak, black oak, white oak and scarlet oak. Within the Pine Barrens ecotype is, different communities such as: dwarf (pitch) pine, pitch pine/oak, oak/pine, pine/oak/heath and to a lesser extent upland hardwoods. Agricultural areas and grasslands as well as many small and large pockets of phragmites are also found.

Large fires on Long Island are typically wind-driven. July, August and September see the most severe fire behavior. The sea breeze can influence wind driven fires with high rates of spread and diurnal 180-degree wind shifts. Dense stands of pine/oak/ scrub oak/heath can produce flame lengths of 15 to 30 feet. Crown fires can be sustained in closed stands of pitch pine or in stands of scrub oak with leaves that over-winter.

Hudson Valley

Mixed northern hardwoods of oak, maple, hickory, ash, cherry and beech dominate this FDRA. Some scattered pockets of hemlock, fir, pine and red cedar are also present.

The primary carrier of fire is timber litter or grass. Spread rates are low to moderate. Fire intensity may be low to high with flame lengths usually less than four feet. Spotting and torching is possible. Duff fires with high resistance to control are common during summer periods with sustained periods of drought.

FIRE MANAGEMENT

Southern Tier

This FDRA is a combination of forested land and abandoned agricultural land. Primary forest types are oak/hickory and northern hardwoods. Abandoned agricultural lands generally have a majority grass/shrub component.

Spring fire behavior in the grass fuel types during moderate weather conditions will produce flame lengths between 4-12 feet and rate of spread (ROS) between 78-104 chains per hour, if not influenced by initial attack or other conditions. Typical fire behavior in hardwoods will produce flames of 1-5 feet with ROS between 2-8 chains per hour. Higher fire intensities are observed in the oak/hickory types and may contribute to problem fire behavior, especially if an understory of rhododendron is present.

FIRE-REPLICATED OR DEPENDENT NATURAL COMMUNITIES

Grasslands and Oak Openings

Grasslands

Prescribed fire can be used to improve the quality of grassland habitat for bird species such as the Henslow's sparrow, grasshopper sparrow, bobolink, and savannah sparrow. The quality of habitat in grasslands is reduced for many bird species when shrubs and other successional species encroach into open fields. Prescribed fire is intended to remove the build-up of dead vegetation, encourage new grass growth, and control undesirable vegetation such as thistle, milkweed, goldenrod, asters, and various shrub species.

Maintenance of grassland habitat on Long Pond State Forest in Chenango County

A typical management objective, applied to fields on Long Pond State Forest, is the prevention of shrub cover from increasing beyond 5%. Management activities will generally occur during the non-breeding season to minimize effects on breeding birds.

ADDITIONAL RESOURCES

USGS Management Guidelines – The USGS has published guidelines for specific grassland bird species at: www.npwrc.usgs.gov/resource/literatr/grasbird/

Oak Openings

The globally rare plant communities commonly referred to as "oak openings" or "oak savannahs" are composed of native prairie plants, usually surrounded by Oak - Hickory forests. Considered to be "fire climax" communities, fire has played a key role in establishing them and assuring their continued existence. Historically, fires were set by Native Americans or caused by lightning strikes. Without prescribed fire, these communities will weaken over time and disappear from the landscape. Fire produces bio-chemical effects which cannot be duplicated by other management actions.

Oak openings can be variable in size, from just an acre to several thousand-acre complexes. Characteristic species include indian grass (*Sorghastrum nutrans*), little bluestem (*Schizachyrium scoparium*), butterfly - weed (*Asclepias tuberosa*), and wild bergamot (*Monarda fistulosa*) along with scattered specimens of chinquapin oak (*Quercus muhlenbergii*), northern red oak (*Quercus rubra*) and white oak (*Quercus alba*). Grassland and oak ecosystems depend upon frequent fires for the preservation and maintenance of their structure and biodiversity for several reasons. Fire increases vegetative productivity, flowering, native species diversity, and suppresses fire-intolerant exotic species that are less adapted to survive periodic fire. In grassland communities, fine fuels (thatch) often accumulate faster than it can decompose. The annual buildup of the litter layer makes it difficult for herbaceous species to sprout and grow.

Fire can also help regenerate oak trees by removing leaf litter, exposing mineral soil and killing/suppressing the interfering shrub layer.

Starting in 1990, the DEC manages the 240-acre Rush Oak Openings Unique Area, located in southern Monroe County. This site is the only known intact oak opening remaining in New York and is the easternmost remaining oak opening. Oak openings were very common in the Midwest (where the prairie met eastern forests) prior to European settlement.

Pine Barrens

Long Island Central Pine Barrens

The pitch pine, oak, and ericaceous shrub dominated forests of the Long Island Central Pine Barrens represent an extremely volatile fuel type with a long history of severe fires. They are the most difficult wildland fuel complex to control in the Northeast. Coupled with a dense human population and decades of extensive development, the Central Pine Barrens presents a significant wildland-urban interface hazard. These fire-dependent barrens are also an important

David A. Sarnoff Pine Barrens State Forest in Suffolk County is part of the Long Island Pine Barrens

habitat for a variety of rare, threatened, and endangered plant and insect species. Most of the area is comprised of an overstory of pitch pine and/or tree-sized oak in varying densities, with either a scrub oak or huckleberry/blueberry understory. Open areas are dominated by scrub oak. Many stands have a heavy accumulation of litter and duff.

Following a round of catastrophic fires in 1995, the Central Pine Barrens Joint Planning and Policy Commission formed a Wildfire Task Force to develop a coordinated approach to fire management. The DEC and Pine Barrens Commission are joint partners in the Long Island Central Pine Barrens Forest Fuel Reduction and Ecological Restoration Demonstration Site, funded in part by a federal grant issued under National Fire Plan. The goal is to apply prescribed fire or mechanical fuel reduction techniques at a landscape level. In order to reach beyond state lands, local demonstration projects have been undertaken for public education and as a learning opportunity for land managers to observe firsthand the results of different types of fuels management.

Albany Pine Bush

The Albany Pine Bush represents one of the best remaining examples of an inland pine barrens ecosystem in the world. This gently rolling sand plain is home to a unique diversity of animals and plants, including 20 rare species and two rare natural communities. DEC is a member of the Albany Pine Bush Preserve Commission, which administers the preserve, which includes state land as well as private and municipal land.

A formal protection plan guides the future management and protection of the unique inland Pine Barrens habitat, home of the endangered Karner Blue Butterfly. Prescribed fire and mechanical treatment are used to encourage native species of grass, wild blue lupine (*Lupinus perennis*), pitch pine (*Pinus rigida*) and scrub oak (*Quercus ilicifolia*) and to inhibit hardwood invasion by species such as quaking aspen (*Populus tremuloides*), black cherry (*Prunus serotina*, and gray birch (*Betula populifolia*).

GUIDELINES FOR FIRE MANAGEMENT

The use of prescribed fire will be addressed, where applicable, in UMPs. Those UMPs that address prescribed fire should clearly state goals and objectives for the use of fire on the unit. Engaging in partnership with multiple DEC programs, state agencies, non-profit groups, municipalities and private landowners is vital to implementing fire management policies. Protocols and procedures for the use of prescribed fire and wildland fire suppression response have been developed by DEC's Division of Forest Protection and Fire Management. The chief role of land managers is to offer input on ecological and biological concerns as well as the public notification procedures to be included in prescribed fire plans.

Fuels Management and Prescribed Fire

Fuels management may include use of prescribed fire, mechanical treatments, or chemical treatments, or any combination. A safe and effective prescribed fire program can mitigate risks to people and their communities, and restore and maintain healthy, diverse ecological systems using fuels management. Short term impacts associated with prescribed fire listed below should be considered in light of the long-term benefits to forest health and reduced fire hazard.

There are a number of potential short-term impacts associated with prescribed fire, including:

- The risk of a fire burning out of control and the resulting danger posed to personal property and public safety and health.
- The safety risks for staff
- The impact of smoke on neighboring communities, especially on individuals with respiratory sensitivities
- The impact on wildlife species
- Aesthetic impacts
- Impacts on recreational use of the area after the burn
- Impacts to non-target vegetation if the prescribed fire intensity is exceeded.

The following mitigation measures will be employed to address potential impacts:

- Prescribed fires in grasslands will be timed to limit impact during breeding and nesting season.
- All prescribed fire projects must have an approved prescribed fire plan prior to ignition.
- All prescribed fire plans must contain measurable objectives and a predetermined prescription that defines conditions under which a prescribed fire may be ignited to reduce the chance of an escaped fire.
- Prescribed fire plans will also establish acceptable wind directions to avoid smoke impacts on population centers and travel corridors.
- Plans will incorporate public notification protocols.
- Staff members conducting prescribed fires will be required to follow safety protocols.
- Areas to be treated (burn units) will be delineated and sized to reduce visual impacts.
- Plans will follow the National Wildfire Coordinating Group (NWCG) format.

Wildfire Prevention and Suppression

The impacts from wildfires are similar to and greater than those from prescribed fires. Most wildfires occur during periods of high fire danger and their intensity is far greater than would be permitted under a prescribed fire. Intense fires can seriously impact forest soils, riparian areas and valued natural communities. As a result, it is DEC's policy to prevent and control wildfires on State Forest lands. The risk of fuel loading in non-fire dependent natural communities and

hardwood stands that form the majority of New York's State-owned properties is minimal and does not require fuel reduction by letting wildfires burn.

DEC's wildfire prevention and suppression program strives to mitigate or avoid wildfire impacts by applying the following measures:

- Fuel loading and fire danger are monitored by Forest Rangers during fire seasons.
- Wildfires on State Forest lands are reported to DEC's Division of Forest Protection and Fire Management.
- Timber sales contracts require all harvesting equipment to have spark arresters.
- When significant mortality from blowdown, disease or insect infestation creates high fuel loading, salvage harvests are conducted to mitigate the risk.
- The public is encouraged to use campfires responsibly.
- Minimum Impact Suppression Tactics (MIST), will be utilized to reduce impacts of wildfire suppression on the ecosystem.

"FM" OBJECTIVES, ACTIONS AND SEQR ANALYSIS

Fire Management (FM) Objective I – Support Forest Rangers in their traditional responsibilities of controlling the ignition and spread of wildfire on State Forests.

FM Objective II – Maintain naturally occurring fire-dependent communities on State Forests.

FM Action 1 – Continue to conduct prescribed burns in conjunction with Forest Rangers to perpetuate fire dependent communities.

FM SEQR Alternatives Analysis and Thresholds

Wildfire Prevention and Suppression
The **no-action alternative** which has been chosen as DEC's **preferred alternative** is the continuation of the Forest Rangers' traditional role of prevention education and active suppression. As mentioned above, suppression does not create excessive fuel loading in most State Forest settings.

An alternative for the suppression of wildfire would be a "let burn" policy. This cannot be implemented, considering the resource damage from an intense wildfire, threat to public safety and destruction of personal property. It also violates state law where quoted "all wildland fires are to be extinguished".

No other viable alternatives have been identified.

