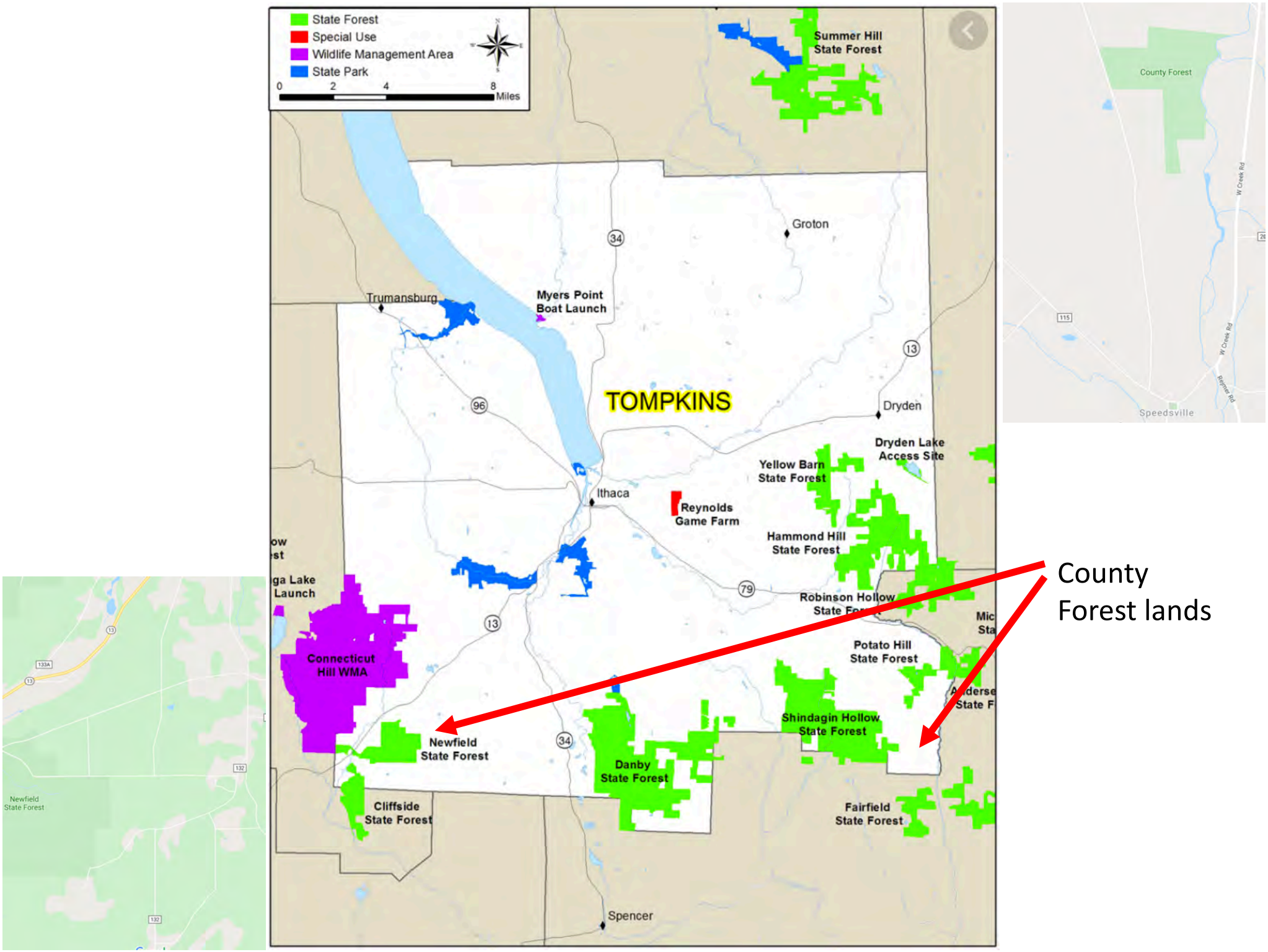
EVALUATION OF OPTIONS FOR THE POTENTIAL MANAGEMENT OF THE TOMPKINS COUNTY FORESTS

Draft 12-10-2019

Unique Natural Areas Committee
of the Tompkins County Environmental
Management Council

Allmon et al. 2019. “Smith Woods: The Environmental History of an Old Growth Forest in Central New York State”


