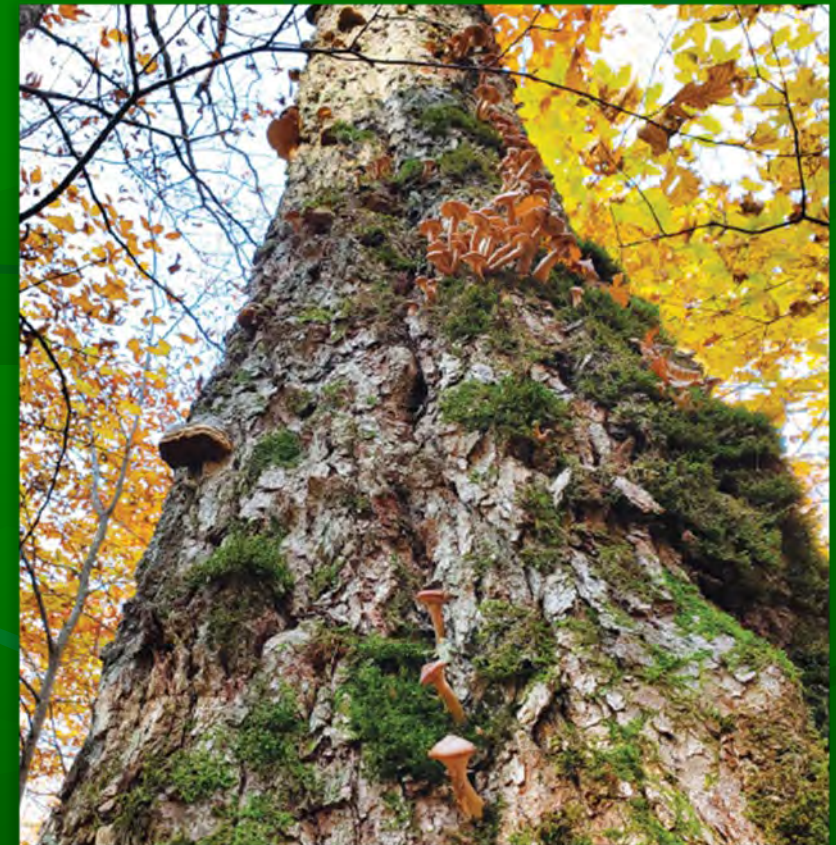


# Restoring Old Growth Characteristics & Understanding Family Forest Owners in Passive Management

Paul Catanzaro, UMass Amherst

Lina Clifford, UMass Amherst

Tony D'Amato, UVM



**RESTORING OLD-GROWTH  
CHARACTERISTICS**

*to New England's and New York's Forests*



The University of Vermont  
ANTHONY D'AMATO

UMassAmherst  
PAUL CATANZARO



# Why now?



## Restoring Old-Growth Characteristics

**Anthony D'Amato**  
University of Massachusetts–Amherst  
**Paul Catanzaro**  
University of Massachusetts–Amherst



2007

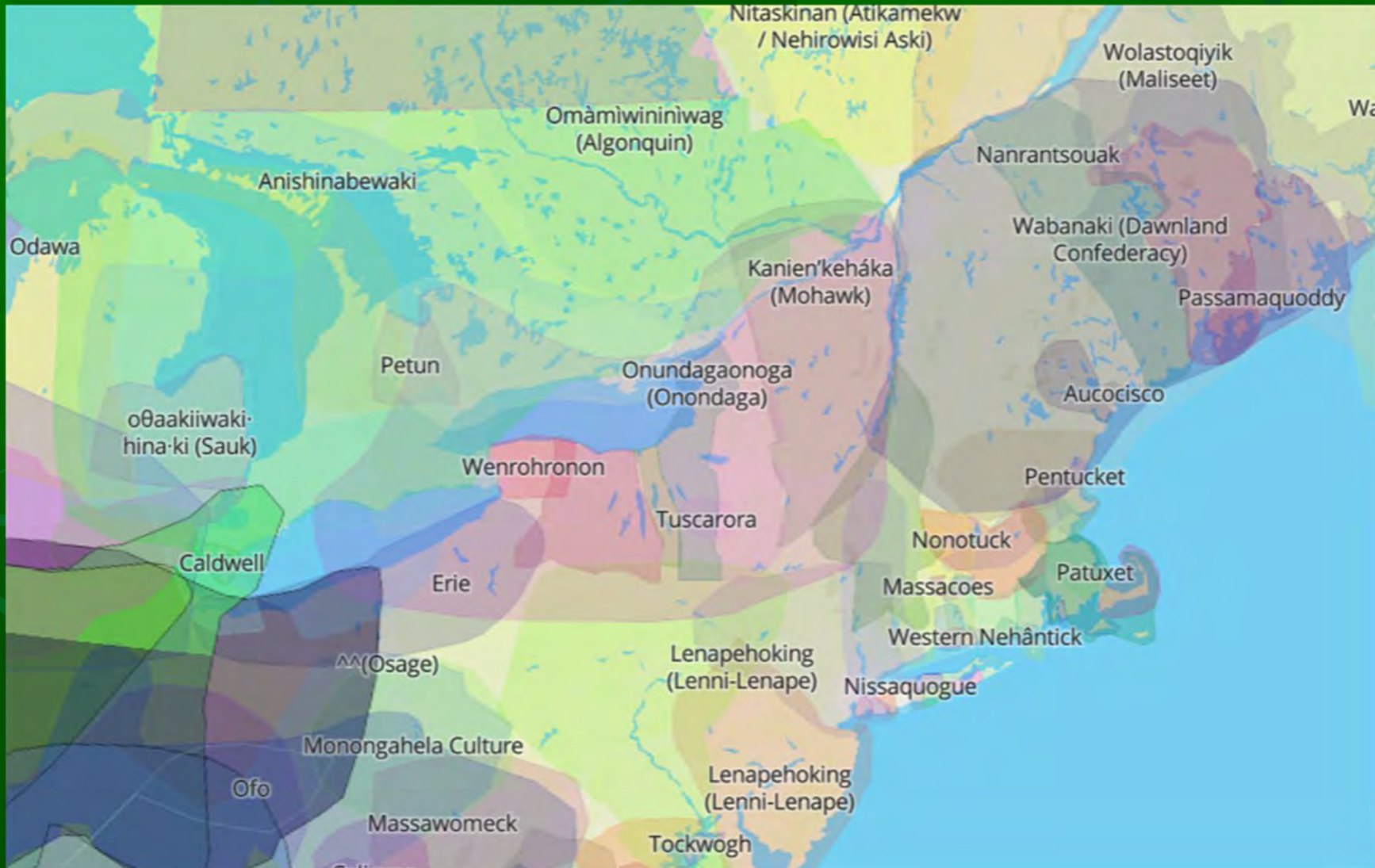
A FOREST MANAGER'S GUIDE TO  
Restoring Late-Successional Forest Structure

