

An Ecological Approach to Forest Stewardship

Session 2: Threats to Northeast Forests



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Session 2: Threats to Northeast Forests

- Impacts of development, habitat loss, and fragmentation
- The changing composition of our forests due to invasive plants, pests, and pathogens
- Deer impacts on our forest communities
- Doing nothing is doing something



Natural Disturbances



Fire



Flooding and Erosion

Windthrow

Ice Damage

“Land health is the capacity for self-renewal in the soils, waters, plants and animals that collectively comprise the land.” ~Aldo Leopold~



Human-caused Disturbances



Impervious Surfaces

Landform Changes



Pollution

Unsustainable Forestry Practices



**“Our tools are better than we are,
and grow better faster than we do.
They suffice to crack the atom, to
command the tides, but they do not
suffice for the oldest task in human
history: to live on a piece of land
without spoiling it.” ~Aldo Leopold~**



Whenever there is a change to an ecosystem...

some species will benefit a lot

others will benefit a little

some will be harmed a little

others will be harmed a lot



Ecological Trade-offs

WINNERS



LOSERS



Beaver Dam

some species will benefit



others will be harmed





Fragmentation

some species will benefit



others will be harmed

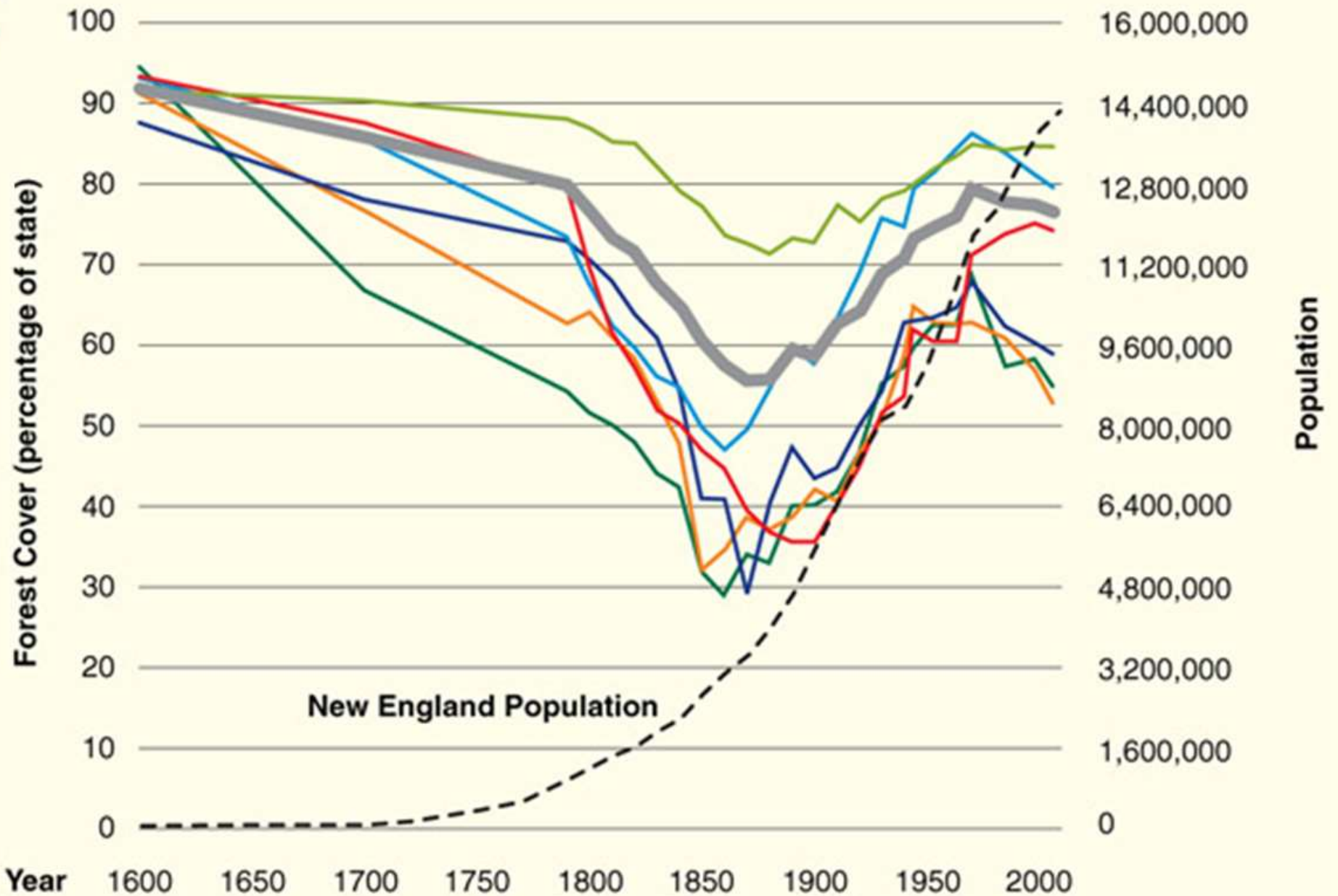


Fragmentation



New England Forest Cover and Human Population

- Connecticut
- Maine
- Massachusetts
- New Hampshire
- Rhode Island
- Vermont
- All New England (% of all six states)



