

An aerial photograph of a forested hillside. The foreground and middle ground show a mix of green and brown trees, suggesting a transition or a specific forest type. In the upper right, a large, calm blue lake is visible, surrounded by more dense forest. The overall scene is a natural landscape with a focus on forest management or ecology.

Slash Walls and beyond

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The Challenge

Oak regeneration is often hampered by taller red maple, birch and less valuable species,

especially where browse intensity is high and after thinning and “selection” harvests.



4-yr-old sprout

For quality regeneration



Ralph Nyland

In this order ...

- 1. Shoot the deer**
- 2. Poison the beech**
- 3. Manage the light**

In this order ...

- 1. Reduce browse intensity**
- 2. Control competition**
- 3. Let the sun shine in**

74 acres. "Gas Line" harvest completed 6/2017



Peter Smallidge & Brett Chedzoy



Cornell University

College of Agriculture and Life Sciences
Department of Natural Resources

Smallidge, P.J., B. Chedzoy, et al. 2021. Evaluating the construction and effectiveness of slash walls at the perimeter of regeneration harvests to exclude deer. *Forest Ecol. Manage.*
<https://doi.org/10.1016/j.foreco.2021.119529>



CAES

The Connecticut Agricultural Experiment Station

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Nepaug pre-harvest (2020)



USDA Forest Service - GRANT 19-DG-11420000-177
Increasing Resiliency in Southern New England Oak Forests





