and most aspens, grow fast and are relatively short-lived, surviving on average between 35 and 65 years. Others, like red oak and white pine, may live for 120 to 350 years.

Large scale disturbances can create conditions of exposed soils and full sunlight reaching the forest floor. Natural disturbances include forest fires (killing the existing forest and burning the leaf litter and exposing the soils), severe weather events that knock down the forest from either strong winds or heavy ice and snow (killing the existing forest and exposing soils from uprooted trees), and major insect or disease outbreaks that may kill off the forest. Human disturbances that can create similar conditions include large scale farming (and abandonment of farm fields), establishment or re-establishment of tree plantations, and other active forest management activities.

Soon after the disturbance, the "new" forest of shade-intolerant pioneer trees begins to establish itself within a short amount of time (anywhere from one to 20 years following the disturbance). The shade-intolerant trees are not the only beneficiaries of this disturbance. Many plants and wildlife prefer early successional forest and the many shade-intolerant pioneer trees for their mast (fruit, such as acorns from oaks). The trees of this newly established forest are considered by foresters to be about the same age, or *even-aged*.

As the forest matures, the trees compete with each other for limited resources (sunlight, nutrients from the soil, and water). Some trees will be outcompeted and die while others dominate the site. One day a new disturbance may come and destroy this maturing forest and start the process over again - continuing the cycle of an even-aged forest.

### *Even-Aged Silvicultural Systems*

As discussed earlier, many shade-intolerant trees have ecological values as mast producers and may also have significant value as timber. Foresters can apply different management techniques that mimic disturbances to perpetuate an even-aged forest. These harvest techniques, like the natural events they attempt to mimic, tend to be very intense and can be drastic in appearance. Although many may not like the appearance, when these harvesting techniques are applied correctly, the forest quickly rebounds and many plants and animals benefit from the new habitat type.

These trees have fallen due to heavy winds; this natural disturbance can be imitated by a shelterwood cut.

Foresters have three options (silvicultural systems) to choose from when establishing an even-age structure in a forest:

- **Clearcutting** (one harvest)

- **Seed Tree** (two harvests)
- **Shelterwood** (two or more harvests)

All three even-aged silvicultural systems remove the entire* mature forest and allow new forest to establish (regenerate) either naturally or by planting when there is insufficient seed after the cut. For this reason, these harvests are called *regeneration cuts*. As the new forest grows, foresters may decide to conduct intermediate thinnings to weed out unwanted trees and other competing vegetation. These intermediate thinnings are called *tending cuts*.

* DEC practices **tree retention** in all silvicultural systems. *To learn more about forest and tree retention, refer to* *page 104*.

### The Life Cycle of an Uneven-Aged Forest

Uneven-aged forests tend to be very different from even-aged forests in that, as the name implies, they will have a distribution of trees ranging from young seedlings to old, mature trees and everything in between. A forest with this variation of **age classes** will look very different from the uniform nature of an even-aged forest. Typically, an uneven-aged forest will have three or more age classes.

Uneven aged management creates minimal openings in the forest canopy, layers of vegetation and a moist forest floor, among other conditions

Uneven-aged forests are, in many instances, indicative of a forest free from significant natural or man-made disturbances over many years—possibly hundreds of years. As you can imagine, this lack of disturbance also tends to attract an entirely different host of trees, plants and animals. Where trees of even-aged forests may be faster growing and shade-intolerant; trees of uneven-aged forests are more shade-tolerant and tend to be slower growing. Some examples in New York are sugar maple (hard maple), American beech, yellow birch and eastern hemlock.

Just as in an even-aged forest, individual trees compete for limited resources (sunlight, nutrients from the soil, and water) as an uneven-aged forest matures. Once again, some trees will be out-competed or grow old and die, while others will dominate the site and fill in gaps created from the dead. If, after many years (again, possibly 100 years or more), the forest is not significantly disturbed, shade-tolerant trees will begin to emerge as the dominant species. The multiple age classes that develop in uneven aged stands create a diverse **vertical structure** that offers a visual impression that is distinctly different than that which is seen in even aged

stands. Since there are few younger trees to impede one's view in an even aged forest, it is possible to see quite a distance into the woods. In contrast, a mature uneven-aged forest has large, mature trees well distributed throughout, and younger trees of various ages with **crowns** (leaves and branches) at different levels down to the forest floor where ground vegetation of shade-tolerant plants and tree seedlings intermingle. Foresters commonly call the vertical structure in an uneven-aged forest the "green wall" due to the appearance of this forest from the side (say, from a forest opening or road) which can appear thick and impenetrable with vegetation from top to bottom. This vertical structure provides habitat that is very valuable for songbird species of special concern, like the wood thrush.

### *Uneven-Aged Silvicultural Systems*

While even-aged silvicultural systems are preferred when meeting early successional and mid-successional habitat needs, uneven-aged silvicultural systems are preferred over even-aged methods when trying to address the need for large blocks of late successional habitat. As discussed earlier, treatments for even-aged forests usually include one to four tending cuts with a final regeneration cut when the forest matures. For uneven-aged management, foresters enter the stand at regular intervals to conduct both tending and regeneration cuts at the same time. The intervals may be as short as 15 years and as long as 50 years or more.

These techniques are gradual and occur in many steps as the forest begins to establish uneven-aged characteristics. During each entry into the stand the forester will designate either clumps of trees (group selection), individual trees (single tree selection) or a combination to thin saplings and pole-sized trees (tending) and harvesting a few of the mature trees to allow for new trees to grow (regenerating). Foresters have two options (silvicultural systems) to choose from when maintaining the uneven-age structure in a forest:

- **Group Selection:** Trees are removed in an area commonly spanning about twice the height of surrounding mature trees and new age classes are established in small groups within that area. Smaller openings provide microenvironments suitable for shade-tolerant regeneration and larger openings provide conditions suitable for more shade-intolerant regeneration. The management unit or stand in which regeneration, growth and yield are regulated consists of an aggregation of groups. (Helms 1998)
- **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 (Helms 1998).

More than 75% of state forests are comprised of even-aged stands as a result of European settlement and historical clearing of forests for agriculture. Today, many of these forests are mature from a timber reproduction standpoint and ready to be either regenerated maintaining their even-age structure or slowly managed to develop uneven-age characteristics. Converting to uneven-aged structure occurs by applying single tree and group selection silviculture to the management of the forest. The process of conversion typically takes well over 100 years. Success with any conversion of even-aged stands depends upon freedom from intense

herbivory, lack of interference by undesirable woody or herbaceous plants, and protection against destructive agents like fire and drought (R. D. Nyland 2003). UMPs should consider recommending stands to be converted to an uneven-aged structure where forest conditions are suitable and other objectives are not compromised. Stands that are good candidates for long term uneven-aged management are typically located on productive ground that is capable of growing shade-tolerant, long-lived tree species - chiefly sugar maple (hard maple), American beech, and eastern hemlock.

Applying the strategy of converting even- to uneven-aged in certain forest types will lead to minimizing openings two acres or larger within these stands and thereby helping to establish and retain a relatively continuous and semi-permanent closed forest canopy condition. Landscapes with continuous closed forests canopies that are 500 acres or greater in size are environmentally significant, as they provide effective wildlife travel corridors between adjacent habitats on public and private lands. These large contiguous sections of closed canopy also provide core interior forest habitat that can be vital for some wildlife species.

Bear tracks: black bear is one of many species that prefer large blocks of continuous closed forests

A well-developed uneven-aged forest may be characterized by larger diameter trees, greater amounts of coarse woody material on the forest floor, and greater numbers of living or dead hollow trees. In many ways, uneven-aged silviculture mimics the natural process by which older trees grow to maturity, die, and are gradually replaced by young seedlings and saplings.

## PROTECTIVE MEASURES (FOREST MATRIX BLOCKS, CONNECTIVITY, RETENTION AND BUFFERS)

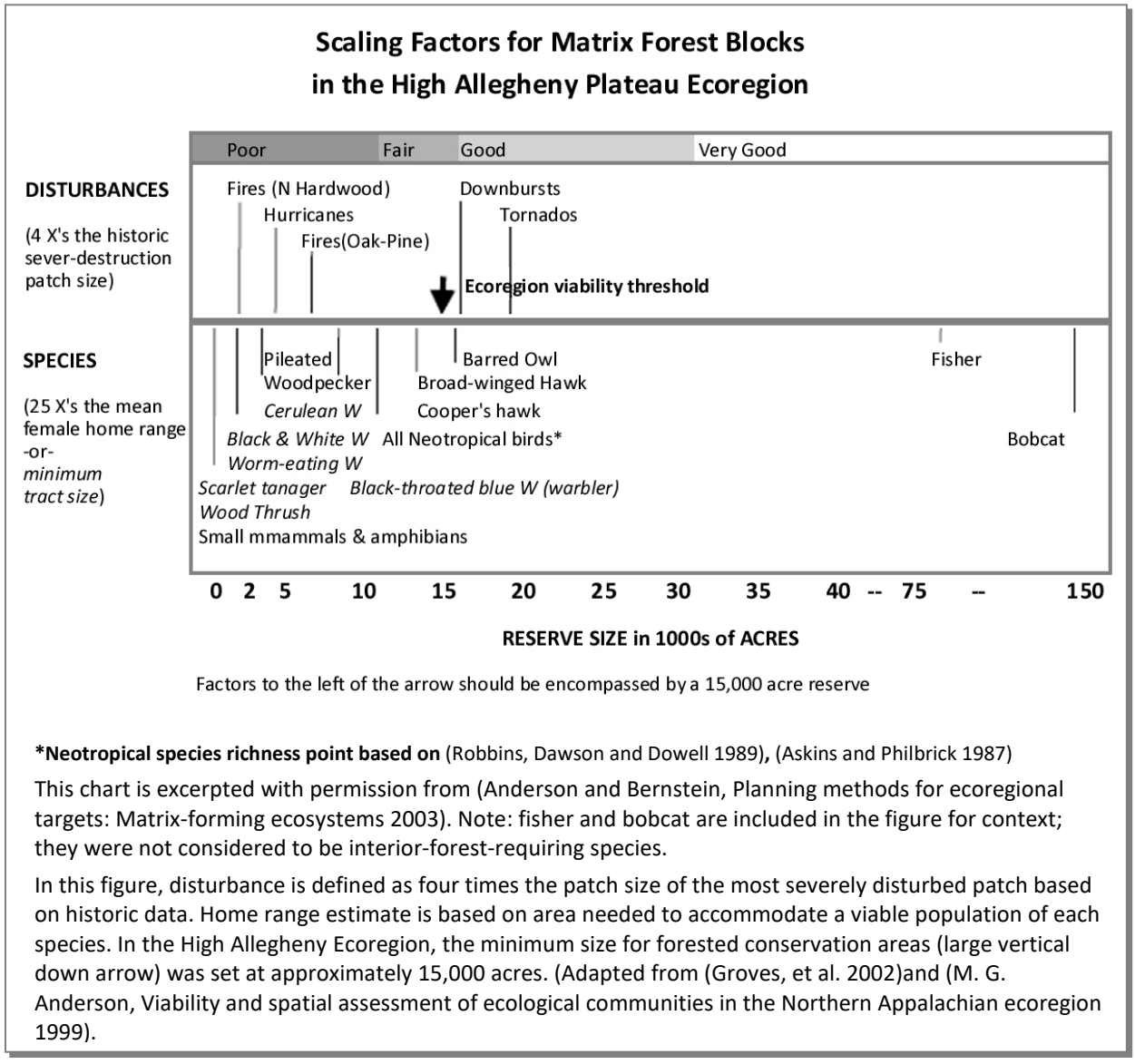
In the course of practicing active management, it is important to identify areas on the land that are reserved from management activity or where activity is conducted in such a manner as to provide direct protection of wildlife, biodiversity, successional features and water quality.

### Forest Matrix Blocks

The identification of large, unfragmented forested areas, also called matrix forest blocks, is an important component of biodiversity conservation and forest ecosystem protection. Changes in both land use and climate will stimulate the alteration of movement patterns and range shifts for many species as they respond to changes in habitat availability and configuration along with changes in temperature, precipitation and the distribution of other species. Research that combines data from natural, dynamic disturbance processes (e.g., fires, tornados, downbursts, icestorms, etc.) with the habitat needs of forest dwelling species in the Northeast U.S. has generated suggestions for how large forest blocks need to be in order to provide adequate

space for maintaining viable populations of a number of species (Fig. 1). The two principal factors used to assess and recommend an appropriate size for proposed conservation areas of forested ecosystems, within a given ecoregion, are the home range of wide-ranging animal species and historical patch sizes that result from natural disturbance events within the landscape. Based on these assessments, a set of priority matrix forest blocks have been identified within the four following terrestrial ecoregions within New York.

- St. Lawrence/Champlain Valley (SL-CV) (Thompson 2002)
- Northern Appalachian/Acadian (NAP) (The Nature Conservancy n.d.)
- New York High Allegheny Plateau (HAP) (Zaremba and Anderson et. al. 2003)
- Lower New England/Northern Piedmont (LNE-NP) (Barbour et al. 2000 )




***Neotropical species richness point based on** (Robbins, Dawson and Dowell 1989)**,** (Askins and Philbrick 1987)

This chart is excerpted with permission from (Anderson and Bernstein, Planning methods for ecoregional targets: Matrix-forming ecosystems 2003). Note: fisher and bobcat are included in the figure for context; they were not considered to be interior-forest-requiring species.

In this figure, disturbance is defined as four times the patch size of the most severely disturbed patch based on historic data. Home range estimate is based on area needed to accommodate a viable population of each species. In the High Allegheny Ecoregion, the minimum size for forested conservation areas (large vertical down arrow) was set at approximately 15,000 acres. (Adapted from (Groves, et al. 2002)and (M. G. Anderson, Viability and spatial assessment of ecological communities in the Northern Appalachian ecoregion 1999).

A total of 242,962 acres of State Forest fall within 55 of New York's 115 identified matrix forest blocks. This includes acreage on 124 state forests in 38 of the state's 60 UMPs.

During the planning process for UMPs, maintaining or enhancing matrix forest blocks must be balanced against the entire array of goals, objectives and demands that are placed on a particular State Forest. Where matrix forest block maintenance and enhancement is chosen as a priority for a given property, management actions and decisions should emphasize keeping forest as forests, avoiding continued parcelization and working towards late successional conditions. More specifically, the following should be considered:

- Minimize or avoid management actions that create large and persistent artificial openings in the forest canopy or abrupt transitions from closed to open canopy area known as "edges." Examples of such actions include building of roads (of a size and extent comparable to PFARs), forest openings from 0.25 to 1 acre or larger (depending upon the forest type) or high densities of even-aged management actions (Roe and Ruesink undated).
- Manage closed canopy areas to increase the amount of forest area supporting both late successional forests and their characteristics by incorporating harvest rotations beyond economic maturity. Specific practices employed might include: increased basal area and density of large diameter trees (in size classes >18" and >27.5" dbh); standing dead trees (snags) and coarse woody material with dbh of >11.8"; the formation of natural canopy gaps, a well-developed vertical structure of tree layers and continuous canopy area of 80% cover or higher (Goodell and Faber-Langendoen 2007) (Keeton 2006).
- Progressively convert embedded pine or spruce plantations within matrix forest blocks to natural forest types, allowing the compatible introduction of larger areas of seedling – sapling aged natural forest cover.
- Refrain from salvaging damaged stands or trees following natural disturbance events. Large and small patches of standing dead or down trees facilitate the development of late successional structural characteristics including higher densities of standing and down course woody debris, a desirable feature of interior forest habitat (Foster and Orwig 2006).

These management options should be viewed as the 'ideal' means of managing matrix forest blocks. Recognizing the extremely wide array of users and stakeholders involved, management choices may need to be made that do not serve the forest block as well as they could, but serve it better than others. For example, if a stand within the forest block is scheduled for harvest, and truck access is needed to implement the harvest, the choice might be made to construct a haul road, instead of a public forest access road (PFAR). Since haul roads are narrower than PFARs, the effect of the haul road on the forest canopy would be less than that of a PFAR.

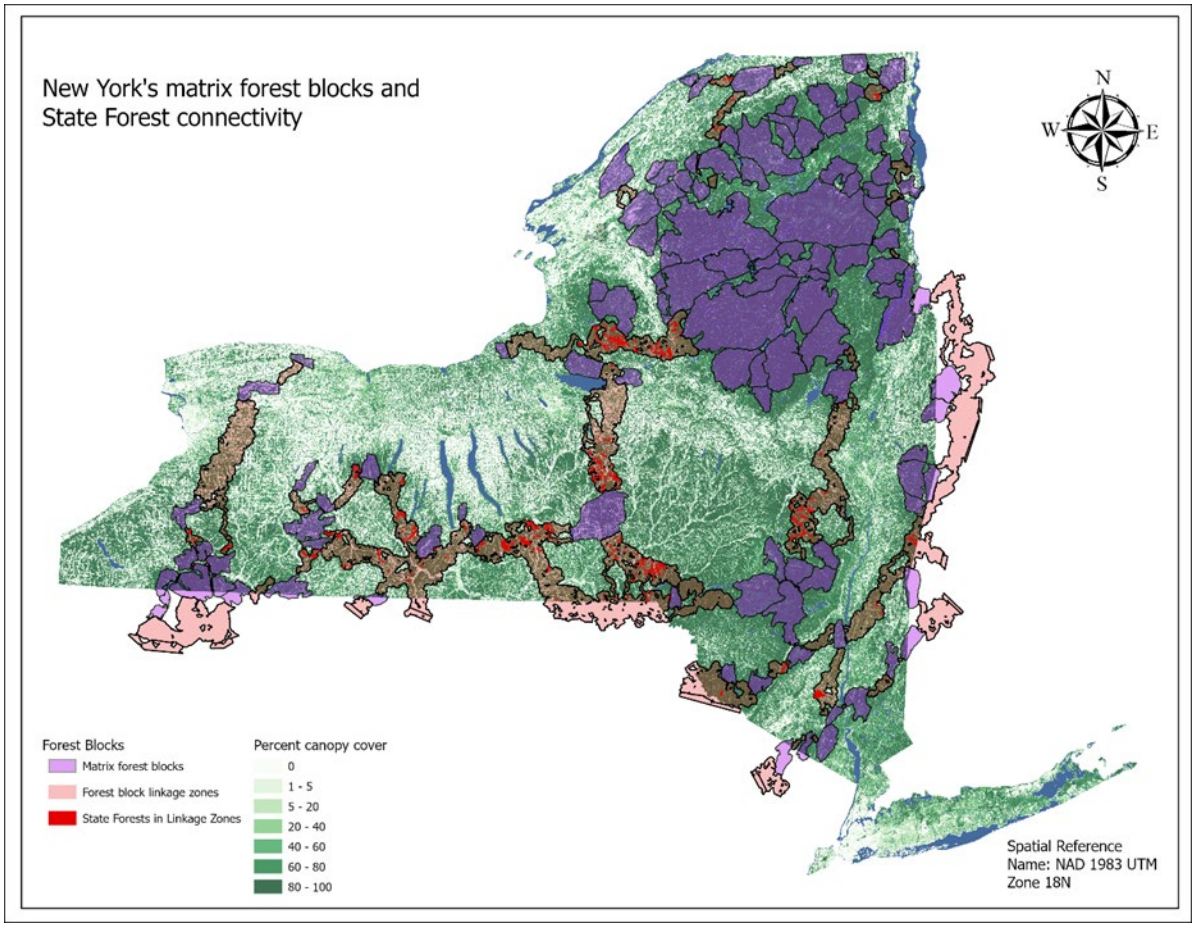
## Forest Landscape Connectivity

Securing connections between major forested landscapes and their imbedded matrix forest blocks is important for the maintenance of viable populations of species, especially wide-ranging and highly mobile species, and ecological processes such as dispersal and pollination over the long term. Identifying, maintaining, and enhancing these connections represents a critical adaptation strategy if species are to shift their ranges in response to climate change and other landscape changes. Various nonprofit, state, and federally funded connectivity modeling efforts have been completed or are underway around New York State (e.g., (Quinby 2006), (Howard and Schlesinger 2013)). These projects target the identification of linkages between the large forested landscapes within New York and the broader region of eastern North America, including southern Canada and the Appalachian region to the northeast and south. As a part of this effort, least cost path (LCP) corridors between identified matrix forest blocks have been predicted. An LCP corridor represents the most favorable dispersal path for forest species based on a combination of percent natural forest cover in a defined area, barriers to

ADDITIONAL RESOURCES

**Forest Matrix Blocks and Connectivity Map (full size)** –

http://www.dec.ny.gov/docs/lands_forests_pdf/sfconnectivity.pdf



movement, and distance traveled. Thus, as species that live in forests generally prefer to travel through a landscape with less human development (i.e., fewer impediments to transit) as well as in a relatively direct line, the predicted routes depict a balance of these sometimes opposing needs.