State Forest
Special Use
Wildlife Management Area
State Park
0 2 4 8 Miles
Summer Hill State Forest
Groton
Trumansburg
Myers Point Boat Launch
TOMPKINS
Dryden
Dryden Lake Access Site
Yellow Barn State Forest
Ithaca
Reynolds Game Farm
Hammond Hill State Forest
Robinson Hollow State For
Potato Hill State Forest
Shindagin Hollow State Forest
Connecticut Hill WMA
Newfield State Forest
Danby State Forest
Cliffside State Forest
Fairfield State Forest
Spencer
County Forest
Speedsville
Newfield State Forest
County Forest lands

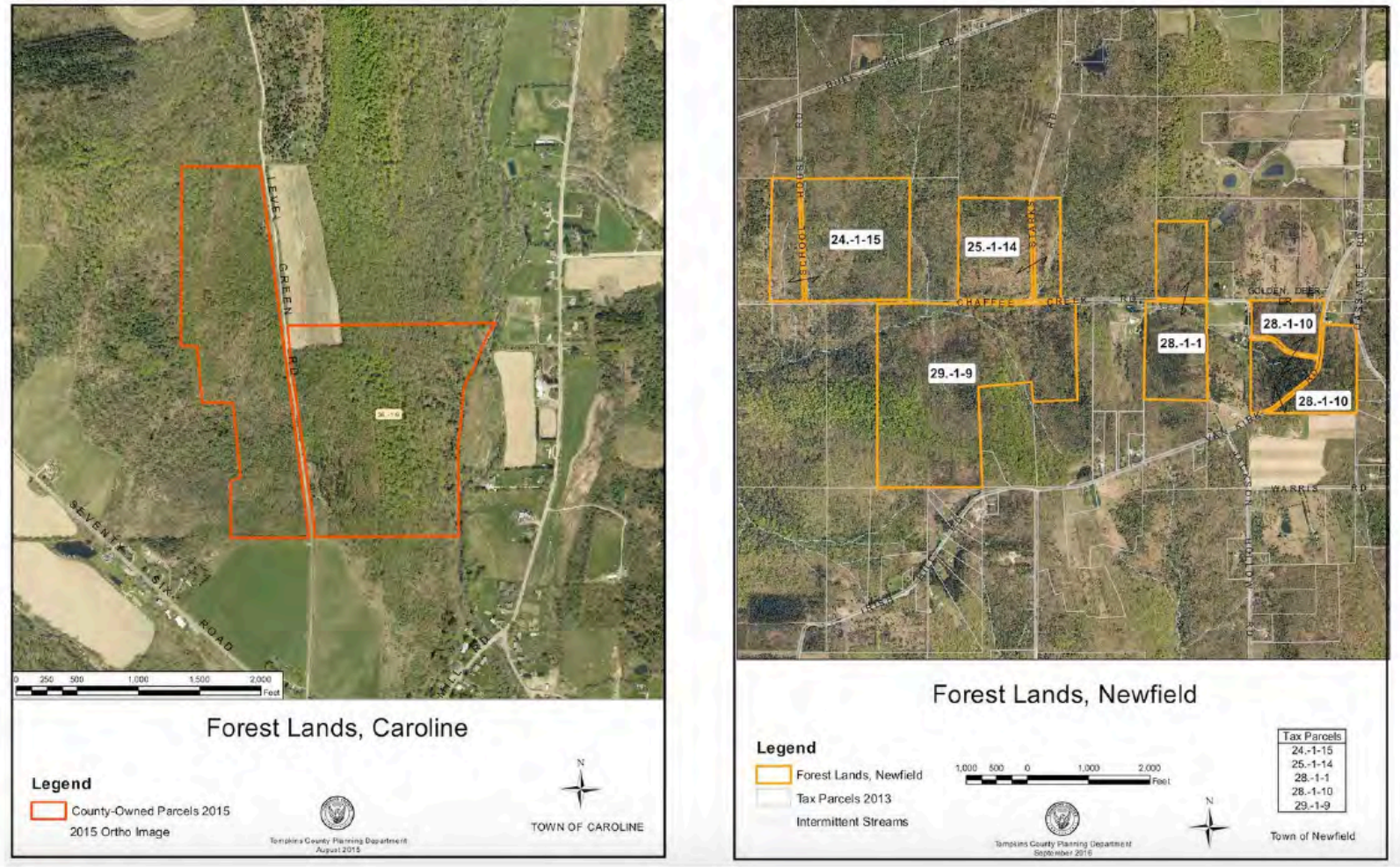


Figure 1. The general outlines of the forest lands in Caroline (left) and Newfield (right).