ANTHONY D'AMATO, UNIVERSITY OF MINNESOTA | PAUL CATANZARO, UNIVERSITY OF MASSACHUSETTS

2009

- Climate change mitigation
- Biodiversity
- Resilience

# Pre-Colonial Land Use History





# Colonial Land Use History

1700



1740



1830



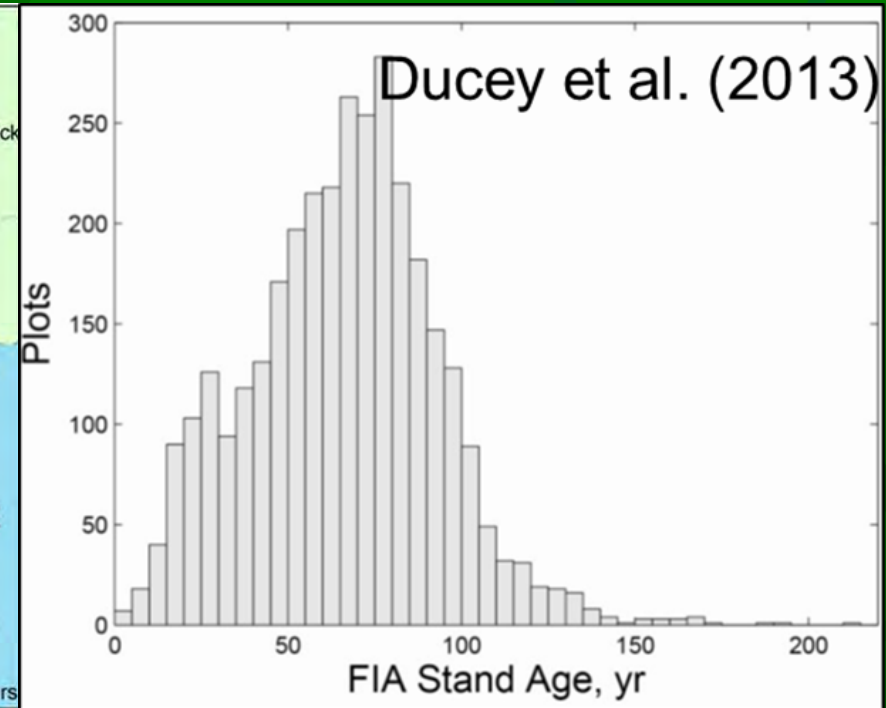
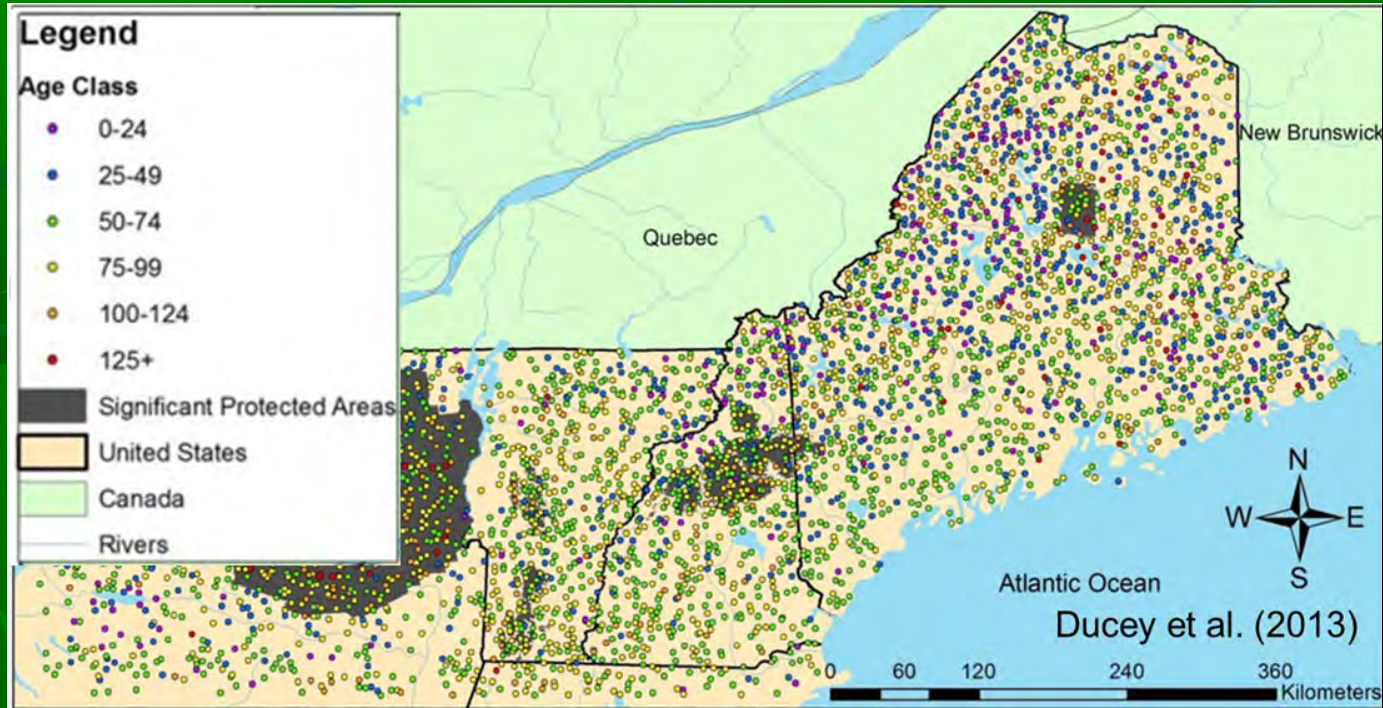
1910



Harvard Forest Fisher Museum - Petersham, MA



# Current Forest Age



Most of our forests are **ecologically-young**, second growth

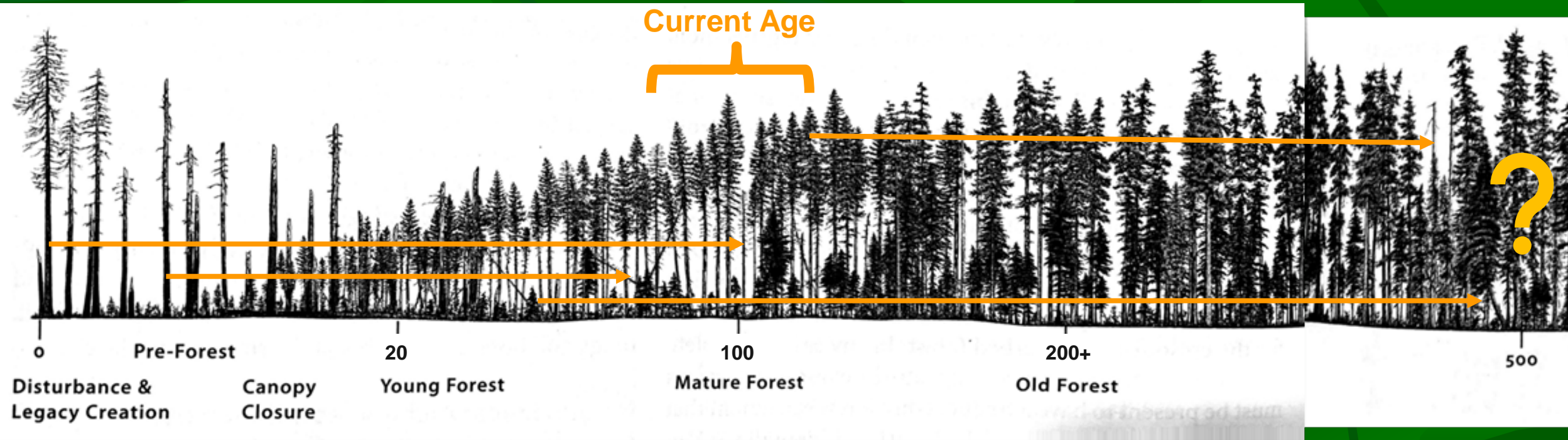




# Forest Succession

1. Our forests are young
2. Biological Legacies Provide Continuity Through Time

No  
End  
Point!



Adapted from: Franklin, J. F., Johnson, K. N., & Johnson, D. L. (2018). Ecological Forest Management. Waveland Press, Inc.