Based on connectivity modeling for LCP corridors between matrix forest blocks found in New York, there are over 117 State Forests intersected by a predicted LCP corridor or less than a mile from a LCP. Lands that are bisected by or within one mile of an LCP, including State Forests, should be managed to create, maintain and enhance their forest cover characteristics that are most beneficial to the priority species that may use them.

**Management Considerations:**
Looking statewide at LCPs, it is obvious that the greatest restrictions to species movement along these corridors are paved and gravel public highways, agricultural fields and permanent fragmentation created by subdivisions and development. DEC and not-for-profit partners in land conservation should adopt strategies to provide greater forest continuity along LCPs through the acquisition of conservation easements along with fee purchases.

The connectivity analysis depicted in this section uses graph theory to assess connections and their relevance in conservation planning, as put forth by Dean Urban and colleagues (e.g. (Urban and Keitt 2001), (Minor and Urban, Graph theory as a proxy for spatially explicit population models in conservation planning 2007), (Minor and Urban, A graph-theory framework for evaluating landscape connectivity and conservation planning 2008)). The methods used here are an extension of those developed by Ben Best (see (Urban, et al. 2009) & www.nicholas.duke.edu/geospatial/software). Here, NYNHP staff used the percentage of natural land cover derived from the land use dataset developed by the NOAA Coastal Change Analysis Program (CCAP: www.csc.noaa.gov) to represent the resistance to travel for forest species. Thus, for each location on the ground (GRID cell) they calculated the percentage of natural land within 300 meters in any direction and scored those cells with more natural land as places where forest dwelling animals would be more likely to travel. The connectivity analysis then takes this scoring into account and finds the 'least cost path' between each forest block based on distance and the preference to travel through areas with natural land cover. A similar application using an earlier version of

In comparison, State Forests do not provide significant limiting factors to species movement along LCPs, however the quality of these corridors on State Forests can still be enhanced. Many of the management strategies and goals in this plan will increase the quality of LCPs on State Forests as these lands continue to be restored to more natural conditions. Plantations on State Forests will be managed to fill ecosystem voids in the surrounding landscape. Some species derive most or all of their year-round requirements from conifer stands, while an even greater array of species incorporate conifers as an essential or highly sought-after component of their habitat on a year-round or seasonal basis. Hardwood plantations also offer varied benefits to wildlife, from the hard mass produced by mature trees and consumed as a food source to the protective cover a dense

stand of saplings offers from predation for birds, small mammals, reptiles, and amphibians. New standards for the retention of snags, den and legacy trees along with Special Management Zone buffer requirements along streams wetlands and vernal pools will also enhance connectivity in LCPs.

UMPs for State Forests bisected by LCPs will also consider adaptive management to provide enhanced connectivity including the following strategies:

- Favoring uneven aged management over even aged management.
- Where even aged management will be employed, final harvests can be conducted with smaller patch sizes and cuts within a stand spread out over a longer time period.
- Enhancing the level of snag, cavity and legacy tree retention as guided by Retention Standards.
- Design any new roads to limit canopy gaps. Where feasible and in line with other goals, build roads to Haul road standards instead of PFAR standards.
- Limit use of fencing and incorporate best practices for facilitating successful species movement across roads (e.g. improved culvert design).
- Cease mowing of PFARs shoulders, allowing them to grow back into a wooded canopy.
- In non-forested areas, maintain or restore linkages between these continuous forest canopy areas via the retention or restoration of contiguous natural cover.
- Where possible, emphasize forest canopy conditions preferred by highly mobile species.

### Forest and Tree Retention

Forest retention is a strategy for conserving biodiversity in stands managed for timber production. Retention and recruitment of snags, cavity trees, coarse woody material (CWM) and other features will advance the structural and compositional complexity necessary for conserving biodiversity and maintaining long term ecosystem productivity. The purpose of this chapter is to provide guidance on the quantity and distribution of live and dead trees to be retained during stand treatments and through at least the next rotation.

This cavity tree may provide a home for many species, from insects to birds or small mammals

Foresters have long recognized the importance of "wildlife trees" - snags, cavity trees, retained live trees and coarse woody material as necessary components of a healthy, diverse forest. Retention of live and dead trees to enhance or provide wildlife habitat has been the subject of much research going back decades (Evans and

Conner 1979) (DeGraff and Shigo, Managing Cavity Trees for Wildlife in the Northeast 1985) (Tubbs, et al. 1987).

DeGraff and Yamasaki documented over 50 wildlife species dependent upon cavity trees for feeding, roosting, or nesting/denning sites (DeGraff, Yamasaki, et al. 1992). In addition to vertebrate wildlife species, numerous invertebrate species such as wasps, spiders and honeybees depend upon cavities for habitat. Providing an abundance of trees suitable to maintain cavity nesting bird populations maintains avian species diversity while also directly benefitting the forest. Most cavity nesting birds are insectivorous. Researchers have demonstrated the increased growth of forests when insectivorous birds are present to control populations of leaf eating insects (Marquis and Whelan 1994).

DeGraff and Yamasaki also document 39 wildlife species (esp. small mammals and amphibians) that use dead and down woody material for foraging or shelter and 65 species that use overstory inclusions (pockets of hardwood trees within conifer stands or groups of conifers within hardwood areas) for feeding, nesting or winter shelter (DeGraff, Yamasaki, et al. 1992). The retention of dead and down trees also provides habitat for many invertebrates, vascular plants, lichens, fungi, mosses and microorganisms. Coarse woody material (CWM) and fine woody material are also essential for nutrient cycling and provide a seedbed for the establishment of some tree species (Harmon, et al. 1986). Much of New York's State Forests are gradually recovering from the complete loss of dead wood material as a result of agricultural clearing. On many of these areas, there is still a lack of any large CWM (logs) even up to 70 years after reforestation.

In the 1990s, scientists incorporated the retention of "wildlife trees" into the larger concept of biological legacies. Biological legacies are defined as: "the organisms, or a biologically derived structure or pattern inherited from a previous ecosystem – note biological legacies often include large trees, snags, and down logs left after harvesting…" (Helms 1998). Biological legacies also include other ecological features that are vulnerable to timber harvesting such as vernal pools, small forest wetlands and patches of rare or unusual plant species. In addition to the obvious function of providing habitat for wildlife species as described above, biological legacies are valued for their "lifeboating" function after a period of heavy disturbance. Examples of such function include:

- Perpetuating plant species that would otherwise be lost as a result of the disturbance.
- Perpetuating living organisms by providing nutrients, habitat and modifying microclimatic conditions.
- Providing habitat for recolonizing species by structurally enriching the new stand and providing protective cover in the disturbed area (Franklin, Mitchell and Palik 2007).

The function of "lifeboating" is most pertinent after a large disturbance such as an even-aged regeneration harvest. Lifeboating is believed to be most effective at protecting those species

with limited dispersal capabilities such as herbaceous plants, lichens, mosses, invertebrates and terrestrial amphibians. Bellemare et al. documents the difficulty many forest herbs have at recolonizing secondary forests, many decades after the sites have been reforested, and that such herbs are often present on sites that escaped the extermination effects of forest clearing and plowing such as bedrock outcrops, rocky slopes and along hedgerows. Sites such as these would be examples of desirable locations for retention (Bellemare, Motzkin and Foster 2002).

If biological legacies are to be deliberately left, they must first be recognized and incorporated into harvest prescriptions. This practice is known as the variable retention harvest system and is defined as: "an approach to harvesting based on the retention of structural elements or biological legacies (trees, snags, logs, etc.) from the harvested stand into the new stand to achieve various ecological objectives. Major variables are types, densities and spatial arrangements of retained structures." (Helms 1998) (Franklin, Mitchell and Palik 2007). Variable retention harvests can be incorporated into traditional regeneration harvest systems (clearcut, seed tree, shelterwood or selection) to enable managers to protect a wider array of site characteristics for conservation of biodiversity while still establishing conditions for desirable tree regeneration. This practices or components are collectively referred to as reserves.

There is also recognition that traditional silviculture has the potential to reduce or largely eliminate cavity and snag trees, as well as coarse woody material. Kenefic and Nyland reported that managers need to deliberately incorporate cavity tree retention as part of their marking strategy to maintain cavity trees in stands where the focus of management is on growing high-value trees (Kenefic and Nyland 2007).

As mentioned above, retention components provide benefits to a majority of the life forms dependent upon forests. These benefits include important habitat attributes, cover, shelter and nesting sites, nutrient recycling for soils, and general support for life forms at the foundation of the food chain. Unfortunately, some of these same attributes, especially fine woody debris (downed treetops) are viewed negatively by many human forest visitors who prefer a park-like, open landscape and the ease of walking and hunting in an "uncluttered" forest. The positive benefits of retention outweigh the human-related impacts, which are often satisfied or mitigated through education and a better understanding of the forest system.

Retention of dead and decaying trees is also important for aquatic species, as these trees eventually fall and can provide important habitat in streams. Large woody debris (LWD) provides important trout habitat in streams.

There are limited economic impacts associated with practicing retention in State Forest timber sales. In some cases, the retention of saleable trees translates to loss of income, however the

ADDITIONAL RESOURCES

**Program Policy: Retention on State Forests**

https://www.dec.ny.gov/docs/lands_forests_pdf/retentiononstateforestoct2018.pdf

ecological value of the retained trees takes precedence.

***Retention Standards***

The Bureau of Forest Resource Management has developed standards for retention on State Forests and implemented a program policy to that end. In the development of these standards, existing research results and similar standards or guidelines of other states were reviewed including those of Wisconsin, Michigan, Pennsylvania, Minnesota, New Hampshire and Maine. While the requirements inevitably vary somewhat among states, there is broad consensus on the need for such standards to assist managers in maintaining diverse, healthy and productive forests.

### Special Management Zones

Upland/aquatic habitat on Texas Hollow State Forest in Schuyler County, typical of an area where Special Management Zones are applied

DEC Special Management Zone (SMZ) Guidelines (Buffer Guidelines) provide continuous over-story shading of riparian areas and adjacent waters, by retaining sufficient tree cover to maintain acceptable aquatic habitat and protect riparian areas from soil compaction and other impacts. DEC's buffer guidelines also maintain corridors for movement and migration of all wildlife species, both terrestrial and aquatic. Buffers are required within SMZs extending from wetland boundaries, high-water marks on perennial and intermittent streams, vernal pool depression, spring seeps, ponds and lakes, recreational trails, campsites and other land features requiring special consideration. These guidelines are discussed in the soil and water protection section of this plan; DEC's special management zones can be found on DEC's webpage.

## Active Management Guidelines (Salvage, Clearcutting and Pesticide/Herbicide Use)

There are some tools used in State Forest management which are important and essential for reaching ecosystem management goals, but which must be used carefully and judiciously. The following provides limitations and guidance for use of these tools to prevent and mitigate potential impacts.

### Salvage

Extreme weather or outbreaks of insect activity can cause significant damage to State Forests. Salvage of severely damaged forest stands has traditionally been a very high priority for DEC. Natural disasters, including windstorms, ice storms, and insect infestations routinely impact State Forests. The 1995 blowdown and 1998 ice storm created a major impact on State Forests

## ACTIVE FOREST MANAGEMENT

in northern New York. A major outbreak of the forest tent caterpillar caused significant defoliation in Central New York from Lake Erie to the Massachusetts border, roughly between 2000 and 2010. The 1998 ice storm alone impacted over 100,000 acres of State Forests in Jefferson, St. Lawrence, Clinton and Franklin counties. Approximately 4,500 acres of the most severely impacted areas were salvaged under 247 separate timber sales, netting $1.8 million. More recently, Emerald Ash Borer (EAB) has started to impact the ash stands across NYS. In response to the EAB infestation in Cattaraugus County, since 2017 approximately 2,657 acres of the areas most impacted were salvaged under 24 separate timber sales, netting $3.85 million. These timber harvests captured the value in dying ash trees and have improved access to the forests through the development of roads and trails that can now be used by recreational visitors. 2021 saw an unusually high level of defoliation from *Lymantria dispar* (insect formally known as Gypsy moth). Aerial surveys during the year recorded more than 680,000 acres of public and private lands had been defoliated by *L. dispar.* However, the unusually wet weather during the 2021 growing season allowed the defoliated trees to regrow much of the damage canopy. If similar levels of outbreak occur over the coming years, DLF staff for may have to plan salvage harvests across the impacted stands.

There are several reasons to prioritize salvage over other management activities. At the time the damage occurs, there is a narrow window of time in which salvageable timber can be retrieved before succumbing to natural decay. Such timber has been grown and tended on State Forests, usually for decades. The value of this investment in time and labor as well as the monetary value of the timber itself is of great importance to the State of New York and to local businesses and communities that rely on timber harvesting. In addition, damaged stands can become a danger to neighboring forests and landowners. These stands may harbor and support forest insect and disease outbreaks. They also contain significant fuel loads that, especially in softwood stands, can be a wildfire hazard.

There are also numerous reasons not to salvage dead or dying trees. The economic importance of salvage must be balanced with these other important concerns. DEC must consider the ecological value of dead and dying trees. These trees will return nutrients to forest soils and provide biodiversity and structural diversity that is needed by a variety of forest-dependent life forms. (Foster and Orwig 2006) In addition, the value of conducting salvage must be balanced against the value of other scheduled harvests, the importance of maintaining a regular harvesting schedule, and the availability of staff and other resources.

The decision of whether or not to salvage must be made on a case-by-case basis, considering all these factors. At a minimum, the economic value of salvaged timber must be greater than the revenue lost by deferring other scheduled harvests.

## Clearcutting

Clearcutting in particular is sometimes cited as an activity that State Forest users would prefer not to see. When the silvicultural prescriptions are written, most regeneration cuts on State Forests end up being overstory removals or shelterwood cuts. In comparison, a clear cut would be used when the desired regeneration in in the understory is lacking. Often, the reasons behind such dislike for the practice are based on aesthetics. Despite the visual appearance of a new clearcut, there are few other options that will accomplish certain goals as effectively. Timber production can be most effectively maximized by using even-aged management systems, of which clearcutting is one type. Native shade-intolerant species such as black cherry and red oak reproduce best under conditions of full sunlight. It is highly desirable that the presence of these trees be maintained in the New York landscape. Also, there are myriad animal species that depend on young stands of seedlings and saplings. Clearcutting is an effective means of creating such habitat, so that these animals remain a part of our ecosystems. As the photos at right illustrate, this habitat is present for approximately 20 years following a clearcut before forested habitat begins to reestablish itself.

A naturally regenerated clearcut stand, five years after harvest

A naturally regenerated clearcut stand, 19 years after harvest

Staff conversations with members of the public often reveal that opposition to clearcutting stems from an incomplete knowledge of the reasons for using even-aged management systems, and the benefits derived from them. When they learn of these benefits, their opposition commonly changes to acceptance of the practice. Following a clearcut, stands may be replanted with selected tree species or, if sufficient regeneration or seed stock is present, allowed to develop into natural forest

cover. The photos at right, collected from various clearcut stands in Delaware and Schoharie counties, represent the successional progress of reforestation that typically occurs following a clearcut that is not replanted, but allowed to develop into a natural forest stand.

The Division of Lands and Forests developed policy guidance that addresses the visual and ecological impacts of clearcutting and set guidelines for use of the practice on State Forests. This policy builds upon mitigations that are currently in place on State Forests and additional policies discussed in this plan. All clearcutting on State Forests incorporates SMZ's (discussed above) which buffer and protect water resources and associated wildlife. In addition, the retention policy (discussed above) establishes guidelines for ensuring that timber harvesting, including clearcutting, works around and does not remove features on the land that provide the structural and compositional complexity necessary for conserving biodiversity and maintaining long term ecosystem productivity. In addition, the plantation section of this plan establishes guidelines for the management of plantations, including use of clearcutting. The plantation policy sets the stage for the gradual conversion of most plantations to more natural forest cover (*refer to page 279*).

ADDITIONAL RESOURCES

**Program Policy: Clearcutting on State Forests** – Establishes the Bureau of Forest Resource Management's practices for the use of clearcutting and other forest regeneration methods. Available at https://www.dec.ny.gov/docs/lands_forests_pdf/clearcuttingonsfoct2018.pdf

### Pesticide/Herbicide Use

Foresters apply principles of Integrated Pest Management (IPM), the science of silviculture and best management practices as the preferred methods of promoting forest health and providing for forest regeneration. However, in limited cases it is necessary to use pesticides to accomplish broader management objectives. Pesticides may be necessary to control invasive species, to protect rare and endangered plants from competition, or to control vegetation interfering with forest regeneration. Pesticides are used only as a last resort, where other "minimum tools" are not effective. For further discussion of invasive species and control of interfering vegetation, including IPM, and the "minimum tool" approach, *refer to the Forest Health section on page 309 of this plan.*

Pesticides are currently used effectively in limited situations on State Forests. Specific pesticides are carefully chosen, after researching their chemical components for their ability to bio-degrade in the environment, their resistance to leaching into the ground water and their effectiveness in controlling the target pest with minimal impact to other flora and fauna. Only those pesticides approved for use in New York State are considered. Additionally, no chemical not approved by the Forest Stewardship Council and Sustainable Forestry Initiative's forest certification standards is allowed. The latest research and in some cases partners such as TNC and the SUNY ESF are consulted to determine the best control methods. All applications are

made under the direct supervision of a New York State Certified Pesticide Applicator using the most conservative application methods.

Among the herbicides that are used for vegetation management on State Forests, the following are the most frequently used:

- **Glyphosate** (trade names Accord, Roundup, Rodeo and others) - Glyphosate is a non-selective herbicide registered for use on many food and non-food crops as well as non-crop areas where vegetation control is desired. It adsorbs strongly to soil and is not expected to move vertically below the six inch soil layer. Residues are expected to be immobile in soil. Glyphosate is readily degraded by soil microbes into AMPA, a compound that degrades to carbon dioxide. Glyphosate and AMPA are not likely to move to ground water due to their strong adsorptive characteristics. Glyphosate does have the potential to contaminate surface waters; this risk is limited by application restrictions during wet or rainy conditions. (See "State Forest Pesticide Application Guidelines" below.) The US EPA has determined that the effects of Glyphosate on birds, mammals, fish and invertebrates are minimal.
  - Considering the possible changes in restrictions regarding the use of glyphosate, DEC staff will continue to monitor and follow all current NYS regulations regarding chemical use, more specifically ECL § 33-1301.
- **Imazapyr** (trade name Arsenal) – Imazapyr is a non-selective herbicide registered for use on many food and non-food crops as well as non-crop areas where vegetation control is desired. Imazapyr is an anionic, organic acid that is non-volatile and is both persistent and mobile in soil. Photosynthesis is the only identified mechanism for imazapyr degradation in the environment. The US EPA concluded that risks to human health, dietary risks, residential post-application exposures and aggregate risks are below the EPA level of concern. However, there are no risks of concern to terrestrial birds, mammals, and bees, or to aquatic invertebrates and fish. However, there are ecological risks of concern associated with the use of Imazapyr for nontarget terrestrial plants and aquatic vascular plants, and potential risks to federally listed threatened and endangered species which include aquatic vascular plants, terrestrial and semiaquatic monocots and dicots that cannot be precluded at this time. Imazapyr use at the labeled rates on noncrop areas when applied as a spray or as a granular to forestry areas present risks to nontarget plants located adjacent to treated areas. Risk of inadvertent introduction to surface waters via runoff is reduced by application restrictions during wet or rainy conditions. Risk of inadvertent introduction to surface waters or contact with non-target vegetation is reduced by application restrictions which minimize spray drift. (See "State Forest Pesticide Application Guidelines" below.)
- **Triclopyr** (trade name Garlon 4, Vegetation Manager Triclopyr 3SL) – Based on EPA data, Triclopyr can be used in compliance with label requirements without posing unreasonable risks to people or the environment. Triclopyr is a selective herbicide registered for use on non-crop areas, rice and in forestry use for the control of broad-leafed weeds and woody plants. Triclopyr acid is somewhat persistent and is mobile.