Fuels Management and Prescribed Fire

The **no-action alternative** for use of prescribed fire has been adopted for all State Forest lands other than those listed in the preferred alternative. DEC's **preferred alternative** is to continue the use of prescribed fire on a limited acreage to maintain fire-dependent communities, grasslands, regenerate oak and pine, and to treat forests in highly populated areas where excessive fuel loading could develop (i.e., Long Island Pine Barrens). The area of any single burn operation will be less than 100 acres.

SEQR Analysis Threshold: Compliance with the guidelines and strategies of this section will avoid and minimize potential impacts resulting from the use of prescribed fire. DEC will employ prescribed fire only if it is in conformance with the preferred alternative above and addressed in an approved fire plan. Any other prescribed fire will require additional site-specific environmental review under SEQRA.

CHAPTER 7
BACKGROUND

LEGAL CONSIDERATIONS

NYS CONSTITUTION

Article XIV, Section 3 of the New York State Constitution provides that forest and wild-life conservation are declared to be policies of the state, and authorizes the acquisition of lands outside the Adirondack and Catskill Parks for the practice of forest or wildlife conservation.

STATUTES

Federal Statutes

Americans with Disabilities Act (ADA)

Title II of the ADA requires, in part, that DEC make reasonable modifications to its services and programs, so that when those services and programs are viewed in their entirety, they are readily accessible to and usable by people with disabilities. For a more detailed discussion of this topic, see Section 6.17.1 Universal Accessibility.

State Laws

Environmental Conservation Law (ECL)

Among other powers and duties, Article 9 of the ECL provides authorization for the DEC to do the following:

- exercise care, custody and control of state lands; and
- acquire lands outside of the Adirondack and Catskill Parks A... which are adapted for reforestation and the establishment and maintenance thereon of forests for watershed protection, the production of timber and other forest products, and for recreation and kindred purposes; and
- create reforestation areas which shall consist respectively of not less than five hundred acres of contiguous lands, which shall be forever devoted to the planting, growth and harvesting of...trees; and
- make necessary rules and regulations; and
- enter into stewardship agreements with any person or persons for the purposes of preserving, maintaining, or enhancing a state-owned natural resource or portion thereof; and
- sell the trees, timber and other products on State Forest lands outside the Forest Preserve; and
- enter into leases for the purpose of aiding in discovering and removing oil or gas from, or for storage of gas or oil on State Forest lands outside the Forest Preserve; and
- maintain a system of forest fire protection.

LEGAL CONSIDERATIONS

Further, the Park and Recreation Land Acquisition Act of 1960, and the Environmental Quality Bond Acts of 1972 and 1986 (as implemented through Articles 51 and 52 of the ECL, respectively) contained provisions for the acquisition of lands to be managed for multiple uses and added to the State Forest system.

Article 8 of the ECL, often referred to as the State Environmental Quality Review Act (SEQRA), requires all state agencies to act and choose alternatives which...minimize or avoid adverse environmental effects, and to prepare...an environmental impact statement on any action they propose...which may have a significant effect on the environment.

Parks, Recreation & Historic Preservation Law (PRHPL)

Article 14 of the PRHPL requires DEC to include such cultural resources in the range of environmental values that are managed on public lands. For a more detailed discussion of this topic, see Section 6.7 Historic and Cultural Resources.

General Obligations Law (GOL)

DEC is subject to the provisions of the GOL, Article 9, Title 1 of which sets forth the duty of care owed by a landowner who allows specific uses of their property by others.

RULES & REGULATIONS

Public use of State Forests is regulated under 6 NYCRR Part 190, Chapter II. This includes general regulations that apply to all State Forests, as well as regulations that apply only to specific parcels of state land. The following is a brief summary of the sections of those regulations that pertain to the use and management of lands for which this plan is written.

- Section 190.1 Fire - no fires permitted except for cooking, warmth or smudge. Also prohibits depositing matches, etc. and using live trees for fuel;
- Section 190.2 Signs and structures - no person shall deface, mutilate or destroy, etc. This section also prohibits placing trash, garbage, etc. on state lands;
- Section 190.3 Camping sites - sites must be kept neat, 150 feet from trail, road, stream, pond, spring, etc. and includes emergency closure times and elevation restrictions;
- Section 190.4 Camping permits - camping at one site for four nights or more without a permit prohibited, length of stay specified, camping restricted to posted areas, group size specified and age of permittee;
- Section 190.5 Permissible structures - no permanent structures allowed, no transfer of existing structures, listing of reasons for cancellation of existing permits for lean-tos (open camps)
- Section 190.6 Open camps - specifies number of days a lean-to may be occupied, what constitutes an enclosure, etc;
- Section 190.8 General - list of prohibitions for the public use of state lands including gambling, use of snowmobiles, toboggans and sleds on ski trails, sale of alcohol, speed

limits on truck trails, defacing, removing or destroying vegetation without a permit, etc. This section allows the use of horses except on intensively developed facilities (listed);
- Section 190.9 - Use of pesticides on state lands - none allowed except by written permission;
- Section 190.10 Unique Areas - special regulations listed by area;
- Section 190.11 Environmentally sensitive lands - lists the sections above that apply to people using sensitive lands (Sections 190.0 - 190.9);
- Section 190.24 Boat launch sites - specific rules of public use of launch sites;
- Section 190.25 - 190.33 Regulations for specific areas such as Zoar Valley, etc.

POLICY & GUIDELINES

The following policies and guidance documents are currently in effect and should be adhered to when making any decisions regarding the use and management of State Forest lands:

- Motor Vehicle Access to State Lands Under the Jurisdiction of DEC for People with Disabilities (CP-3);
- Contact, Cooperation, and Consultation with Indian Nations (CP-42);
- Standards and Procedures for Boundary Line Maintenance (NR-91-2; NR-95-1);
- Division Regulatory Policy (LF-90-2);
- Land Acquisition, Timber Cutting Reservations (NR-86-1);
- Volunteer Stewardship Agreements (CP-58);
- State Land/Facility Naming (NR-90-2);
- Trail Construction and Maintenance Manual (being updated)
- State Forest Tiber Sales Manual
- Drone Usage (CP-71)

Additional discussion of specific policies and guidance is provided where necessary in preceding sections of this plan.

VSAs & TRPs

Volunteer Stewardship Agreements (VSAs) are authorized by DEC policy, and allow interested parties to undertake care and maintenance of department facilities, while providing Worker=s Compensation coverage for those working under the auspices of the VSAs. The VSAs set forth the activities allowed and the services to be provided by DEC to facilitate those activities.

Temporary Revocable Permits (TRPs) are authorized by DEC policy and Environmental Conservation Law and allow careful review of special events and proposed activity on State Forests. In general, TRPs are required for any activity that conforms to existing law but exceeds average levels of usage or access. TRP review allows DEC to avoid conflicting uses of state land and situations that could threaten public safety or integrity of natural resources. TRP authorization does not provide exemption to any existing state laws and regulations.

APPENDICES

For most supplemental information and resources, refer to
www.dec.ny.gov/lands/64567.html

GLOSSARY

GLOSSARY

Access trails
: temporary, unpaved roads which do not provide all weather access within the state land. They are not designed for long term and repeated use by heavy equipment. These corridors were originally constructed for the seasonal removal of forest products by skidding to log landings or other staging areas. Constructed according to best management practices, these trails may be used to support other management objectives such as recreational access corridors. Maintenance is limited to activities which minimally support seasonal access objectives.

Adaptive management
: a dynamic approach to forest management in which the effects of treatments and decisions are continually monitored and used, along with research results, to modify management on a continuing basis to ensure that objectives are being met

Afforestation
: The establishment of a forest or stand in an area where the preceding vegetation or land use was not forest

Age class(es)
: trees of a similar age originating from a single natural event or regeneration activity

All-aged
: a condition of a forest or stand that contains trees of all or almost all age classes.

Basal area
: the cross-sectional area, measured in square feet, of a single stem, including the bark, measured at breast height (4.5 ft above the ground)

Best Management Practices (BMP's)
: a practice or a combination of practices that are designed for the protection of water quality of water bodies and riparian areas, and determined to be the most effective and practicable means of controlling water pollutants

Biodiversity
: 1. the variety and abundance of life forms, processes, functions, and structures of plants, animals, and other living organisms, including the relative complexity of species, communities, gene pools, and ecosystems at spatial scales that range from local through regional to global —synonym biological diversity, diversity
2. an index of richness in a community, ecosystem, or landscape and the relative abundance of these species —note 1. there are commonly five levels of biodiversity: (a) genetic diversity, referring to the genetic variation within a species; (b) species diversity, referring to the variety of species in an area; (c) community or ecosystem diversity, referring to the variety of communities or ecosystems in an area; (d) landscape diversity, referring to the variety of ecosystems across a landscape; and (e) regional diversity, referring to the variety of species, communities, ecosystems, or landscapes within a specific geographic region —note 2. each level of biodiversity has three components: (a) compositional diversity or the number of parts or elements within a system, indicated by such measures as the number of species, genes, communities, or ecosystems; (b) structural diversity or the variety of patterns or organizations within a system, such as

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habitat structure, population structure, or species morphology; and (c) functional diversity or the number of ecological processes within a system, such as disturbance regimes, roles played by species within a community, and nutrient cycling within a forest

Biological legacy
: an organism, living or dead, inherited from a previous ecosystem - note: biological legacies often include large trees, snags, and down logs left after timber harvesting

Blowdown
: tree or trees felled or broken off by wind

Browse
: portions of woody plants including twigs, shoots, and leaves consumed by animals such as deer

Buffer zone(s)/buffer strip
: a vegetation strip or management zone of varying size, shape, and character maintained along a stream, lake, road, recreation site, or other vegetative zone to mitigate the impacts of actions on adjacent lands, to enhance aesthetic values, or as a best management practice

Cavity tree/den tree
: a tree containing an excavation sufficiently large for nesting, dens or shelter; tree may be alive or dead

Clearcut
: the cutting of essentially all trees, producing a fully exposed microclimate for the development of a new age class —note 1. regeneration can be from natural seeding, direct seeding, planted seedlings, or advance reproduction —note 2. cutting may be done in groups or patches (group or patch clearcutting), or in strips (strip clearcutting) —note 3. the management unit or stand in which regeneration, growth, and yield are regulated consists of the individual clearcut stand —note 4. when the primary source of regeneration is advance reproduction, the preferred term is overstory removal

Climax forest
: an ecological community that represents the culminating stage of a natural forest succession for its locality / environment

Coarse filter approach
: a strategy for conserving biodiversity that involves maintaining a variety of native ecosystems within a landscape context. A coarse filter approach would ensure the availability of grasslands, shrublands, open wetlands, forest wetlands, riparian zones, northern hardwood forest and mixed northern hardwood/conifer forest in various stages of successional development. This approach assumes that a representative array of native ecosystems will contain the vast majority of species in a region

Coarse woody material
: any piece(s) of dead woody material on the ground in forest stands or in streams