J.P. Barsky



Anna Welch

Katie Overstrum

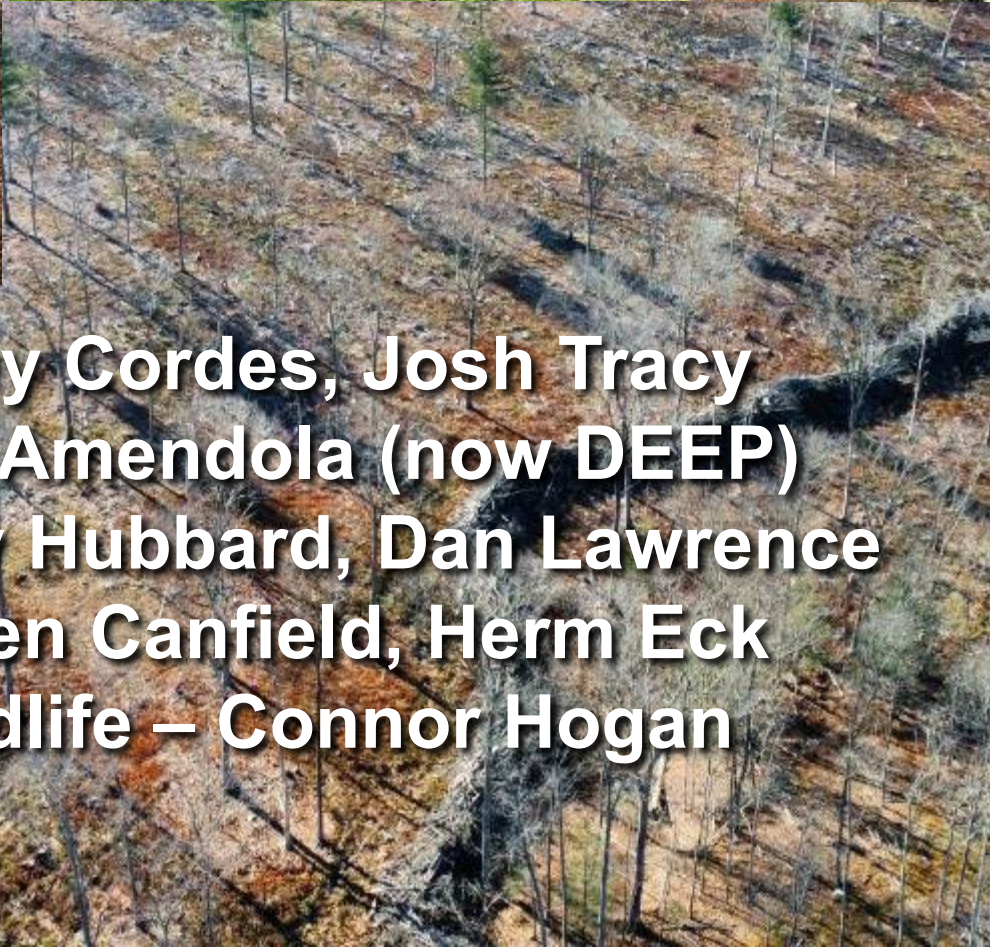


Erin Reily



Jessica Shanley

Rachael Harris



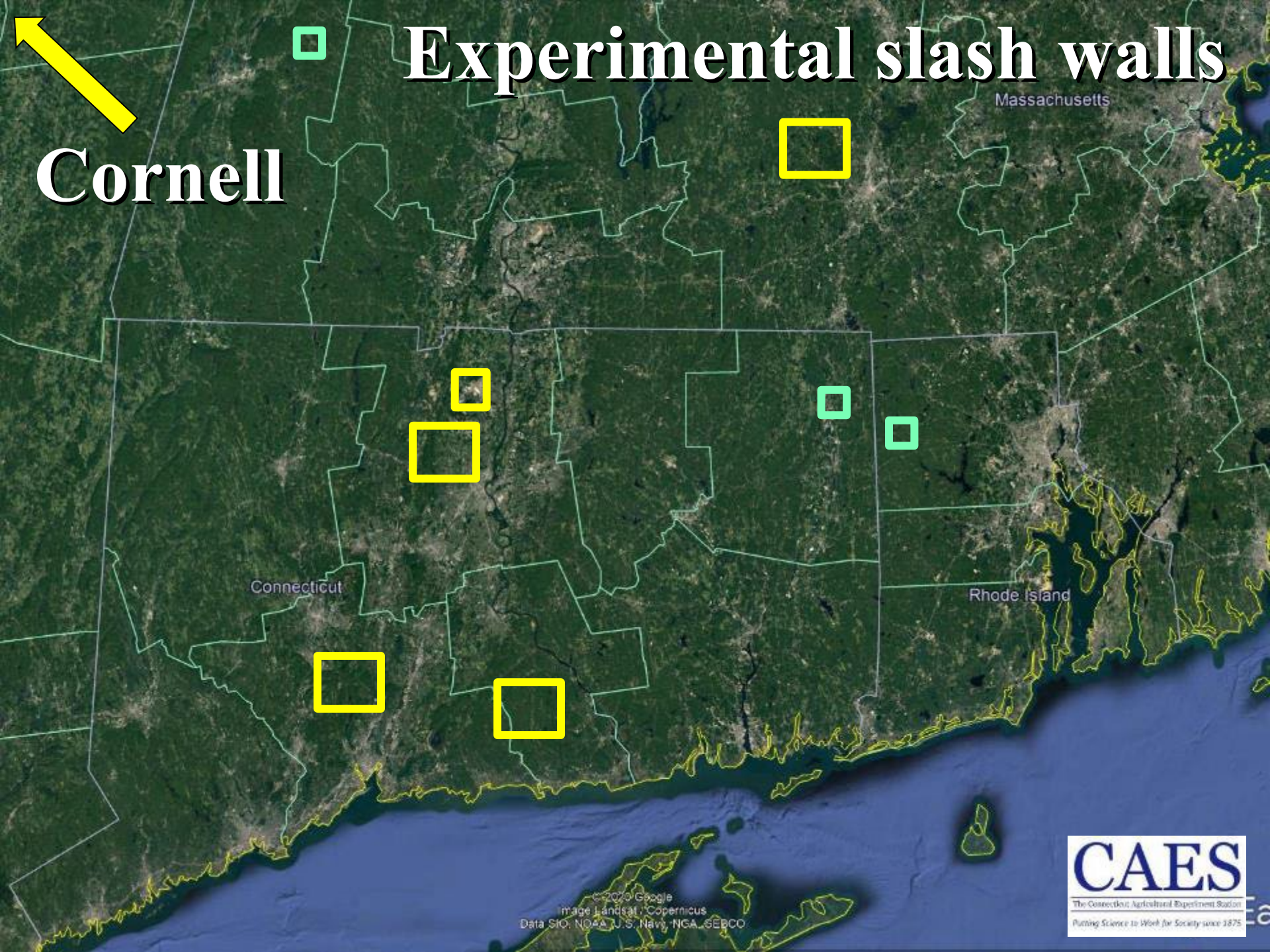
**Nicole Gotthardt,
Zach Bates**

**RWA – Casey Cordes, Josh Tracy
Alex Amendola (now DEEP)
MDC – Andy Hubbard, Dan Lawrence
MA DCR – Ken Canfield, Herm Eck
McLean Wildlife – Connor Hogan**



Cornell

Experimental slash walls



Connecticut

Massachusetts

Rhode Island

© 2020 Google
Image Landsat, Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO



MDC - 40+ acres



RWA North Madison - 18 acres
RWA Seymour - 18 acres



MA DCR - 16 acres





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Need a knuckle boom

A photograph of a forest floor covered with a large pile of cut logs and branches. The logs are stacked haphazardly, with some lying horizontally and others vertically. The background shows a dense forest of tall, thin trees, likely pines, under an overcast sky. The ground is dark and appears to be covered in mulch or soil.