The predominant degradation pathway for triclopyr in water is photodegradation. The predominant degradation pathway in soil is microbial degradation to the major degradate TCP, which is both persistent and mobile. Based upon current data, EPA has determined that triclopyr is non-toxic to slightly toxic to birds and estuarine/marine invertebrates and practically non-toxic to mammals, insects, fish and freshwater invertebrates.

The term "pesticides" refers to both herbicides and insecticides. The New York State Department of Environmental Conservation is the agency in New York State designated to regulate pesticides. The Division of Materials Management regulates pesticide applications in New York State and is responsible for compliance assistance, public outreach activities and enforcement of state pesticide laws, Article 33 and parts of Article 15 of the Environmental Conservation Law, and regulations, Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York Parts 320-329.

Under Sections 33-0301 and -0303 of the Environmental Conservation Law (ECL), the DEC has jurisdiction in all matters pertaining to the distribution, sale, use and transportation of pesticides. DEC also regulates the registration, commercial use, purchase and custom application of pesticides.

For compliance and enforcement purposes, DEC promulgates regulations pursuant to state laws, and issues policies as a part of compliance assistance.

### *Use of Pesticides to Control Insects on State Forests*

There have been fewer instances over the past decade where pesticides have been used on State Forests to control insect populations. IPM is applied to limit the need for pesticide use, including the promotion of health and biodiversity to maintain a resilient forest. Natural population cycles have been permitted to occur even though moderate to heavy defoliations sometimes cause significant tree mortality. However, the use of pesticides will not be ruled out, as the future will bring introductions of non-native invasive pests which could cause significant, wide-spread and permanent disruptions to forest ecology. The opportunity to control a new introduction before it has the ability to alter the ecosystem might, after careful consideration, warrant the use of a pesticide. While this option will not be considered lightly, it is wise to keep it available for limited use, when no other options are feasible. Any future use will conform to the guidelines established in this section, including SEQR analysis thresholds for pesticide application.

### *Use of Herbicides to Control Plants on State Forests*

Examples of situations where herbicides may be used on State Forests when other options are not viable, effective or economically feasible include protection of rare and endangered

species, controlling exotic invasive plants, habitat restoration and ensuring adequate forest regeneration.

**Controlling exotic invasive plants**

Herbicides are sometimes used on State Forests to control non-native invasive plants. Targeted exotic plants include but are not limited to Japanese knotweed, mile-a-minute weed, honeysuckle, ailanthus, non-native Phragmites, pale and black swallowwort, giant hogweed, multi-flora rose, oriental bittersweet, kudzu and autumn olive. The goal is to control small introductions prior to their ability to colonize an area and disrupt natural processes. Herbicides are only used in situations where other options such as mechanical control (usually hand-pulling individual plants out of the ground) have been proven to be ineffective. The initial 2010 plan cited an average of less than twenty acres of invasive species control is conducted annually on State Forests. Our most recent 2019 records show we treated 640 acres for invasive species.

**Rare and endangered species protection**

Herbicides are also used in limited situations to protect rare and endangered species. An example is the hart's tongue fern, federally listed as threatened. This is one of only a few plants listed in the Endangered Species Act. According to New York's Natural Heritage Program, 90% of the heart's tongue fern global populations are located in New York and a significant number of these populations are being seriously impacted by invasive plants. On a steep, rocky limestone bedrock site managed by DEC in Onondaga County, the Bureau is working with TNC and the State University of New York College of Environmental Sciences and Forestry (SUNY ESF) to save a rapidly declining population of Hart's tongue fern from being out-competed by the exotic, invasive vine called pale swallow-wort. Hand pulling swallowwort is not an option at this site due to the thin soils and roots intertwined hart's tongue fern plants. After a thorough literature search and consultations with TNC and SUNY ESF the decision was made that the only viable option is to apply herbicide using a cut-stem application method. Using the cut-stem application method the applicator directly applies a drop of herbicide to each cut stem of pale swallowwort, significantly reducing the amount of chemical used and the area treated, while protecting the ferns.

**Habitat Improvement and Control of Interfering Vegetation**

The remaining instance of herbicide use relates to forested areas which cannot be adequately regenerated due to interfering vegetation. The Bureau performs silvicultural treatments on approximately 7,000 acres annually. One of the basic tenets of silviculture is to ensure forests have adequate regeneration (seedling growth). In most cases, favorable conditions are created on the forest floor to stimulate seedling growth through either natural regeneration or by planting. Efforts to establish regeneration in a forest are incorporated into all active forest management activities. In cases where these efforts are unsuccessful, it may be necessary to judiciously use herbicides to reduce the abundance of interfering vegetation to create favorable

conditions for the establishment of regeneration or to provide proper conditions for planting tree seedlings.

Herbicide use is limited to a few state approved herbicides that are effective at controlling interfering vegetation and have minimal short and long-term negative impacts on the environment when applied by a New York State Certified Pesticide Applicator according to the label instructions. Using herbicides to control interfering vegetation can have targeted results if the herbicide is applied to individual plants either by stem injection, cut stump treatment or foliar application. Broadcast spraying from the ground (either by backpack sprayer or tank sprayer attached to a vehicle) may be more appropriate in specific applications where larger areas need treatment in a more cost effective and efficient manner. When correctly and appropriately used, herbicide applications can be more cost efficient and effective at controlling interfering vegetation compared to other options. Herbicide is used only after all other options are considered. Records from the last few years show we have treated with herbicide a low of 2,410 acres in 2019 and a high of 4,725 acres in 2018. In relation to total acreage under BFRM management, that approximates to about .3% of our managed acres. Herbicide use is further reduced by the application methods employed – typically hand application and mist blowers, specifically applied where and when possible only on the interfering vegetation.

***State Forest Pesticide Application Guidelines***

**Green Certification Standards**
Info on the listed chemicals for each standard.
Forest Stewardship Council's (FSC) Standard:
https://fsc.org/en/document-centre/documents/resource/315
Sustainable Forestry Initiative (SFI) Standard:
https://www.forests.org/forestmanagementstandard/

Use of pesticides/herbicides shall comply with label directions and restrictions, including but not limited to: proper mixing, storage and disposal, personal safety equipment, application methods and rates, and minimizing effects on non-target vegetation and wildlife. No chemical not approved for use in New York State and no chemical not approved by the Forest Stewardship Council and Sustainable Forestry Initiative's forest certification standards will be used. The general public will be restricted from areas where herbicide is being applied. Overall impact will be minimized by using application methods that minimize the amount of herbicide being applied to the lowest level feasible. When practical, methods such as individual plant or tree stem injection, basal stem applications, cut stump treatment or backpack/machine spraying will be employed.

**Specifications**

Pesticide application will be conducted according to conditions described in a Pesticide or Herbicide Application Plan written for each specific instance of application. Such application plans will include, at minimum, the following information:

- location map;
- acreage of application;

- method and timing of application;
- name, registration number**, including the registration number for a restricted ee herbicide** and sample label of herbicide/pesticide to be used;
- public notification procedures;
- post-application procedures.

To ensure protection of water resources and improve the effectiveness of foliar applications, pesticide spraying shall only take place when foliage is dry. Pesticide spraying shall not take place when rainfall is expected **within 12 hours before** or twelve hours after application, or during times when winds are gusty or exceed 10 miles per hour. The pesticide spraying shall be done in a manner, such that drifted pesticide does not impact adjacent areas or private land. No pesticide application may take place when the Palmer Drought Index drops below negative two (-2).

Pesticide application to control interfering vegetation will occur within the dates and times according the product label and as further described in the Pesticide Application Plan. A second application the following year may be required if the contractor does not meet the success rate standard specified in the Notice of Sale and Pesticide Application Plan. Equipment used in the application of pesticide or otherwise contaminated with pesticide shall not be used to draw water. Water mixed into pesticides will be brought to the site and will not be drawn from any water body adjacent to or located on State Forests.

Notices of pesticide application will be posted at the **primary** entrance to the treated area and on the boundary of the treated area, and as noted in the Herbicide Action Plan.

Pesticides will not be applied outside of the specifications listed on the label, within defined protection buffers, along water bodies, or within the boundaries of designated wetlands, intermittent streams, seeps, springs and vernal pools as described in the “DEC Division of Lands and Forests Management Rules for Establishment of Special Management Zones on State Forests and Wildlife Management Areas” version June 2015 or later. This guidance is taken with the understanding that there may be unique circumstance that require the use of chemicals within the aforementioned areas. Staff in these situations, will follow all necessary protocols and guidance for safe application of the chemicals for themselves and the environment.

A New York State Certified Applicator will apply the pesticides following label instructions and safety precautions. This will minimize impact to both the environment and the public. Application personnel will be equipped with safety equipment as described on the label of the pesticide product being used.

# ACTIVE FOREST MANAGEMENT

## "AFM" OBJECTIVES, ACTIONS AND SEQR ANALYSIS

**Active Forest Management (AFM) Objective I** – DEC will practice active forest management, applying sound silvicultural practices, including the use of timber harvesting and limited use of pesticides to reach statewide, ecoregional and unit-level ecosystem management goals.

**AFM Action 1 –** Adhere to DEC Program Policy established in ONR-DLF-3 / Clearcutting on State Forests (2011, https://www.dec.ny.gov/docs/lands_forests_pdf/clearcuttingonsfoct2018.pdf).

**AFM Objective II** –Timber sales will be used to enhance forest health and the diversity of species, habitats and structure and thereby improve the resiliency of ecological systems and forest sustainability. Timber sales will also be used to increase the sequestration potential for underperforming stands through elimination of invasive species and interfering vegetation. Harvests will be planned in such a way as to develop a wider range of forest successional stages. To accomplish this objective, UMPs will contain harvesting plans and schedules. Occasionally unplanned salvage cuts may be necessary.

**AFM Action 2 (also FP 2)** – Explore creating a statewide system of permanent sample plots on State Forests to ensure sustainability and to quantify long-term carbon storage and forest growth, mortality and removals (harvests) and other forest characteristics, following the same protocol and methodology as used to develop the forest statistics for New York's forests. Continue to develop and refine the current State Forest Inventory system to capture all the pertinent information allowing staff to make informed management decisions.

**AFM Action 3** – Approach SUNY ESF to develop climate change adaptation strategies, using State Forests as a living laboratory and model. Strategies could include studies with varied planting stock and species redistribution (assisted migration).

**AFM Objective III** – Opportunities will be identified in all new UMPs to address ecoregional gaps, creating missing habitat types and diversity components to maintain and enhance landscape-level biodiversity. While there is not enough acreage within each unit to fill all landscape gaps, each UMP will address the gaps each State Forest is best suited to fill.

**AFM Objective IV** – Adaptive management strategies will be considered to provide enhanced connectivity on State Forests bisected by LCPs. Also, management actions and decisions that emphasize closed canopy and interior forest conditions to maintain and enhance pre-identified matrix forest blocks will be considered within each respective UMP.

**AFM Action 4 (also SM 5)** –Conduct ongoing training for forestry staff on the enhancement of forest matrix blocks and connectivity.

**AFM Objective V** – Forest and tree retention will be applied to preserve biodiversity in stands managed for timber on State Forests.

**AFM Action V** – Adhere to DEC Program Policy established in ONR-DLF-2, Retention on State Forests (2011, https://www.dec.ny.gov/docs/lands_forests_pdf/retentiononstateforestoct2018.pdf).

**Active Forest Management (AFM) SEQR Alternatives Analysis and Thresholds**

Following the **no-action alternative**, DEC will continue to employ the same silvicultural tools that have been proven effective to reach the desired conditions established in this plan and in UMPs. These tools emulate natural disturbances and processes to reach desired future conditions. However, we must recognize that this plan establishes many new landscape ecology and ecosystem management approaches that have not been consistently applied throughout the State Forest system. Using established tools to reach these new goals has been selected as the **preferred alternative** on acreage identified in UMPs as open to active management. This preferred alternative includes the application of protective measures, including uniform application of retention standards on areas of State Forests which are open to active forest management. Under this policy, other areas will be set aside to protect sensitive sites, rare and endangered species or to meet other ecological goals.

The alternative of removing all State Forests from active management has not been selected due to the following:

- State Forests are legislatively dedicated to the production of forest products
- Active management is used as a tool to promote forest health and biodiversity
- Timber harvests support local economies and offset the cost of administering and maintaining State Forests
- Timber sale contracts include requirements for the development and upkeep of forest access roads, parking lots and some multi-use trails.

The alternative of precluding pesticide use has not been selected because, there are instances in which small outbreaks of invasive species cannot be controlled by other methods and must be eradicated to prevent disastrous consequences. There are also instances in which ecological and silvicultural goals cannot be realized without the use of pesticides.

SEQR analysis of the direct impacts of timber harvesting are also addressed in the Forest Products section of this plan.

**SEQR Analysis Threshold**

The use of any active forest management on acreage occupied by protected species ranked S1, S2, G1, G2 or G3 will first require site-specific environmental review under SEQRA. In addition, site-specific environmental review will be required for any projects that would cause the following impacts:

- substantial soil movement or change in soil condition;
- significant increased runoff or siltation of surface waters;
- significant change in the quantity or quality of ground water.

In consideration of the potential impacts of clearcutting on water quality, water temperatures, soil erosion and aesthetics, any clearcut of a contiguous area 40 acres or larger will require additional site-specific environmental review under SEQRA.

The use of pesticides to control invasive species or interfering vegetation on State Forests shall conform to Pesticide Application Guidelines delineated above. Compliance with these guidelines will avoid and minimize potential impacts resulting from pesticide application to the maximum extent practicable and no further SEQRA review will be conducted for pesticide application to State Forests as discussed in this chapter.

However, any pesticide application described below will require additional site-specific environmental review under SEQRA.

- aerial spraying (application by airplane or helicopter)
- applications close enough to impact a rare, threatened, endangered species, or species of special consideration species
- applications exceeding 40 contiguous acres

Selection harvesting (uneven aged management) conducted in accordance with this plan and not outside of the parameters established here, ***WILL NOT*** require additional SEQR analysis.

# CHAPTER 3
# RESOURCE PROTECTION

# SOIL AND WATER PROTECTION

## SOIL PROTECTION AND ECOLOGY

### The Importance of Forest Soils

"Aldo Leopold suggests that the first rule of intelligent tinkering is to save all the pieces. We would recast this idea and say that the first rule of intelligent forest management is to take care of the soil. Taking care of the soil requires many important insights into the chemistry, physics and biology of soils, which together comprise soil ecology." (Fisher and Binkley 2000).

Soils provide the foundation, both figuratively and literally, of forested ecosystems. They support an immense number of microorganisms, fungi, mosses, insects, herpetofauna and small mammals which form the base of the food chain. They filter and store water and also provide and recycle nutrients essential for all plant life. "More than 99% of the diversity of life in forest ecosystems resides in soils, where amazingly small, numerous and important organisms make the rest of the ecosystem (such as trees and mammals) possible." (Fisher and Binkley 2000). The value of forest soils extends well past the boundaries of the forest, not only in providing high quality water, but also as important "sinks" for the sequestration of carbon.

Impacts on soil affect wildlife, starting at the base of the food chain

Unfortunately, soils are vulnerable to human impacts. State Forests are a testimony to this fact as past agricultural practices, prior to state ownership, depleted soils on these lands of nutrients and organic materials as well as impairing their structure. In some cases, soils were even lost to unchecked erosion. While reforestation efforts of the 1930s and 1940s have contributed to a replenishment of the soils and carbon stocks, the process is still far from complete. High quality forest soils are the product of thousands of years of development, a process for which there are no shortcuts.

**Filtration** is the process of absorbing and filtering rainwater and runoff. It is highly dependent on combined vegetative cover, humus and soil type.

**Compaction** of forest soils reduces aeration, which reduces their ability to absorb and filter water, support healthy root systems and support the full range of life forms dependent on healthy, well-aerated soils.

**Erosion** is the removal of vegetation, organic matter and soil, leaving the remaining soil prone to further damage. Erosion is caused by runoff, which occurs wherever the volume of water exceeds the ground's capacity for filtration. It increases exponentially as a function of increased water velocity.

### Soil Management

Sustainable forest management dictates the protection of forest soils. Human activity can potentially have negative impacts on soils and the many life forms resident in soil ecosystems. Management activities must be modified to limit these impacts. DEC staff will strive to minimize

and mitigate soil impacts, erosion and compaction, to the fullest extent practical during the process of planning, working and contracting on State Forests.

To reduce impacts, including erosion and compaction, DEC:

- Designs and constructs recreational trails, roads and access trails to minimize running slope, which in turn minimizes the velocity of water that travels over them;
- Minimizes the overall impact of its activities by directing heavy use, such as recreational use, toward formal trail systems and designated campsites, which are designed to accommodate such use
- Heavy-duty harvesting equipment will often be limited to designated skid trails and restricted from areas where impacts would be excessive;

While this photo was not taken on State Forest lands, it illustrates that erosion problems can compound quickly when major storm events occur over exposed soils

- Closes poorly designed or badly damaged facilities and restores and maintains existing facilities to prevent damage from occurring;
- Applies best management practices (BMPs) and bureau guidelines.

Not all soils are created equal. Some are able to withstand heavier use than others. Impacts can be minimized by concentrating a particular use in soils which are better able to support that use. Another strategy is to avoid impacting some soils altogether. Where the filtration value of soil is highest, on the edge of streams, wetlands, vernal pools and spring seeps, a buffer zone will be created around water features and heavy equipment will be excluded, except at carefully selected and designed crossings.

### Nutrient Depletion

Intensive management of forests, like intensive management of agricultural land, has the potential of depleting nutrients from the soil. This is more of a risk with plantations in the southern United States, where a “crop rotation” ending in a clearcut could happen every 20 to 25 years. At the present rate on State Forests in New York, less than 1/100th of the total area is cut every year, with the vast majority of those harvests being intermediate thinnings. This is far from being intense enough to deplete soils, as shown by the fact that State Forest soils are actually much richer on average in 2010, than they were when the state first acquired these lands. Still, the demand for forest products, as a biomass fuel source for combustion, or as a raw material for the production of cellulosic ethanol, stands to increase significantly.

The Bureau of Forest Resource Management has proactively developed policies on forest and tree retention *(refer to page 104)* and plantation management *(refer to page 279)* which

establish standards and procedures to protect forest soils from nutrient depletion and protect the ecological goals outlined in this plan. Buffer guidelines (discussed below in the context of water quality) also help prevent nutrient depletion.

## WATER ECOLOGY

The important role forests play in producing high quality fresh water cannot be overstated. Forests serve as nature's water filters and regulate water flow by storing rainfall and releasing it into streams at a more even rate. Water is essential for almost all terrestrial life forms, as well organisms that spend at least part of their life cycle in water, or are aquatic-based, like some insects and salamanders. As with soils, the state's waters support an immense variety of organisms which serve as the foundation for the food chain and the core of biodiversity.

Water quality—the ecological health of streams, ponds, lakes and wetlands—is directly and inextricably intertwined with soil protection. DEC's actions to protect soils and terrestrial vegetation directly and indirectly protect water quality by: maintaining the filtering capacity of soil; reducing soil erosion to protect stream habitat from sedimentation; stabilizing water chemistry; controlling water temperatures; buffering high water events to reduce damage from flooding; and storing water between rain events.

East Branch Fish Creek State Forest in the Tug Hill Plateau, Lewis County

### Water Quality Classifications

All waters of the state are provided a class and standard designation based on the *best usage* (for drinking, fishing, etc.) of each water or waterway segment. The following list shows waterway classifications and mileage found on State Forest lands.