Foster, D.R., B.M. Donahue, D.B. Kittredge, K.F. Lambert, M.L. Hunter, B.R. Hall, L.C. Irland, R.J. Lillieholm, D.A. Orwig, A.W. D'Amato, E.A. Colburn, J.R. Thompson, J.N. Levitt, A.M. Ellison, W.S. Keeton, J.D. Aber, C.V. Cogbill, C.T. Driscoll, T.J. Fahey, and C.M. Hart. 2010. *Wildlands and Woodlands: A Vision for the New England Landscape*. Harvard Forest, dist. by Harvard University Press, Cambridge, Massachusetts. 36pp.



Fragmentation



**Habitat
Loss**



**Loss of
Connectivity**

Some species thrive in fragmented ecosystems



- Increased habitat
- Increased food availability
- Lack of predators

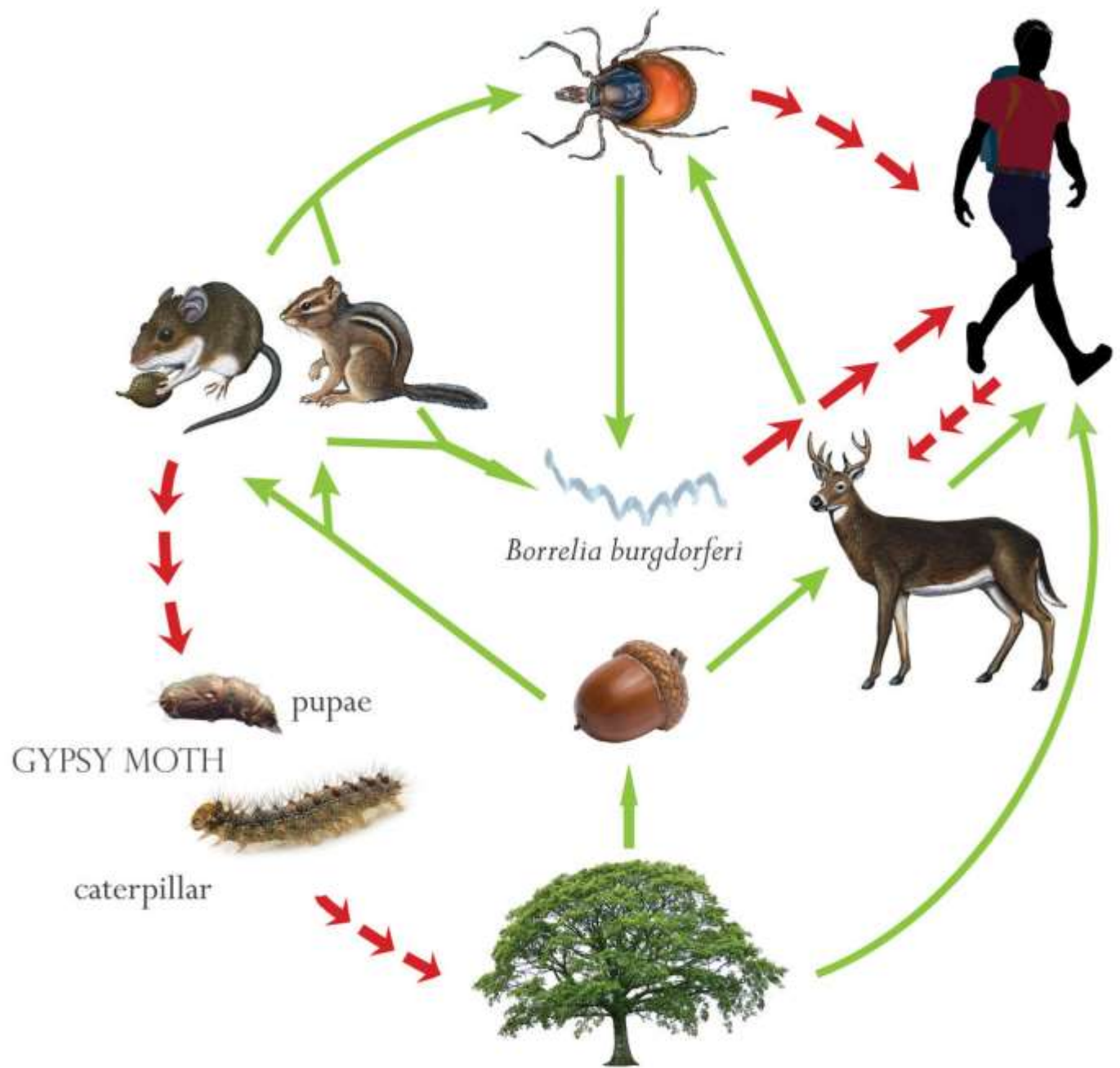
Key Species Decline or Are Lost



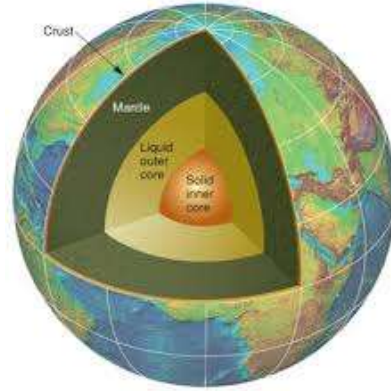
- Predators
- Native pollinators



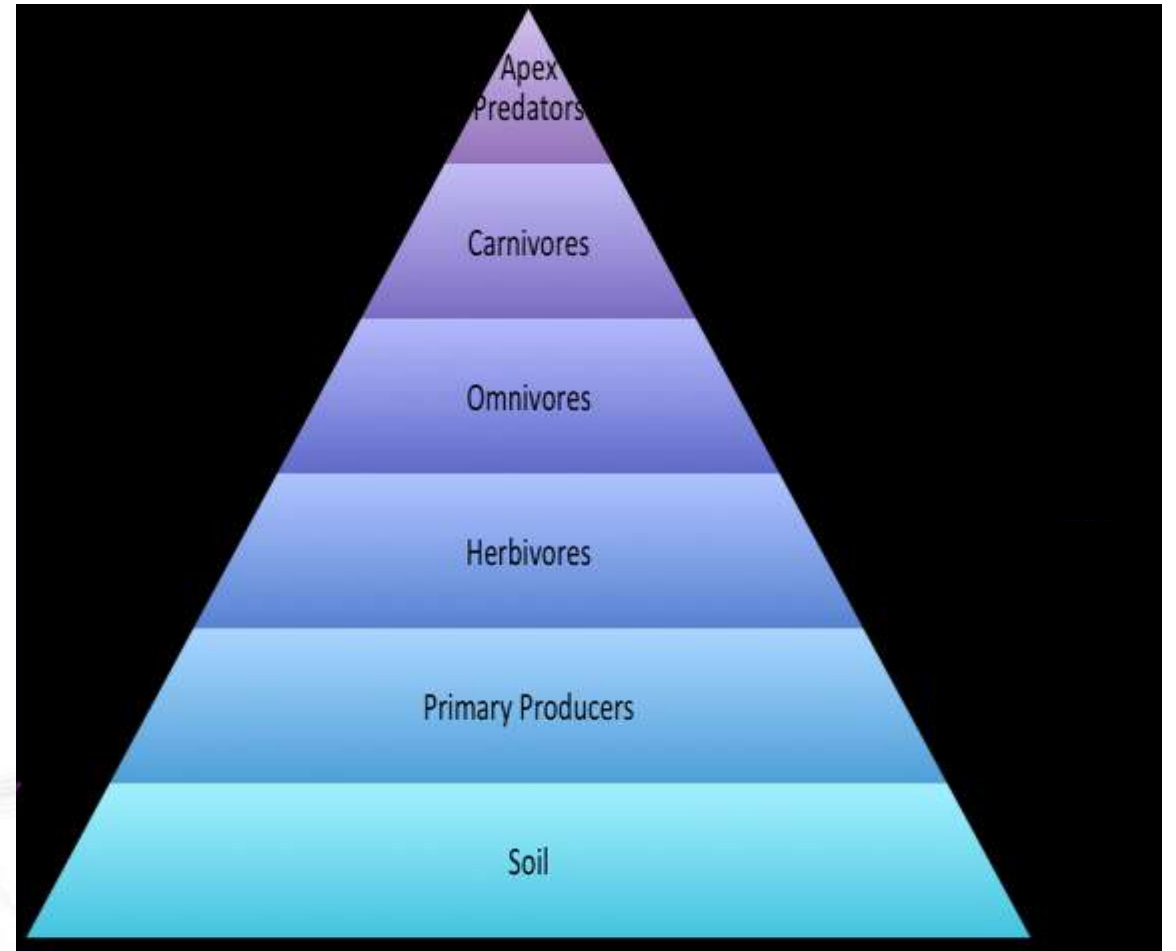
The Acorn Connection



What do all these things have in common?



The Biotic Pyramid



“Life piled on life...”