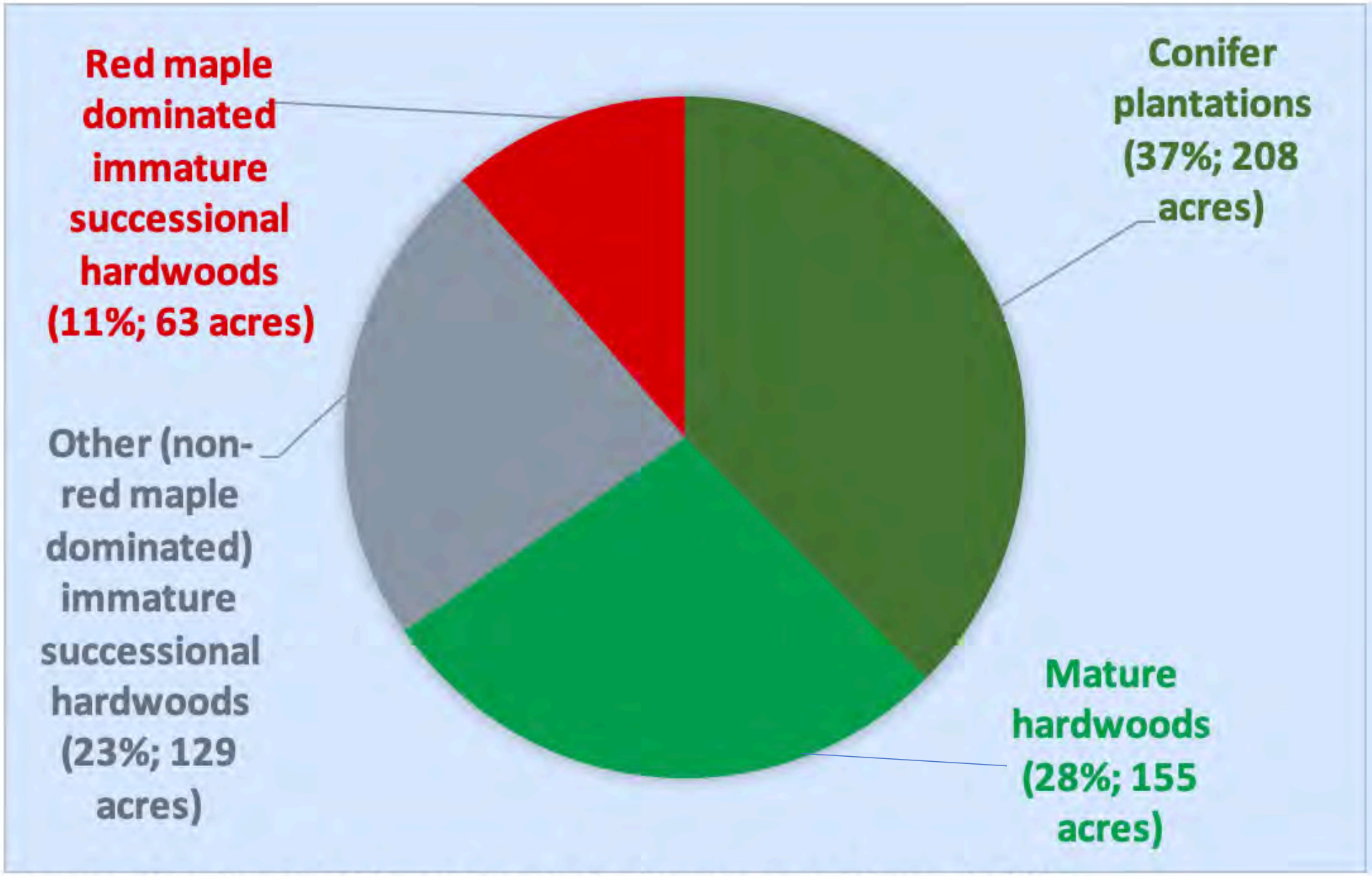
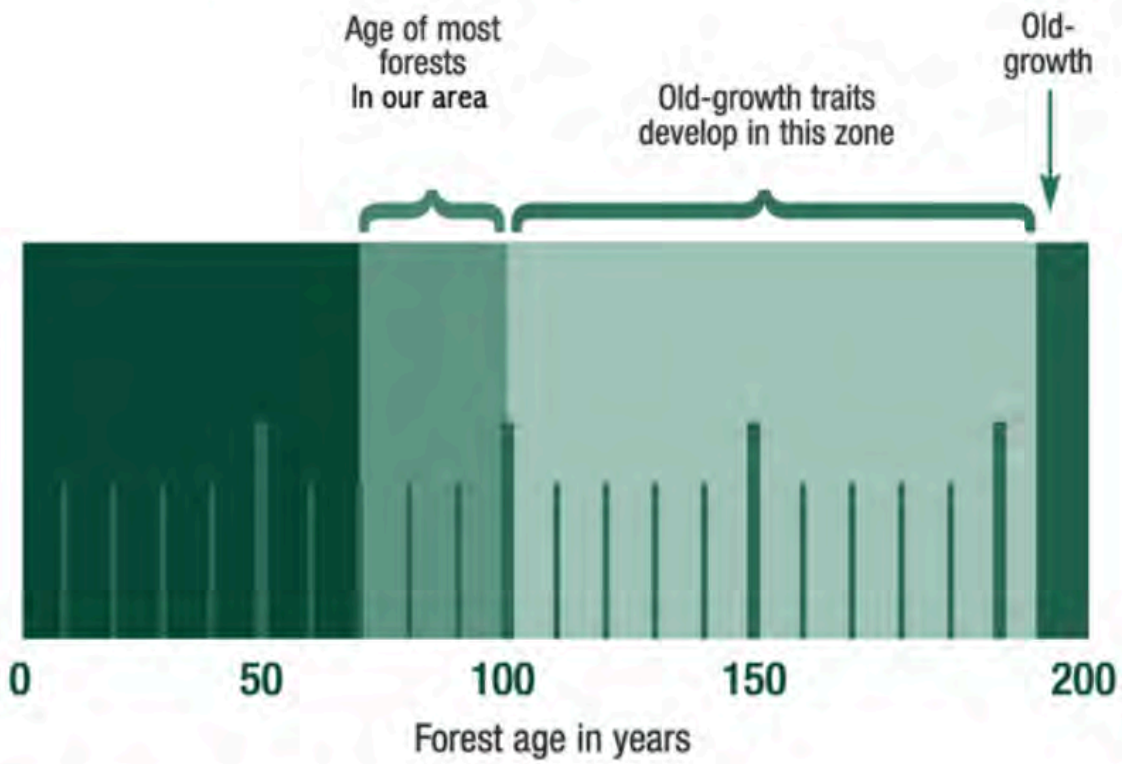