- 150 miles of Class AA or A assigned to waters used as a source of drinking water.
- 51 miles of Class B, indicating a best usage for swimming and other contact recreation, but not for drinking water.
- 1,542 miles of Class C, for waters supporting fish propagation and survival.
- 135 miles of Class D, for waters supporting fish survival, but not propagation.

Waters with classifications A, B, and C may also have a standard of (T), indicating that they may support a trout population, or (TS), indicating that it may support trout spawning (TS). Special requirements apply to sustain waters that support these valuable and sensitive fisheries. Small ponds and lakes with a surface area of 10 acres or less, located within the course of a stream,

are considered to be part of a stream and are subject to regulation under the stream protection category of the Protection of Waters regulations.

Certain waters of the state are protected on the basis of their classification. Streams, or small water bodies located in the course of a stream, designated as C(T) or higher (i.e., C(TS), B or A) are collectively referred to as "protected streams," and are subject to the stream protection provisions of the Protection of Waters regulations. Special protective measures are used when protected waters are crossed, or have the potential to be impacted in the course of conducting management activities. When harvesting, for instance, portable temporary bridges are required in many cases to protect streams and their banks from damage and sedimentation. Additional protective measures are discussed on DEC's public website at www.dec.ny.gov/permits/49060.html and www.dec.ny.gov/permits/49066.html.

State Forests are included in DEC's Routine Statewide Monitoring Program which is responsible for the monitoring of the waters of the state to allow for the determination of the overall quality of waters, trends in water quality, and identification of water quality problems and issues. The program includes lake assessments, stream biomonitoring and rotating integrated basin studies. More information is found at www.dec.ny.gov/chemical/23848.html.

## Best Management Practices and Guidelines

To protect soils and water quality, the following BMPs and guidelines are being, and will continue to be, used in all projects undertaken on State Forest lands. The BMPs, in particular, describe appropriate actions that should be taken with very few exceptions.

### Soil and Water Guidelines

- Apply **DEC Special Management Zone (SMZ) Guidelines**, which provide continuous over-story shading of riparian areas and adjacent waters, by retaining sufficient tree cover to maintain acceptable aquatic habitat and protect riparian areas from soil compaction and other impacts. DEC's buffer guidelines also maintain corridors for movement and migration of all wildlife species, both terrestrial and aquatic. Buffers are required within SMZs extending from wetland boundaries, high-water marks on perennial and intermittent streams, vernal pool depression, spring seeps, ponds and lakes, recreational trails, campsites and other land features requiring special consideration. DEC's special management zones are summarized in the table below.

Additional Resources

**Rules for Establishment of Special Management Zones on State Forests** – December 2015, establishes the Bureau of Forest Resource Management's buffer guidelines and can be found at https://www.dec.ny.gov/docs/wildlife_pdf/yfismzrules.pdf

General BMPs
*(Refer to page 175 for additional construction guidelines.)*

- Limit the size of improvements to the minimum necessary to meet the intended use.
- Minimize tree cutting associated with construction projects.
- Minimize the use of equipment in streams.
- Locate improvements to minimize cut and fill.
- Locate improvements away from streams, wetlands, and unstable slopes.
- Plan projects to avoid hydric and highly erodible soils. Where these soils must be traversed consider: construction in dry periods, seasonal closure, use limitations or the use of gravel and fabric.
- Use properly placed drainage devices such as water bars and broad-based dips.
- Locate trails to minimize grade.
- Use bridges instead of culverts or fords whenever possible.
- Design stream crossings (fords) where there are low, stable banks, a firm stream bottom and gentle approach slopes.
- Construct stream crossings perpendicular to the stream flow.
- Limit stream crossing construction to periods of low or normal flow.

ADDITIONAL RESOURCES

**Recommendations for Stream Crossings** can be found online at www.dec.ny.gov/permits/49060.html and www.dec.ny.gov/permits/49066.html

- Avoid disrupting or preventing movement of fish and other aquatic species.
- Stabilize bridge approaches with aggregate or other suitable material.
- Use soil stabilization practices on exposed soil around construction areas, especially bridges, immediately after construction.
- Construct stream crossings which maintain a continuous natural streambed by using bridges, “D” shaped culverts, or oversize round culverts placed deep enough to provide this attribute.
- Restrict the size and type of equipment used, in order to minimize adverse impacts.

Recreation BMPs
*(Refer to page 227 for additional recreation guidelines.)*

Trails BMPs

- Wherever possible and appropriate, lay out trails on existing old roads or clear or partially cleared areas;

## SOIL AND WATER PROTECTION

- Where stream bank stabilizing structures are needed, use natural materials such as rock or wooden timbers;
- Construct new trails on low or moderate side slopes to facilitate effective drainage;
- Avoid flat topography where ponding could develop and drainage could be problematic should the trail surface erode or become compacted to a level below the surrounding area.

Trailheads and Parking Areas BMPs

- Locate parking lots on flat, stable, well-drained sites;
- Use gravel or other appropriate materials to avoid runoff and erosion problems;
- Limit construction to periods of low or normal rainfall;
- Limit the size of the parking lot to the minimum necessary to address the intended use.

Lean-tos and Campsites BMPs

- Use drainage structures on trails leading to lean-to sites and campsites, to prevent water flowing into them;
- Locate lean-tos and campsites on flat, stable, well-drained sites that are properly buffered from streams, wetlands and waterbodies;
- Limit construction to periods of low or normal rainfall.

Timber Harvesting Guidelines
*(Refer to page 271 for related information.)*

Timber Harvests are conducted under a contract developed by DEC. Special terms and conditions are included in contracts to limit impacts on soil and water resources. A bond is required in any contract written for over $500, to ensure compliance with all requirements.

ADDITIONAL RESOURCES

**New York State Forestry, Best Management Practices for Water Quality, BMP Field Guide** – 2018. Developed by the Division of Lands and Forests.
www.dec.ny.gov/lands/37845.html

**Rutting Guidelines for Timber Harvests and TRPs on State Forests** – May 2008, developed by the Bureau of Forest Resource Management.
http://www.dec.ny.gov/docs/lands_forests_pdf/ruttingguidelines.pdf

- Harvesting is often prohibited in spring and in periods when soils are saturated and unable to support harvesting activities.
- Skid trails are located by DEC to avoid sensitive soils and limit impacts on water resources.
- Contractors are required to have oil spill containment devices.
- Soils and water quality are protected during harvesting and construction operations by implementing best management practices as outlined in DEC's "BMP Field Guide" and "Rutting Guidelines for Timber Harvests, 2009."

Oil and Gas Exploration and Development – Surface Impacts Guidelines
*(Refer to page 243 for further detail.)*

The Division of Lands and Forests is responsible for managing surface impacts from oil and gas exploration and development on State Forests. These activities are regulated under a temporary revocable permit, which includes special terms and conditions required by DEC to reduce overall impacts and include mitigation measures. A bond is always required to ensure all terms are satisfied.

The regulation of subsurface impacts related to oil and gas development and protection of aquifers is the responsibility of DEC's Division of Mineral Resources and is not discussed in this plan. The minerals section of this plan does contain information regarding these management responsibilities.

The following guidance documents have been developed to limit impacts on soil and water resources on State Forests:

- Guidelines for Seismic Testing on DEC Administered state Lands
- DRAFT Guidelines for Pipeline Construction on DEC Administered State Lands

ADDITIONAL RESOURCES

**Guidelines for Seismic Testing**

http://www.dec.ny.gov/docs/lands_forests_pdf/sfseismic.pdf

**DRAFT Guidelines for Pipeline Construction on DEC Administered State Lands**

http://www.dec.ny.gov/docs/lands_forests_pdf/sfpipelines.pdf

## "SW" OBJECTIVES, ACTIONS AND SEQR ANALYSIS

**Soil and Water (SW) Objective I** – Soil and water quality will be protected by preventing erosion, compaction and nutrient depletion. Protection of soil and water quality is one of the highest management priorities and is the foundation of sustainable management.

**SW Action 1** - Increase monitoring of BMP effectiveness by sampling management sites on a periodic basis after construction of erosion control structures to assess sedimentation and water quality.

**SW Action 2 (also SM 5)** - Provide training to Bureau of Forest Resource Management (BSLM) and Division of Operations staff in modern application of BMPs.

**SW Objective II** –All SMZs and highly-erodible soils will be identified and mapped in UMPs.

**SW SEQR Alternatives Analysis and Thresholds**

The **no-action alternative**, or in other words, continuing with current management approaches, has been selected as the **preferred alternative**. The above-mentioned BMPs

## SOIL AND WATER PROTECTION

and other soil and water protection mitigations being implemented on State Forests adequately protect soil and water resources. However, there are some exceptions where impacts may occur. This may be due to such issues as illegal ATV use, which requires greater education and enforcement activity and the lack of adequate funding for maintenance. To address these obstacles, DEC will rely more heavily on timber sale-related work and VSAs to maintain existing infrastructure.

The alternative of not implementing the above mitigations will not be adopted. This alternative is not acceptable, considering the severe impacts to soil and water that can occur with management activities and public use.

**SEQR Analysis Threshold:** Soil and water protection strategies established in this section will avoid and minimize potential impacts to the maximum extent practicable and no further SEQRA review will be conducted.

# CARBON SEQUESTRATION

## Climate Change, Global Warming and Greenhouse Gases

One of the most important and highly publicized environmental issues in the world today is climate change. While there is a significant amount of debate and speculation on the rate of global warming, scientific studies from almost every nation have documented an increase in greenhouse gasses in the Earth's atmosphere. "As the largest source of U.S. greenhouse gas emissions, CO2 from fossil fuel combustion has accounted for approximately 76 percent of GWP-weighted total U.S. gross emissions across the time series. Between 1990 and 2019, CO2 emissions from fossil fuel combustion increased from 4,731.5 MMT CO2 Eq. to 4,856.7 MMT CO2 Eq., a 2.6 percent total increase. (U.S. EPA 2021). "The global atmospheric concentration of carbon dioxide has increased from a pre-industrial value of about 280 ppm (parts per million) to 409 ppm in 2019. The atmospheric concentration of carbon dioxide in 2019 (as it was in 2005) exceeds by far the natural range over the past 650,000 years (180-300 ppm) as determined from ice cores." (Intergovernmental Panel on Climate Change 2021). More research has confirmed that the concentrations of $CO_2$ have continued to grow, and in 2019 were at 410 ppm, (

The predicted consequences of global warming are starting to be seen across the planet as species continue to be lost to extinction pressure, major species migrations, wider swings in weather patterns that cause extreme weather incidents and more severe droughts, melting of polar ice and glaciers, rising sea levels, shifting trade winds and the death of coral reefs, to only name a few. Even though the future cannot be accurately predicted, all possible solutions to mitigate this problem must be considered, including the contributions that forests can supply.

In order to combat climate change, carbon needs to be pulled out of the atmosphere and put into long-term storage elsewhere. "Trees and forests are one of the answers Forest land, harvested wood products (HWP), woodlands, and urban trees within the land sector collectively represent the largest net carbon (C) sink in the United States, offsetting more than 11 percent of total GHG emissions in 2019", (U.S. Environmental Protection Agency 2021). NY's forests continue to provide a major net negative flux of carbon, or carbon sink, of -26mmt CO2e, (Domke, et al. 2021). Through photosynthesis trees absorb $CO_2$ and use the carbon (C) to form wood fiber (growth) while releasing oxygen ($O_2$) into the atmosphere. Forests and urban trees presently absorb over ten percent of the overall $CO_2$ emissions in the United States annually. Carbon sequestration is also occurring in wetland habitats and is a great reason to protect wetlands as well as forests.

One half the dry weight of wood is carbon.

# $CO_2$ CARBON SEQUESTRATION

One means of combating climate change is adapted management of State Forests. Minor adverse impacts associated with carbon sequestration strategies (discussed below) may include slightly lower harvesting levels and reduced capacity to accommodate biodiversity objectives because of longer harvest intervals in some stands.

Afforestation has been a tremendous source of carbon sequestration over the past century. However, today much of that potential has already been realized. In the early 1900s about 25% of New York's land area was forested, today more than 61% is forested. Consequently, there are relatively limited opportunities for new, large scale additions of forest cover. Reforestation, active forest management, and avoided conversion now provides the primary potential for carbon sequestration in this state.

## Active Forest Management

One of the primary management tools is active forest management, which involves the use of silvicultural systems to conduct timber stand improvements, timber harvests and various other treatments described in this plan that affect forest composition and vigor. Associated impacts are addressed in the forest products section of this plan.

Active forest management enhances a forest's carbon sequestration capacity by harvesting of future mortality and enhancing growth rates through thinning. Through active forest management, State Forest lands have an advantage in the ability to sequester carbon. Although forests do release some $CO_2$ from natural processes such as decay and respiration, a healthy forest typically stores carbon at a greater rate than it releases carbon. A forest's rate of growth is reminiscent of human growth for in its "teenage" years it has a large appetite for $CO_2$. The actual rate of carbon sequestration will vary with species, climate and site, but in general, younger, faster growing shade-tolerant species have higher annual sequestration rates. Although older forests have a lower potential for annual carbon sequestration, these older forests are likely "holding" a larger portion of carbon (carbon sinks) than the younger forests overall (barring disturbance) - especially for mixed, uneven-aged forests dominated by shade-tolerant species. While older forests, such as those in New York's Adirondack and Catskill Forest Preserve and on many State Forests, have significant value as pristine water sources, undisturbed wildlife habitat, genetic repositories, and places of rare beauty and special value to society, these forests have a significantly lower potential for carbon sequestration. Active forest management produces durable wood products that can store carbon for decades, while offering alternatives to carbon intensive materials like concrete and steel, and can still help create more resilient forests.

## Passive Forest Management

The other primary management approach is passive forest management. This is the concept that a forest, if allowed to grow untouched and unmanaged, will reach its maximum ecological/carbon storage potential. Passive forest management makes the active decision to allow a forest to continue with minimal to no direct management of a stand. There has been a recent push by some members within the forestry community to encourage passive forest

management across all State-owned lands. New York State has the Adirondack and Catskill Preserve, which currently offers one of the largest passive forest management areas in the country. A stumbling block to this philosophy being more widely implemented on State-owned lands designated as Reforestation Areas, stems from a section in the ECL that establishes Reforestation Areas (ECL 9-0501 (1)), where it provides that: *Reforestation areas 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*…". State land managers need to weigh the various best uses for the properties; habitat protection, water quality conservation, timber production, recreational uses, and now carbon sequestration, can all be chosen as the highest and best use for a stand. There are numerous stands on State Forest lands that are actively chosen for these various types of site preservations. Letters from the Yale School of the Environment, The Forest School, to the New Jersey state forester, John Sacco, and to the Governor's Council on Climate Change, summarizes the forestry community's science-based issues with passive forest management being the sole best choice. Passive management tends to ignore the forest health concerns caused by both forest pests/diseases and the needs of fire suppression by limiting fuel loads in a stand, both of which can be handled by applying the proper silvicultural techniques. Also, passive forest management doesn't take in account the needs of the bioeconomy, which relies heavily on the waste biomass produced from active management. The letter, and more information on this topic, can be requested from BFRM Central Office staff or on SharePoint at https://nysemail.sharepoint.com/:f:/r/sites/DECInSite-DLF/DLFDocs/Proforestation?csf=1&web=1&e=GOGj39. As with the other forest management techniques, the land managers choice to use passive forest management needs to be made on an individual stand basis taking into account the species and site conditions present.

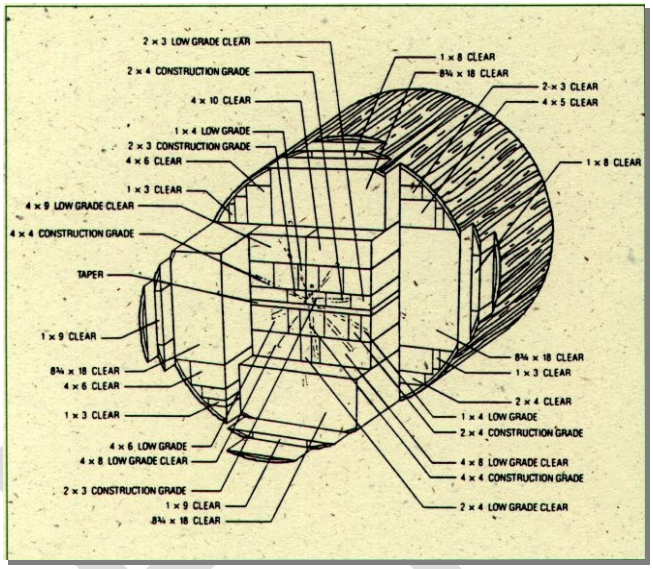
***Forest Soils***

As a forest grows, carbon in the form of organic matter such as roots, leaves and twigs, collects in the soil. This is called soil organic carbon (SOC). SOC stock may decline sharply following harvesting due to soil mixing and exposure, leading to oxidation and increased susceptibility to erosion (Bouwman 1990) (Johnson 1992) (Davidson 1993). SOC stock can return to pre-harvest levels within 17 to 80 years, depending on site conditions. Harvesting on State Forests is conducted in a manner to minimize the disruption of natural processes and thereby maintain SOC stock.

# $CO_2$ CARBON SEQUESTRATION

***Forest Products***

One half of the dry weight of wood is actually carbon. The use of wood in durable goods can bolster the effectiveness of forests to sequester carbon. Trees in a forest gradually slow their carbon intake as they age. Eventually forests reach a point where harvesting and conversion of wood to durable goods enhances long term carbon storage and increases forest growth rate.




Cross-section of a 38" diameter log, displaying its potential to produce lumber and thereby delay the release of carbon that occurs through natural decay

Use of forest products continues the sequestration (storage) of carbon until those products are eventually discarded and allowed to decay. Use of wood over other substitutes provides additional benefits through "avoided emissions." The manufacturing process for plastics can emit 40 to 75 times as much carbon than for similar wood products. Carbon emissions for manufacturing other substitutes are also substantially greater than for wood: 4 to 8 times more carbon emissions for concrete, 12 to 24 times more for steel, and up to 3 times as much additional carbon emissions for brick manufacturing (U.S. EPA 2006).

Forest products may also be used as a renewable energy source. Woody biomass is effectively consumed in large scale power plants as well as in smaller scale wood-energy heating systems. When harvested on a sustainable basis, biomass-derived energy is considered carbon-neutral because the carbon released in combustion originates from the natural above-ground carbon cycle, which includes natural sequestration, decomposition systems and atmospheric $CO_2$. Combustion of fossil fuels, on the other hand, adds carbon into the system.

## "CS" OBJECTIVES, ACTIONS AND SEQR ANALYSIS

**Carbon Sequestration (CS) Objective I** – Keep forests as forests

**CS Action 1** – Protect forests (and wetlands) through fee and easement acquisition. The state's land acquisition program will focus on purchases as outlined on page *165*. An indirect benefit of most acquisitions will be the protection of forests (and wetlands) from development.

**CS Action 2** – Limit conversion of State Forests to non-forest habitat. Exceptions will be made to protect rare, threatened and endangered species and to fill habitat gaps which cannot reasonably be provided on private lands.

**CS Objective II** – Enhance carbon storage in existing stands

**CS Action 3** – Lengthen rotation or harvest intervals in some stands, focusing on high-value timber species that have potential for longer term sequestration in durable goods

**CS Action 4** – Use silviculture management techniques and prescribed burns to prevent high-intensity wildfire in vulnerable stands, which can result in large scale carbon emissions

**CS Action 5** – Manage timber harvests to protect forest soils and to reduce SOC loss.

**CS Objective III** – Keep forests vigorous and healthy and improve forest growth rates.

**CS Action 6** – Conduct thinning operations on young forests, to concentrate and enhance growth on crop trees. This action mimics natural events with enhanced results.

**CS Action 7** – Stem the spread of invasive insects and diseases thath can cause widespread mortality in a forest, resulting in large carbon emissions when those trees decay. Employ adequate resources for rapid detection and eradication of new introductions of non-native threats to native species.