~Tennyson's *Ulysses*~



“Land, then, is not merely soil, it is a fountain of energy flowing through a circuit of soils, plants and animals.” ~Aldo Leopold~



Simplified, less functional systems result in a loss of biodiversity



“The land recovers, but at some reduced level of complexity, and with a reduced carrying capacity for people, plants and animals.” ~Aldo Leopold~

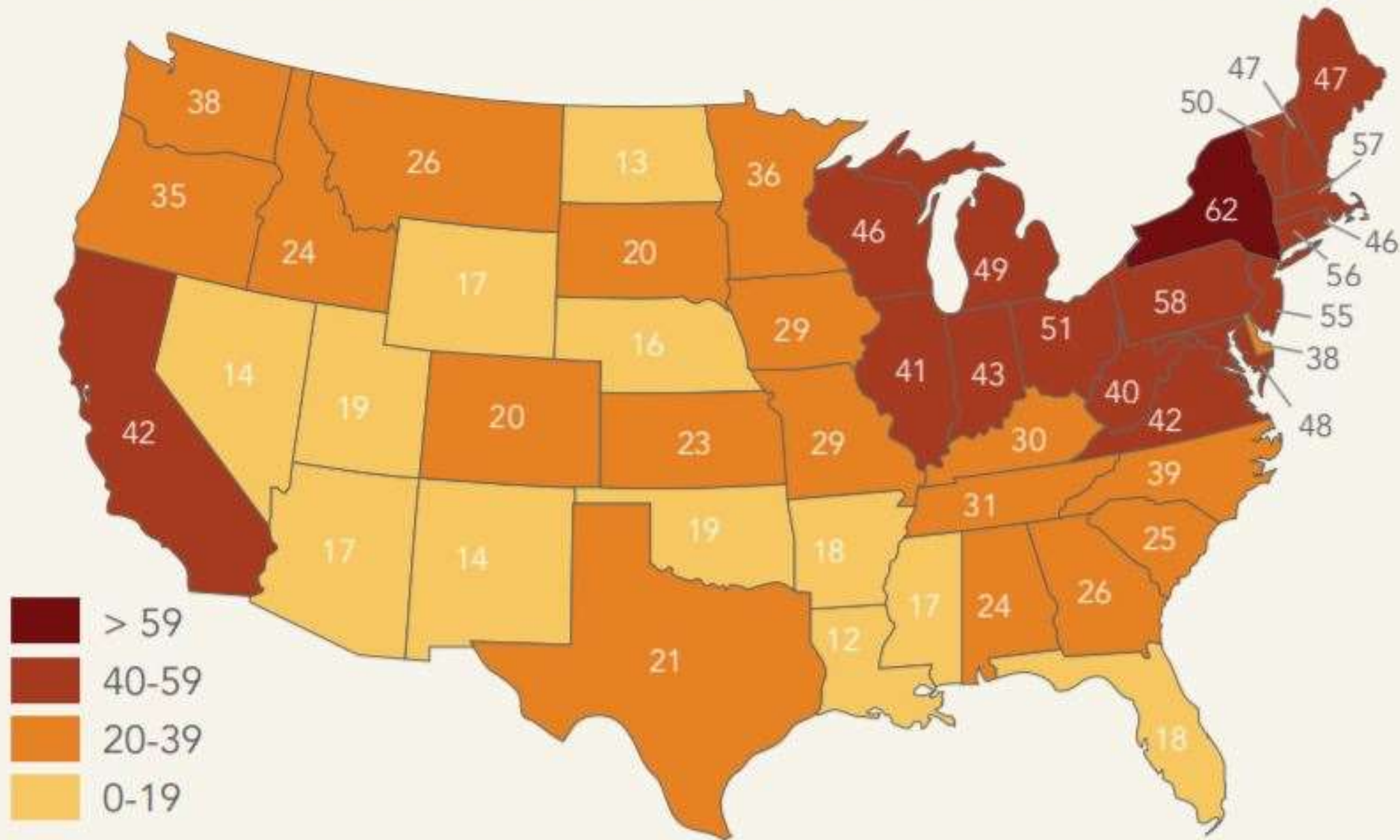


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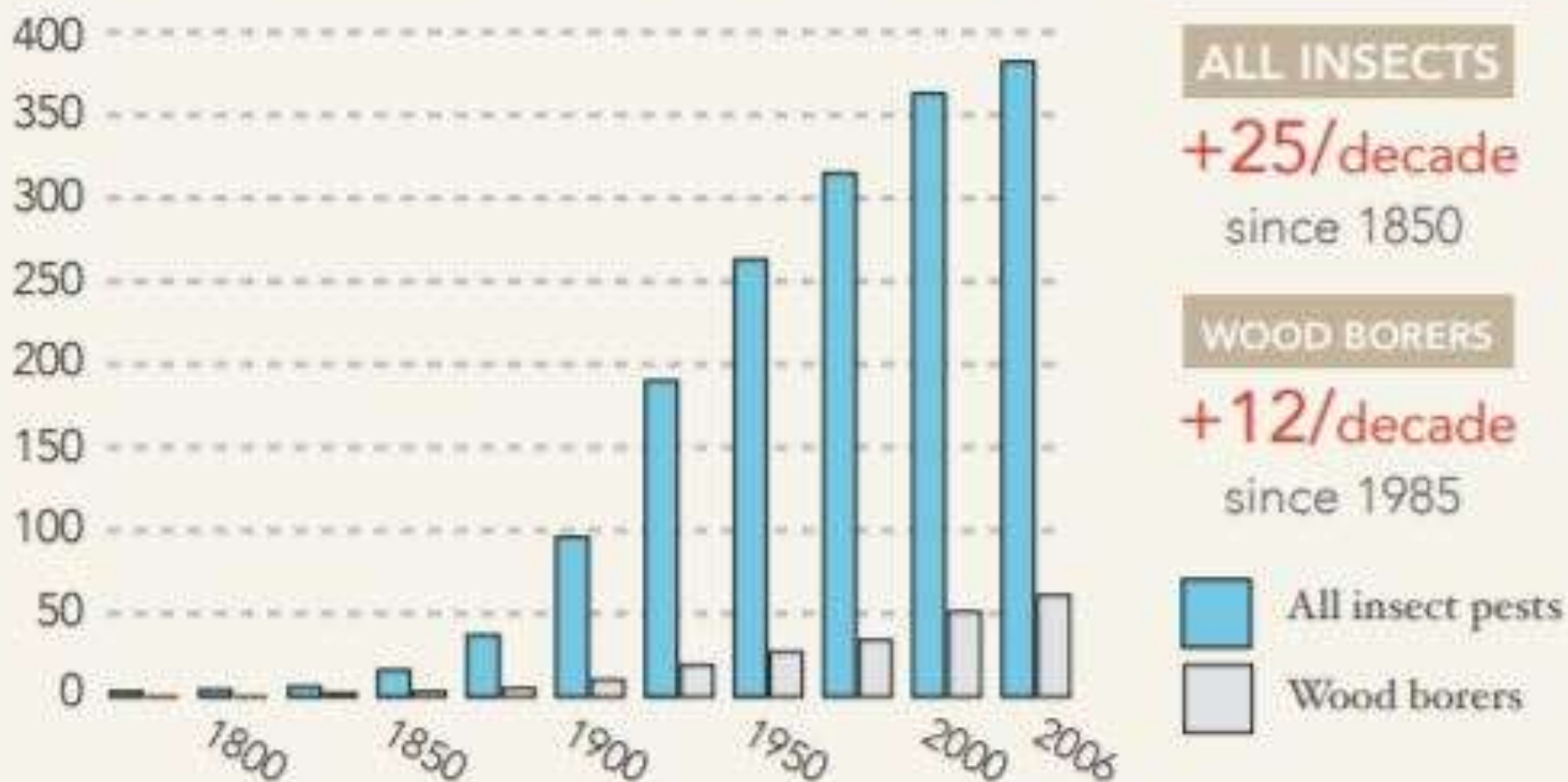


Imported forest pests occur in every state in the US



Data source: USDA Forest Service, 2015. Alien Forest Pest Explorer Online Database, <http://foresthealth.fs.usda.gov/portal/Flex/APE>

Cumulative detections of imported pests 1775-2006



The recent increase in detections of wood borers is associated with widespread use of solid wood packaging in international shipping.²

Data source: Aukema, J.E., McCullough, D.G., Von Holle, B., Liebhold, A.M., Britton, K., Frankel, S.J. 2010. Historical accumulation of nonindigenous forest pests in the continental U.S. *Bioscience* 60(11):886-897.

Annual cost of imported insect pests



Tree-SMART Trade

Fighting the importation of forest pests with policy,
education, and action

#StopForestPests



Follow us @treeSMARTtrade



Learn more at TreeSmartTrade.org

TreeSMART Trade

5 actions to reduce the accidental importation of insects and diseases from international trade:

Switch to pest-free packaging materials for international shipments to the US.

Minimize new pest outbreaks by expanding early and rapid response programs.

Augment international pest prevention programs with key trade partners.

Restrict the importation of live plants in the same genera as native woody plants in the US.

Tighten enforcement of penalties for non-compliant shipments.

[TreeSmartTrade.org](https://www.TreeSmartTrade.org)



Invasive Species



What Makes A Species “Invasive”?

- Compete with natives for resources (i.e. water, sunlight, pollinators)
- Reproduce rapidly and spread over large areas
- Few natural controls on populations (i.e. predators, herbivores)



What Makes A Species “Invasive”?

- Causes harm (i.e. ecological, economic)
- Alter structure and function of ecological communities
- Can cause the decline or extinction of native species



What Makes A Species “Invasive”?