Figure 4. Distribution of forest types in the County-owned forests in 2007.

Timeline of Old-Growth Structural Development



adapted from Hagan and Whitman (2004)

In our forests, it takes at least 200 years for the full suite of old-growth structures to develop. Because most of our forests are 70 to 100 years old, very little old-growth structure is currently present in our region. Both passive and active management approaches can ensure the development of these structures. The opportunity exists to shorten the time it takes to create old-growth characteristics by using forest management (see Table 1, page 9).

Restoring old-growth characteristics. D'Amato, A., and Catanzaro,

2006

Age class
Seedling-sapling (1-15 yrs)
Small pole (15-30 yrs)
Large pole (30-60 yrs)
Mature even-aged (60-100 yrs)
Old even-aged (100-150 yrs)
Transitional uneven (150-300 yrs)
Old uneven-aged (300+ yrs)

https://extension.unh.edu/resources/files/Resource006914_Rep9973.pdf

Expected % of landscape occupied by different age classes based on historic disturbance rates.

Northern hardwood dynamics

Expected % of landscape occupied by different age classes based on average, historic disturbance rates (Lorimer and White 2003)

Age class	500-year Rotation (Fire 1000 yrs, Wind 1000 yrs)	1364-year Rotation (Fire 3000 yrs, Wind 2500 yrs)
Seedling-sapling (1-15 yrs)	3.0	1.1
Small pole (15-30 yrs)	3.0	1.1
Large pole (30-60 yrs)	6.0	2.2
Mature even-aged (60-100 yrs)	8.0	2.9
Old even-aged (100-150 yrs)	10.0	3.7
Transitional uneven (150-300 yrs)	30.0	11.0
Old uneven-aged (300+ yrs)	40.0	78.0

- Lowest frequency of stand-replacing disturbance of any northeast forest type
- Average rotation periods of 1000-3000 yrs for stand-replacing wind and fire

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Our much higher disturbance rate: agriculture → 80%

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- Average rotation periods of 1000-3000 yrs for stand-replacing wind and fire

https://extension.unh.edu/resources/files/Resource006914_Rep9973.pdf

Northern hardwood management options.

- Without any management, forests on these sites would be expected to **slowly develop into northern hardwood stands**.
  - The question is ”**how fast**”
  - Even the mature stands are even-aged, within 20 years of each other.
  - Given the poor soils, it will take a long time for these stands to develop into an uneven age with older growth characteristics.

- The longer that the forest remains **even-aged and even-tree-sized**:
  - the lower the diversity will remain,
  - the more vulnerable the forest will be to insect and pathogen attack,
  - the more vulnerable the forest will be to climate change effects.

Northern hardwood management options.

- By **actively removing some canopy trees** (felling them in place or logging), the growth of the remaining trees toward large size **could be accelerated**.

  - Making gaps in the canopy would create a diversity of of light-gap opportunities for **diverse trees to become established,**

  - This would also promote a **diversity of herbaceous plants and animals.**

  - This would lead to **greater carbon sequestration**.

Not managing these stands will still allow them to develop into northern hardwood uneven aged forests, but very slowly and at some risk.

About those conifer plantations:

- These stands are at the age when they fall apart (lots of tree death, tree falls, etc.).
- Did not provide a good nursery environment for northern hardwood species underneath the canopy.
- Insufficient understory to develop into a mature northern hardwood forest quickly.
- Continue to acidify soil with their needles.
- Slow development of species diversity.
- Boom and bust cycles
- More susceptible to disease epidemics and insect outbreaks.
    - ➢ both pathogens and insects finding tree conditions to their liking for invasion spread rapidly to neighboring trees with similar conditions.

Biomass (= 2x carbon) in red pine plantations of New York.