Cohort
: a population of trees that originate after some type of disturbance

Community
: 1. an assemblage of plants and animals interacting with one another, occupying a habitat, and often modifying the habitat; a variable assemblage of plant and animal

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populations sharing a common environment and occurring repeatedly in the landscape. 2. a group of people living in a particular local area

Conversion

a change from one silvicultural system to another or from one tree species to another

Corridor(s)

a linear strip of land identified for the present or future location of a designed use within its boundaries. Examples: recreational trails, transportation or utility rights-of-way. When referring to wildlife, a corridor may be a defined tract of land connecting two or more areas of similar management or habitat type through which a species can travel from one area to another to fulfill any variety of life-sustaining needs

Cover type(s)

the plant species forming a majority of composition across a given area

Crown class

a category of tree based on its crown position relative to those of adjacent trees.
a) dominant: a tree whose crown extends above the general level of the main canopy and receives full light from above and partial to full light from the sides.
b) co-dominant: a tree whose crown helps to form the general level of the main canopy and receives full light from above and comparatively little from the sides.
c) intermediate: a tree whose crown extends into the lower portion of the main canopy and receives little direct light from above and none from the sides.
d) suppressed / overtopped: a tree whose crown is completely overtopped by the crowns of one or more neighboring trees and receives little or no direct sunlight

Cultural resources

significant historical or archaeological assets on sites as a result of past human activity which are distinguishable from natural resources

Cutting interval

the number of years between harvest or regeneration cuts in a stand

Designated recreational trail(s)

a Department authorized recreational trail that is signed and/or mapped

Diameter (at) Breast Height (DBH)

the diameter of the stem of a tree (outside bark) measured at breast height (4.5 ft) from the ground

Disturbance

a natural or human-induced environmental change that alters one or more of the floral, faunal, and microbial communities within an ecosystem. Timber harvesting is the most common human disturbance. Wind or ice storms are examples of natural disturbance

Early successional habitat

the earliest stage of development in a ecosystem. An example: vegetative habitat where early successional is seen as old fields, brushy shrubby type plants, with species that are shade-intolerant

Ecosystem

a spatially explicit, relatively homogeneous unit of the earth that includes all interacting organisms and components of the abiotic environment within its boundaries - note: an ecosystem can be of any size, e.g., a log, pond, field, forest or the earth's biosphere

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Ecosystem management
: the appropriate integration of ecological, economic, and social factors in order to maintain and enhance the quality of the environment to best meet current and future needs. Involves management at the landscape level, prompting the biodiversity of natural communities of plants, animals, and seeking to maintain healthy and productive environments

Edge(s)
: the more or less well-defined boundary between two or more elements of the environment, e.g., a field adjacent to a woodland or the boundary of different silvicultural treatments

Endangered species
: any species of plant or animal defined through the Endangered Species Act of 1976 as being in danger of extinction throughout all or a significant portion of its range, and published in the Federal Register, also those listed by NYS regulation. Section 182.2(g) of 6 NYCRR Part 182. Many more in NY are state listed than federally listed. (https://www.dec.ny.gov/animals/7494.html)

Even-aged
: a class of forest or stand composed of trees of about the same age. The maximum age difference is generally 20 years

Even-aged (silviculture)
: a program of forest management directed to the establishment and maintenance of stands of trees having relatively little (10-20 yrs) variation in ages. The guidelines to be applied in using this system at all stages of tree development are uniquely different from the uneven-aged system

Flood plain(s)
: the level or nearly level land with alluvial soils on either or both sides of a stream or river that is subject to overflow flooding during periods of high water level

Forest fragmentation
: 1. the process by which a landscape is broken into small islands of forest within a mosaic of other forms of land use or ownership. Note- fragmentation is a concern because of the effect of noncontiguous forest cover on connectivity and the movement and dispersal of animals in the landscape
: 2. islands of a particular age class (e.g., old growth) that remain within areas of younger-aged forest

Forestry
: the profession embracing the science, art, and practice of creating, managing, using, and conserving forests and associated resources for human benefit and in a sustainable manner to meet desired goals, needs, and values

Fragipan
: a dense and brittle layer of soil. Its hardness results mainly from extreme density or compactness rather than from high clay content; the material may be dense enough to restrict root, nutrient, and water penetration

Gaps
: natural communities, habitats, successional stages, or organisms which have been identified as lacking in the landscape

GLOSSARY

Geocaching
: an outdoor activity in which the participants use a Global Positioning System (GPS) receiver or other navigational techniques to hide and seek containers

Geographic Information System (GIS)
: an organized collection of computer hardware, software, geographic and descriptive data, personnel, knowledge and procedures designed to efficiently capture, store, update, manipulate, analyze, report and display the forms of geographically referenced information and descriptive information

Group selection
: trees are removed and new age classes are established in small groups —note 1. the width of groups is commonly approximately twice the height of the mature trees with smaller openings providing microenvironments suitable for tolerant regeneration and larger openings providing conditions suitable for more intolerant regeneration —note 2. the management unit or stand in which regeneration, growth, and yield are regulated consists of an aggregation of groups

Habitat
: the geographically defined area where environmental conditions (e.g., climate, topography, etc.) meet the life needs (e.g., food, shelter, etc.) of an organism, population, or community

Hardwoods
: broad-leafed, deciduous trees belonging to the botanical group Angiospermae

Haul roads
: permanent, unpaved roads which are not designed for all-weather travel, but may have hardened or improved surfaces with artificial drainage; they are constructed according to best management practices primarily for the removal of forest products, providing limited access by log trucks and other heavy equipment; these roads may or may not be open for public motor vehicle use, depending on management priorities and objectives; they may serve as recreational access corridors, but are not maintained according to specific standards or schedules

Improvement thinning(s)
: the removal of less desirable trees of any species in a stand of poles or larger trees, primarily to improve composition and quality

Indicator species
: species with such specialized ecological needs that they can be used for assessing the quality, condition, or extent of an ecosystem on the basis of their presence and density, or the accumulation and effect of materials in their tissues

Invasive species
: species that have become established outside their natural range which spread prolifically, displacing other species, and sometimes causing environmental damage

Keystone species
: a plant or animal species that strongly influences that functioning of an entire ecosystem; for example, the way beaver influence wetlands

Landscape
: a spatial mosaic of several ecosystems, landforms, and plant communities across a

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defined area irrespective of ownership or other artificial boundaries and repeated in similar form throughout

Landscape ecology
: the study of the distribution and abundance of elements within landscapes, the origins of these elements, and their impacts on organisms and processes.

Landscape matrix
: the most extensive and connected landscape element type present, which plays the dominant role in landscape functioning; for example, New York's South-Central Highlands (Central Appalachian) landscape is dominantly forest cover; thus, the landscape matrix is forest cover

Large poles
: trees that are 9 to 11 inches in diameter at breast height

Large sawtimber
: trees that are 24 inches or greater in diameter at breast height

Late successional habitat
: habitats predominated by forests with older and larger trees, having more structural complexity than mature forest, and being either in the process of developing or have developed old growth characteristics; they may exhibit evidence of past human or natural disturbances; these forests may exist as entire stands or as smaller patches within younger stands

Log landing(s)/(Log deck)
: a cleared area to which logs are skidded and are temporarily stored before being loaded onto trucks for transport

Mast
: all fruits of trees and shrubs used as food for wildlife; hard mast includes nut-like fruits such as acorns, beechnuts and chestnuts. Soft mast includes the fleshy fruits of black cherry, dogwood and serviceberry

Mature forest cover
: pertaining to an even-aged stand that has attained most of its potential height growth, or has reached merchantability standards. Within uneven-aged stands, individual trees may become mature but the stand itself consists of trees of diverse ages and stages of development

Medium sawtimber
: trees that are 18-23 inches in diameter at breast height

Mesic
: of sites or habitats characterized by intermediate moisture conditions; i.e., neither decidedly wet nor dry

Mid Successional
: forests that are pole-sized or larger, with relatively open understories

Multiple use
: a strategy of land management fulfilling two or more objectives, e.g. forest products removal and recreation

Natural area(s)
: an area allowed to develop naturally; intervention will be considered to protect forest health (e.g. fire or invasive plant or animal invasive species), to enhance structural or

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species diversity, to protect, restore or enhance significant habitats or to exploit or create regeneration opportunities for desired plant species

Natural regeneration

the establishment of a forest stand from natural seeding, sprouting, suckering or layering

Neotropical migratory birds (migrants)

birds that breed in Canada and the United States and spend the winter in Mexico, Central America, South America or the Caribbean islands; these species represent more than 50% (340 of the 600 species) of North American birds

Niche

1. the ultimate unit of the habitat, i.e., the specific spot occupied by an individual organism

2. by extension, the more or less specialized relationships existing between an organism, individual or synusia, and its environment

3. the specific set of environmental and habitat conditions that permit the full development and completion of the life cycle of an organism —note the ecological niche of a species is the functional role of the species in a community; the fundamental niche is the totality of environmental variables and functional roles to which a species is adapted; the realized niche is the niche a species normally occupies

Northern hardwood forest

a forest type usually made up of sugar and red maple, American beech, yellow birch, and to a lesser extent black cherry and white ash. This type represents about 70 percent of all forests in New York State

Old growth

an abundance of late successional tree species, at least 180 - 200 years of age in a contiguous forested landscape that has evolved and reproduced itself naturally, with the capacity for self perpetuation, arranged in a stratified forest structure consisting of multiple growth layers throughout the canopy and forest floor, featuring canopy gaps formed by natural disturbances creating an uneven canopy, and a conspicuous absence of multiple stemmed trees. Old growth forest sites typically are characterized by an irregular forest floor containing an abundance of coarse woody materials which are often covered by mosses and lichens; show limited signs of artificial disturbance and have distinct soil horizons. The understory displays well developed and diverse surface herbaceous layers. Single, isolated trees may be considered as old growth if they meet some of the above criteria

Overstory

that portion of the trees in a forest forming the upper or uppermost canopy layer

Overstory removal

the cutting of trees constituting an upper canopy layer to release adequate desirable advanced regeneration in the understory

Parcelization

the subdivision of land into smaller ownership blocks. This intrudes new features and activities into the forest and changes its character, but does not necessarily fragment it in biophysical terms

GLOSSARY

Patch cut
: a type of clearcut where the cut area consists of a small part of a stand or forest —note 1. the minimum size of a patch depends primarily on (a) the creation of microclimate conducive to establishment of desired regeneration of particular tolerance, and (b) the area needed for safe felling and yarding of harvested trees

Pioneer Species
: a plant capable of invading bare sites (newly exposed soil) and persisting there or colonizing them until supplanted by later successional species

Plantation
: a stand composed primarily of trees established by planting or artificial seeding – a plantation may have tree or understory components that have resulted from natural regeneration

Poletimber
: trees that are generally 6-11 inches diameter at breast height

Prescribed fire
: fire that is deliberately ignited to burn wildland fuels in either their natural or modified state and under specific environmental conditions which allow the fire to be confined to a predetermined area and produces the fireline intensity and rate of spread (ROS) required to attain planned resource management objectives.