“Land, then, is not merely soil, it is a fountain of energy flowing through a circuit of soils, plants and animals.” ~Aldo Leopold~



Forest Pests and Pathogens



Hemlock
Woolly
Adelgid

Beech
Bark
Disease



Asian
Longhorned
Beetle

Chestnut
Blight



Emerald
Ash Borer

Oak
Wilt



Forest Pests and Pathogens

- Reduce habitat
- Decrease food availability
- Less cover to avoid predators





Japanese Stiltgrass



Phragmites



Wisteria



Ailanthus



Barberry



Japanese Knotweed



Garlic Mustard



Oriental Bittersweet

Invasive Plants

- Change in habitat quality
- Change in food availability and quality
- Competition with native plants
- Impacts cascade through food web



Invasives Management

- Identify what you have



Invasives Management

- Identify what you have



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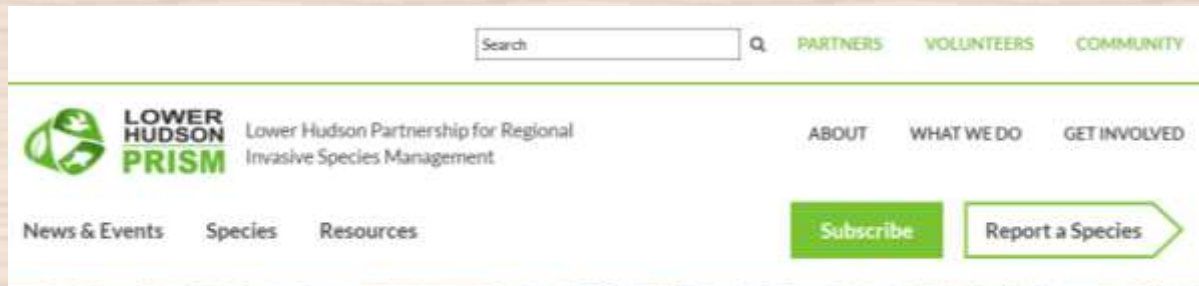
Invasives Management

- Identify what you have
- Learn about management methods



Invasives Management

- Identify what you have
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LHPRISM.ORG



The Lower Hudson Partnership for Regional Invasive Species Management
is a collection of environmental organizations and individuals concerned about invasive species in the region.

Invasive species are a serious threat to the rich biodiversity and ecosystems of the Lower Hudson Valley. Once established in our region, they have the potential to spread to other areas too.

We use every tool at our disposal to control the introduction, spread, and harmful impact of invasive species.



Invasives Management

- Identify what you have
- Learn about management methods
- Make a plan and set realistic goals



Invasives Management

- Identify what you have
- Learn about management methods
- Make a plan and set realistic goals
- Prioritize - pick your battles