**CS Action 8** – Promote regeneration of forest stands that have been negatively impacted by invasive species and diseases, and/or are experiencing low levels of natural regeneration

**CS Objective IV** – Sequester carbon in forest products.

**CS Action 9** – Conduct timber sales from State Forest lands on a sustainable basis, following sound silvicultural systems described within this plan.

**CS SEQR Alternatives Analysis and Thresholds**

The **no-action alternative**, or in other words, failure to adopt the actions listed above, would directly reduce the carbon sequestration potential of State Forests. This alternative will not be adopted in consideration of the important role that forests play in carbon sequestration. The other negative impacts of adopting the no-action alternative are: unchecked spread of forest pests, decreased economic contributions from State Forests, damage to soils and potential loss of land in forest cover.

The **preferred alternative** is the implementation of all actions listed above, which have been designed to mitigate the potential effects of increased atmospheric levels of $CO_2$. The only other alternatives would involve implementation of a selected group of these actions. These alternatives will not be adopted considering the need to maximize carbon sequestration and the serious consequences associated with climate change.

**SEQR analysis thresholds** have not been specifically formulated for carbon sequestration actions. Other relevant sections of this plan, which include actions that assist in carbon sequestration, include thresholds for those actions

# AT-RISK SPECIES AND NATURAL COMMUNITIES

When air, land, water, plants and animals support each other in a healthy environmental system, all species, including humans, flourish. Alone among the animals, humans have the power to throw the system out of balance and to damage key elements in the web of life beyond repair. But the same knowledge and technology that make humans uniquely destructive also give us the ability to prevent damage to the environment and to care for the environmental support system on which human survival depends. State Forests will be managed with an ecosystem management approach which includes a focus on the overall health of the "system" and on the individual species and communities (elements) within the ecosystem.

Hart's Tongue Fern (A*splenium scolopendrium)* is one of many species that are actively protected on State Forests. *Photo credit: Doug Schmid*

This plan addresses At-Risk Species and Natural Communities with a strategy to:

- "Keep Common Species Common" by enhancing landscape level biodiversity and providing a wide variety of naturally occurring forest-based habitat.
- Protect and in some cases manage known occurrences of endangered plants, wildlife and natural communities using the Natural Heritage Database and conservation guides along with assistance from DEC experts in the Division of Lands and Forests and the Division of Fish and Wildlife.
- Consider other "at-risk species" whose population levels may presently be adequate but are at risk of becoming imperiled due new incidences of disease or other stressors.

The bog turtle *(Clemmys muhlenbergii)*, endangered in New York, is one of the smallest turtles in North America. *Photo credit: Jesse W. Jaycox*

DEC's Endangered Species Program is designed to identify and protect imperiled species and communities. There are several levels of classification that rank the scarcity or vulnerability of species, established by federal and state governments. Under Federal and New York State law, species and natural communities may be classified as "Threatened," "Endangered," "Special Concern," "Rare," or "Exploitably Vulnerable." Upon classification, these species are granted a commensurate level of protection under the law. Legal protections do vary, with greater legal protections for wildlife than for plants or natural

communities. There are also many species of invertebrates, insects and smaller micro-organisms that are biologically rare and imperiled, but have not gone through the review process necessary for state listing. All of the above listed and unlisted elements are referred to as "At-Risk Species and Communities" (ARS&C) in this plan.

On State Forests, DEC foresters are able to actively promote habitat for the enhancement of ARS&C. In addition, DEC's management role on State Forests requires that the presence of ARS&C are investigated and appropriate protections or management actions are in place. This investigation occurs both through the UMP process and associated inventory of the State Forest resources, as well as before undertaking specific management activities in sensitive sites. Protections include reserving areas from management activity or mitigating impacts of activity.

It is important to note that DEC has the responsibility to protect all fish and wildlife, including those considered at-risk throughout the state, including on private lands as fish and wildlife are all considered property of the state. However, the protection of ARS&C plant species and natural communities is a responsibility that falls primarily with the owner of the land where on these elements occur as these are considered the property of the landowner. Therefore, State Forests present a tremendous opportunity where DEC can actively engage in the protection of RTE plants and natural communities, along with fish and wildlife species found on these public lands.

## CLASSIFICATION SYSTEM

On State Forests, DEC will employ the ranking system described below, developed by the New York Natural Heritage Program (NYNHP), which is a joint program supported by DEC and The Nature Conservancy. (More information on this program can be found at www.dec.ny.gov/animals/29338.html.) The rankings compile multiple layers of regulation and protections along with the program's research into one useful system.

Each element in New York State has been assigned a global and state rank that reflects their scarcity or vulnerability. These ranks carry no legal weight. The global rank reflects the rarity of the element throughout the world and the state rank reflects the rarity within New York State.

### *Global Rank*

**G1 -** Critically imperiled globally because of extreme rarity (5 or fewer occurrences), or very few remaining acres, or miles of stream) or especially vulnerable to extinction because of some factor of its biology.

**G2 -** Imperiled globally because of rarity (6 - 20 occurrences, or few remaining acres, or miles of stream) or very vulnerable to extinction throughout its range because of other factors.

**G3 -** Either rare and local throughout its range (21 to 100 occurrences), or found locally (even abundantly at some of its locations) in a restricted range (e.g. a physiographic region), or vulnerable to extinction throughout its range because of other factors.

**G4 -** Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.

**G5 -** Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.

**GH -** Historically known, with the expectation that it might be rediscovered.

**GX -** Species believed to be extinct.

***NYS Rank***

**S1 -** Typically 5 or fewer occurrences, very few remaining individuals, acres, or miles of stream, or some factor of its biology making it especially vulnerable in New York State.

**S2 -** Typically 6 to 20 occurrences, few remaining individuals, acres, or miles of stream, or factors demonstrably making it very vulnerable in New York State.

**S3 -** Typically 21 to 100 occurrences, limited acreage, or miles of stream in New York State.

**S4 -** Apparently secure in New York State.

**S5 -** Demonstrably secure in New York State.

**SH -** Historically known from New York State, but not seen in the past 15 years.

**SX -** Apparently extirpated from New York State.

**SZ -** Present in New York State only as a transient migrant.

***SxB** and **SxN**, where Sx is one of the codes above, are used for migratory animals, and refer to the rarity within New York State of the breeding (B) populations and the non-breeding populations (N), respectively, of the species.*

***Ecological Communities***

In 1990, NYNHP published Ecological Communities of New York State, an all-inclusive classification of natural and human-influenced communities, using the ranking system outlined above (Reschke 1990). A revised and expanded second edition of this publication was produced in 2014 and can be found on NYNHP's new webpage classification system is now the primary source for natural community classification in New York and a fundamental reference for natural community classifications in the northeastern United States and southeastern Canada. This classification system is used in many decision-making processes on State Forests, guiding the establishment, maintenance and protection of natural systems.

## ENDANGERED SPECIES LAW

### Federal Law

One of the results of the environmental movement of the 1960s and 70s was the enactment of the Endangered Species Act of 1973. The Act was designed to prevent the extinction of plants and animals, addressing problems of both exploitation and habitat destruction. The Act defines an endangered species as any species of animal or plant that is in danger of extinction over all or a significant portion of its range. A threatened species is defined as one that is likely to

## AT-RISK SPECIES and NATURAL COMMUNITIES

become endangered. The Act regulates the "taking" of endangered and threatened plants on federal land or when they are affected by federal actions or the use of federal funds.

A particularly important section of the Act promotes the conservation of habitats of endangered and threatened species. The Act authorized the acquisition of land for the protection of habitats of these species and directs federal agencies to ensure that their activities or those authorized or funded by them do not jeopardize the continued existence of endangered and threatened species.

The Act prescribes strict procedural guidelines for determination of status and listing of species. These provide that species be listed only after extensive input and review by biologists, the states and the general public. This procedure ensures that only species in need of protection are listed, and it provides baseline data from which further population monitoring may proceed.

Presently, 11 New York rare plants are on the federal endangered and threatened list:

***Endangered Plants***
*Agalinis acuta* - Sandplain Gerardia - presently known from Long Island
*Schwalbea americana* - Chaffseed - historically known from the Albany Pine Bush
*Scirpus ancistrochaetus* - Northeastern Bulrush - presently known from Steuben and Washington Counties

***Threatened Plants***
*Aconitum noveboracense* - Monkshood - presently known from the Catskills
*Amaranthus pumilus* - Seabeach Amaranth - presently known from Long Island
*Asplenium scolopendrium* var. *americanum* - Hart's-tongue Fern - presently known from Central New York but in the process of being formerly delisted at the Federal level but it will remain state listed
*Helonias bullata* - Swamp Pink - historically known from Staten Island
*Isotria medeoloides* - Small Whorled Pogonia - historically known from Central and Eastern New York and Long Island
*Platanthera leucophaea* - Prairie Fringed Orchid - historically known from Central New York
*Rhodiola integrifolia* ssp. leedyi - Leedy's Roseroot - presently known from the Finger Lakes region
*Solidago houghtonii* - Houghton's Goldenrod - presently known from Western New York

In addition, the following animal species that are known to occur, have been known to occur in the past or could potentially occur on or near State Forests, are on the federal endangered and threatened list.

***Endangered Animals***

Molluscs: *Alasmidonta heterodon* - Dwarf Wedgemussel
*Epiblasma torulosa – Northern Riffleshell*

| | |
|---|---|
| | *Lampsilis abrupta* - Pink Mucket |
| | *Pleurobema clava* - Clubshell |
| | *Potamilus capax* - Fat Pocketbook |
| | *Villosa fabalis – Rayed Bean* |
| Insects: | *Nicrophorus americanus* - American Burying Beetle (extirpated from NYS) |
| | *Lycaeides melissa samuelis* - Karner Blue Butterfly |
| | *Bombus affinis* - Rusty Patched Bumble Bee (historically known from NYS) |
| Fishes: | *Acipenser brevirostrum* - Shortnose Sturgeon |
| | *Acipneser oxyrinchus ssp. oxyrinchus* – Atlantic Sturgeon |
| Birds: | *Numenius borealis* - Eskimo Curlew (extirpated from NYS) |
| | *Sterna dougallii* - Roseate Tern |
| Mammals: | *Myotis sodalist* - Indiana Bat |
| | *Canis lupus* - Gray Wolf (extirpated from NYS) |
| | *Felis concolor* - Cougar (extirpated from NYS) |

***Threatened Animals***

| | |
|---|---|
| Molluscs: | *Novisuccinea chittenangoensis* - Chittenango Ovate Amber Snail |
| Insects: | *Cicindela dorsalis* - Northeastern Beach Tiger Beetle (extirpated from NYS) |
| Reptiles: | *Clemmys muhlenbergii* - Bog Turtle |
| | *Sistrurus catenatus* – Eastern Massasauga |
| Birds: | *Calidris canutus* – Red Knot |
| | *Charadrius melodus* - Piping Plover (Atlantic Coast Breeding Population) |
| | *Laterallus jamaicensis* – Black Rail |
| Mammals: | *Lynx canadensis* – Canada Lynx (extirpated from NYS) |
| | *Myotis septentrionalis* - Northern Long-eared Bat |

Proposed Threatened

| | |
|---|---|
| Molluscs: | *Fusconaia subrotunda* – Longsolid |
| | *Obovaira subrotunda* – Round hickorynut |

Candidate for listing

| | |
|---|---|
| Insect: | *Danaus plexippus* - *Monarch Butterfly* (Candidate for Federal listing as of 12/2020) |

# AT-RISK SPECIES and NATURAL COMMUNITIES

## State Laws and Regulations

### *Plant Rarity and the Law*

Various laws, regulations and policies protect rare plants. Probably the most surprising aspect of rare plant protection is that, unlike animals, plants are the property of the landowner whether that might be an individual, corporation, or government agency. This means that the protection of rare plants is under control of the landowner unless, in some cases, a government-regulated action is affecting them. Then the government entity regulating the action may require that protection efforts take place to preserve the rare plants and their habitat. As a large landowner, as well as the agency which promulgated many of the above-mentioned legal requirements, the DEC has a responsibility to make every effort to fulfill the intent of those requirements.

ADDITIONAL RESOURCES

**New York State's Endangered, Threatened and Special Concern Wildlife Species List** – Available at: www.dec.ny.gov/animals/7494.html

At-risk plants in New York State are protected under New York State Environmental Conservation Law section 9-1503 and under regulations in 6 NYCRR Part 193. Part (f) of the regulation reads as follows: "It is a violation for any person, anywhere in the state to pick, pluck, sever, remove, damage by the application of herbicides or defoliants, or carry away, without the consent of the owner, any protected plant. Each protected plant so picked, plucked, severed, removed, damaged or carried away shall constitute a separate violation." Violators of the regulation are subject to fines of $25 per plant illegally taken. This regulation contains lists of protected plants under four different categories (rare, threatened, endangered and exploitably vulnerable) based on their scarcity in New York State. The DEC Protected Plant Program and Part 193 Regulations can be viewed on the DEC website at: www.dec.ny.gov/regs/15522.html.

Accordingly, the DEC long ago adopted regulations to protect rare and endangered plants on state lands. Specifically, 6 NYCRR 190.8(g) makes it illegal for anyone to “deface, remove, destroy or otherwise injure in any manner whatsoever any tree, flower, shrub, fern, fungi or other plant organisms, moss or other plant, rock, soil, fossil or mineral” on state lands.

### *Wildlife Rarity and the Law*

Regulations related to fish and wildlife protection have been in existence even longer than for plants. Current Environmental Conservation Law Article 11 contains protections for game and non-game fish and wildlife species with related regulations found in 6 NYCRR Chapter I, Sub-chapters A-J. Endangered and threatened species of fish and wildlife are located within those regulations in Part 182.

## NEW YORK NATURAL HERITAGE PROGRAM

The Nature Conservancy established the New York Natural Heritage Program (NYNHP) in 1985 as a contract unit within the DEC. The NYNHP is currently a partnership between SUNY College of Environmental Science and Forestry and the NYS Department of Environmental Conservation (NYSDEC). NYNHP's mission is to facilitate conservation of rare animals, rare plants, and natural ecosystems, which are commonly referred to as "natural communities." They accomplish this mission by working collaboratively with partners inside and outside New York to support stewardship of New York's rare plants, rare animals, and significant natural communities, and to reduce the threat of invasive species to native ecosystems.

This limestone woodland (rank: S2) is one of many rare natural communities present on State Forests

### Capturing Many Different Levels of Biodiversity

A "coarse filter/fine filter" approach can be used to identify and prioritize the protection of rare species and significant ecological communities. Ecological communities represent a "coarse filter," an aggregate of biodiversity at a larger scale than the species level. Their identification and documentation encompass whole assemblages of plant and animal species, both common and rare. The conservation of good examples of natural communities ensures the protection of most of the species that make up the biological diversity of the state.

However, because rare animals and plants often have narrow or unusual habitat requirements, they may fall through the coarse filter, not being captured within protected communities. Identifying and documenting viable populations of each of these rare species serves as the "fine filter" for protecting the state's biological diversity. This coarse filter/fine filter approach to a natural resources inventory is an efficient way to account for the most sensitive animals, plants, and communities in an area.

### Ranking: Putting Biodiversity into Context

NYNHP's lists of rare species and natural communities are based on a variety of sources including museum collections, scientific literature, information from state and local government agencies, regional and local experts, and data from neighboring states.

# AT-RISK SPECIES and NATURAL COMMUNITIES

Each natural community and rare species is assigned a rank based on its rarity and vulnerability. Like all state Natural Heritage Programs, NYNHP's ranking system assesses rarity at two geographic scales: global and state. The global rank reflects the rarity of a species or community throughout its range, whereas the state rank indicates its rarity within New York. These ranks are usually based on the range of the species or community, the number of occurrences, the viability of the occurrences, and the vulnerability of the species or community around the globe or across the state. As new data become available, the ranks may be revised to reflect the most current information. Sub-specific taxa are also assigned a taxon rank which indicates the subspecies' rank throughout its range.

Individual occurrences of rare plants, imperiled animals, and natural communities are ranked according to their quality, or perceived viability, based on factors including size, condition, and landscape context. All occurrences are assigned a quality rank of A-F, H, or X.

Species occurrence ranks are based on historical evidence of presence and/or on current population data. They are determined by evaluating the population's size, condition, and reproductive health, plus ecological processes needed to maintain the population and total landscape condition. Each of these factors is compared against specifications gathered from other populations throughout the species' global range. A final occurrence rank is calculated from this comparative review. Generally, an A-ranked occurrence is considered to represent one of the largest, most viable populations within a natural landscape.

Significant natural communities are also assigned ranks based on quality and are evaluated within the context of the known or hypothesized distribution of that particular community. Several ecological and spatial factors must be considered when determining the occurrence rank of a community. These include the occurrence size, maturity, evidence and degree of unnatural disturbance, continued existence of important ecological processes, overall landscape context, and existing and potential threats. A-ranked community occurrences are among the largest and highest quality of their type. These community occurrences are large enough to provide reasonable assurance of long-term viability of component ecological processes. They are essentially undisturbed by humans or have nearly recovered from past human disturbance, and typically exhibit little or no unnatural fragmentation. Exotic or particularly invasive native species are usually absent from high-quality community occurrences, or if present, are observed at very low levels.

## STATE LANDS ASSESSMENT PROJECT

The State Lands Assessment Project is an ambitious effort by the NYNHP to assess State Forests for rare species and significant natural communities. The State Forest Assessment, a partnership between the Division of Lands & Forests and NYNHP, completed its first five-year cycle covering New York State Forests in 2009. A second cycle began around 2016 and remains underway as of 2021.

The overall objectives of the project were to conduct a detailed examination of approximately 723,000 acres of State Forests managed by DEC's Division of Lands & Forests for rare species and significant natural communities (i.e., occurrences of rare natural communities, and the state's best examples of common natural communities) to (a) develop tools for state land managers that will help conserve rare species and significant natural communities on State Forests and (b) improve human understanding of New York's biodiversity, which will enhance informed conservation outside of State Forests. This project has grown to cover the now more than 807,000 acres BFRM currently manages.

The State Forest Assessment Project included details rare species and significant natural community surveys, monitoring of High Conservation Value Forest (State Ranked S2 or rarer), rare species and natural communities, targeted observation point data collection at non-significant community occurrences, delineation of all significant natural communities within each State Forest, and preparation of in-depth reports for each property. The assessment project updated element occurrence data in DEC's GIS database, and created region-specific biodiversity reports and conservation guides for many rare, threatened and endangered species and natural communities on State Forests.

Currently, the rare species and significant ecological community data, including their mapped locations, are delivered through the DEC's GIS data server and accessible digitally to forestry staff statewide in an ongoing fashion to inform their planning and management activities. Conservation guides for the species and natural communities documented over the course of this project and other projects are also available on the web at http://guides.nynhp.org.

From 2004 through the end of 2020, the State Lands Assessment Project has documented a total of 283 rare species and significant natural community occurrences (hereafter referred to as element occurrences) on 223 State Forests. These records were distributed among State Forests as follows:

- 67 rare plant populations,
- 61 rare animal populations, and
- 153 natural communities

During this same period, other NYNHP projects funded by State Wildlife Grant monies, the Office of Parks, Recreation and Historic Preservation, and a number of other NYNHP data contributors added an additional 282 element occurrences that fell at least in part on State Forests.

## NEXT STEPS

As discussed earlier in this plan, State Forest management will strive to maintain and enhance habitat level diversity using an ecosystem management approach. The primary focus of management will be to provide a wide diversity of habitats that naturally occur in New York. This approach will help keep common species common. When species and communities ranked S1, S2, S2-3, G-1, G-2 or G2-3 are present, actions will be taken to protect those specific populations or communities. This may involve taking action to enhance habitat, or may entail

preventing actions that would degrade habitat. DEC Foresters who manage State Forests are provided educational opportunities, technologically advanced tools like GIS and GPS, and access to expert advice from Division of Fish and Wildlife (DFW), US Fish and Wildlife Service, and NHP staff to improve their ability to recognize, manage and protect rare species and forest communities with exceptional values. DEC Foresters use the following resources to make broad-scale ecological and social assessments: this Strategic Plan for State Forest Management, DEC's State Wildlife Action Plan (SWAP) (the NYS Comprehensive Wildlife Conservation Strategy was incorporated into the 2015 SWAP update) and the NYS Open Space Conservation Plan.