Protection area
: land excluded from most active management to protect sensitive sites; exclusions include: timber harvesting, road construction, oil and gas exploration and development and some recreational activities. These sites most often include steep slopes, wet woodlands and riparian zones along stream corridors

Public Forest Access Roads (PFAR)
: permanent, unpaved roads which may be designed for allweather use depending upon their location, surfacing and drainage. These roads provide primary access for administration and public use within the Unit. The design standards for these roads are those of the Class A and Class B access roads as provided in the Unpaved Forest Road Handbook (8/74). As a general guideline, sufficient access is typically achieved when 1 mile of PFAR is developed for each 500 acres of state land, and no position within the unit lies more than one half-mile from a PFAR or public highway

Pulpwood
: low grade or small diameter logs used to make paper products, wood chips

Regeneration
: seedlings or saplings of any origin

Release
: 1. a treatment designed to free trees from undesirable, usually overtopping, competing vegetation
: 2. a treatment designed to free young trees not past the sapling stage from undesirable competing vegetation that overtops or closely surrounds them

Riparian buffer (zone)
: areas of transition between terrestrial and aquatic ecological systems; they are characterized as having soils and vegetation analogous to floodplains, or areas

GLOSSARY

transitional to upland zones; these areas help protect the water by removing or buffering the effects of excessive nutrients, sediments, organic matter, pesticides, or pollutants

Rotation
: the period of years between stand establishment and final harvest as designated by management decisions

Salvage cutting
: the removal of dead trees or trees damaged or dying because of injurious agents other than competition, to recover economic value that would otherwise be lost

Sapling
: a small tree, usually defined as being between 1 and 5 inches diameter at breast height

Sawtimber
: trees that are 12 inches and larger diameter at breast height

Seed tree
: 1. a regeneration method consisting of cutting all trees except for a small number of widely dispersed trees retained for seed production and to produce a new age class in fully exposed microenvironment
: 2. a tree retained for seed production —note seed trees are usually removed after regeneration is established

Seedling
: a young tree originating from seed that is less than one inch in diameter

Seedling(s)/sapling(s)
: trees less than 6 inches diameter at breast height

Shade tolerance
: the ability of a tree species to germinate and grow at various levels of shade;
: a) shade-tolerant: having the capacity to compete for survival under shaded conditions,
: b) shade-intolerant: having the capacity to compete for survival only under direct sunlight conditions; light demanding species

Shelterwood
: an even-aged method of natural regeneration designed to regenerate and maintain a stand with a single age class;
: the cutting of most trees, leaving those needed to produce sufficient shade to produce a new age class in a moderated microenvironment —note the sequence of treatments can include three types of cuttings: (a) an optional preparatory cut to enhance conditions for seed production, (b) an establishment cut to prepare the seed bed and to create a new age class, and (c) a removal cut to release established regeneration from competition with the overstory; cutting may be done uniformly throughout the stand (uniform shelterwood), in groups or patches (group shelterwood), or in strips (strip shelterwood); in a strip shelterwood, regeneration cuttings may progress against the prevailing wind

Silviculture
: the art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis

GLOSSARY

Single tree selection
: individual trees of all size classes are removed more or less uniformly throughout the stand, to promote growth of remaining trees and to provide space for regeneration — synonym individual tree selection

Site
: the area in which a plant or forest stand grows, considered in terms of its environment, particularly as this determines the type and quality of the vegetation the area can support

Skid trail(s)
: a temporary or permanent trail used to skid or forward felled trees from the stumps to the log landing

Small poles
: trees 6-8 inches diameter at breast height

Small sawtimber
: trees 12-17 inches in diameter at breast height

Snags
: standing, dead trees, with or without cavities; function as perches, foraging sites and/or a source of cavities for dens, roosting and/or nesting for wildlife

Softwoods
: generally refers to needle and/or cone bearing trees (conifers) belonging to the botanical group Gymnospermae

Spatial analysis
: an examination of data in the context of where it occurs geographically or “on the ground;” This is usually accomplished by tying database information to GIS based maps

Species
: the main category of taxonomic classification into which genera are subdivided, comprising a group of similar interbreeding individuals sharing a common morphology, physiology and reproductive process

Species richness
: the number of different species present within a defined area

Stand
: a contiguous group of trees sufficiently uniform in age-class distribution, composition, and structure, and growing on a site of sufficiently uniform quality, to be a distinguishable unit —see all-aged stand, mixed, pure, even-aged, and uneven-aged stands —note 1. a mixed stand is composed of a mixture of species —note 2. a pure stand is composed of essentially a single species —note 3. in a stratified mixture stand different species occupy different strata of the total crown canopy

Stand structure
: the horizontal and vertical distribution of components of a forest stand including the height, diameter, crown layers and stems of trees, shrubs, herbaceous understory, snags and down woody materials

State Forest / State Reforestation Area
: lands owned by the State of New York, administered by the Department of Environmental Conservation Division of Lands & Forests, and authorized by Environmental Conservation Law to be devoted to the establishment and maintenance

GLOSSARY

of forests for watershed protection, the production of timber and other forest products, and for recreation and kindred purposes. These forests shall be forever devoted to the planting, growth, and harvesting of such trees (Title 3 Article 9-0303 ECL). (G)

Stocking

1. the amount of material on a given area – example: the stand is fully stocked
2. an indication of growing- space occupancy relative to a pre-established standard

Succession

the gradual supplanting of one community of plants by another —note 1. the sequence of communities is called a sere, or seral stage —note 2. a sere whose first stage is open water is termed a hydrosere, one whose first stage is dry ground, a xerosere —note 3. succession is primary (by pioneers) on sites that have not previously borne vegetation, secondary after the whole or part of the original vegetation has been supplanted, allogenic when the causes of succession are external to and independent of the community (e.g., accretion of soil by wind or water, or a change of climate), and autogenic when the developing vegetation is itself the cause

Suite

species similar in their habitat needs which may respond similarly to habitat changes

Sustainable forest management

management that maintains and enhances the long-term health of forest ecosystems for the benefit of all living things, while providing environmental, economic, social and cultural opportunities for present and future generations

Temporary revocable permit (TRP)

a Department permit which authorizes the use of state land for a specific purpose for a prescribed length of time

Thinning(s)

a silvicultural treatment made to reduce stand density of trees primarily to improve growth of remaining trees, enhance forest health, or recover potential mortality

Threatened species

a species likely to become endangered in the foreseeable future, throughout all or a significant portion of its range, unless protected

Timber Stand Improvement (TSI)

pre-commercial silvicultural treatments, intended to regulate stand density and species composition, while improving wood product quality and fostering individual tree health and vigor through the removal of undesirable trees

Understory

the smaller vegetation (shrubs, seedlings, herbaceous plants, small trees) within a forest stand, occupying the vertical zone between the overstory and the forest floor

Uneven-aged system

a planned sequence of treatments designed to maintain and regenerate a stand with three or more age classes

Uneven-aged stand/forest

a stand with trees of three or more distinct age classes, either intimately mixed or in small groups

GLOSSARY

Universal Design

Universal design is the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.

Variable patch retention (harvest system)

an approach to harvesting based on the retention of structural elements or biological legacies (trees, snags, logs, etc.) from the harvested stand for integration into the new stand to achieve various ecological objectives

Watershed

a region or area defined by a network of stream drainage. A watershed includes all the land from which a particular stream or river is supplied

Wetland(s)

a transitional area between aquatic and terrestrial ecosystems that is inundated or saturated for periods long enough to produce hydric soils and support hydrophytic vegetation

BIBLIOGRAPHY

BIBLIOGRAPHY

Aldrich, R., and J. Wyerman. 2005. "National Land Trust Census Report." The Land Trust Alliance, Washington, DC. www.lta.org.

Anderson, M. G. 1999. "Viability and spatial assessment of ecological communities in the Northern Appalachian ecoregion." Ph D, University of New Hampshire, Durham, NH.

Anderson, M. G., and S. L. Bernstein. 2003. "Planning methods for ecoregional targets: Matrix-forming ecosystems." Unpublished report, The Nature Conservancy, Conservation Science Support, Northeast & Caribbean Division, Boston, MA, 20.

Anderson, M.G. et al. 2006. "The North Atlantic Coast Ecoregional Assessment, Conservation Status Report, First Iteration, Edited." The Nature Conservancy, Northeast and Caribbean Division, Boston, MA.

Askins, R.A., and M.J. Philbrick. 1987. "Effect of changes in regional forest abundance on the decline and recovery of a forest bird community." *Wilson Bulletin* 99: 7-21.

Avery, T. E., and H. E. Burkhart. 1994. *Forest Measurements.* Fourth Edition. New York: McGraw-Hill.

Barbour et al., Henry. 2000 . *Lower New England-Northern Piedmont Ecoregion Conservation Plan; First Iteration, Edited.* Boston, MA: The Nature Conservancy, Northeast and Caribbean Division.

Bellemare, J., G. Motzkin, and D. Foster. 2002. "Legacies of the Agricultural Past in the Forested Present: An Assessment of Historical Land-Use Effects on Rich Mesic Forests." *Journal of Biogeography* 29: 401-1420.

Botkin, D.B. 1990. *Discordant Harmonies: a New Ecology for the 21st Century.* New York: Oxford University Press.

Bouwman, A.F., ed. 1990. *Soils and the Greenhouse Effect.* Chichester: J. Wiley & Sons.

Casey, D., and D. Hein. 1983. "Effects of heavy browsing on a bird community in deciduous forest." *Journal of Wildlife Management* 47: 829-836.

Caslick, J. W. 1975. *Measuring revegetation rates and patterns on abandoned agricultural lands.* Ithaca, NY: Cornell University Agricultural Experiment Station, New York State College of Agriculture and Life Sciences.

Chambers, R. E. 1983. *Integrating Timber and Wildlife Management Handbook.* State University of New York College of Environmental Science and Forestry, New York State Department of Environmental Conservation.

Cote, S.D., T.P. Rooney, and J. Tremblay. 2004. "Ecological impacts of deer overabundance." *Annual Review of Ecology, Evolution, and Systematics* 35: 113–147.

Davidson, E.A., Ackerman, I.L. 1993. "Changes in soil carbon inventories following cultivation of previously untilled soils." *Biogeochemistry* 20: 161–193.

deCalesta, D. S. 1994. "Effect of white-tailed deer on songbirds within managed forests in Pennsylvania." *Journal of Wildlife Management* 58: 711-718.

deCalesta, D. S., and T.G. Pierson. 2005. "Deer Density Estimation and Deer Browse Impact Survey Protocols 2005-06." Kinzua Quality Deer Cooperative.

BIBLIOGRAPHY

DeGraff, R.M., and A.L. Shigo. 1985. "Managing Cavity Trees for Wildlife in the Northeast." General Technical Report NE-101, USDA Forest Service.

DeGraff, R.M., M. Yamasaki, W.B. Leak, and J.W. Lanier. 1992. "New England Wildlife: Management of Forested Habitats." Gen. Tech. Report NE-144, USDA Forest Service, NE Forest Experimental Station.