**Not appropriate for pine
dominated stands**

And tough to accomplish in thinned stands

Photo credit: Eric Dunnack (NRCS CT)



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Observed sprouting

2nd year survivors (%)

Species	Inside	Outside	Difference
Northern red oak	48%	15%	3.2 X
Hickory	70%	34%	2.0 X
Sugar maple	49%	25%	2.0 X
Chestnut oak	57%	33%	1.7 X
Black/scarlet	24%	17%	1.4 X
Red maple	77%	71%	1.1 X
Yellow-poplar	84%	90%	0.9 X
White oak	14%	19%	0.8 X

Stumps of most species were more likely to have a sprout if within a slash wall than outside. The exceptions were red maple, yellow-poplar, and unexpectedly, white oak.

Original count

Species	Inside	Outside	Grand Total
Northern red oak	136	73	209
Hickory	159	58	217
Sugar maple	63	44	107
Chestnut oak	30	9	39
Black/scarlet	143	81	224
Red maple	272	164	436
Yellow-poplar	55	20	75
White oak	84	43	127
All species	942	492	1,434

Sprout height growth

		Height (feet)			
		1st year	2nd year	Yr2 Growth	n
Oak	Outside	1.1	2.2	1.1	49
	Inside	3.1	6.0	2.8	147
Hickory	Outside	1.1	2.2	1.0	31
	Inside	2.9	5.4	2.5	121
Sugar maple	Outside	0.8	0.9	0.1	18
	Inside	3.5	6.6	3.1	33

Height growth of oak, hickory, and sugar maple stump sprouts greater inside than outside slash walls for both years.

Sprout height growth

		Height (feet)			
		1st year	2nd year	Yr2 Growth	n
Oak	Outside	1.1	2.2	1.1	49
	Inside	3.1	6.0	2.8	147
Hickory	Outside	1.1	2.2	1.0	31
	Inside	2.9	5.4	2.5	121
Sugar maple	Outside	0.8	0.9	0.1	18
	Inside	3.5	6.6	3.1	33
Red maple	Outside	1.8	3.7	2.0	128
	Inside	3.7	7.5	3.9	214