DFW have developed the New York State SWAP which is a valuable tool for managing at risk wildlife species on State Forests. The SWAP identifies "Species of Greatest Conservation Need" (SGCN) in New York State. This designation takes into account species abundance and downward trends in population levels. Management of State Forests will consider at-risk species which, without intervention, might become imperiled. A list of SGCN that rely on forested habitat has been prepared by DFW and is available on the DEC website. This list will be consulted, along with DFW biologists when developing UMPs.

DEC Lands and Forests GIS staff and staff from NYNHP deploy a, currently routinely updated, layer in GIS for use by L&F Foresters. This data layer is based on the results of predictive models (the EDMs) for targeted identification of high potential, suitable habitat for rare plant and animal species. This model was developed as part of the State Land Assessment Project to make the 'Predicted Richness Overlays' (PROs) available to Foresters. In addition to the element occurrence data, these PROs serve as an additional tool to aid in the identification of areas with habitats that may support conditions favorable to the occurrence of rare species. This tool allows for an additional layer of protection beyond just protecting known occurrences of rare plants and animals or high-quality natural communities. DEC Foresters are now able to look for new or unknown occurrences in areas where the PROs indicate areas where suitable habitat for the elements to possibly be present. The PROs data layer is consulted prior to any timber sale contract, oil and gas lease, or construction project.

DEC foresters use predictive models to focus efforts to discover and protect at-risk species and communities

Bureau staff will address ARS&C concerns within the context of each individual UMP, which includes public input and review. While a majority of management actions focus on habitat-level diversity, protection of rare, threatened and endangered species will take priority over other management concerns. DEC Foresters will reference NYNHP conservation guides and will confer with Natural Heritage Program staff along with college and university experts to apply appropriate management strategies. It is important to recognize that in some cases active management is required or desirable to protect or enhance ARS&C.

ADDITIONAL RESOURCES

**'Predicted Richness Overlays' (PROs)** – DEC data layer used by foresters to identify new or unknown occurrences

**Conservation Guides** for species and natural communities documented by TNC's Natural Heritage Program project are available on the web at guides.nynhp.org. Additional info is available at www.nynhp.org.

**State Wildlife Action Plan (SWAP)** - completed by DEC's Division of Fish and Wildlife (DFW) in April of 2016 to address the wildlife species in greatest need of conservation in the state. The update to the CWCS was incorporated into the 2015 SWAP update. Collectively, these plans assess the health of the State's wildlife and habitats, identify the problems they face, and outline the actions that are needed to conserve them over the long term.

**List of SGCN that Rely on Forested Habitat** –

https://www.dec.ny.gov/animals/7179.html

## Land Classification

DEC developed a land classification for those portions of State Forests which have known high conservation values that DEC feels should take precedence over all other land use and management decisions. Areas identified as having exceptional values may, in certain circumstances, be managed using harvesting as a tool to reach management goals, but all management activities must maintain or enhance the high conservation values present. DEC consults with NYNHP, university scientists, and other concerned citizens and topical experts to develop and define these classifications. Currently, DEC has identified two land classifications that are considered to have high conservation values on State Forests and address ARS&C:

1. Biologically Diverse Forest - Forest areas that are in or contain rare, threatened or endangered ecosystems.
2. Special Treatment Area - Forest areas containing globally, regionally or nationally significant concentrations of biodiversity values (e.g. endemism, endangered species, and refugia).

### *Land Classification Ranking*

DEC recognizes that State Lands have many unique or special designations and are being managed to maintain or enhance these unique features. As a result, some areas may be part of more than one land classification. Therefore, it is necessary to rank all classifications against each other to help land managers incorporate management decisions based on the highest

priority for the forest. However, if a situation arises where a management decision protects the values of a higher-ranking forest attribute but may have a known or unknown negative impact on the values of a lower ranking attribute within the same forest, no management actions will take place until further analysis can be accomplished to verify impacts and assure the protection of all unique forest values. Ranking from highest to lowest priority is: 1) Biologically Diverse Forest; 2) Special Treatment Area; 3) Cultural Heritage Forest; 4) Watershed (either above a *primary source aquifer* or supplying public water to municipalities greater than 5,000 people).

## "AR" OBJECTIVES, ACTIONS AND SEQR ANALYSIS

**At-Risk Species and Communities (AR) Objective I** – Where any ARS&C ranked S1, S2, S2-3, G1, G2 or G2-3 is present, management activity will be conducted for the protection of these elements as a high priority compared to other management goals.

**AR Action 1** –Conduct up-to-date training for forestry staff on the identification and protection of at-risk species and communities, including use of PROs, as needed.

**AR Objective II** – UMPs will identify the presence of ARS&C and will present appropriate management actions to protect these elements, conduct habitat restoration, or otherwise promote the recovery of declining species, including use of timber harvest contracts as a mechanism for accomplishing proactive species restoration work.

**AR Action 2** – Maintain and contribute additional data to the existing Master Habitat Database on ArcGIS which identifies all known occurrences of rare, threatened and endangered species and important natural communities in conjunction with the New York Natural Heritage Program.

**AR Objective III** – All new UMPs will be developed using the State Wildlife Action Plan and DFW staff to consider protection and management of Species of Greatest Conservation Need.

**AR SEQR Alternatives Analysis and Thresholds**

The **no-action alternative**, or in other words, continuing with current management approaches, has been selected as the **preferred alternative**. Use of data collected by the State Lands Assessment Project, including newly-identified occurrences of at-risk species and communities, the PROs layers, and TNC management guides provide important protections and management tools. DEC will continue to provide educational opportunities for land managers in the identification and management for RTE elements.

The alternative of not implementing the actions above will not be adopted. This alternative is not acceptable, considering the impacts timber harvesting, construction projects and minerals development can have on at-risk species and communities.

**SEQR Analysis Threshold:** Endangered species and natural community protection strategies established in this section will avoid and minimize potential impacts to the maximum extent practicable and no further SEQRA review will be conducted.

# VISUAL RESOURCES AND AESTHETICS

"A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise." -Aldo Leopold

Foresters manage many diverse aspects of a forest. Some aspects of forest management are easy to observe and measure while others are more subjective and may not be measured easily. The visual resource aspect of forest management and the associated benefits to people fall into the latter category.

A natural floral arrangement on Cameron State Forest in Steuben County

"Many amenity values defy simple qualification. Their worth depends upon subjective factors that many people can only describe in terms of feelings and emotional benefit. Foresters cannot often translate this worth into tangible measures that have a marketable value. Instead, they can only rank the alternatives by user preference, without defining how much people would pay for different kinds of experiences, or gain by having them. On the other hand, people can often quite readily tell when some management activity destroyed or lessened an intangible value, or what areas do not provide quality experiences of some inexplicable kind." (R. Nyland, Silviculture Concepts and Applications 1996).

"In the last three decades, environmental legislation has mandated that recreation (and related aesthetic and ecological) values be considered more fully in forest management decisions. For these reasons, recreational resources can be as important to the land manager as the more tangible values of wood and water and forage." (Avery and Burkhart 1994).


A hardwood stand, following a timber harvest, with regeneration (newly seeded trees) and woody debris

When it comes to aesthetics, people hold different opinions. What may be aesthetically pleasing to some, may not be to others. Often, ecologically responsible management may not exhibit the most aesthetically pleasing results. State Forest management practices such as silvicultural and wildlife decisions take many considerations into account. Even so, the visual impact of some of these practices may not be kindly greeted by many people. While it is important for State Forest managers to

consider the visual effects of their management actions in terms of recreation and public perception, the ecological health of State Forests must be paramount.

While this plantation provides an aesthetically pleasing "park-like" setting, it lacks many attributes necessary for ecological health and integrity. *Photo credit: Melody Wolcott*

A stereotypical example of this concept may be seen in the public's perception of and positive reaction to a park-like setting, one that exhibits large evenly spaced trees with mowed grass or a thick bed of pine needles beneath them. While this image may be desirable to many, it does not necessarily represent much diversity from an ecological perspective. The forest manager must consider the forest's value to wildlife, through habitat and food and protective cover requirements. The manager must consider the next generation of trees or vegetation to inhabit the site and the manager must consider the area's susceptibility to erosion or environmental impacts. Frankly, both healthy, well-managed forests and most old growth forests may not look very inviting at all. Even this natural, uninviting look, however, may provide a core subconscious wild lands appeal to the viewer, who even though they may not wish to wander through the area and have a picnic, can still appreciate the appearance of disorder and its benefit at an ecological level.

## VISUAL RESOURCES ON STATE FORESTS

### History

Historic management of State Forests in New York has focused on timber management while also considering recreation, watershed protection and wildlife management. Many magnificent natural features, unique areas, historic structures, and wildlife habitats can be found in New York's State Forests. Management decisions regarding these many natural features have included development of hiking trails, creating access to water bodies and unique areas, construction of scenic public forest access roads, development of scenic vistas, creation and maintenance of forest openings, mowing of field areas to encourage various forms of wildlife, preservation of historic structures and carefully planned harvest operations.

Over the years, the general appearance of many State Forests has undergone quite a dramatic change. A significant amount of State Forest land came into state ownership as old farm areas with abandoned fields and pastures. A majority of these areas were replanted and have grown into mature and dense forests. As these forests matured and were harvested or tended, forest management practices focused on minimizing the visual impacts of management practices. The removal of most of the diseased, defective and over-mature trees left a park-like setting in

some places, which may be perceived by the untrained eye as a forest that has developed without any disturbance.

Stone wall on Stoney Pond State Forest in Madison County

### Current Conditions

Current aesthetic qualities and considerations of State Forests cover a broad spectrum. Seemingly greater importance has been placed on scenic areas in recent years, recognizing the uniqueness of certain areas and preserving or creating opportunities for the public to enjoy them. New York's State Forest land base is expanding. When available properties are deemed desirable and funding is in place to purchase such properties, they are slowly added to the State Forest inventory. Many of these new properties have significant unique attributes which make excellent additions to New York's public land. Recent acquisitions and existing State Forests provide many opportunities for the public to recognize and enjoy the many visual resources at their doorstep.


A gravestone on State Forest land

Some of the interesting aspects of many State Forests are historic structures or remains. Throughout most State Forests, remnants of old farms or other settlements are visible through stone walls, foundation holes, wells, chimneys, root cellars, gravestones, stone culverts, bridge abutments, etc. The origins of many of these structures date back many years and tell an interesting story of the history of the area. These structures add a unique aesthetic quality to the areas they occupy and should be protected from any management activities that would disturb them. Any historic structures that exhibit imminent safety concerns for the public should be dealt with immediately and documented in the UMP when it is written.

See *Historic and Cultural Resources on page 157 for further detail.*

### Trends

Large, unbroken tracts of forest and natural areas on private lands (farms, game reserves, etc.), which have served as public recreation areas in the past, are decreasing in number and size. As this trend continues in New York, the public will have fewer opportunities to recreate on such lands. DEC recognizes the valuable visual resources found on state lands and will maintain opportunities for the public to enjoy these unique and wonderful aspects of State Forests. As policies bring about the increased use of mitigation measures to reduce the visual disruptions associated with timber harvesting, silvicultural activities will become less noticeable.

## AESTHETIC STANDARDS AND GUIDANCE

### Timber Management

Various forms of timber management can have differing effects on visual resources. Foresters can use vegetative buffering, irregular edges, and other techniques to alter the visual effect harvest areas may have on the public. Creative application of Forest Retention Standards can provide aesthetic benefits to timber harvests in addition to reaching ecological goals. Informational kiosks and signs may also be placed near harvests to educate the public about the reasons for, and benefits of, the visible operation.

Betty Brook Road leads to a recently harvested area on Burnt-Rossman State Forest in Schoharie County

Prescribed burning, as with clearcutting, may be essential to managing some types of ecosystems; however, these practices may result in an appearance that is offensive or shocking to the general public. Special consideration must be given to aesthetic resources when planning prescribed burns or clearcuts.

**Timber Sales Manual 2021**
https://nysemail.sharepoint.com/:w:/r/sites/DECInSite-DLF/_layouts/15/Doc.aspx?sourcedoc=%7B33F0B48D-D910-4860-831A-04766E891A86%7D&file=SF_timber_sales_manual_3.2021_final.docx&action=default&mobileredirect=true

Current standards and background information on all items concerning timber sales on State Forests can be found in the 2021 Timber Sales Manual. This document was revised prior to the drafting of the 10-year update to the SPSFM and can be found on SharePoint or requested from BFRM CO staff.

Additional management practices that should be considered for aesthetic purposes include: new road construction; use of gates and signage; vegetation used to stabilize landings, skid trails and disturbed areas; vegetative variety; prescribed burning; and making appropriate vegetative choices around scenic areas. The Timber Sales Manual has been updated as the primary resource for harvests conducted on State Forests and will continue to be updated as needed.

### Roads

During new road construction, designing a road that travels directly from point A to point B may be the most efficient design, however, if the route can be altered to expose a unique hidden natural feature, the land manager should take that into consideration. Opportunities to develop

Mount Washington State Forest in Steuben County

access to scenic vistas and aesthetically pleasing areas have a value that should be given appropriate weight as managers make decisions.

### Gates

Gates have been routinely used on State Forests in New York to prevent unwanted use of motor vehicles. Gates, while effective and sometimes necessary for maintaining administrative use, may appear unsightly. Where appropriate, the land manager should consider use of natural barriers such as large boulders or logs in place of unsightly gates in aesthetically sensitive areas.


Gates can be unattractive

Natural barriers may be preferable

### Signs

Signs used on state lands have maintained a consistent and pleasing appearance over the years. Sign designs remain noticeable and informative and unobtrusive. Signs should continue to follow this format to maintain a consistent look to State Forests. Some warning signs may appropriately consist of brighter colors where it is necessary to grab the attention of the public for safety concerns. Signs are also helpful to inform the public of the reasons why the land manager has made certain management decisions in an area. An educational sign describing why a specific management area may look a little out of the ordinary can be educational and helpful in putting the public's mind at ease.

An example of sign pollution

Yet signage can be overdone and become an unsightly addition to an otherwise scenic area. In such cases, managers will install kiosks at areas to replace numerous individual signs avoiding "sign pollution."


Birdseye Hollow State Forest Auto Tour


Reforestation Project" sign explaining a clearcut forest regeneration project in DEC Region 4

## Soil Stabilization

Log landings and areas of disturbed soil on State Forests have traditionally been stabilized with grass seed mixes. In areas where the public comes into frequent view with disturbed soil areas, or in additional areas deemed appropriate, the land manager may vary the stabilization plantings by adding a native wildflower component to the stabilization mix. Care should be taken to ensure the seed mixture is free of unwanted and invasive seeds. DFW may be consulted to help determine which additional vegetation could increase benefits to wildlife while enhancing the aesthetic quality of the area.

Aesthetics and biodiversity go hand in hand. Restoring landing areas with a variety of vegetative cover can improve habitat diversity

Maintaining a vegetative variety over the forest landscape is aesthetically important at the ecosystem level as well. Aesthetically, maintaining vegetative variety helps to avoid visual impacts from a potential catastrophic event.

# VISUAL RESOURCES and AESTHETICS

## Recreation

Recreational facilities managed on State Forests include: structures, parking facilities, campsites and trails. As with signs, the DEC has maintained a consistent and pleasing appearance of its many structures. Outhouses, parking lot bollards, equestrian structures, picnic tables and other wooden structures typically exhibit similar designs from one working unit to another and are protected with the same brown stain. This dark brown color helps the structures blend into their surroundings and has come to be one of the ways the public can more easily recognize state facilities. Fireplaces or fire rings are found at someday use areas on State Forests or at the occasional campsite and typically have a consistent natural or unobtrusive design of stone, concrete or steel.

Stone fireplace

Accessible fishing pier and observation deck on Green Pond, Bonaparte's Cave State Forest in Lewis County, built using primarily natural materials

State facilities should maintain a natural appearance where possible while accounting for accessibility. Natural materials such as wood or stone should be used in construction to help create a visually appealing finished structure that tends to blend into the surroundings and not stand out.

### *Parking Lots*

Parking lot design allows convenient access to facilities, provides for efficient flow of traffic, and offers a form of control by limiting the number of recreational users in an area to a level that will not degrade the resource. Aesthetic considerations in parking lot design should include vegetative manipulation in or around the parking area, scenic view opportunities from the parking area, and the general appearance of the parking area from the surrounding area.

This parking lot provides a scenic view of the valley, however, it may be larger than needed for intended use and has a large visual impact from above

Design of a parking lot can have a negative effect on the aesthetics of a nearby area. For example, removal of trees and construction of

a large open parking area directly below a scenic overlook, as opposed to creating a masked parking area that allows access to the same overlook but remains hidden from the view.

### *Campsites*

Designated primitive campsites on State Forests and areas typically used for camping should be monitored to ensure they are not getting overused and degrading the resource. Proper consideration in locating campsites will help ensure the area holds up to use and avoids the undesirable appearance of an over-used site. The visibility of a campsite is another consideration. Is the campsite obscured from view of nearby trails or roads, so it does not detract from the view of other users of the resource?

### *Trails*

Recreational trails are another important component of many State Forests. Snowmobile, horse, ATV access routes for people with disabilities, mountain bike, hiking, and accessible trails are some of the trails commonly found on State Forests. Trails can be marked to allow or prohibit certain types of use. In some situations, multiple use may be appropriate and in others trail use should be restricted to a single type of recreational activity.

Construction of new trails should take aesthetics into consideration. Does the trail bring the recreational user to some scenic destination or does it provide an aesthetically pleasing experience along the entire length or portions of the trail? If not, could it? Does the trail have variety? Is it irregular in nature and does it allow the user more of a personal experience as opposed to long straight stretches where, even when spaced out, users remain in view of one another? Will trail construction in certain areas detract from the view of that area from afar?

Trails must be signed properly. The manager must have direct oversight of the signs used along trails and in the frequency of trail markers. Some trails are improperly over marked with trail markers, which can detract from the trail's appearance. Proper trail site determination and construction will also help ensure that its aesthetics are not destroyed from overuse or erosion.

In applying retention standards to harvesting near recreation trails, foresters will consider leaving legacy trees and other green tree retention within sight of those trails for aesthetic enhancement, when the opportunity exists and long-term safety considerations do not preclude it.

# VISUAL RESOURCES and AESTHETICS

### *Additional Structures*

Other structures on State Forests may impact the visual resources of a Unit. Additional structures need to be considered on a unit-by-unit basis. Gas and oil wells, communication towers, and utility lines all can have a large visual impact on an area. These structures may not be appropriate in certain locations on State Forests. Foresters assess the visual resources of the Unit and any potential impact an additional structure will have on these resources. If structures already in existence have a significant negative impact on the visual resources of the unit, they should be moved to an appropriate location. If structures cannot be moved, the land manager should concentrate efforts on vegetation management to screen them and minimize the negative visual impacts the structures have on the Unit and the surrounding area.

An oil well in DEC Region 9


Zoar Valley Multiple Use Area in Erie County

### Scenic Vistas

Scenic vistas on State Forests may become compromised by vegetation that grows on or around them. If it is deemed appropriate to create or maintain a vista, the land manager should plant a native species of tree or other vegetation that will not threaten to block the scenic vista in the future. Managers of State Forests that exhibit multiple scenic vistas or other interesting attributes may wish to document those attributes in the form of a map or informational table in the UMP for that area. Documentation will aid in the management of the vista and may provide information for the public. To aid in management of the vista, the documentation should include photos and information such as the location of the vista, maintenance requirements, etc. Information that may be used by the


Scenic vista on Cameron State Forest in Steuben County

public should also include the location of the vista and perhaps a brief description or history of the area. A map showing all of the major scenic attributes of a Unit may be a valuable resource for the public.

## Potential Alternatives and Related Impacts

If State Forests were managed with no consideration for aesthetics, public perceptions and the failure of those State Forests to provide the emotional, subconscious necessities for a pleasing natural experience would likely result in numerous complaints to DEC. Aesthetic considerations must, however, be weighed carefully against ecological goals, and the diversity and quality of important biological forest communities and habitats must also be considered.

