Forest stewardship in southern New England natural areas – applying history, science, and values
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Outline

1. A brief ecological history of southern New England (SNE)

2. some of the important ecological and forest conservation issues in SNE
   i. forest fragmentation
   ii. deer and forests
   iii. non-native species
   iv. missing old growth forests
   v. decline of early successional habitats
   vi. wildlands vs. managed woodlands

3. stewardship and management: applying values informed by history and science
Part 1. History
Fossil pollen from lake sediments reveals the structure and composition of past landscapes

Black Pond - Pollen Diagram
Past Two Thousand Years

Grass

Ragweed

Oak

Charcoal

Years before present

(Pollen %)

(Influx)

DR Foster 2017. A meeting of land and sea
“When the Pilgrims came to this continent, New England was covered by forest interrupted only where lakes or bogs and river swamps made tree growth impossible; where sand deposits near the coast were unsuitable for closed stands; where fire or windfall had temporarily destroyed the forest; where Indians had burned the forest (especially near the coast); and where rock outcrops occurred in the more rugged sections.” (E. Lucy Braun 1950)
From forest to farm field (1620-1870)

Forest cover (% of state or region)

New England Population (see right-hand axis)

Year

1600

1850

Harvard Forest dioramas
Changes in wildlife populations with changes in vegetation structure
Farm abandonment and successional woodlands (1870-1925)

95% of Litchfield County Connecticut forests were less than 40 years old in 1909.
The great rewilding (1870-1980)
Arrival and spread of Eurasian ornamental shrubs

- Japanese Barberry
- Oriental Bittersweet
- Multi-flora Rose
- Winged Euonymus
- Olives
- Honeysuckles
- Buckthorns
## Arrival and spread of Eurasian forest insects and diseases

<table>
<thead>
<tr>
<th>Insect/Disease</th>
<th>Arrival Date in CT</th>
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</thead>
<tbody>
<tr>
<td>Gypsy Moth</td>
<td>1904</td>
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<tr>
<td>Chestnut Blight</td>
<td>1910</td>
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<tr>
<td>White Pine Blister Rust</td>
<td>1914</td>
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<tr>
<td>Dutch Elm Disease</td>
<td>1930</td>
</tr>
<tr>
<td>Beech Bark Disease</td>
<td>1932</td>
</tr>
<tr>
<td>Hemlock Wooly Adelgid</td>
<td>1985</td>
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</tbody>
</table>
The loss of American chestnut
Change in forest composition

White oak = 33%
Chestnut = 10%
Red maple = 3%

White oak = 5%
Chestnut = 0
Red maple = 33%

Pre-Colonial Forest

Modern Forest

Thompson et al. 2013
Loss of old growth forest

Greeley 1925
Second (hard) deforestation (1980-present)

- Since 1985 – almost a million acres of forest lost to development
- in NE (over 25,000 acres per year).
Part 2. Some of the major topics of forest ecology and conservation in SNE today
i. Effects of forest fragmentation on wildlife and people

- 25 forest songbirds less abundant in small, isolated patches of forest compared to larger forest blocks
- Greater abundance of edge species (raccoons, opossums, crows, cowbirds)
- 7 of 11 turtle species in Massachusetts are globally threatened or endangered
- Higher Lyme disease risk – (greater densities of infected deer ticks)
ii. Deer and forests
Browsing effects are often complex and not unilaterally negative

2008
- Tree regeneration density and height
- Forest succession

2014
- Herb and low shrub diversity

Faison et al. 2016
iii. Non-native organisms ("exotics" or "invasives")
How prevalent are exotic plants in southern New England forests?

Trees:
only 1 of every 200 trees (0.5%) in SNE forests are exotic species

Shrubs and herbs:
Almost 50% of US Forest Service inventory plots in the northeast have exotic invasive plants

USDA Forest Service Data 2010-2015; Oswalt et al. 2012
Impact of exotic plants on native plants: depends on density

Dense barberry
- native plant richness
- tree regeneration

Low-moderate density barberry
- no effect on native plant richness

Dense Rhododendron = 6 native plant species
tree regeneration low

Low density Rhododendron = 26 native plant species
Tree regeneration high

(Baker and Van Lear 1998 Forest Ecology and Management; Flinn 2014 Journal of the Torrey Botanical Society)
Do exotic shrubs provide inferior nesting habitat for birds compared to native shrubs? **Yes and No**

- Barberry:
  - provided greater refuge from nest predators during rodent outbreak than other shrubs
  - Veery used more than any other nest substrate in eastern NY

- Common yellowthroat territory sizes increased as invasive shrub cover increased

Fickenscher et al. 2014 *Forest Ecology and Management*; Schmidt et al. 2005 *Ecological Applications*
iv. Missing benefits of old growth forest

>200 years old

~0.04% of forested land in Massachusetts is old growth.