**Ditto for red maple*, but ...
red maple sprouts growing twice as
fast as other species outside slash walls**

***also yellow-poplar**

Aspen root suckers



2-year-old aspen, Seymour, CT



May 2023 freeze damage



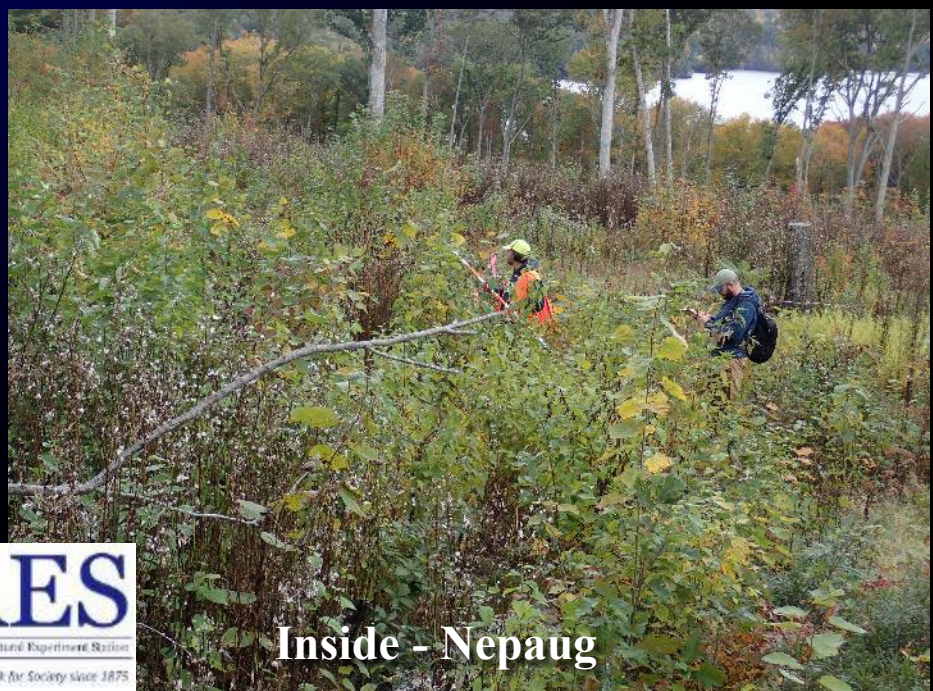
Outside - Seymour



Inside - Seymour



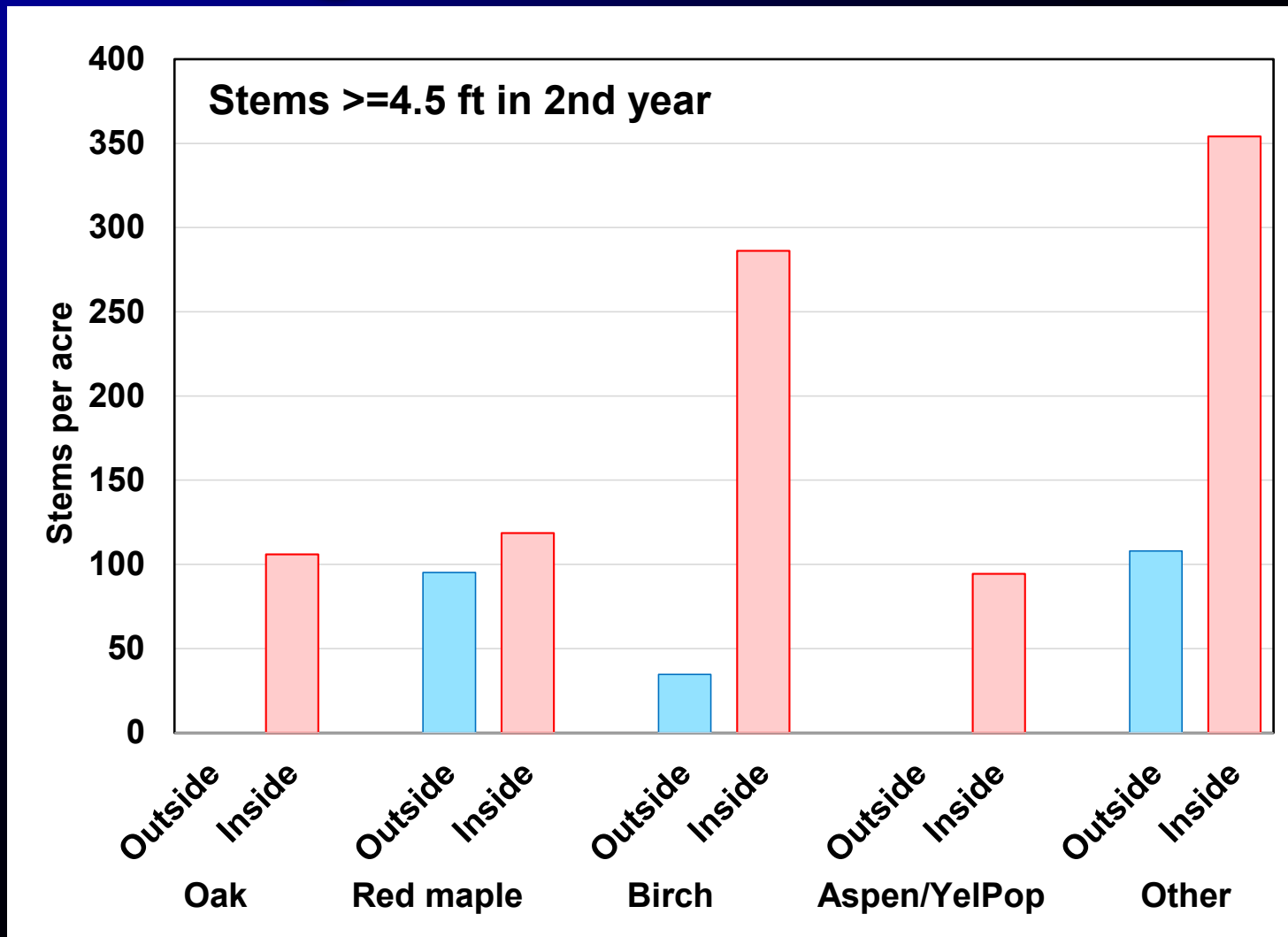
Outside - Nepaug



Inside - Nepaug



Regeneration density



Oak/hickory regeneration density is much higher inside the slash wall than outside. There are a lot of true oak seedlings that are 2/3/4 foot tall and will move into the 4.5 ft tall height class next year (stand medians shown).