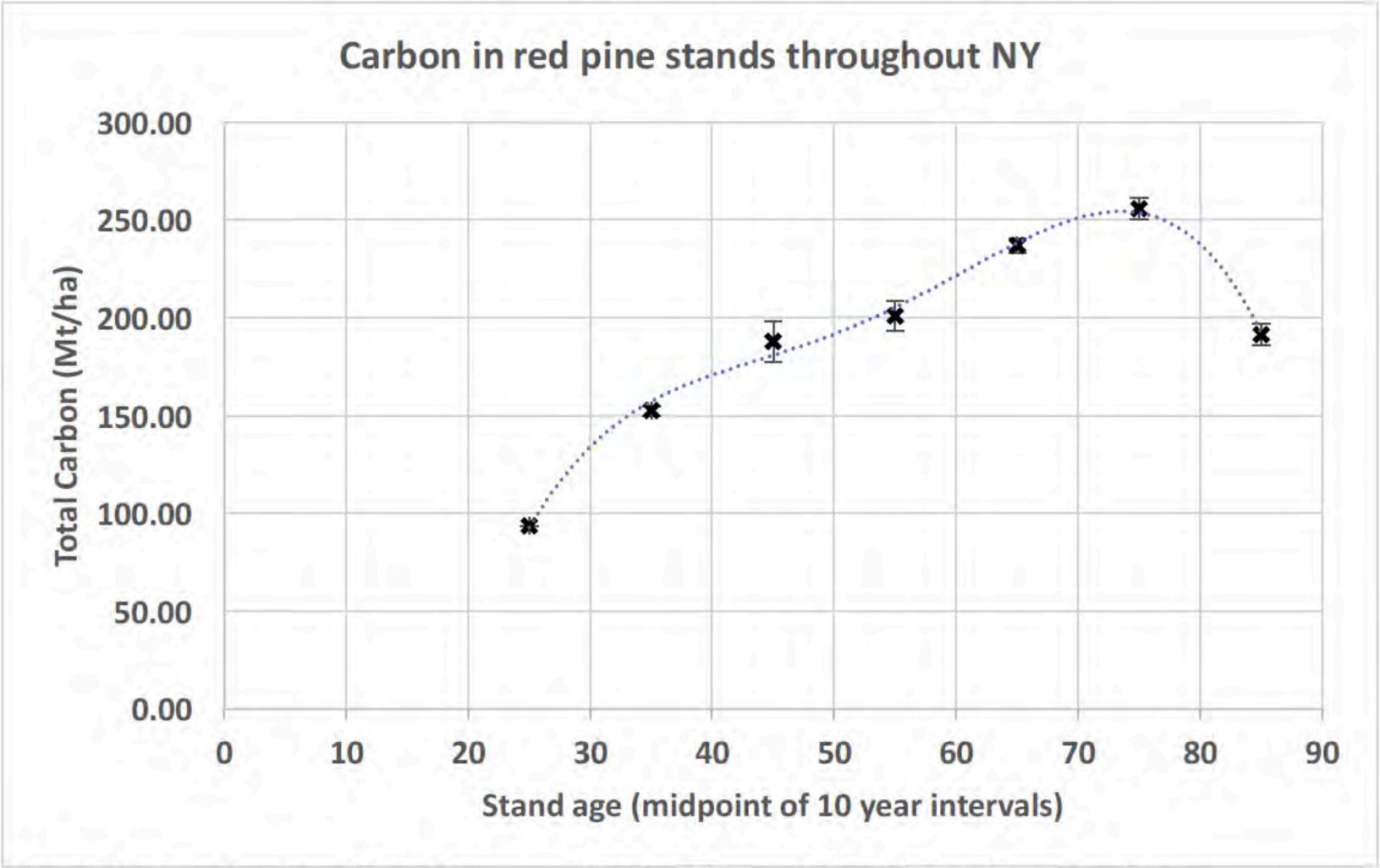


Figure 22. Total carbon (directly proportional to biomass) in red pine plantation forests throughout New York (from the US Forest Service Continuous Inventory Analysis data).

Conifer plantation management options:

- For these reasons, the conifer plantations, may be strongly considered for the types of **plantation management** outlined in both the 2007 and 2018 reports.

  - Because of the low value of this timber (190,000 board feet that would raise $15,000 to $20,000), a reasonable alternative to logging might be to pay to **actively directionally fell the plantation trees**, leaving the understory trees as untouched as possible.

  - The network of downed trees that would be created would greatly **discourage deer** from reaching and destroying the current and future seedlings.