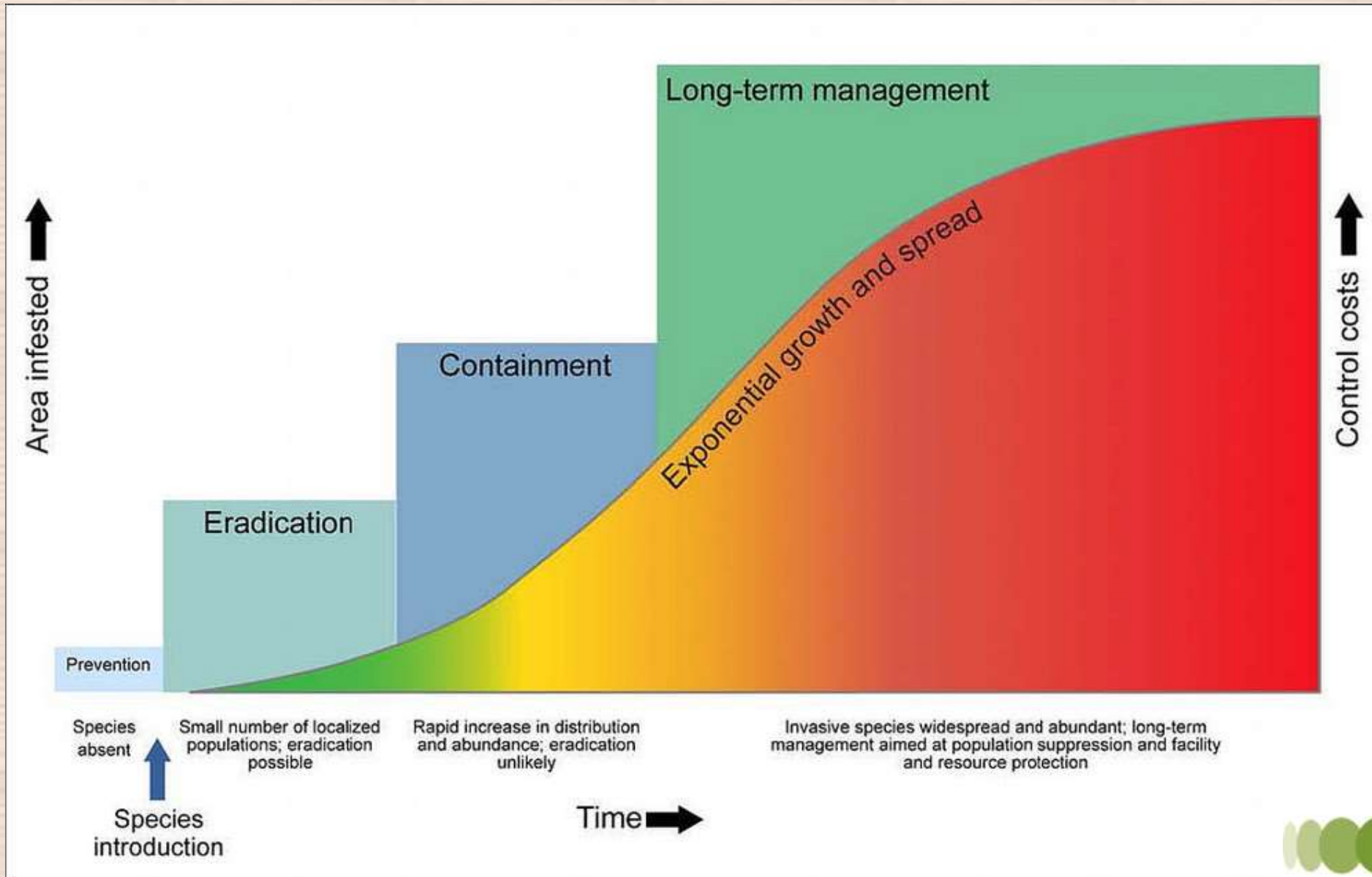


Invasives Management

- Identify what you have
- Learn about management methods
- Make a plan and set realistic goals
- Prioritize - pick your battles
- Commit to making progress, not “winning”