# Terminology

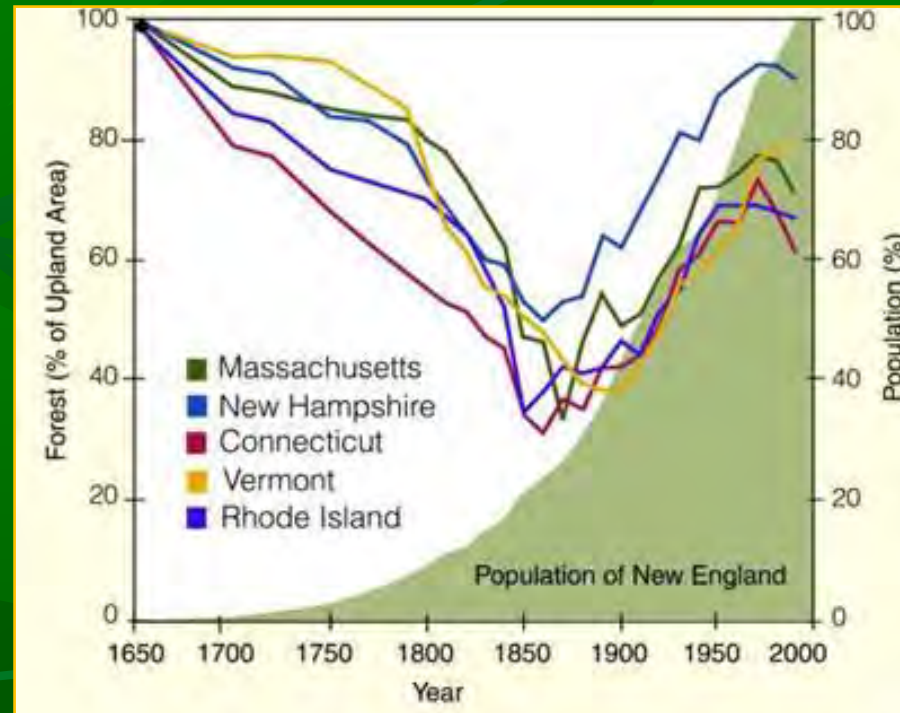
- **Old growth**: forests that were never directly impacted by intensive human land uses, such as those brought on by European settlement.
- **Second growth**: forests that established and grew following intensive human land use, such as agriculture or logging.
- **Old forests**: forests that contains a critical mass of characteristics associated with old growth.
  - Age at which these characteristics develop varies by forest type, disturbance history, and site quality. Focus on restoring tractable characteristics **versus relying on stand age**.



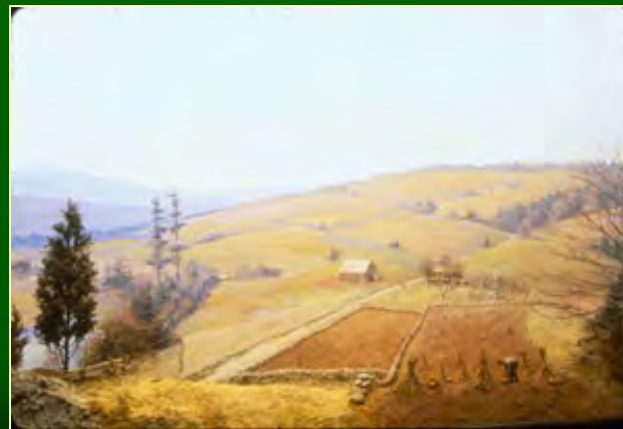
Photo: Tony D'Amato

# Past Extent of Old-Growth

- Old-growth forests covered ~ 90% of the landscape prior to European settlement



Harvard Forest





# Current Extent of Old-Growth

| State         | Estimated Acres of Old Growth    | Total Forested Acres* | % of Forest in Old Growth |
|---------------|----------------------------------|-----------------------|---------------------------|
| Connecticut   | 0 <sup>1</sup>                   | 1,763,459             | 0%                        |
| Massachusetts | 1,119 <sup>2</sup>               | 2,984,347             | .04%                      |
| Maine         | 50,000 <sup>3</sup> (old forest) | 17,521,753            | .29%                      |
| New Hampshire | ~3,500 <sup>4</sup>              | 4,691,524             | .07%                      |
| Rhode Island  | 0 <sup>5</sup>                   | 361,127               | 0%                        |
| Vermont       | ~1,000 <sup>6</sup>              | 4,523,088             | .02%                      |
| New England   | 55,619                           | 31,845,298            | .17%                      |

<sup>1</sup> Personal communication Chris Martin, State Forester, CT DEEP

<sup>2</sup> D'Amato, Anthony W., David A. Orwig, and David R. Foster. 2006. New Estimates of Massachusetts Old-growth Forests: Useful Data for Regional Conservation and Forest Reserve Planning. *Northeastern Naturalist*. 13(4):495–506.

<sup>3</sup> Personal communication, Justin Schlawin, Maine Natural Areas Program

<sup>4</sup> Personal communication, Chris Kane, NH Natural Heritage ecologist

<sup>5</sup> Davis, Mary Byrd, (Ed.). *Eastern Old-Growth Forests: Prospects for Rediscovery and Recovery*. Island Press, 1996.

<sup>6</sup> Personal communication, Anthony D'Amato, UVM

\*2019 USDA Forest Service Forest Inventory and Analysis Unit

**What do we do with the other  
> 99.83% of the forest?**

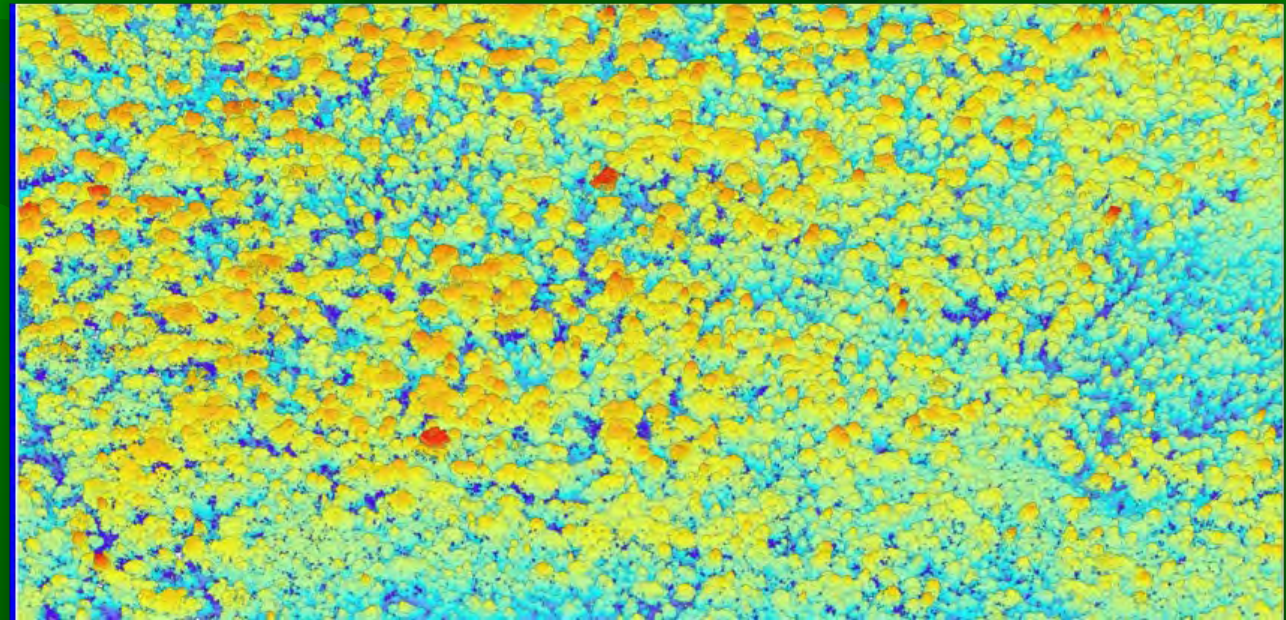




# General Old Growth Characteristics

*It's more than big trees!*

- Diversity of tree sizes and ages  
(including large trees 20+ and old 400+)
- Spatial variability  
(crowded small trees, well-spaced big trees,  
& in-between)
- Dead standing trees (snag)
- Downed logs
- Late seral plan communities



Courtesy of John Hagan: [jhagan@ourclimatecommon.org](mailto:jhagan@ourclimatecommon.org)

These characteristics are the result of continuous disturbance over centuries...and also demonstrate continuity!