Why do we want more old growth?

Old Growth structural characteristics

- High diversity of **tree sizes and ages**
- High number of **large standing dead trees**
- High number and volume of **downed logs and snags**
- High number of **large living trees**
- Between **25 to 50 percent** of the canopy trees are large ‘legacy’ trees

Other older-growth properties that enhance biodiversity

- A broad range of sizes of fallen logs
- Heartwood-decayed trees
- Canopy gaps both large and small
- Complex pit and mound forest floor that enhances herbaceous diversity.
- Multiple leaf canopy layers
- Soils with a thick humus layer.
- A well-developed herbaceous layer.
- An abundance of fungi

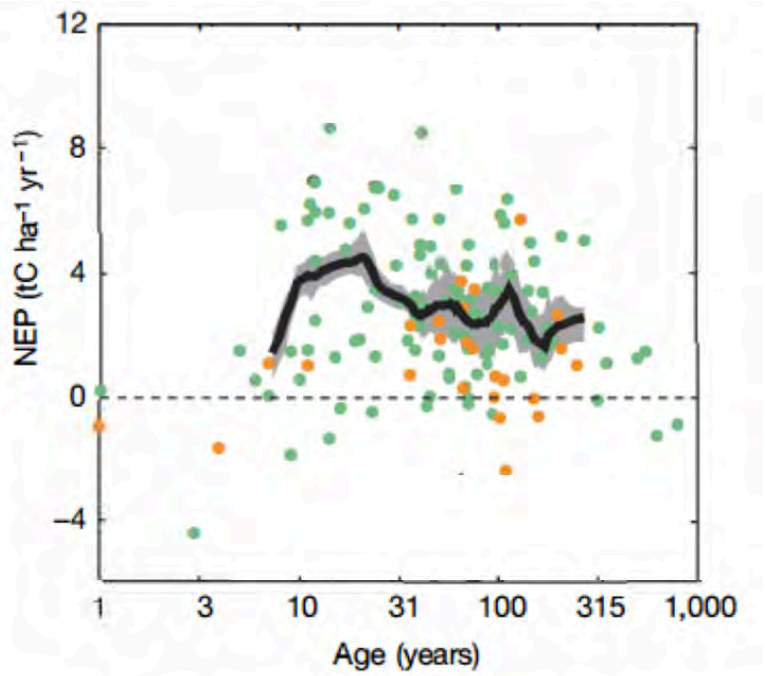
How do we get more old growth?