Organisms of limited mobility

Lichens - large number of species restricted to old growth

Forest herbs – generally much higher abundance and diversity (ant and gravity dispersed)

Salamanders - Clearcutting old forest can result in 80% reduction in salamander populations – can take ~ 70 years for populations to recover

Carbon - Store 30% more carbon than 2nd growth forests
“As their eyes became used to the dimness they could see a little way to either side in a sort of darkened green glimmer. Occasionally a slender beam of sun that had the luck to slip in through some opening in the leaves far above...stabbed down thin and bright before them. But this was seldom, and it soon ceased altogether.” JRR Tolkien The Hobbit
Bialowieza, one of Europe’s last virgin forests © Tomasz Wilk

McCarthy 1995
Old growth openings and bird habitat

"Eventually, as beavers return to more regions in the eastern forest and as the forests age and produce more large canopy gaps, natural processes may provide much of the habitat needed by shrubland birds." Dr. Robert Askins
v. Decline of “early successional” habitats
Grassland and shrubland birds are generally in decline

“Very local and strongly declining”

Data, maps, and art from Massachusetts Audubon Breeding Bird Atlas
Many forest birds on the other hand are increasing

“Very local and strongly increasing”

1979

“Widespread and strongly increasing”

(Data, maps, and art from Massachusetts Audubon Breeding Bird Atlas)
Forests continue to grow bigger in Southern New England

Large trees (>70 cm dia.) per acre

93% increase

Live tree weight (tons/per acre)

65% increase

US Forest Service FIA data
Rare plant populations in New England have increased in forests but declined in open habitats over past 15 years*

*Overall, the numbers of reported occurrences for rare plants increased for 118 taxa and declined for 40 taxa

Eastern silver aster

© Kathy Schlosser

Gerke et al. (2014) Rhodora
vi. Wildlands (wilderness areas) vs. woodlands in New England
Wildlands (wilderness areas) are rare in New England

~2 percent of New England is designated wilderness
Timber harvesting is a larger cause of tree mortality in the region than all other sources combined

Wood products: about 25% of New England’s wood comes from local sources; Habitat: canopy gaps for early successional species
Part 3. Forest stewardship: applying values informed by history and science
Establishing conservation priorities for a natural area: you can’t satisfy all values.

Value 1 - manage as a wildlands preserve ("wildwood") where people can enjoy a forest largely undisturbed by human activity

Value 2 - manage the preserve to support a maximum of biodiversity
The landscape context in which a natural area sits might determine your conservation priorities.
Ecological monitoring: knowing what’s on your preserve so you can make more informed decisions

- Invasive plants
- Wildlife movement
- Rare reptile
- Birds
- Coarse woody debris
- Deer population estimates
Forest monitoring:
Photopoints

2009

2015
Forest insects and pathogens: to manage or not?

You can protect some residual trees by removing diseased trees

But consider:

Removing diseased trees will:
(1) reduce habitat for woodpeckers and other cavity nesters, as well as numerous insects
(2) reduce coarse woody debris and den habitat on ground
(3) Increase soil disturbance - can increase erosion, facilitate non-native species colonization, modify hydrology.
Invasive plant species: to manage or not?

But consider:

Are there alternative nesting sites for shrub nesting birds and escape cover for New England cottontails?

Do you have the resources to initiate a long-term, intensive ‘gardening’ project?
Early successional species in decline: manage for or not? (i.e. by opening up forest patches)

- New England cottontail is globally “vulnerable” and endemic to our region

But consider:

- Many species likely occurred at low densities in the pre-European SNE landscape (or were absent altogether) ... and increased only after European land clearance and farm abandonment

- Many species have ranges that are much larger than SNE (except NE Cottontail!)

Yellow-breasted chat
Connecticut DEP: “endangered”
Is ‘let nature take its course’ (no mgmt. at all) an acceptable management option?  **YES**

- Forestry values (e.g., diversity of stand ages, tree regeneration levels, tree stocking levels) that advocate active timber mgmt. often differ from values associated with managing a natural area

- You can’t be faulted for allowing the vegetation to self-organize – (it has always done so in our absence)

- Most efficient use of limited resources is not to oppose the self organization of the vegetation

- many species and people will benefit (others will not)
The choice is yours...
Managing for climate change – TNC’s resilient landscapes

• areas best able to support plants and animals in a changing climate

sum of two variables:
1. diversity of topography and range of elevation

2. local connectedness to other undeveloped land
Recent uptick in timber harvesting (patch cuts) in SNE to provide habitat for New England cottontail
Impact of forest pests and pathogens: Hemlock Woolly Adelgid

Hemlock trees in SNE

Trees per acre

55% increase

1985
2013

USDA Forest Inventory Data

Counts with established HWA populations 2012

Note: This map shows counties with established HWA populations. The map data is from the United States Department of Agriculture, Forest Service, Northeastern Research Station.