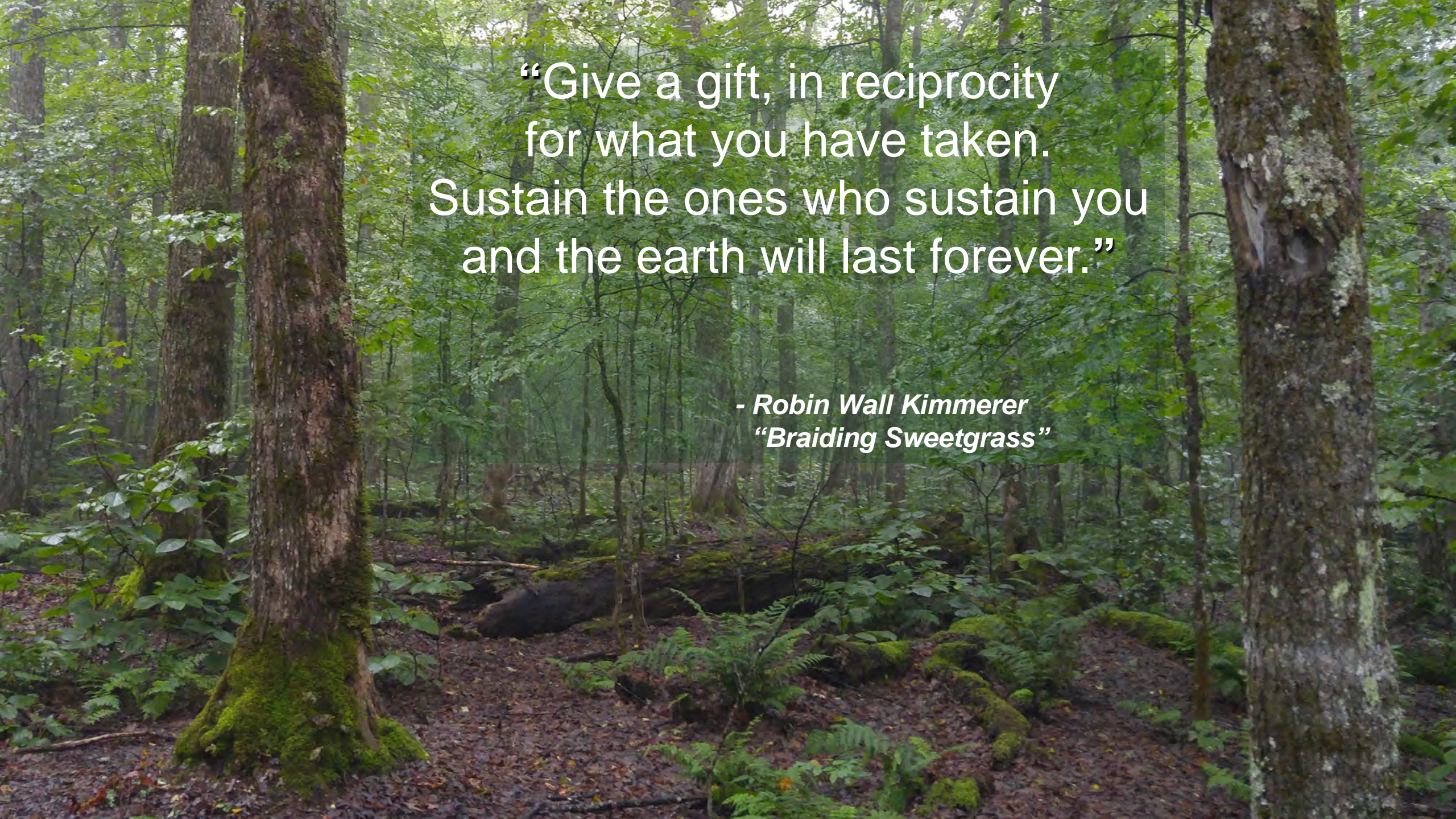




**“To Keep Every Cog  
and Wheel is the  
First Precaution  
of Intelligent  
Tinkering”**

*- Aldo Leopold*



A photograph of a lush forest. The scene is filled with tall, thin trees and a dense canopy of green leaves. In the foreground, several tree trunks are visible, some of which are covered in vibrant green moss. The forest floor is a mix of dark brown leaves and bright green ferns. The lighting is soft and diffused, creating a serene and natural atmosphere.

“Give a gift, in reciprocity  
for what you have taken.  
Sustain the ones who sustain you  
and the earth will last forever.”

*- Robin Wall Kimmerer  
“Braiding Sweetgrass”*



# Strategies for Restoring Old-Growth Characteristics

- We can't re-create old-growth forests,  
so how do we close the gap from ~90% to ~.17%?
  - Active Management
  - Passive Management



# Active Management

- Diversify tree size and spatial variation:  
establish patch reserves
- Diversify tree size and spatial variation:  
patches of ¼ acre to couple of acres (HRV)
- Increase tree size: thin between patches
- Increase stand variation and dead standing trees:  
designate legacy trees and patch reserves
- Increase downed dead logs:  
designate legacy trees and fell & leave trees
- Late seral plant communities: patch reserves





# Passive Forest Management

*“Letting nature be the main driver”*

## Allowed Uses

- Non-motorized recreation
- Some invasive plant management
- Collecting NTFPs for personal use
- Hunting