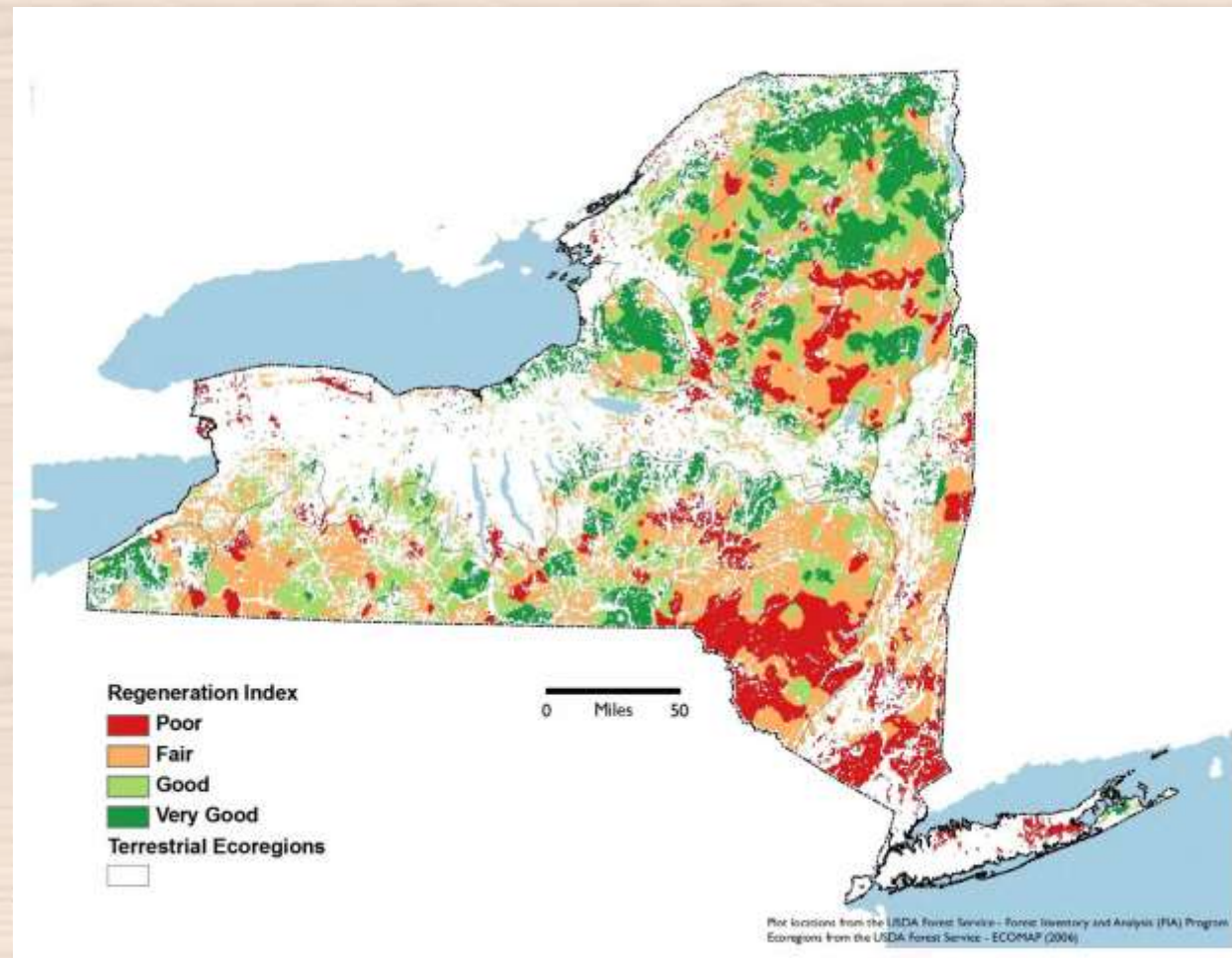
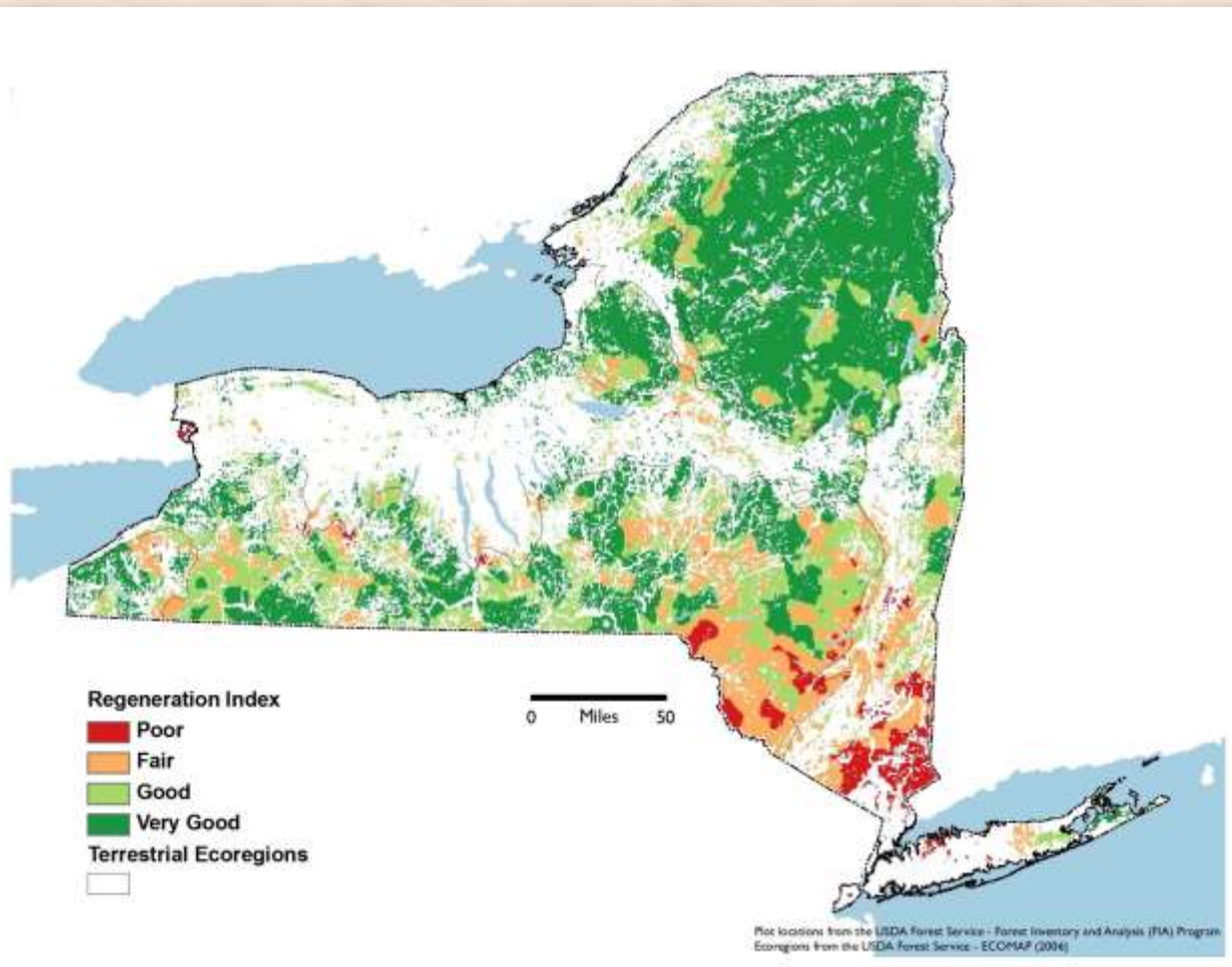


Invasion Curve



Predicted Regeneration of Native Canopy Species

Predicted Regeneration of Desirable Timber Species



From the Nature Conservancy's *Forest Regeneration in New York State Report

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