## "VR" Objectives, Actions and SEQR Analysis

**Visual Resources (VR) Objective I** – State forests will be managed such that the overall quality of visual resources is maintained or improved.

**VR Action 1** – Develop guidance for visual impact assessment and mitigation around timber harvests, mineral extraction sites and infrastructure.

**VR Action 2** – Timber Sales Manual has been updated and is available on SharePoint or by request to BFRM CO staff.

**VR Action 3 (also AFM 1, AFM 5, PM1)** – Incorporate visual resource protection into final DEC policies for retention, plantation management and clearcutting.

**VR Objective II** – Natural materials such as wood and stone will be used for observation and fishing deck structures, and barriers such as large boulders, in areas that experience greater amounts of recreational use and where administrative access is not frequently needed or anticipated. To be addressed on a site-by-site basis in UMPs.

**VR Objective III** – In case of new construction, roads and trails will be laid out to highlight unique natural features of the land and develop access to scenic vistas. UMPs will address.

**VR Objective IV** – Kiosks will be developed where appropriate to provide educational material and reduce sign pollution. To be implemented within UMPs.

### VR SEQR Alternatives Analysis and Thresholds

The **no-action alternative**, or in other words, continuing with current management approaches, has not been selected. As mentioned in this section, policy revisions are needed to ensure the protection of visual resources.

The **preferred alternative** is to implement the follow the current plantation management, retention and clearcutting policies, which all address visual impacts related to active

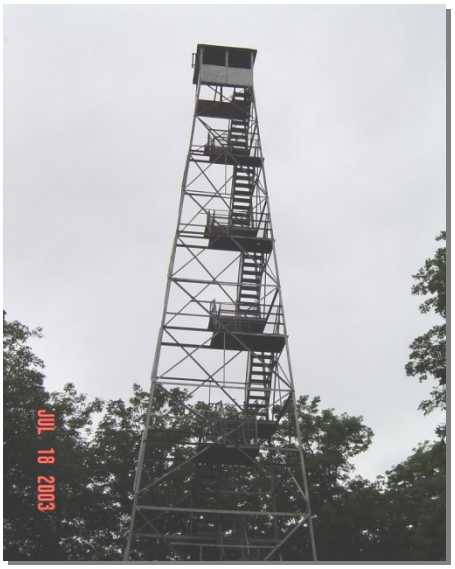
## VISUAL RESOURCES and AESTHETICS

management practices. In addition, the recommendations in this plan related to soils, recreation, scenic vistas and other infrastructure will be implemented under this alternative.

**SEQR Analysis Threshold:** Visual resource protection strategies established in this section and elsewhere in this plan will avoid and minimize potential impacts to the maximum extent practicable and no further SEQRA review will be conducted. However, this plan has identified specific thresholds for some management activities, such as clearcutting and oil and gas development, that could otherwise cause significant visual impacts.

# HISTORIC AND CULTURAL RESOURCES

The term "cultural resources" encompasses a number of categories of human created resources. The term used in state and federal law for these resources is historic properties. Historic properties include buildings, structures, objects and districts listed or eligible for listing in the State and National Registers of Historic Places. These can include standing structures, ruins, archaeological sites and other related resources. Such resources form the historical record and legacy of New York State. They tie us to and inform us of history and culture and are an important part of community identity and sense of place.



Leonard Hill Fire Tower on Leonard Hill State Forest in Schoharie County

DEC is required by the New York State Historic Preservation Act (SHPA) (PRHPL Article 14) and SEQRA (ECL Article 8) to include such historic and cultural resources in the range of environmental values that are managed on public lands. SHPA and State Education Law (EDN Section 233) are the legal mechanisms affecting the management of historic properties on state land.

SHPA does a number of things. First it authorizes a comprehensive statewide inventory of such properties. Second it directs state agencies to behave as stewards of the resources under their care, custody and control. SHPA also sets up a process by which agencies are required to identify and avoid or mitigate impacts to historic properties from the actions they permit, fund or undertake directly.


CCC Tool and Engineering Building on Winona State Forest in Jefferson County

On lands managed by DEC's Division of Lands and Forests, the number of standing structures is generally limited, due to the nature of past and current land use. Often those that remain are structures that relate to DEC's land management activities such as fire towers, ranger cabins and related resources. Fire towers as a class of resources have been the subject of considerable public interest over the last decades.

The majority of surviving fire towers have been found eligible for inclusion in the State and National Registers of Historic Places and a number have been formally listed in the Registers since 2001. Whether formally listed in one of the

registers or merely found eligible, DEC must treat these resources appropriately, requiring that special procedures be followed should it be necessary to remove or otherwise affect them.

Archaeological sites are, simply put, any location where materials (artifacts, ecofacts) or modifications to the landscape reveal evidence of past human activity. Human occupation of New York State extends as far back as immediate post-glacial times, perhaps as early as 15,000 years ago. Evidence of the human past includes a wide range of resources ranging from pre-contact Native American camps and villages to Euro-American homesteads, cemeteries and graves as well as mills and other industrial sites. Such sites can be entirely subsurface or can contain above ground remains such as foundation walls or earthwork features. All of these types of resources are known to exist within the State Forest system.

Former Civilian Conservation Corps (CCC) camp on McDonough State Forest in Chenango County

The New York State Office of Parks, Recreation and Historic Preservation (OPRHP) and the New York State Museum are charged by law with creating and maintaining a comprehensive inventory of archaeological resources, including those on public lands. Other state agencies are charged with helping to develop this inventory by providing information on archaeological resources on their lands to OPRHP and the State Museum. Other agencies are also charged with acting as stewards of the archaeological resources under their care, custody and control.

Sawmill foundation in Cattaraugus County

A cursory examination of the inventory reveals several hundred identified archaeological resources as being present on DEC managed lands. Many of these were recorded prior to state ownership as DEC has never had the funds budgeted to undertake a systematic inventory. Were a systematic inventory to take place, it is likely that many new archaeological sites would be added.

The quality of site inventory information varies a great deal in all respects. Very little systematic archaeological surveying has been undertaken in New York State, especially on state land. Therefore, all current inventories

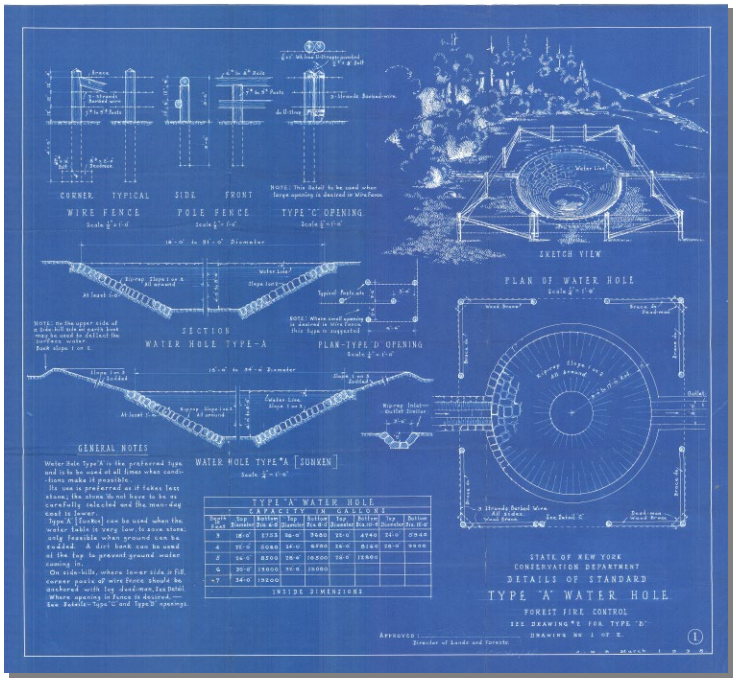
must be considered incomplete. Even fewer sites have been investigated to any degree that would permit their significance to be evaluated. Many reported site locations result from 19th century antiquarian information and artifact collector reports that have not been field verified. Often very little is known about the age, function or size of these sites. This means that reported site locations shown on inventory maps can be unreliable or encompass a large area.

As a part of the inventory effort associated with the development of UMPs, DEC arranges for a search of the archaeological site inventories maintained by the State Museum and OPRHP in order to identify known archaeological resources that might be located within or near a State Forest unit. This is done for two reasons: to determine if any known sites might be affected by actions proposed within the unit, and to assist in understanding and characterizing past human use and occupation within the unit. Archaeological site information is maintained as a part of the DEC's resource inventory for a given Unit and is discussed in general in the UMP. To prevent damage to sites, specific site locations are not published in plans or otherwise made public as required by PRHPL Article 14.07.

## HISTORIC AND ARCHAEOLOGICAL SITE PROTECTION

The historic and archaeological sites located on State Forests as well as additional unrecorded sites that may exist are protected by the provisions of the New York State Historic Preservation Act (SHPA - Article 14 PRHPL), Article 9 of Environmental Conservation Law, 6 NYCRR Section 190.8 (g) and Section 233 of Education Law. Unauthorized excavation and removal of materials from any of these sites is prohibited by Article 9 of Environmental Conservation Law and Section 233 of Education Law. In some cases additional protection may be afforded these resources by the federal Archaeological Resources Protection Act (ARPA).

State Forests can be made available for research on known archaeological sites, as well as unrecorded sites that may be suspected to exist on the property. Such research requires permits, which can be issued only after consultation with the New York State Museum (NYSM) and OPRHP.




CCC firefighting reservoir design

# HISTORIC and CULTURAL RESOURCES

## HISTORIC PROPERTY MANAGEMENT AND PROTECTION GUIDELINES

### Resource Inventory

DEC will continue to provide its forestry staff with training opportunities to enhance their ability to identify and protect historic and cultural resources on the lands they manage. While conducting forest inventory or timber management tasks, they will note the presence of possible artifacts for future investigation, and will shelter or protect these features from management activities until that investigation has been completed. All known and suspected historic and cultural resources will be discussed in all new UMPs and added to a GIS database.

When new cultural and historic sites are identified, their presence will be shared with OPRHP and NYSM using inventory forms developed for this purpose. DEC will explore an enhanced partnership with NYSM to develop and initiate a long-term State Forest archeological inventory project as funding and staffing permit.

### Resource Protection

Timber harvesting, well site construction and recreational activities that would impact historic properties should be avoided. Haul roads, skid trails, landings, trailheads and parking areas should not be located in the vicinity of historic resources that might be damaged by such activities. A *do-no-harm* approach should be applied where possible artifacts are identified, until such time as a full archeological review can be conducted to establish the true nature of the find.

Cultural resources should be managed to preserve the integrity of individual sites such that the association between site features is not diminished. For example, the relationship between foundations, stone walls, garden plots and old orchards provides evidence about a functioning farmstead. Activities that disrupt this integration decrease the accuracy of site interpretation and lessen the ability to learn about the past.

Where necessary, place protective conditions on sales contracts that prohibit harvesting activities that would impact historic properties, or direct harvesting activities in such a way as to protect historic properties. Should disturbances be necessary, the contract or Temporary Revocable Permit (TRP) can require that the structures be returned to their pre-impact condition.

Protections will be put in place such that stone walls and other structures will not be dismantled and efforts will be made to accommodate access using existing gateways. Hedgerows, shade and fruit trees, garden shrubs and other ornamental plants associated with cultural sites will be excluded from harvesting, and efforts will be made to sustain non-invasive vegetation through thinning and pruning. Hedgerows will be maintained, though hazard trees may need to be removed.

## "HC" OBJECTIVES, ACTIONS AND SEQR ANALYSIS

**Historic and Cultural Resources (HC) Objective I** –Historic and cultural resources will be preserved and protected wherever they occur on State Forests.

**HC Action 1** – The needs of each situation will be determined on a case-by-case basis. Work with the State Historic Preservation Officer to develop guidance for staff.

**HC Objective II** –Historic and cultural resources on State Forests will be identified and addressed during development of UMPs. Inventory forms will be completed and submitted to OPRHP and NYSM and resources will be added to DEC's state land assets GIS layer as they are identified.

**HC Objective III** –Historic and cultural resources on State Forests will be inventoried at a statewide level.

**HC Action 2** – Discussions have begun to initiate a systematic and comprehensive archaeological inventory of State Forests in partnership with the New York State Museum, however budgetary restrictions have slowed progress.

**HC Action 3 -** In situations where an action may impact a historic or cultural resource, which cannot be addressed by the application of standard operating procedures, appropriate case-specific measures will be developed to address the impact and safely preserve the site.

**HC SEQR Alternatives Analysis and Thresholds**

The **no-action alternative**, or in other words, continuing with current management approaches has been selected as the **preferred alternative**. This means that protective measures will be applied where known historic and cultural resources occur. In addition, resources will be inventoried as staffing and other resources allow.

The alternative of not implementing the above-mentioned protections has not been selected because it would neglect DEC's responsibility as a landowner.

**SEQR Analysis Threshold:** Historic and cultural resource protection strategies established in this section will avoid and minimize potential impacts to the maximum extent practicable and no further SEQRA review will be conducted.

# CHAPTER 4
# REAL PROPERTY AND INFRASTRUCTURE

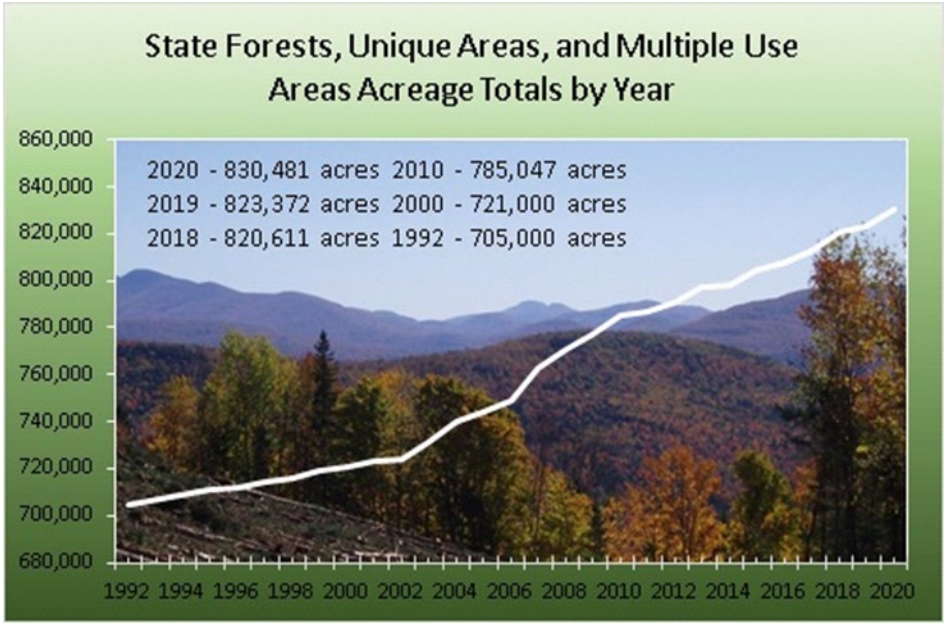
# LAND ACQUISITION

Acquisitions in fee and conservation easements have been utilized by New York State to conserve land for more than a century. These lands have created the State Forest Preserve, reforested marginal farmland, created state parks, and have protected sensitive natural habitats for threatened and endangered species.

New York's State Forests, to be managed separately from the State's Forest Preserve, were established by The State Reforestation Law of 1929 and the Hewitt Amendment of 1931. Today, these laws are authorized under Article 9, Title 5 of the Environmental Conservation Law (ECL). Both laws set forth legislation that authorized the former Conservation Department to acquire land by gift or purchase for reforestation areas. Land Acquisition Bond Issues in 1960, 1962, 1970, 1972, 1986 and 1996 as well as today's Open Space Conservation program funded by the Environmental Protection Fund have strengthened the public commitment to acquire, protect and preserve these valuable areas.

In 1990, the state legislature passed ECL Article 49, Title 2 to ensure citizen input into state land acquisition decisions made by DEC and the Office of Parks, Recreation and Historic Preservation (OPRHP). Nine Regional Advisory Committees were established to assist DEC & OPRHP in identifying areas in which land acquisition is a high priority for conservation purposes. Through a formal public review and natural resource evaluation process, projects are required to be listed in a state land acquisition plan, now formally known as the New York State Open Space Conservation Plan (Plan). As one of the principles of the State's Open Space Conservation Program, the Plan recognizes fee acquisition from willing sellers as one of a variety of tools to be utilized for conserving land.

Shortly following, in 1993, the New York State Environmental Protection Fund (EPF) was created to provide funding for open space conservation and land acquisition. Purchases of land in areas identified in the Plan are eligible for funding from the EPF, and other state, federal and local funding sources for



acquisition purposes, with “State Forest, Wildlife Management Area & Unique Area Protection” identified as a statewide priority project. Projects listed in the State’s Open Space Conservation Plan are required to be reviewed every three (3) years.

**Profile of a Successful Acquisition**

In June of 2010, the City of Rochester’s lands surrounding Hemlock and Canadice Lakes, totaling about 6,684 acres in Livingston and Ontario Counties, were acquired by DEC, and re-named the **Hemlock-Canadice State Forest**.

View of Canadice Lake, on Hemlock-Canadice State Forest, in Ontario County

Hemlock and Canadice Lakes have provided drinking water for the City of Rochester and adjacent communities for more than 100 years. The City began drawing water from the lakes in order to put an end to cholera outbreaks. To protect water quality, the City acquired much of the watershed property around the lakes. However, much of the property being acquired in the early 1900's was in agricultural use. Therefore, in 1902, an aggressive tree-planting program began in order to provide the desired forest cover. During the next 29 years, 3.7 million conifer seedlings were planted on 3,000 acres. The remaining acres naturally re-grew to trees without needing to be planted. Few traces remain of the land’s former uses except for stone walls.

With the addition of a water filtration plant in the 1980’s, the protection provided by natural forest cover was no longer a high priority in comparison with other financial concerns. Hemlock and Canadice Lakes were identified as a "high priority" on the state's Open Space Conservation Program since its inception in 1992 - state acquisition would remove the pressure on the City to sell off the buffer lands for development. Today, the lakes, with their steep forested shorelines guarding the deep clear water, show visitors a glimpse of the past when all the Finger Lakes were wild lakes. While protecting water quality continues as the most important function of this property, the lands will be managed for multiple benefits as described in this plan.

# LAND ACQUISITION

## POLICY

Under the state's Open Space Conservation program, available acquisition funds for State Forest protection would be placed on fee acquisition of parcels that are either: a) in-holdings, i.e., parcels with at least three sides bordered by existing State Forest; b) improve access to an existing State Forest; c) are scenically important; d) contain threatened or endangered species; or e) are of exceptional historical or cultural importance. Priority will be placed on the elimination of "in-holdings" and the consolidation of State Forest parcels; in order to lessen management demands and fiscal expenses by significantly reducing boundary line maintenance, improving operational access, and by providing additional protective buffers from non-compatible or potentially non-compatible adjoining land use.

### Procedure

ADDITIONAL RESOURCES

**New York's 2016 Open Space Conservation Plan** –

In order for land to be acquired for State Forest protection, as described in the Open Space Conservation Plan, a proposed parcel will be evaluated to determine: a) the impact of the location of the parcel on its ability to achieve the project's objective; b) the compatibility of the parcel with other state environmental plans and other regional and/or local environmental plans; c) the multiple benefits afforded by the proposed parcel; d) the availability of alternative or additional funding for purchase of the parcel; e) post acquisition management needs and the availability of post-acquisition management support; f) the extent to which a parcel encompasses agricultural lands; and g) the fiscal and economic benefits and burdens resulting from acquiring the proposed parcel, including those on state agencies, the local government and the local economy (2016 New York State Open Space Conservation Plan).

The Commissioner of DEC will then consider: a) the extent to which the parcel's location contributes to the geographical balance and availability of the State's diversity of resources, as well as the fair distribution of the available monies across the State; the availability of the project for acquisition by purchase, gift or partial; b) the suitability and practicality of a conservation easement, or other less than fee acquisition strategies, as required by ECL Section 49-0203(2) (c) the cost of the project in relation to its resource value; d) the social, cultural and educational values, benefits, and potential of the project; and e) the comments from the Regional Open Space Advisory Committees.