## Uses NOT Allowed

- Timber harvest
- Motorized recreation
- Building structures





# Context: Biodiversity & Climate Concerns



UNITED NATIONS BIODIVERSITY CONFERENCE

5 to 17 December 2022

Montreal, Canada

30% protected by 2030

Wildlands and  
Woodlands



Farmlands and  
Communities

*Broadening the Vision for New England*



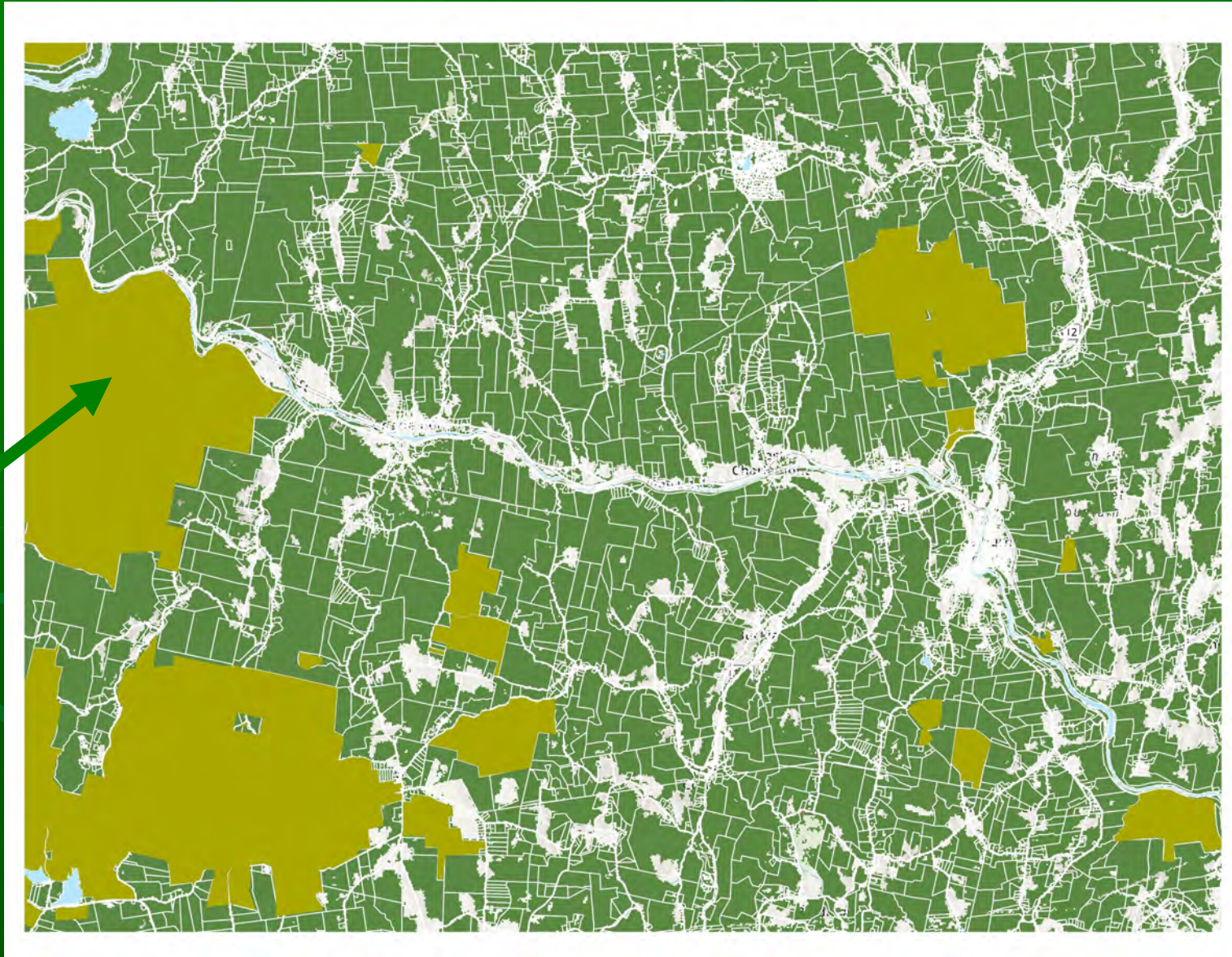
Conserve  
30% of our  
lands + ocean  
by 2030.

IT'S TIME. #30x30



# Our New England Landscape: MA Example

State Lands





# Research Objectives

- 1) FFO willingness to adopt passive management scenarios, which are most popular
- 2) FFO characteristics of those willing to adopt passive approach
- 3) Benefits of the passive approach to FFOs
- 4) FFO concerns regarding the passive approach





# Stage 1 interview

Land

# Stage 2

Cogn

# Stage 3

2600

# Stage 4

Comp



ethod”

Card

ailing



# Method: Survey Hypothetical Scenarios

| Scenario  | Maintain ownership | Property Tax Reduction | One-time payment | Duration |
|-----------|--------------------|------------------------|------------------|----------|
| Voluntary | X                  |                        |                  |          |



# Method: Survey Hypothetical Scenarios

| Scenario      | Maintain ownership | Tax Benefit | One-time payment | Permanent |
|---------------|--------------------|-------------|------------------|-----------|
| Voluntary     | X                  |             |                  |           |
| Tax Reduction | X                  | X           |                  |           |
| Easement      | X                  |             | X                | X         |
| Fee-Simple    |                    | X           | X                | X         |

↓

**Would you adopt this approach  
on some or all of your land?**

↓

**How certain of answer**



A scenic landscape view of a mountain range. The foreground is dominated by a dense forest of green trees, including several tall evergreens. In the middle ground, a valley opens up, revealing a small lake or reservoir. The background consists of rolling mountain ranges under a bright blue sky filled with scattered white and grey clouds. A thin power line is visible in the upper right portion of the frame.

**Some preliminary findings**



# About the Respondents

**653** responded (26% cooperation rate)

*Forested acreage  
in state:*

10ac min

**123ac mean**

4500ac max

**73% resided  
on their  
forested  
property**

*Age:*

25 years min

**66 years mean**

96 years max

**51% are  
enrolled in a  
current use  
program**



# Adoption of Passive Management: Overall

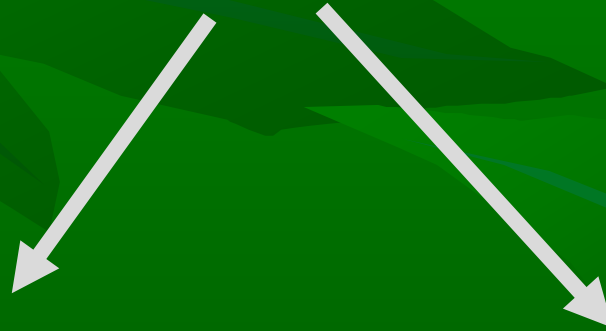
**36% would do at least one scenario  
with certainty**