Old Growth structural characteristic	Management practice that promotes this characteristic
Increase the diversity of tree sizes and ages	Harvest single trees or small groups of trees, creating gaps up to ¼ acre; repeat
Increase the number of large standing dead trees	Girdle selected mid to large trees, leave standing
Increase number and volume of downed logs	Fell and leave on the ground selected mid to large trees.
Provide for future snags and downed logs	Reserve permanent legacy trees
Increase the number of large living trees (between 25 to 50 percent of your canopy trees as legacies)	Thin woods by removing competing low-quality trees adjacent to largest, most vigorous trees
	Restoring old-growth characteristics. D'Amato, A., and Catanzaro, P. Univ of Mass Extension Adapted from Keeton 2005

Table 9. Methods to promote old-growth characteristics.

Effects on carbon sequestration?

- The carbon accumulation rate peaks in early mature forests, then **slowly declines** with stand age.



- Low-intensity selective harvesting causes carbon to **accumulate at faster rates** after the first few decades following logging.

- Soil carbon content recovers in 20 years following logging.

How do we keep deer in check?

- Create physical impediments that cause the deer to want to avoid the area for their own health, and
- Overwhelm the deer with so many seedlings that they are unable to eat all of them.

- These could be accomplished through:
  - Manually directionally felling trees, and/or
  - Increasing light into the canopy through selective harvesting.

Remove all the ash trees before the borer decimates them?

- Elimination is unlikely to slow the spread of the insect and its damage.
- Some revenue can be produced from a harvest of these trees.
  - Removal of 564 mature white ash, (+ 300 other hardwood trees; 140,000 board feet) would yield $40,000-$50,000.
- However,
  - Identify possible resistant trees?
  - Excellent location for trial releases of borer predators and pathogens?

Would tree thinning and removal increase the establishment of invasive species?

- Low intensity selective harvesting is unlikely greatly increase the successful invasion of non-native tree and shrub plant species
  - as long as at least 50% of the tree canopy remained.

Would tree thinning and removal lead to scarring of the forest?

- Paths are created on which logs have been dragged out of the forest.
  - ➢ It is certainly desirable to avoid making permanent paths.
- Modern logging operations can minimize their impact by requiring loggers to follow the best management practices with particular attention to minimizing skid-rows, logging trails, etc.
- Following these prescriptions can ensure that permanent disruption of the forest floor can be avoided.

Two overriding principals for adapting to climate change:

1. Continuity

- Make provisions for continuity in forest structure, function, and biota.
  - Create regeneration safe sites (a diversity of understory light environments, different stages of decomposing dead wood),
  - Create micro-refugia for sensitive taxa, and conserving the genetic diversity.