DeSantis, R. D., W. K. Moser, D. D. Gormanson, M. G. Bartlett, and B. Vermunt, 2013: Effects of climate on emerald ash borer mortality and the potential for ash survival in North America. Agricultural and Forest Meteorology, 178–179, 120–128. doi:10.1016/j.agrformet.2013.04.015

Domke, G.M., Perry, C.H., Walters, B.F., Nave, L.E., Woodall, C.W. and Swanston, C.W. (2017), Toward inventory-based estimates of soil organic carbon in forests of the United States. Ecol Appl, 27: 1223-1235. https://doi.org/10.1002/eap.1516

Domke, Grant M., Brian F. Walters, David J. Nowak, James, E. Smith, Michael C. Nichols, Stephen M. Ogle, J.W. Coulston, and T.C. Wirth. 2021. *Greenhouse gas emissions and removals from forest land, woodlands, and urban trees in the United States, 1990–2019.* Vols. Resource Update FS–307. Madison, WI: U.S. Department of Agriculture, Forest Service, Northern Research Station. Accessed April 21, 2021. https://doi.org/10.2737/FS-RU-307.

Ecological Society of America (ESA); The Nature Conservancy; U.S. Geological Survey; U.S. Federal Geographic Data Committee. 1999. *Forming a partnership to further develop and implement the national vegetation classification standards.* Memorandum of Understanding, Washington DC: Ecological Society of America.

Edinger, G. J., D. J. Evans, S. Gebauer, and T. G. Howard. 2002. "Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. (Draft for Review)." New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.

Evans, K. E., and R. N. Conner. 1979. "Management of North Central and Northeastern Forests for NONGAME BIRDS (Snag Management)." General Technical Report NC-51, USDA Forest Service, 214-225.

Federal Geographic Data Committee. 1997. "FGDC vegetation classification and information standard, June 3, 1996 draft." Federal Geographic Data Committee, Vegetation Subcommittee (FGDC-VS), FGDC Secretariat, Reston, VA.

Fisher, R. F., and D. Binkley. 2000. *Ecology and Management of Forest Soils.* New York: Wiley.

Foster, D., and D. Orwig. 2006. "Preemptive and Salvage Harvesting of New England Forests: When Doing Nothing Is a Viable Alternative." *Conservation Biology* 20: 959-970.

Franklin, J.F., R.J. Mitchell, and B.J. Palik. 2007. "Natural Disturbance and Stand Development Principles for Ecological Forestry." Gen. Tech. Rep. NRS-19, USDA Forest Service .

Frumhoff, P.C., J.J. McCarthy, J.M. Melillo, S.C. Moser, and D.J. Wuebbles. 2007. *Confronting Climate Change in the U.S. Northeast:.* Cambridge, MA: UCS Publications.

Gibbs, James P. 2000. "Research Note: Wetland Loss and Biodiversity Conservation." *Conservation Biology* 14 (1): 314-317.

BIBLIOGRAPHY

Goetz, S. J., P. Jantz, and C. A. Jantz. 2009. "Connectivity of core habitat in the northeastern United States: parks and protected areas in a landscape context." *Remote Sensing of Environment* 113: 1421-1429.

Goodell, L., and D. Faber-Langendoen. 2007. "Development of stand structural stage indices to characterize forest condition in Upstate New York." *Forest Ecology and Management* 249: 158-170.

Grossman, D. H., D. Faber-Langendoen, A. S. Weakley, M. Anderson, P. Bourgeron, R. Crawford, K. Goodin, et al. 1998. "International classification of ecological communities: terrestrial vegetation of the United States." In *Volume I, The National Vegetation Classification System: development, status, and applications*, by The Nature Conservancy. Arlington, VA.

Groves, C. R., D. B. Jensen, L. L. Valutis, K. H. Redford, M. L. Shaffer, J. M. Scott, J. V. Baumgartner, J. V. Higgins, M. W. Beck, and M. G. Anderson. 2002. "Planning for biodiversity conservation: putting conservation science into practice." *Bioscience* 52: 499-512.

Harmon, M.E., J.F. Franklin, F.J. Swanson, P. Sollins, S.V. Gregory, J.D. Lattin, N.H. Anderson, et al. 1986. "Ecology of Coarse Woody Debris in Temperate Forest Ecosystems." *Advances in Ecological Research* 15: 133-302.

Hartley, M.J. 2002. "Rationale and Methods for Conserving Biodiversity in Plantation Forests." *Forest Ecology and Management* 155: 81-95.

Healy, W.M., R.T. Brooks, and R.M. DeGraaf. n.d. "Cavity Trees in Sawtimber-Sized Oak Stands in Central Massachusetts." *Northern Journal of Applied Forestry* 6: 61-65.

Helms, John A., ed. 1998. *The Dictionary of Forestry.* Society of American Foresters.

Hunter, M. L., Jr. 1990. *Wildlife, forests, and forestry: principles of managing forests for biological diversity.* Englewood Cliffs, NJ: Prentice Hall.

Howard, T. G., and M. D. Schlesinger. 2013. Wildlife habitat connectivity in the changing climate of New York's Hudson Valley. Annals of the New York Academy of Sciences 1298:103–109.

Ickes, R. 1992. "Yellow_billed Cuckoo." In *Atlas of breeding birds in Pennsylvania*, edited by D.W. Brauning, 152-153. Pittsburgh, PA: University of Pittsburgh Press.

Intergovernmental Panel on Climate Change. 2021. *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2019.* Intergovernmental Panel on Climate Change, Working Group 1.

Johnson, D.W. 1992. "Effects of forest management on soil carbon storage." *Water, Air and Soil Pollution* 64: 83-120.

Karasin, L. N. 2003. "All-Terrain Vehicles in the Adirondacks: Issues and Options WCS Working Paper No. 21, April 2003." *Wildlife Conservation Society, Adirondack Program.* Accessed 2010. http://www.wcs.org/adirondacks/.

Keeton, W. S. 2006. "Managing for late-successional/old-growth characteristics in northern hardwood-conifer forests." *Forest Ecology and Management* 235: 129-142.

Kenefic, L.S., and R.D. Nyland. 2007. "Cavity Trees, Snags, and Selection Cutting: A Northern Hardwood Case Study." *Northern Journal of Applied Forestry* 24 (3): 192-196.

2005. "Landscape Ecology." In *McGraw-Hill Encyclopedia of Science and Technology*. The McGraw-Hill Companies, Inc.

BIBLIOGRAPHY

Lanier, J. 1988. *Who Lives Where?* Vermont Fish and Wildlife Department.

Latham, R. E., J. Beyer, M. Benner, C.A. Dunn, M.A. Fajuan, R.R. Freed, M. M. Grund, S.B. Horsley, A.F. Rhodes, and B.P. B. P. Shissler. 2005. "Managing White-tailed Deer in Forest Habitat from an Ecosystem Perspective: Pennsylvania Case Study." Audubon Pennsylvania and Pennsylvania Habitat Alliance, Deer Management Forum , Harrisburg.

Leimgruber, P., W. J. McShea, and J.H. Rappole. 1994. "Predation on artificial nests in large forest blocks." *Journal of Wildlife Management* 58: 254-260.

Lorimer, C.G., and A.S. White. 2003. "Scale and frequency of natural disturbances in the northeastern US: implications for early successional forest habitats and regional age distributions." *Forest Ecology and Management* (185): 41-64.

Mace, R. 2008. *About Universal Design.* Accessed 2009. http://www.design.ncsu.edu/cud/about_ud/about_ud.htm.

Marks, P. L., S. Cardescu, and F. Seischab. 1992. "Late Eighteenth Century Vegetation of Central New York State on the Basis of Original Land Survey Records." Bulletin No. 484, New York State Museum, Albany, NY.

Marquis, D. A., R. L. Ernst, and S. L. Stout. 1992. "Prescribing silvicultural treatments in hardwood stands of the Alleghenies (revised)." General Technical Report NE-96, US Department of Agriculture, Forest Service, Northeastern Forest Experimental Station, Radnor, PA, 43-44.

Marquis, R.J., and C.J. Whelan. 1994. "Insectivorous Birds Increase Growth of White Oak through Consumption of Leaf-Chewing Insects." *Ecology* 75 (7): 2007-2014.

McCabe, T. R., and R.E. McCabe. 1994. "Recounting whitetails past." In *The Science of Overabundance: Deer Ecology and Population Management*, edited by W.J. McShea, H.B. Underwood and J.H. J. H. Rappole, 11-26. Washington, DC: Smithsonian Institution Press.

McShea, W. J., and G. Schwede. 1993. "Variable acorn crops: responses of white-tailed deer and other mast consumers." *Journal of Mammology* 74: 999-1006.

McShea, W. J., and J.H. Rappole. 1997. "Herbivores and the ecology of forest understory birds." In *The Science of Overabundance: Deer Ecology and Population Management*, edited by W. J. McShea, H.B. Underwood and J.H. Rappole, 298-309.

McShea, W. J., and J.H. Rappole. 2000. "Managing the abundance and diversity of breeding bird populations through manipulation of deer populations." *Conservation Biology* 14: 161-170.

McShea, W.J., and J.H. Rappole. 1992. "White-tailed deer as keystone species within forested habitats of Virginia." *Virginia Journal of Science* 43: 177–186.

Minor, E. S., and D. L. Urban. 2008. "A graph-theory framework for evaluating landscape connectivity and conservation planning." *Conservation Biology* 22: 297-307.

Minor, E. S., and D. L. Urban. 2007. "Graph theory as a proxy for spatially explicit population models in conservation planning." *Ecological Applications* 17: 1771-1782.

Moller, T. R., and C. P. Rordam. 1985. "Species of number of vascular plants in relation to area, isolation, and age of pond in Denmark." *Oikos* (45): 8-16.

2001. *Multi-Resolution Land Characteristics Consortium (MLRC).* http://www.mrlc.gov/.

BIBLIOGRAPHY

2008. *Multi-Resolution Land Characteristics Consortium (MRLC).* U.S. Department of the Interior, U.S. Geological Survey. April 22. Accessed January 20, 2009. http://www.mrlc.gov/about.php.

2003-04. "Natural Heritage Elements - Species Level." *Vermont Fish and Wildlife Dept.* Accessed 2010. http://www.vtfishandwildlife.com/cwp_elem_spec_esf.cfm.

2003. *NatureServe.* Accessed 2009. http://www.natureserve.org/.

Noss, R. F., E. T. LaRoe, and J. M. Scott. 1985. "Endangered ecosystems of the United States: a preliminary assessment of loss and degradation." Biological Report 28, U.S. Department of the Interior, National Biological Service, Washington, D.C.

Nowak, D.J., and J. T. Walton. 2005. "Projected urban growth (2000 – 2050) and its estimated impact on the U.S. forest resource." *Journal of Forestry* 103 (8): 383-389.

Nyland, R.D. 1996. *Silviculture Concepts and Applications.* New York: McGraw-Hill.