**60% are uncertain, already doing, or would not do  
at least one scenario**



# Adoption of Passive Management: Some or All

**36% would do at least one scenario  
with certainty**



**23%**

at least one on  
some of their  
land, never all

**12%**

at least one on  
all their land



# Adoption of Passive Management: No Adoption

**21% said no with certainty across the scenario questions they answered**

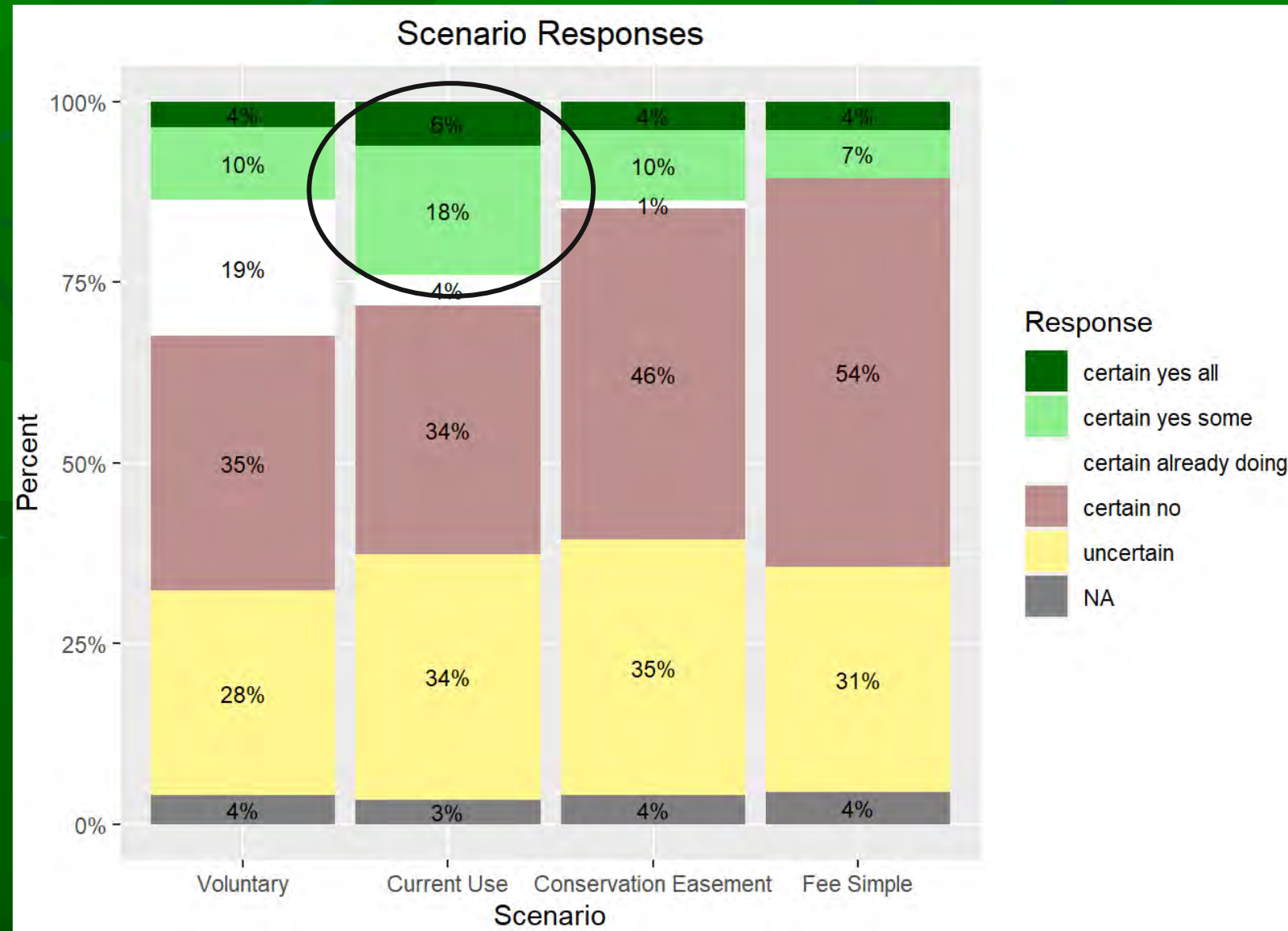




# Which scenario was most appealing?

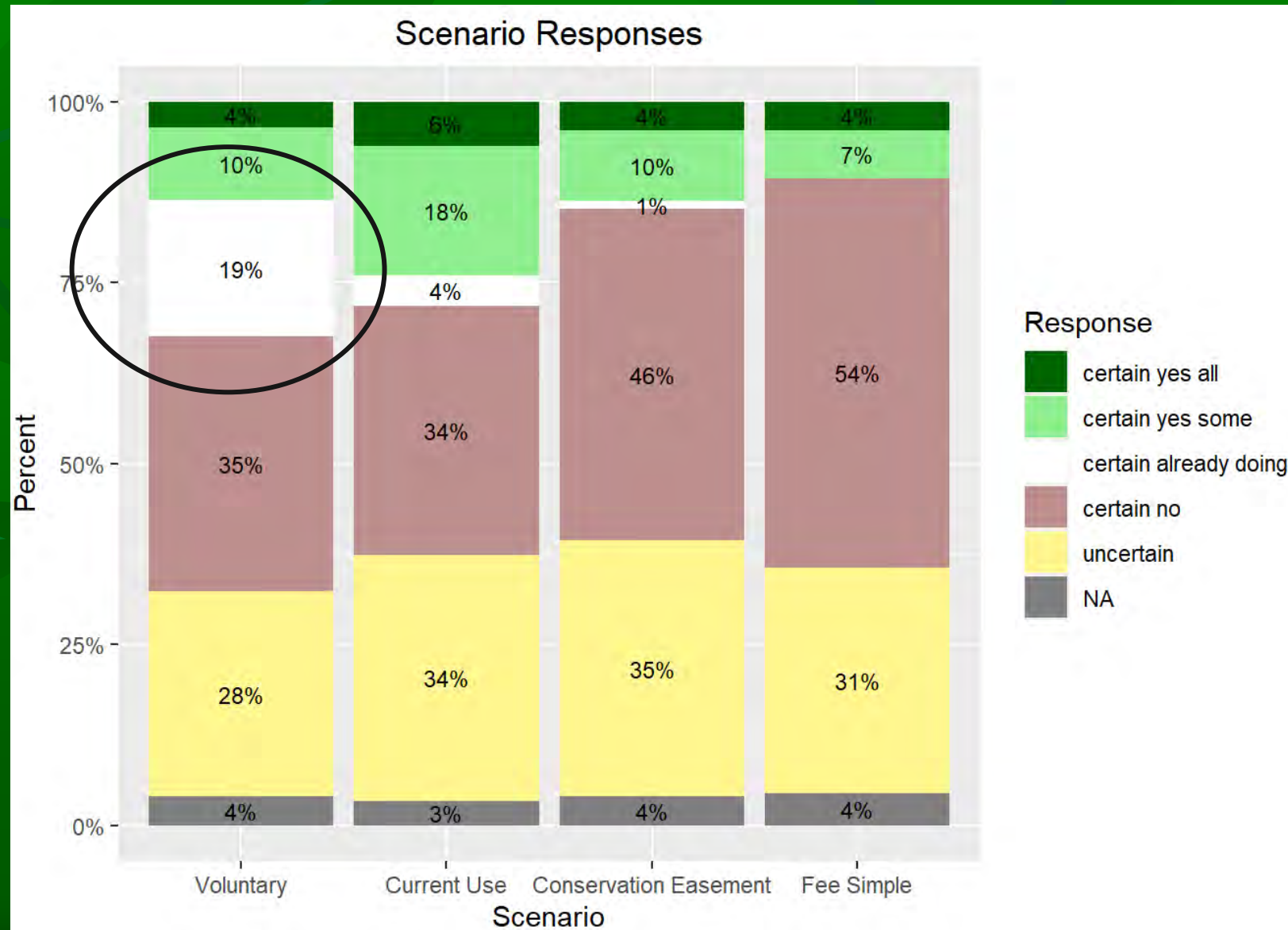
Current Use had the highest intention of adoption at 24%

More willingness to do on some land than all land (for all scenarios)



# Already Doing Passive Management

**21% were already doing at least one of the scenarios with certainty.**  
(most in the voluntary scenario)





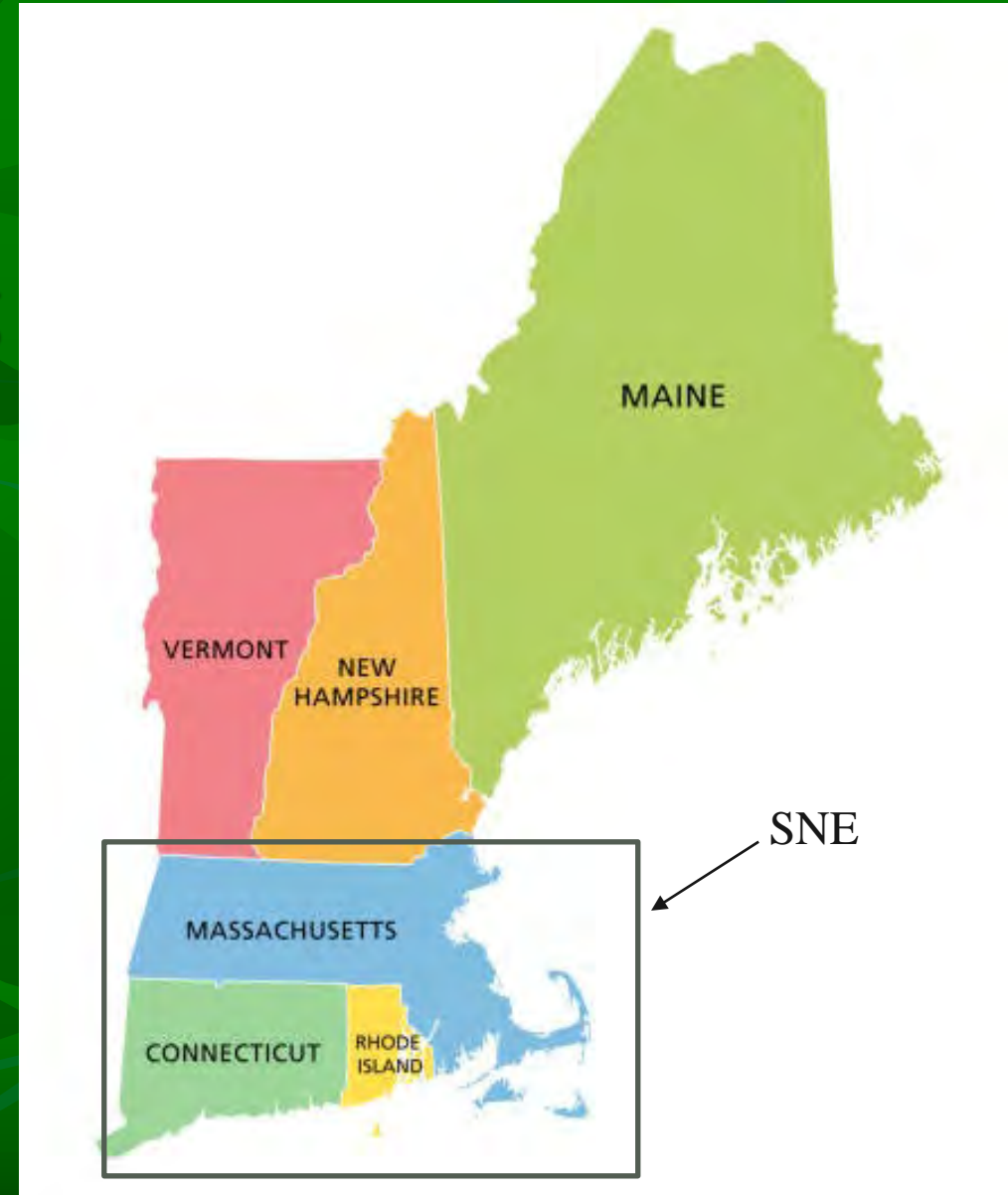
# Were there regional differences or trends?