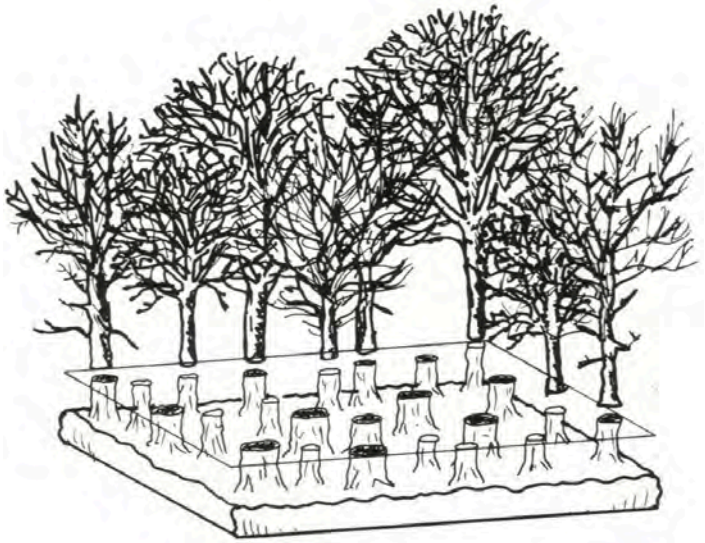
2. Complexity

- Create and maintain structural and compositional complexity and biological diversity, through silvicultural treatments when necessary.
- Reduce the vulnerability to disturbance through a diversity of species abundances,
  - Increase the stress-tolerance range with a mixture of tree sizes/ages,
  - Increase resource availability, and
  - Increase heterogeneity in microsites for new species.

Options and ways to meet different objectives: stands in which treatment might be positive.

					Management objectives					
Stand #	Acres (yellow=> 20)	Vegetation type (light red=red pine-dominated)	Recommendation 2007	Harvest recommendation in 2018 report	1. Develop northern hardwood older growth characteristics slowly thru no management	2. Develop older growth characteristics faster thru limited selectve harvesting	3. Limit damage caused by logging	4. Convert from even-aged to uneven-aged	5. Obtain maximum revenue	6. Manage for sustainable yield; even-aged; invasives?
1	54.8	Red pine with limited shade-tolerant understory except in blow down areas	No treatment - regenerate to hardwoods (Wait 5 years and evaluate for commercial thinning or regeneration cut to convert to hardwoods.)	No action planned	Insufficient understory for natural regeneration except for blow down areas	Directionally fell red pine, leave in forest for deer protection. Patchiness already developing	Directionally fell red pine, leave in forest	Harvest red pine; concern over invasives establishing	Harvest red pine	Remove red pine for maple growth

Stand	Vegetation type	Acres	Basal areas in whole stands and by species, ft2/acre						
	Red pine with limited shade-tolerant hardwood understory		Total	Red Pine	Red Maple	Sugar Maple	White Ash	Black Cherry	Northern Red Oak
1		54.8							
			96.0	75.8	6.7	5.8	5.8	1.0	1.0



Options and ways to meet different objectives: stands in which treatment might be negative.

					Management objectives					
Stand #	Acres (yellow=> 20)	Vegetation type (light red=red pine-dominated)	Recommendation 2007	Harvest recommendation in 2018 report	1. Develop northern hardwood older growth characteristics slowly thru no management	2. Develop older growth characteristics faster thru limited selectve harvesting	3. Limit damage caused by logging	4. Convert from even-aged to uneven-aged	5. Obtain maximum revenue	6. Manage for sustainable yield
12	9.5	Maturing red oak - red maple - white oak dominated	No treatment until 2014 when the stand is projected to be overstocked. Healthy stand that has been previously thinned.	**Remove declining and/or unsounc growth trees**	Let nature take its course; this will quickly become an impressive oak stand.	Remove some oaks and red maples to provide light for remaining oaks	Strict adherence to best practices will be needed to avoid damage to understory and rutting of soil.	Already developing toward uneven age.	Probably the most $ valuable stand with oak removal	Remove some oaks and red maples to provide light for remaining oaks

Stand	Vegetation type	Acres	Basal areas in whole stands and by species, ft2/acre							
			Total	Red Maple	Northern Red Oak	White Oak	Chestnut Oak	Yellow Birch	Quaking Aspen	Beech
12	Mature oak dominated	9.5								
	Harvest ash, UGS, declining		107.0	26.8	26.8	20.3	12.8	6.4	6.4	6.4

Questions outside the scope of this analysis

There are, of course, many questions that could not be answered as part of this evaluation. Among these questions are the following:

1. What properties to we want these forests to have?

2. How much opportunity will there be to use these forests for education and/or recreation?

3. If we remove trees, can we make sure the wood is used by local communities who need it?

4. Should we also include afforestation (planting new trees in abandoned farm fields) in our plan?

5. Is the revenue that would be obtained from harvesting trees sufficient to pay for the management actions associated with different options.

These questions involve policy decisions that are best left up to the legislature.

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Discussion?

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