—. 1996. *Silviculture: Concepts and Applications;.* State University of New York College of Environmental Science and Forestry.

Nyland, Ralph D. 2003. "Even- to uneven-aged: the challenges of conversion." *Forest Ecology and Management* 291-300.

NYS DEC. 2009. "2009 New York State Open Space Conservation Plan." *New York State Department of Environmental Conservation.* Accessed 2010. http://www.dec.ny.gov/lands/47990.html.

—. 2001. "DEC Region 7 Draft Recreation Plan." unpublished.

NYSDEC. 2007. *NYS Forestry Best Management Practices for Water Quality: BMP Field Guide.*

O'Leary, J. T., F. A. McGquire, and F.D. Dottavio. 1987. *Using Nationwide Recreation Survey Data in Developing Recreation Policy and Planning Options - Review of Policy Research.*

OPRHP, NYS. 2008. "Statewide Comprehensive Outdoor Recreation Plan." Albany, NY.

Outdoor Industry Foundation. 2006. *The Active Outdoor Recreation Economy.* Boulder, CO.

Outdoor Industry Association. 2021. *2021 Outdoor Participation Trends Report. https://outdoorindustry.org/wp-content/uploads/2015/03/2021-Outdoor-Participation-Trends-Report.pdf*

Paine, R.T. 1995. "A Conversation on Refining the Concept of Keystone Species." *Conservation Biology* 9 (4): 962–964.

Paradis, A., J. Elkinton, K. Hayhoe, and J. Buonaccorsi, 2008: Role of winter temperature and climate change on the survival and future range expansion of the hemlock woolly adelgid (Adelges tsugae) in eastern North America. Mitigation and Adaptation Strategies for Global Change, 13 (5–6), 541–554. doi:10.1007/s11027-007-9127-0

Pendleton, V. 2008. "Seismic exploration." In *Encyclopedia of Earth*, edited by C.J. Cleveland. Washington, DC: Environmental Information Coalition, National Council for Science and the Environment.

Perlman, D., and J. Midler. 2005. *Practical Ecology for planner, developers and citizens.* Washington, DC: Lincoln Institute of Land Policy, Island Press.

Pielou, E. C. 1991. *After the Ice Age: the return of life to glaciated North America .* Chicago: University of Chicago Press.

Quinby, P, S. Trombulak, T. Thomas Lee, J. Lane, M. Henry, R. Long, and P. MacKay. 1999. "Opportunities for Wildlife Habitat Connectivity between Algonquin Park, Ontario and

BIBLIOGRAPHY

the Adirondack Park, New York." online at http://www.ancientforest.org/a2a.html, The Greater Laurentian Wildlands Project, Burlington, VT.

Quinby, Peter(2006)"Evaluating Regional Wildlife Corridor Mapping: A Case Study of Breeding Birds in Northern New York State," Adirondack Journal of Environmental Studies: Vol. 13:No.2, Article 7.
Available at:https://digitalworks.union.edu/ajes/vol13/iss2/7

Rails-to-Trails Conservancy. (2020, July, 2). *New Data Underscores Need for Safe Places to Walk and Bike Close to Home: Findings of Rails-to-Trails Conservancy Survey Show Americans Turning to Outdoors to Reduce Stress Brought on by the COVID-19 Pandemic* [Press Release] https://www.railstotrails.org/resource-library/resources/new-data-underscores-need-for-safe-places-to-walk-and-bike-close-to-home/

Rawinski, T.J. 2008. "Impacts of Deer Overabundance in Forest Ecosystems: An Overview." USDA, USFS, NE Area, Newtown Square, PA.

Rellou, J. 2002. *Chestnut blight fungus Cryphonectria parasitica.* Accessed 2009. http://www.columbia.edu/itc/cerc/danoff-burg/invasion_bio/inv_spp_summ/Cryphonectria_parasitica.htm.

Reschke, C. 1990. "Ecological Communities of New York State." *New York State Department of Environmental Conservation.* Accessed 2009. http://www.dec.ny.gov/animals/29389.html.

Reschke, C. 1993. "Estimated numbers of element occurrences, acreage, trends, and threats for selected New York natural communities." unpublished report, New York State Department of Environmental Conservation, New York Natural Heritage Program, Latham, NY.

Robbins, C. S., D. K. Dawson, and B. A. Dowell. 1989. "Habitat area requirements of breeding forest birds of the Middle Atlantic States." *Wildlife Monographs* 103: 1-34.

Roe, J.H., and A. Ruesink. undated. "Natural Dynamics Silviculture – A Discussion of Natural Community-Based Forestry Practices." Online at www.nature.org/wherewework/northamerica/states/vermont/files/pub_nds_doc.pdf, The Nature Conservancy Vermont.

Runkle, J., K. E. Kunkel, R. Frankson, and B. C. Stewart, 2017: State Climate Summaries: West Virginia. NOAA Technical Report NESDIS 149-WV. NOAA National Centers for Environmental Information, Asheville, NC, 4 pp.

Runkle, J., K. E. Kunkel, D. Easterling, B. C. Stewart, S. Champion, L. Stevens, R. Frankson, and W. Sweet, 2017: State Climate Summaries: Rhode Island. NOAA Technical Report NESDIS 149-RI. NOAA National Centers for Environmental Information, Asheville, NC, 4 pp.

Schlesinger, M. D., and T. Howard. 2010. "Progress report October 2009 – March 2010: State Wildlife Grants Program - Planning for Wildlife Habitat Connectivity in the Hudson River Valley." New York Natural Heritage Program, Albany, NY.

Sjogren, J. 1991. "Extinction and isolation gradients in metapopulations; the case of the pool frog (Rana lessonae)." *Biological Journal of the Linnean Society* (42): 135-147.

Smith, C. R., DeGloria, S.D., Richmond, M.E., et. al. 2001. "A Gap Analysis of New York NY-GAP." *Final Report and Data.* 2-disc CD set. University of Idaho. Moscow, ID: U.S. Geological

BIBLIOGRAPHY

Survey, Biological Resources, National Gap Analysis Office, October. Accessed July 2009. http://www.gap.uidaho.edu/Projects/reports.htm.

Sneddon, L., M. Anderson, J. Lundgren, and et. al. 1998. "International classification of ecological communities: terrestrial vegetation of the Northeastern United States. July 1998 working draft." The Nature Conservancy and Natural Heritage Programs, Boston, MA.

Stout, S. 2005. "Even-aged Silviculture as an Approach to Regeneration of Forests with High Deer Densities." A paper delivered at the Michigan Society of American Forester "Forests and Whitetails-Striving for Balance" Conference, June 9-10, St. Ignace, MI.

The Nature Conservancy. n.d. "Northern Appalachian – Acadian Ecoregional Assessment; Second Iteration, Edited." The Nature Conservancy, Northeast and Caribbean Division, Boston, MA.

The Nature Conservancy, Great Lakes Ecoregional Planning Team. 1999. "Great Lakes Ecoregional plan. First Iteration." The Nature Conservancy, Great Lakes Program, Chicago, IL.

Thibeault, J.M., Seth, A. Changing climate extremes in the Northeast United States: observations and projections from CMIP5. Climatic Change 127, 273–287 (2014). https://doi.org/10.1007/s10584-014-1257-2

Thompson, Elizabeth et al. 2002. "St. Lawrence – Champlain Valley Ecoregion Biodiversity Conservation Plan: Final Draft Report, First Iteration. Edited." The Nature Conservancy, Northeast and Caribbean Division, Boston, MA.

Tubbs, C.H., R.M. DeGraff, M. Yamasaki, and W.M. Healy. 1987. "Guide to Wildlife Tree Management in New England Northern Hardwoods." Gen. Tech. Rep. NE-118., USDA Forest Service.

U.S. Department of the Interior. 2007. *Adaptive Management.* July 30. Accessed August 3, 2010. http://www.doi.gov/initiatives/AdaptiveManagement/whatis.html.

U.S. Environmental Protection Agency. 2021. *Inventory of U.S. greenhouse gas emissions and sinks: 1990–2019.* EPA 430-R-21-005, Washington, DC: U.S. Environmental Protection Agency. Accessed April 14, 2021. https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks.

U.S. EPA. 2021. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2019.* Washington DC: U.S. EPA.

U.S. EPA. 2006. *Solid Waste Management and Greenhouse Gasses – A Life Cycle Assessment of Emissions and Sinks, 3rd Edition.* Washington, DC: U.S. EPA.

U.S. Fish and Wildlife Service. 2006. "New York Hunting & Fishing Survey."

USGCRP, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 1515 pp. doi: 10.7930/NCA4.2018.

Union of Concerned Scientists. 2006. *Climate Choices.* Accessed 2010. www.climatechoices.org.

Urban, D. L., E. S. Minor, E. A. Treml, and R. S. Schick. 2009. "Graph models of habitat mosaics." *Ecology Letters* 12: 260-273.

BIBLIOGRAPHY

Urban, D., and T. Keitt. 2001. "Landscape connectivity: a graph-theoretic perspective." *Ecology* 82: 1205-1218.

USBLM. 1994. *Ecosystem Management in the BLM: From Concept to Commitment.* Washington, DC: USBLM.

Van Driesche, Roy, Suzanne Lyon, Bernd Blossey, Mark Hoddle, and Richard Reardon. 2002. "Biological Control of Invasive Plants in the Eastern United States." *USDA Forest Service Publication FHTET-202-04* (USDA Forest Service Publication FHTET-2002-04) 413.

Vreeland, J. K. 2002. "Survival rates, cause-specific mortality, and habitat characteristics of white-tailed deer fawns in central Pennsylvania." Thesis, The Pennsylvania State University, University Park, PA.

Waller, D. M., and W.S. Alverson. 1997. "The white-tailed deer: a keystone herbivore." *Wildlife Society Bulletin* 25 (2): 217-226.

Weed, A. S., M. P. Ayres, A. M. Liebhold, and R. F. Billings, 2017: Spatio-temporal dynamics of a tree-killing beetle and its predator. Ecography, 40 (1), 221–234. doi:10.1111/ecog.02046

Wisconsin Dept. of Natural Resources. 2003. *PUB-FR-226 2003, Wisconsin Forest Management Guidelines.*

Wondolleck, J.M., and S.L. Yaffee. 2000. *Making Collaboration Work - Lessons from Innovation in Natural Resource Management.* Washington, DC: Island Press.

Yamasaki, M., R. DeGraff, and J. Lanier. 1999. "Wildlife Habitat Associations in Eastern Hemlock - Birds, Smaller Mammals and Forest Carnivores." *Proceedings from: Symposium on Sustainable Management of Hemlock Ecosystems in Eastern North America.*

Zaremba, R. E., and M. G. Anderson et. al. 2003. "High Allegheny Plateau Ecoregional Plan; First Iteration, Edited." The Nature Conservancy, Northeast and Caribbean Division, Boston, MA.