Regions: ME, VT, NH, SNE

29% of SNE respondents already doing voluntary (other states only 15-19%)

Current Use Scenario\*\* VT 7%, NH 9% already doing; ME & SNE 1%

Less regional variation with CE & Fee Simple



# Concerns & Benefits About Passive Management

**80% saw benefits**

Average number benefits: 2.7/6

## Top Benefits:

“Being an example of how nature works on its own” (55%)

“Maximizing carbon storage” (52%)

**89% had concerns**

Average number concerns: 3.2/9

## Top Concerns:

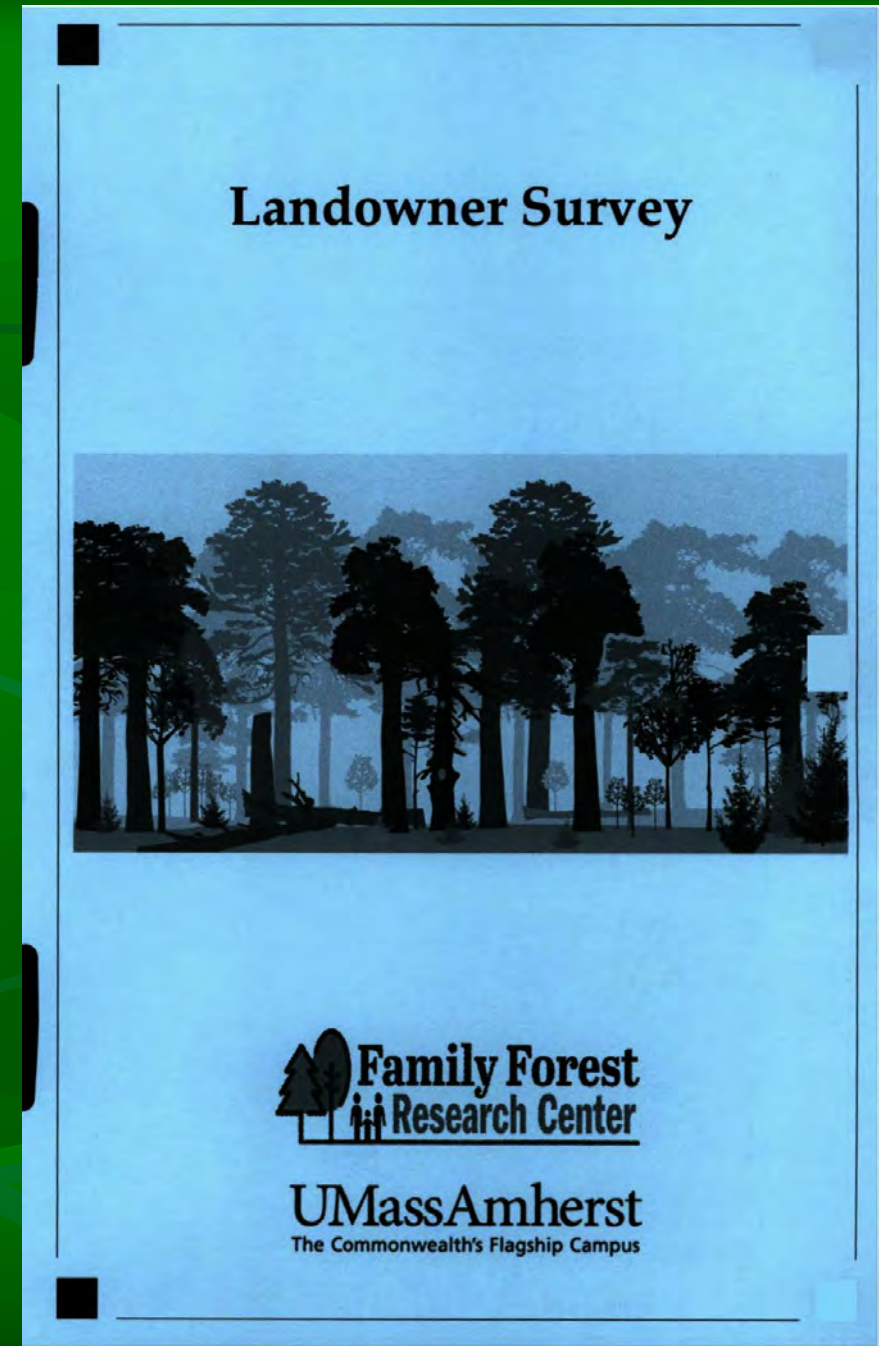
“Not allowed to harvest firewood” (57%)

“Limited land use for future owners” (51%)



# Survey Take-Homes

- Mixed willingness to adopt passive
  - 36% of respondents would adopt at least one scenario
  - 21% would do none
- 20% are already doing passive
  - Mostly via voluntary adoption
- Some land > all land
- Current Use had greatest willingness to adopt