Once the Commissioner decides whether to proceed with the acquisition of certain parcels, they will establish priorities for approved projects and will individually propose the projects for funding through the EPF, which are listed in the capital project budget prepared each fiscal year. Priority projects listed in the final budget are then approved or denied by the Governor and State Legislature.

# LAND ACQUISITION

As stressed by the Regional Advisory Committees, it is important for DEC to critically evaluate the feasibility of managing additional public lands and its incurring expenses beyond the initial acquisition costs. The Committees recommend that: 1) a percentage of the land acquisition portion of the EPF be allocated annually for stewardship activities; 2) user fees should not be collected since they potentially discourage economically disadvantaged people from enjoying these areas, reducing attendance on these lands; and 3) the state should compensate municipal taxing units for property tax on all public lands (including easements) to offset the potential impacts to a local municipality's tax base resulting from the removal of property from the municipalities' tax base.

### Implementation

Following approval by the Governor and the state legislature, and in accordance with the state Open Space Conservation Plan, DEC's Bureau of Real Property performs all aspects of the land and conservation easement acquisition process from appraisals and boundary surveys through negotiations and contracts. Legal assistance is provided to the Bureau from DEC's Office of General Counsel and the State Attorney General Office's Real Property Bureau.

### Applicable Laws

- State Reforestation Law of 1929
- Hewitt Amendment of 1931
- ECL Art. 9 Title 5 - Reforestation Areas
- ECL Art. 49 Title 2 - State Land Acquisition
- ECL Art. 54 Title 3 - Open Space Land Conservation Projects

## FUTURE NEEDS FOR LAND ACQUISITION

### Identify Priority Connectivity Parcels

Connectivity between private and public forest patches across the landscape will become increasingly important for biodiversity and ecosystem health as time progresses. State Forest UMPs should refer to New York State Open Space Plan for guidance and ideas on how to keep the State Forest System connected to other public and private lands. DEC's cooperative forest landowner outreach program can help private landowners learn how their lands fit into the bigger ecosystem picture. An incentive system similar to the 480-a tax law program or conservation easements will be needed to provide long term contributions to connectivity from privately held lands.

Connective corridors identified in the Landscape Assessment section of this plan should be referenced in each UMP as being important assets at the landscape level, worthy of protection through tools such as conservation easements or direct purchase.

### Meet Demand for Open Space and Watershed Protection

Consider new acquisitions of state forest lands in areas of the state that have not traditionally been served by State Forests but are underserved by open space and recreational benefits or are in need of watershed protection. Any proposed acquisition will be listed in the Open Space Plan.

### List Priority State Forest Parcels specifically in the NYS Open Space Plan

Identify, list and map priority acquisition parcels as specific projects by Unit and/or eco-region in the New York State Open Space Plan.

## "LA" Objectives, Actions and SEQR Analysis

**Land Acquisition (LA) Objective I** – Acquisition of in-holdings and adjoining properties that would reduce management costs and benefit resource protection and public access goals will be prioritized with potential acquisitions listed in UMPs.

**LA Objective II** – Acquisition of the mineral estate will be prioritized wherever it is split from a State Forest tract with potential acquisitions listed in UMPs.

**LA Objective III** – Acquisition of properties within identified matrix forest blocks and LCP corridors will be prioritized with potential acquisitions listed in UMPs.

**LA Action 1** – Work with regional advisory committees to add matrix forest blocks and LCP connectivity as priorities for State Forest acquisition in the NYS Open Space Plan.

**LA Objective IV**—Acquisition of forested lands in underserved areas of the state.

**LA Objective V** – Acquisition of forested lands in areas that are in need of watershed protection.

#### LA SEQR Alternatives Analysis and Thresholds

SEQR analysis for the action of land acquisition by New York State for addition to the State Forest system has been addressed in the 2016 New York State Open Space Conservation Plan and Generic Environmental Impact Statements (GEIS).

# BOUNDARY LINE MAINTENANCE

**Background**

DEC has under its jurisdiction nearly 5 million acres of land and easements, among which are included State Forests, Forest Preserve and other lands managed through the Division of Lands & Forests. Although limited at times by fiscal constraints, the state has a firm commitment and responsibility to protect and manage these resources. State Forests alone have more than 6,500 miles of boundary lines. That's roughly equivalent to the distance from New York State to the southern tip of South America.

Given current staffing levels and the rate at which boundary line markings deteriorate, it will take about 200 years to catch up with the backlog of needed surveys at the rate they are currently being completed. Unfortunately, this backlog will result in additional encroachment issues demanding an even greater level of staff involvement to solve.

**Policy**

DEC places great emphasis on stewardship, with boundary line maintenance being an important and necessary element. It is DEC's responsibility to make all state forest boundaries readily identifiable to the public. Well-marked boundary lines enable the public to use state land more fully, while reducing unintentional trespass. Additional resources are needed to meet stewardship responsibilities.

## PROCEDURE

In an effort to make state boundaries readily identifiable, it is important to keep markings consistent throughout the state and through the various program areas and in line with surveying norms and standards. These standards include the practices of painting and blazing trees along the boundary lines as well as establishing monuments at property corners. Blazing involves the cutting or removal of small patches of a tree's bark under the direction of a licensed land surveyor. These blazes are then painted with yellow paint to enhance visual identification of the actual boundary line.

Boundary lines to be maintained will include all lines where existing evidence of paint and blazes can be readily found. All other lines must be verified or established by DEC's Bureau of Real Property before maintenance can take place. Ideally, it is the goal of the Real Property Supervisor to see that all new state land boundaries are surveyed, monumented, blazed and mapped, so they may be maintained.

A seven- to ten-year maintenance cycle for forest lands should be implemented to ensure that state boundaries remain clearly marked. In certain situations, boundary lines such as those in wetlands and lands in heavily populated areas may require more frequent maintenance as

# BOUNDARY LINE MAINTENANCE

dictated by local conditions. Regular maintenance can reduce the need for costly resurveys, illegal occupancies and encroachments.

### Implementation

Generally, Forest Rangers implemented the boundary maintenance program until the mid-1990s when they assumed a greater law enforcement role. Today, boundary maintenance duties vary greatly from region to region, where functions are shared and overlap between DEC's bureaus of Forest Resource Management and Real Property, and its Division of Operations. Each region knows its needs and resources, and can best set up a customized program for implementing a suitable boundary maintenance program while staying within the 7- to 10-year rotation cycle.

Generally, an annual maintenance schedule or request is set up by either the Division of Operations or the Bureau of Forest Resource Management. Actual maintenance (painting and signing) is carried out by seasonal trail crews from the Division of Operations with the assistance of either the Bureau of Forest Resource Management or Bureau of Real Property. Again, how each region manages its boundary maintenance duties depends on its available resources and growing demands on its staff.

As UMPs are developed, DEC will inventory, monitor, and schedule boundary line maintenance, noting encroachments and areas of special need and attention.

## Impacts of Boundary Line Maintenance

Blazing trees can have a minor and temporary impact on a tree's health. Most blazes are 3-4 inches square, depending on tree size. The size and depth of a standard blaze is intended to minimize long term effects. While it is recognized that the visual impact of painted trees can be viewed negatively by some, it is a cost-effective and necessary practice with no viable alternatives.

## Applicable Laws

Applicable Laws relating to destruction of boundary markers, trespass and timber theft are:

- Education Law Section 7209, Subdivision 9 established by Chapter 730, Laws of 2005.
  Sets penalties for the damaging of monuments and/or boundary markers.
- Environmental Conservation Law (ECL) 9-0303
  Restricts the use of state lands including trees and timber – no cutting, removing, etc.
- ECL 9-1501
  No person shall cut, pull or dig up and remove trees on the lands of another without consent of the owner.
- ECL 71-0703 Penalties
  Establishes fines and civil penalties for violating provisions of Article 9.

- Real Property Actions and Proceedings Law, Section 861
  Consequences for cutting, removing, injuring or destroying trees or timber, and damaging lands.
- Article 145 – Penal Law – Criminal Mischief
  Establishes penalties for intentionally damaging the property of another person.
- ECL 71-0712 Timber theft and trespass education training
  Establishes training programs for courts, district attorneys and law enforcement agencies for control and prosecution of timber theft and trespass.

## "BL" OBJECTIVES, ACTIONS AND SEQR ANALYSIS

**Boundary Line Maintenance (BL) Objective I** – Illegal use of State Forests will be minimized through the regular maintenance of boundary lines.

**BL Action 1** – Implement at least a 7- to 10- year boundary line maintenance cycle for forest lands to ensure that state boundaries remain clearly marked.

**BL Objective II** – Boundary line maintenance will be inventoried and scheduled during UMP development, while noting encroachments and areas of special needs and attention.

**BL SEQR Alternatives Analysis and Thresholds**

The **no-action alternative**, or in other words, continuing with current management approaches, has been selected as the **preferred alternative**.

The alternative of not identifying (painting and marking) boundary lines has not been selected. Even though marked boundary lines have some negative visual impacts, they are necessary for the purpose of resource protection and land management.

**SEQR Analysis Threshold:** Boundary line management approaches established in this section will avoid and minimize potential impacts to the maximum extent practicable and no further SEQRA review will be conducted.

# INFRASTRUCTURE

State Forests are managed with a minimal amount of improvements to accommodate rustic, forest based recreational opportunities while providing for resource protection; public health and safety; and access for individuals of all ability levels. Minimal development is in harmony with the open space and ecological goals of these lands, which are of increasing importance, as the surrounding landscape continues to be subdivided and, in some cases, developed. Intensive recreational use and supporting facilities such as athletic fields, playgrounds, man-made beaches, bath houses and developed campgrounds (with running water and bathroom facilities) are beyond the scope and budget of the Division of Lands and Forests.

Infrastructure development must consider DEC's ability to provide long-term maintenance to meet sustainability mandates. This is the case with all infrastructure development by DEC or VSA (formerly AANR) partners. It is always easier to build new infrastructure than to maintain it. Without careful attention, the level of infrastructure development on a State Forest could potentially reach a level that is disproportionate with multiple uses, ecological goals, and DEC's ability to maintain health and safety, facility quality, or that would displace other uses. For example, trail systems, when developed with the help a of VSA (formerly AANR), have shown the potential to incrementally expand beyond expectations or sustainable levels. It is important at the outset of construction activity, to determine and agree to the appropriate bounds of potential development. In most cases, development of new infrastructure will be considered as part of a UMP to consider the above factors and provide opportunities for public input, and whenever possible should be developed through the UMP process.

## GENERAL INFRASTRUCTURE GUIDELINES

ALL infrastructure projects planned or built on State Forests will be developed in accordance with Best Management Practices (BMPs), including the following:

Use BMPs for the protection of soil and water resources
*(Refer to page 121)*

Avoid areas where habitats of threatened and endangered species are known to exist.
*(Refer to page 135.)*

Consider aesthetic impacts, including use of natural materials to blend structures into the surroundings and wooded buffers to screen structures from view of public roads.
*(Refer to page 149.)*

Apply universal design to incorporate accessibility for people with disabilities;
*(Refer to page 192.)*

# INFRASTRUCTURE

Reduce or eliminate the introduction and spread of invasive species by pressure washing equipment between jobs and re-vegetating areas of exposed soil along roadsides using native plants. *(Refer to page 300.)*

## ROADS

A public forest access road

Early needs for State Forest access roads were for tree planting and forest fire protection, since over one half of the acquired acreage was in grassland or light brush. Early access was primarily via old town roads and former farm lanes. Where these were not sufficient, new roads were constructed by the Civilian Conservation Corps (CCC). In the days of the CCC, labor was not expensive. Large crews of human constructed roads and trails using limited machinery and mainly hand labor. Some of the roads were built extra wide to serve as fire breaks to protect the newly established plantations. Although there were few heavy trucks used at that time, the CCC roads were generally built to a high standard and many still exist today. Decades later, as the plantations and natural forests matured, access to stands was needed for timber stand improvement thinning. New roads were built as needed to do this work. Some of these projects involved and were funded by sales of forest products, which included mostly firewood, pulp and Christmas trees.

### Present Situation

Over the past 20 years recreational use of State Forests has expanded dramatically with new uses like mountain biking and geo-caching added to the list of activities enjoyed on these lands, increasing the need for State Forest access. In addition, as State Forests have matured, management has included additional harvesting activities. These harvests are conducted to enhance forest health, promote biodiversity and to provide jobs and economic stimulus for the local economies. Department standards for road maintenance have also increased commensurately with an increased focus on resource protection and higher standards for harvesting operations as established in DEC Rutting Guidelines and strict Timber Sale contract terms. In addition, ecological impacts, such as forest fragmentation, resulting from road development are considered.

Two types of DEC administered Roads can now be found on State Forests, Public Forest Access Roads and Haul Roads.

- **Public Forest Access Roads (PFARs)** are permanent, unpaved roads which may be designed for all-weather use depending upon their location, surfacing and drainage. These roads were previously referred to as “truck trails.” They provide primary access

for administration and unless restricted by a sign, regulation or law, these roads serve as trails for hiking, cross country skiing, snowmobiling, horseback riding, carriage riding and motor vehicles registered for use on public highways. There are 546 miles of PFAR statewide.

- **Haul Roads** are permanent, unpaved roads that 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 within the State Forest 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.

A haul road on Pochuck Mountain State Forest in Orange County

***Legal Status***

In limited cases, access to state land requires the use of roads with uncertain or unresolved legal status. Examples include: former town roads that are now maintained by DEC as Public Forest Access Roads but have an initial section passing through private land before reaching state land; town roads that were abandoned improperly by the Town (without regard to Chapter 203 of the Laws of 1976); town roads that receive little or no maintenance by the Town; and DEC Public Forest Access Roads that also serve as the only access to private parcels. These issues will be researched on a case-by-case basis, as part of the UMP process.

***Trends***

Towns are also being heavily impacted by shrinking budgets and continue to abandon or stop maintenance on roads used to access state land, or post roads against use by heavy trucks. The demand for forest access continues to increase. As some of DEC's constituents age, roads are increasingly important for providing access for hunting, fishing, and trapping. Existing roads and trails will need to be upgraded to a higher standard that will be safer and easier to maintain. New access roads will be needed to replace those not up to standards or that cannot be fixed at a reasonable cost. Some roads were built in a poor location and will need to be rebuilt using up-to-date standards. Roads should be moved out of riparian areas whenever possible and the old road-bed should be restored to a natural condition. However most new road construction and major upgrades of existing forest roads must be done as sale-related work to the extent possible. Maintenance and improvement work on existing forest roads done by DEC Operations will continue to lag behind. Many access roads on State lands need new culverts and gravel. These issues will be discussed in more detail at the individual UMP level.

# INFRASTRUCTURE

## Potential Impacts of Road Establishment and Use

Properly constructed and maintained roads actually mitigate impacts by concentrating and redirecting uses to the least sensitive areas and by properly preparing those areas to support such use. However, there are aspects of road establishment and use which have the potential for negative environmental and ecological impacts. These impacts, along with mitigation measures, are listed here:

- Road construction can create forest fragmentation in the form of edge effect, bringing in predatory species when they are unwanted. They can also create barriers for some species of amphibians, reptiles, and stream based aquatic species. These impacts can be mitigated by maintaining narrow road corridors instead of providing wide mowed shoulders. This is not possible in all cases. Heavily used roads must have good sight distances to prevent accidents and need to be "daylighted" to maintain a hard dry surface (to prevent erosion). Heavily used roads are usually those which serve popular recreational destinations, or which are "through roads" which provide connectivity with other public road systems.
- Roads can provide a vector for the establishment and spread of invasive species like garlic mustard or chervil. This can be mitigated by using the guidelines established under the invasive species section of this plan.
- Roads can negatively impact aesthetics. This can be mitigated by design considerations like meandering the road course. An added benefit of this approach is the tendency for people to travel slower on a curvy road.
- Roads can increase public use of an area. While this is preferable in many locations there are instances where lower public use would decrease the impacts on sensitive areas. This will be addressed at the UMP level.

Road construction on Turkey Point State Forest in Ulster County

## Road Management Guidelines

Permanent access may be established for public use, forest management and silvicultural operations, forest protection, and emergency management. Stand procedure regarding forest roads shall be as follows:

- All roads will be planned, designed and constructed in a sound manner to avoid or minimize unnecessary degradation of natural resources, providing the service needed and at a justifiable cost, with minimal negative impacts to the environment. The Best Management Practices outlined in Chapter 3 will be incorporated into all road planning, design and construction.

- Roads will be operated in accordance with Vehicle and Traffic Laws, Public Highway Laws and 6 NYCRR Part 190.

ADDITIONAL RESOURCES

**DEC Unpaved Forest Road Handbook** – August 19, 2008. Available at http://www.dec.ny.gov/docs/lands_forests_pdf/sfunpavedroad.pdf

**New York State Forestry; Best Management Practices for Water Quality BMP Field Guide** – 2018. Contains additional information to guide planning, design and construction activities. Available at www.dec.ny.gov/lands/37845.html

**Rutting Guidelines for Timber Harvests and TRPs on State Forests** – May 2008. Developed by DEC Bureau of Forest Resource Management. Also available at http://www.dec.ny.gov/docs/lands_forests_pdf/ruttingguidelines.pdf

**USDA Forest Service Handbook for Eastern Timber Harvesting** – Provides additional road building guidance at https://www.fs.fed.us/forestmanagement/products/measurement/handbooks.shtml

## POINTS OF ACCESS

Rock barrier on Morrow Mountain State Forest in Madison County

Points of access, where roads and trails border State Forest lands, provide valuable locations for providing information and orienting visitors. Visitors receive their first impression of the area from the nature and condition of the trailhead/parking facility. For highway travelers, trailheads and/or parking areas are often the only indication that they are passing through public lands. Access points also provide trailhead registration data that can be utilized in quantifying the public's use of a particular area, and for providing crucial information that may assist in search and rescue operations. Parking lots enhance public safety at popular areas, as the shoulders of rural town roads are seldom adequate to accommodate parked cars. Environmental impacts of access points are similar to the impacts of roads.

## INFRASTRUCTURE

**Point of Access Guidelines**

- Locate parking lots roadside. While aesthetic goals would be enhanced by screening parking lots from the road, this is not an acceptable solution in most cases due to security issues and the goal to reduce forest fragmentation.
- Use natural material barriers such as logs and boulders whenever practical.
- Provide combined signage to provide necessary information along with a trail register where needed, following the signage guidelines below.

### DIRECTIONAL AND INFORMATIONAL SIGNS

DEC produces and posts a variety of signs that provide information about regulations, recommendations, directions and distances to destinations, and resource conditions. These signs are posted at trailheads as well as interior locations.

Designated trails on state forests are identified with trail markers. State forests with designated trail systems may have brochures and maps at the trailheads. The brochures typically describe appropriate trail activities and trail etiquette and give a brief description of the history and features of the state forest. Most state forests have at least one 48" x 25" identification sign at or near a main entrance location. This large sign lists the name of the forest and acreage. Smaller 8" x 11" “State Forest” signs are also placed along roadsides and property lines. These signs identify the area as state forest land.

Signs restricting or prohibiting certain activities are posted at key locations, however the present information available to the public about rules and regulations is often inadequate. A few state forests have kiosks* that provide additional information. Signs are occasionally placed on state forests to describe natural features or forestry activities. Self-guided interpretive trail systems are present on some State Forests. Several have a self-guided interpretive auto tour that describes the history, natural features and forestry practices of the state forest area.

#### Signage Guidelines

To maintain a consistent and recognizable appearance, the dimensions, materials, colors, and wording of DEC signs will be standardized. To ensure the public’s ability to locate the State Forest lands and facilities easily, the following guidelines will apply to the design and erection of signs:

- All roadside directional signs, trailhead identification signs and interior guide boards will be made of wood and will be brown with yellow lettering.
- Informational “posters” may be made of metal or plastic and generally will be brown with yellow lettering, although other unobtrusive color combinations may be used, such as yellow or white with dark green lettering, or white with black lettering. Posters or