RESPONSE TO COMMENTS

SUMMARY OF SUBSTANTIVE REVISIONS AND RESPONSE TO PUBLIC COMMENT

The following revisions were made based on internal DEC review of the draft plan:

- Conditions were added which would require additional site-specific environmental review under SEQRA in the Active Forest Management section of Chapter 2.
- Details regarding the information required to be included in Pesticide/Herbicide Application Plans was added to the Active Forest Management section of Chapter.
- Detailed information about the herbicides most commonly used on State Forests was added to the Active Forest Management section of Chapter 2.
- Proposed actions under Infrastructure were increased to include developing guidance for road, trail and utility corridor development, with the express intent of limiting forest fragmentation.
- A 100-acre threshold was added to prescribed burns on State Forests. Any single burning operation larger than 100 acres will require site-specific environmental review under SEQRA.

The following comments were received during the public comment period, by mail, email, telephone and at several public meetings conducted throughout the state. The Department's response follows directly after each comment. Comments are grouped according to the chapter of the plan which they address.

GENERAL

Numerous comments were received regarding proposed actions or regulations for specific State Forest properties. These will be addressed in the individual UMPs for those State Forests.

Comment: The Department did not provide enough time for public comment.

Response: The comment period was twice as long as that which is required by state law. Comments were also accepted after the comment deadline had passed, over three months after the plan's release was announced.

Comment: The plan should include a detailed listing of state forest units, acreage, and acres by category.

Response: The plan includes a link to this information on the Department's website.

Comment: The plan should include detailed maps of state forests, by DEC region or by planning units.

Response: These are included in individual UMPs, and on the Department's website.

Comment: Writing the Strategic Plan as a GEIS will allow projects and UMPs to be implemented and adopted without a full SEQRA review, and with limited public comment.

Response: This is the concept of a generic EIS. If projects or UMPs are implemented or adopted outside of the provisions of this plan, additional SEQRA review will be conducted. There are numerous opportunities for public comment during the development of a UMP.

Comment: The SPSFM states the SEQRA "process is initiated by drafting an Environmental Assessment Form." This EAF must be included in full with the document, along with the legal determination of significance.

Response: An EAF does not need to be completed if the entity undertaking the action decides to complete an EIS, which the Department did in developing the plan.

Comment: The legal framework on which the plan is based should be included in the plan, either in the text or as an appendix.

Response: Legal considerations are included in Chapter 7.

Comment: The plan should report the planned and anticipated expenses listed in the specific UMP's of specific forests and statewide.

Response: This level of detail is addressed at the UMP level.

Comment: The plan is too big to be of use to land managers. It should be streamlined and include more direct guidance.

Response: As a strategic plan, the document's intent is to describe the large-scale, broad goals of the Department for management of State Forests. Direct guidance will come in the form of policies and guidelines, the development of which are actions proposed in the plan.

RESPONSE TO COMMENTS

CHAPTER 1 – NEW YORK STATE FORESTS

Comment: Modify first paragraph under "State Forest History" more accurately describe conditions from the standpoint of European settlers.

Response: These modifications have been made.

CHAPTER 2 – ECOSYSTEM MANAGEMENT

Comment: The plan should recognize the negative impacts of closed canopy, late successional forest habitat on species requiring early successional habitat.

Response: Any management system will favor certain species over others. The plan recognizes that not all landscape deficiencies will be addressed on State Forests. The plan strives to create a balance of cover types, based on a number of considerations, including the surrounding landscape.

Comment: The plan should have targets for the creation of early successional habitat in each of the eco-regions.

Response: These targets will be developed in UMPs, based on the landscape surrounding the specific units.

Comment: The active forest management guidelines on page 95 should include limiting use of fencing and incorporating best practices for facilitating successful species movement across roads (e.g., improved culvert design).

Response: Text to this effect has been added to the plan.

Comment: The plan suggests Native American's where "former" occupants of New York at the time of European settlement. This is not the case. Please delete the word "former" from the section in Chapter 2 describing early successional forest and shrub habitat.

Response: "Former" has been deleted

Comment: The plan should favor even aged management over uneven aged management for the majority of timber harvesting.

Response: As previously stated, the plan strives to create a balance of cover types. Late successional habitats are lacking in many parts of the state, and are therefore a priority on State Forests where there is such a deficiency. While even-aged management will be commonly practiced, the decision in any particular situation will be based on the existing conditions and the surrounding landscape.

Comment: The DEC should not shy away from clearcutting for political reasons if it is the right tool for the job.

Response: The plan does not propose to limit clearcutting.

Comment: Don't limit the size of clearcuts.

Response: The plan does not propose to limit the size of clearcuts.

Comment: The plan should prioritize environmental benefits over economic benefits.

Response: The plan already espouses an approach that does just that. For instance, the plan proposes to hire more staff to harvest more timber, but only within sustainable harvest levels, as well as being subject to the sustainability standards set by the Forest Stewardship Council and the Sustainable Forestry Initiative. These standards include such considerations as: protection of rare, threatened and endangered species and their habitats; protection of ecologically sensitive communities; protection of soil and water quality.

Comment: The plan should include wording to address protection and restoration of native fish populations.

Response: Please see the section on fishing in Chapter 5, which addresses the subject of native fish species, especially brook trout.

Comment: The plan focuses on landscape scale issues at the conceptual level, but the relation of the State Forests to the landscape is not as clear as it could be. For each state forest planning unit, the plan should show how the various State Forest planning units contribute to the landscape level goals, and how each unit affects nearby units.

Response: This information is provided in individual UMPs.

RESPONSE TO COMMENTS

Comment: Pesticides should only be used to combat the spread of exotic invasive species, or perhaps in rare cases, the unnatural proliferation of a native species that has lost its natural control agents.

Response: Pesticides have multiple benefits beyond the control of exotic invasive species and may be used when applying Integrated Pest Management (IPM) and considering alternatives when controlling interfering vegetation.

CHAPTER 3 – RESOURCE PROTECTION

Comment: Request that DEC establish a reasonable timeframe for checking for endangered species.

Response: The presence of listed species may be detected at any time, by any person. The DEC welcomes any information that may be available about occurrences of rare, endangered or threatened species on State Forests lands.

Comment: Sensitive and wide-ranging species may need special protection from trapping and hunting on State lands.

Response: The role of wildlife management and protection is held by the DEC Division of Fish, Wildlife and Marine Resources and is outside the scope of this plan.

Comment: Do not allow construction of buildings within 500’ of state land boundaries.

Response: Construction of homes and other buildings on private lands is outside the scope of this plan.

Comment: An agreement on a set of indicators for species of concern would be beneficial long term.

Response: This set of indicators may be developed as a part of implementing this plan.

CHAPTER 4 – REAL PROPERTY AND INFRASTRUCTURE

Comment: The state should not expand the Forest Preserve.

Response: Acquisition of Forest Preserve property is outside the scope of this plan.

Comment: New York State should continue to acquire property and provide conservation easements to landowners to protect natural beauty and ensure public access to state lands.

Response: The Plan proposes to do this.

Comment: Parking areas should be constructed in more centralized locations on State Forests, instead of along boundaries.

Response: When opportunities arise, usually in conjunction with timber harvesting operations, parking areas are created in the interior areas of State Forests. However, building new roads and parking areas will be balanced with the stated goal of minimizing fragmentation of large forest areas.

Comment: DEC should eliminate wasteful practices and retire unneeded infrastructure.

Response: DEC considers the closing and elimination of unneeded infrastructure whenever possible. Usually these considerations are vetted with the public on a case-by-case basis through the UMP process with occasional exceptions.

Comment: Would like to have better signage indicating user is within 500' of a residence or building.

Response: State Forests are natural areas. The plan specifically expresses a goal of minimizing "sign pollution." In appropriate situations, signs indicating the proximity of private lands or buildings may be posted.

Comment: The Department should minimize forest fragmentation.

Response: Proposed actions under Infrastructure were increased to include developing guidance for road, trail and utility corridor development, with the express intent of limiting forest fragmentation.

Comment: Plans and timelines for completing boundary line maintenance and surveys need to be operationalized.

Response: These timelines are developed at the UMP level.

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Comment: The DEC should give money to towns where it owns lands.

Response: The state pays town and county taxes in most counties.

Comment: DEC should keep the roads open except during the winter by using the local highway departments.

Response: There are many examples of cooperative agreements between towns and the state, whereby DEC roads are maintained. However, not all towns can afford to spend time and money on maintaining roads on State Forests within their town.

CHAPTER 5 – PUBLIC/PERMITTED USE

Comment: ATV usage should be considered on a case-by-case basis.

Response: The plan proposes to consider ATV use for certain purposes, under specific conditions.

Comment: Recreational use of ATVs on State Forests should be allowed.

Response: As the plan more fully articulates, many constraints limit the potential for the development of an ATV trail system on State Forests, including: 1) unique maintenance required; 2) conflicts with neighbors and other users; 3) significant environmental impacts; 4) air and noise pollution; 5) difficult enforcement challenges; 6) high stewardship costs; and 7) necessary legislation for funding, enforcement and use.

Comment: Old railroad beds and utility lines could be used as ATV trail bases.

Response: Most former rail corridors remain in either private or municipal ownership, and are not owned by the state. Utility companies generally do not permit public use of their utility corridors.

Comment: There is an apparent contradiction in allowing four-wheel drive vehicles on truck trails, but not ATVs.

Response: Four-wheel drive vehicles may be legally registered for use on public roads; ATVs may not.

Comment: UTVs ("side-by-sides") should be allowed, since four-wheel drive vehicles are allowed.

Response: UTVs may not be registered under current New York State law, and therefore may not be used on public lands.

Comment: ATV use should be prohibited on State Forests.

Response: ATV use is appropriate in certain situations. Specifically, the plan proposes to continue to allow ATV use in designated locations to allow access by people with disabilities. The plan also proposes to consider creating short linkages between legal ATV trail systems adjacent to State Forests. The plan does not propose to create ATV trail systems on State Forests, nor does it propose to allow recreation use of ATVs by the general public on State Forests.

Comment: The proposal to allow connector trails for ATVs is inconsistent with the negative impacts clearly identified in the plan, and should be removed.

Response: Implementation of this proposal will depend in part on the ability to minimize and mitigate the negative impacts associated with ATV use.

Comment: Public use of ATVs should be allowed on DEC roads where other motor vehicles are allowed.

Response: The Vehicle & Traffic Law allows this only under specific conditions.

Comment: The Department needs to remain open to the possibility of increasing State Forests open to snowmobile use.

Response: The plan allows for increasing the number and length of all types of trails on State Forests, subject to the UMP planning process.

Comment: Hi-volume horizontal hydraulic fracturing (HVHHF) should not be allowed on State Forests.

RESPONSE TO COMMENTS

Response: The decision whether or not to allow HVHHF on State Forests will be made after the DEC's Supplemental GEIS for Hydraulic Fracturing has been completed.

Comment: Natural gas is not a 'forest product' and its extraction is not sustainable.

Response: Natural gas is a natural resource, and the leasing of State Forests for its extraction is explicitly authorized under the Environmental Conservation Law. The sustainability standards and criteria used to assess sustainability of the Department's management of State Forests do permit mineral extraction, within certain specifications.