# Management Implications: Active & Passive on the Landscape

- **Variety of forest benefits need a variety of approaches:**

- Wood products
- Carbon
- Wildlife

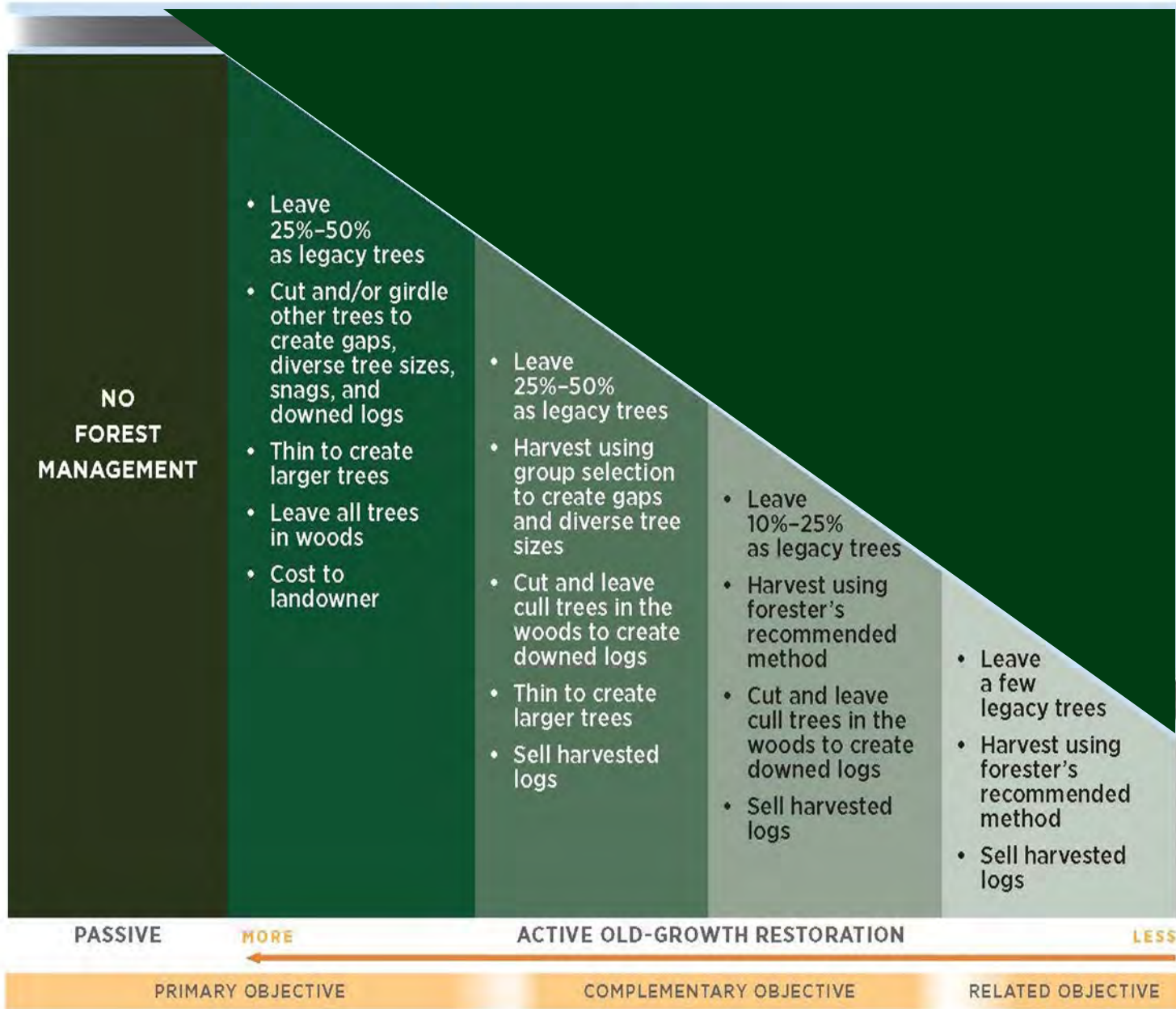
- **Heterogeneity at different scales**

- **“Shades of Green”:**  
ecologically & socially



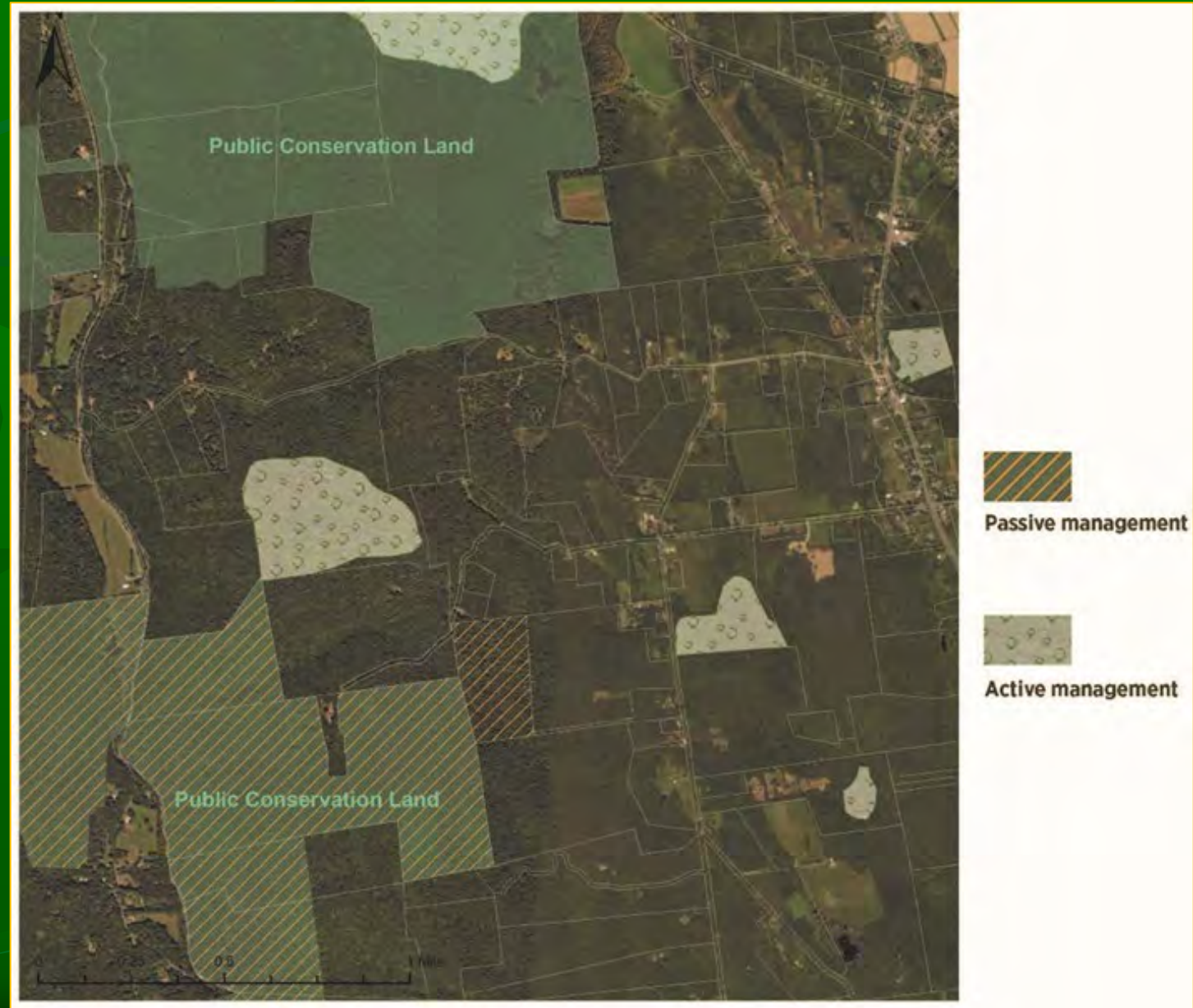


# Gradient of old-growth restoration strategies



# Our New England Landscape

- Restoring continuity of the “cogs and wheels” across the landscape
- Critical mass of characteristics across the landscape





# Land Protection is Essential

- It will take decades/centuries to restore characteristics.
- Average age of family forest owners is ~ 65 years old
- Largest inter-generational transfer we have ever experienced.



# Opportunities to Apply this Work

- Our forests are young. Promote the restoration of old-growth characteristics across the landscape.
- Sustaining our forest benefits necessitates a diversity of approaches. We need both passive and active strategies in variety of intensities across the landscape . Discourage bifurcation!
- There is a segment of FFOs interested in the passive approach. Provide the option for passive forest management on both some and all of their land.
- Foresters: Consider the role of patch reserves on lands you steward.
- Continue to vigorously pursue land protection.



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McIntire-Stennis



# Questions?

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[paulcat@umass.edu](mailto:paulcat@umass.edu)