Comment: Plan should have a complete analysis of mineral extraction, including pipelines, roads, traffic, on State Forests.

Response: This analysis will be conducted during the leasing process.

Comment: The plan lacks analysis of how the DEC would address both the near-term and long-term environmental impacts associated with gas development within the State Forests.

Response: The environmental analysis regarding the use of high-volume hydraulic fracturing is being conducted under the Supplemental GEIS for Hydraulic Fracturing. The Strategic Plan for State Forest Management is not intended to serve as the environmental review for this activity.

Comment: A no leasing alternative would be the most protective of the State Forests and the DEC must examine this alternative as a viable option in the Strategic Plan.

Response: The 'no lease' alternative is addressed. The plan states that "Another alternative would be to close State Forests to all future leasing," and then proceeds to explain why that alternative was not selected.

Comment: Individual SEQR review should be conducted for every well pad developed on State Forests.

Response: The Mineral Resources section of the plan (Chapter 5) outlines the tract assessment process that is conducted whenever State Forest lands are nominated for leasing. This process includes consideration of criteria for site selection, mitigation of potential impacts and land reclamation upon completion

of drilling. If leasing of the property is approved, determinations made during the tract assessment process will be incorporated into the lease documents.

Comment: The statement indicating that mountain bike use is “acceptable only on trails that have been assessed and approved for such use” should be changed to more accurately reflect existing regulations, which allow mountain bike use on all trails that are not posted against it.

Response: This change has been made.

Comment: The trail construction guideline indicating that mountain bike trails should not be constructed at elevations over 2000 feet in elevation should be deleted.

Response: This change has been made.

Comment: The trail construction guideline indicating that skid berms or banked turns should be eliminated. These are proven methods of controlling erosion.

Response: This change has been made.

Comment: There should be a discussion of long-distance bike trails.

Response: There has not been a demonstrated demand for long-distance bike trails on State Forests.

Comment: The statement that "trees are often cut or damaged when trails are established by users without authorization" should either be deleted or applied to all user groups, not just mountain bikers.

Response: Staff experience has been that while other user groups are no more or less likely to create unauthorized trails, they tend not to cut trees in so doing.

Comment: The Recreation section (Chapter 5) is largely biased toward hikers, and doesn't support shared use of trails.

Response: As stated in the plan, multiple-use of the many trail systems on State Forests has exacted a heavy toll on those systems through the sheer numbers of users, regardless of what type of recreation they are pursuing. Impacts and mitigation measures, as well as multiple-use conflicts are listed for hiking, biking, horseback

RESPONSE TO COMMENTS

riding, snowmobiling, cross-country skiing, fishing, hunting, trapping, swimming and boating.

Comment: Pedestrian users are the predominant users of State Forests. The amount of foot-only trails should be proportionally appropriate for the number of pedestrian users.

Response: While there has been no study quantifying the proportion of pedestrian users in relation to other users, pedestrian trails are by far the most common single-use trail type on State Forests.

Comment: Trail height clearance for foot trails should be increased from seven feet to eight or even ten feet to accommodate winter use.

Response: This change has been made.

Comment: All user groups should be allowed equal access to all state-owned land.

Response: Not all uses create the same level of disturbance or environmental impact. To allow all uses the same access would be an abdication of the Department's duty to protect the natural resources found on State Forests. All user groups will be afforded as much access as is reasonable and responsible, commensurate with demand from other users, resources available to monitor and maintain the necessary facilities and the impacts that result from such use.

Comment: Add provisions for advanced level mountain bike trails and features.

Response: The plan does not prohibit such action. The decision to create such features will be made at the UMP level.

Comment: DEC should incorporate mores specific actions towards promoting recreation in our forests beyond basic hiking trails.

Response: The plan proposes to provide local governments with information about the recreational opportunities found on State Forests, and further recommends providing public information to potential users via signs, kiosks, outreach to user groups and online resources.

RESPONSE TO COMMENTS

Comment: Adopt a Natural Resource Agreements with the sporting community should be explored, especially as they relate to maintaining trails to hunting and fishing areas.

Response: Any group is welcome to apply for an Adopt-a-Natural Resource stewardship agreement. Provided that the work the group wishes to accomplish is consistent with the goals of the plan, there is no reason why such applications will not be approved.

Comment: Would like to see the department develop more of an interactive website, perhaps using web 2.0 technology.

Response: The plan expresses the goal of improving public information dissemination, including the use of online resources. Implementation of this goal may well include web 2.0.

Comment: DEC should develop literature and demonstration areas to educate the general public on the ecological benefits of silviculture.

Response: This action has been added to the plan.

Comment: Disagree with the statement that disposal by injection is “valid and viable option.” New York specifically should not consider this practice a viable option.

Response: The referenced statement has been deleted. Additional information about this technology has been inserted, as well as a statement indicating that additional environmental review will be required if disposal by injection is proposed on State Forests.

Comment: The section regarding dog training is much shorter than many of the other sections about other types of recreation, and it inappropriately includes compaction of grass as an “impact.”

Response: The plan does not refer to grass compaction; it includes compaction of soil from driving and parking vehicles as an impact of the activity. A sentence has been added to the section indicating that dog training and field trials are acceptable uses of State Forests.

RESPONSE TO COMMENTS

Comment: Traffic noise should not be listed as a negative impact of dog training and field trials; these activities don't produce more traffic than other user groups. Dogs don't disturb wildlife groups any more than any other group. Language should be modified.

Response: Staff experience is not consistent with the above statement. Field trials usually involve large numbers of vehicles, and parking for the vehicles may not be available on the property. Dog owners and handlers express the need to park close to the actual training or trial site, as many of them bring multiple dogs and do not wish to have to walk long distances to bring each dog to the site individually. Field trials also typically are multiple-day events, involving intense use of a relatively small area as well as actual or simulated firearm discharge.

Comment: Expand land usage for canine events (dog trials and training).

Response: The plan does not discourage expansion of dog training or trial use on State Forests. Expansion of all recreational uses is subject to the UMP planning process.

Comment: Create additional facilities for access and use by equestrian users.

Response: The plan does not encourage or discourage the creation of facilities for any single type of use. This decision is made at the unit level in UMPs.

Comment: "At this time" should be removed from the text on trapping.

Response: "At this time" has been removed.

Comment: Furbearers such as beaver, fisher and river otter are sought by trappers is too vague and almost misleading for this plan, especially since fisher and river otter trapping is not yet allowed in many DEC regions, and thus not yet allowed on many State Forests.

Response: Modifications have been made to the plan to clarify this issue.

Comment: People's dogs should be strictly controlled when on any State Lands. Dogs, except dogs being used for hunting or trained for hunting should not run free on State Forest Lands unless small areas, clearly marked, are set aside specifically for such use.

Response: Dog walking and exercising is an appropriate use of State Forest lands. Most State Forest users who bring their dogs keep them in control along use corridors such as roads or trails.

CHAPTER 6 – FOREST MANAGEMENT AND HEALTH

Comment: The DEC should increase revenues from sustainable logging and enhanced game harvesting.

Response: As stated in the plan, the Department has proposed to hire additional forestry staff to increase the harvest of timber from State Forests, within sustainable limits.

The level of game harvest in the state is outside the scope of this plan.

Comment: Commercial use of State Forests, particularly timber harvesting, is compatible with most other uses, and should be more strongly emphasized in the plan.

Response: The Active Management and Forest Products sections of the plan are already two of the more extensive sections.

Comment: The plan should include an overall target for timber harvest levels.

Response: The target will be developed as an action proposed in the plan. Further data collection is necessary before a responsible harvest level can be determined.

Comment: Timber harvests should not be “hidden” behind buffer strips of vegetation, as this perpetuates the idea that harvested areas are “ugly.”

Response: SEQRA requires that visual impacts be one area of consideration, and that such impacts be minimized or mitigated.

Comment: Revenues from forest product sales should go back into State Forest management.

RESPONSE TO COMMENTS

Response: Revenues from the sale of forest products are deposited in the Natural Resource Account. Changing the disposition of these funds would require legislation, which is beyond the scope of this plan.

Comment: Logging should generally be avoided near wetlands and water bodies, sites of rare or threatened or endangered (RTE) species or natural communities, key ecological linkages, and denning or birthing areas.

Response: Before logging is considered for a site, extensive review of that site is conducted through review of the Master Habitat Database, inventory and site inspection for RTE species, unique communities, nesting and denning with appropriate buffers and conditions to protect any ecological features of significance from logging impacts. Wetlands and other water bodies are protected through the application of the DEC Division of Lands and Forests Management Zone Rules for Establishment of Special Management Zones on State Forests as discussed in Chapter 3.

Comment: Attempts to control invasive species through regulations of NYS residents after those species have demonstrated viability in the ecosystem are inappropriate. DEC should focus attention toward overseas freight at airports and ship yards.

Response: Preventing new introductions via international shipments is another avenue being pursued by the DEC and other agencies. However, it is also economically important to slow the spread of invasive species even after they have become established.

Comment: DEC makes no acknowledgment that Phragmites is harmful to wetlands.

Response: Phragmites has been added to list of examples of harmful invasive species.

Comment: The plan will likely have adverse effects on early successional habitat. Moving it more towards climax forests throughout the state.

Response: The plan expressly states that mid-stage forests (forests between 40 and 140 years old) are more than adequately represented on State Forests. The plan states that efforts will be made to create more late successional and early successional forests.

RESPONSE TO COMMENTS

Comment: The section on Maple Tapping (Chapter 6) includes numerous inaccuracies about the economics of maple sap collection and the impacts that tubing systems would have on other users of State Forests.

Response: The plan has been revised to indicate that: financial return within five years (the longest contract term allowable under current law) could make sap collection on State Forests economically feasible; sap collection systems could be implemented in such a way that will not preclude use of State Forests by others.

Comment: DEC should adopt regulations to prevent overcutting from biomass harvesting for wood energy.

Response: By implementing the rules, guidance and policies discussed within this plan, including but not limited to the Program Policy ONR-DLF-1/Plantation Management on State Forests, ONR-DLF-2/Retention on State Forests, and ONR-DLF-3/Clearcutting on State Forests, the Bureau already employs many practices to promote the sustainable management of State Forests and prevent overcutting.

Comment: Under “Fuels Management and prescribed Fire” add “Short term impacts associated with prescribed fire listed below should be considered in light of the long-term benefits to forest health and reduced fire hazard” to the end of the first paragraph.

Response: Language added.

Comment: Under “Wildfire Prevention and Suppression” add “Methods of reducing impacts of wildfire suppression on the ecosystem should be incorporated into fire suppression activities, and low-impact methods should be deployed whenever possible (i.e. indirect attack methods).”

Response: Language added.

Comment: The plan should take a more aggressive approach, including the use of DMAP permits on State Forests, toward reducing deer impacts.

Response: A pilot DMAP program on State Forests in Region 7 has been started. The program may be expanded, depending on its success in reducing deer impacts on State Forests.