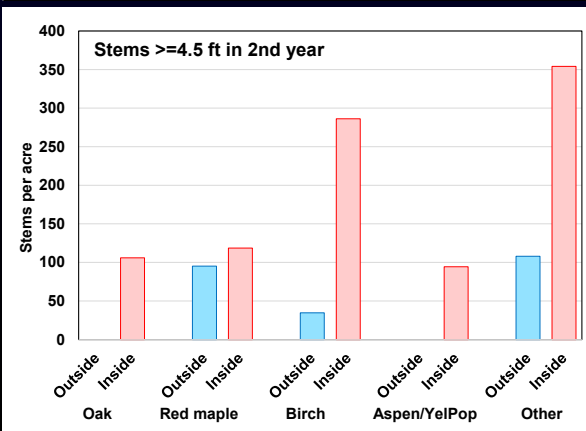


True oak seedlings inside wall – 2-years-old, Nepaug

So, a triple whammy outside the walls

2nd year survivors (%)		
Species	Inside	Outside
Northern red oak	48%	15%
Hickory	70%	34%
Sugar maple	49%	25%
Red maple	77%	71%
Yellow-poplar	84%	90%

Outside walls	Height (feet)	
	1st year	2nd year
Oak	1.1	2.2
Hickory	1.1	2.2
Sugar maple	0.8	0.9
Red maple	1.8	3.7



(1) Fewer stumps of desired species developed sprouts.

(2) Sprouts of desired species are shorter and growing slower than red maple.

(3) Few competitive seedlings of desired species.

For quality regeneration



Ralph Nyland

In this order ...

- 1. Shoot the deer**
- 2. Poison the beech**
- 3. Manage the light**

In this order ...

- 1. Reduce browse intensity**
- 2. Control competition**
- 3. Let the sun shine in**
- 4. Control competition II**

Crop tree release

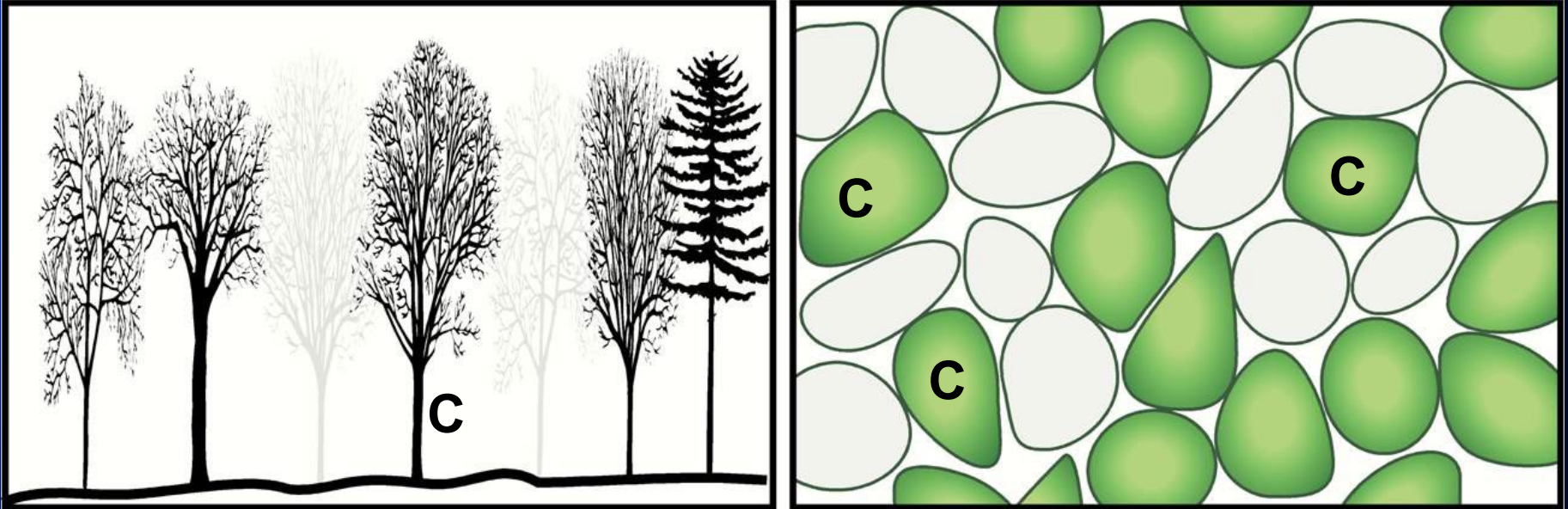
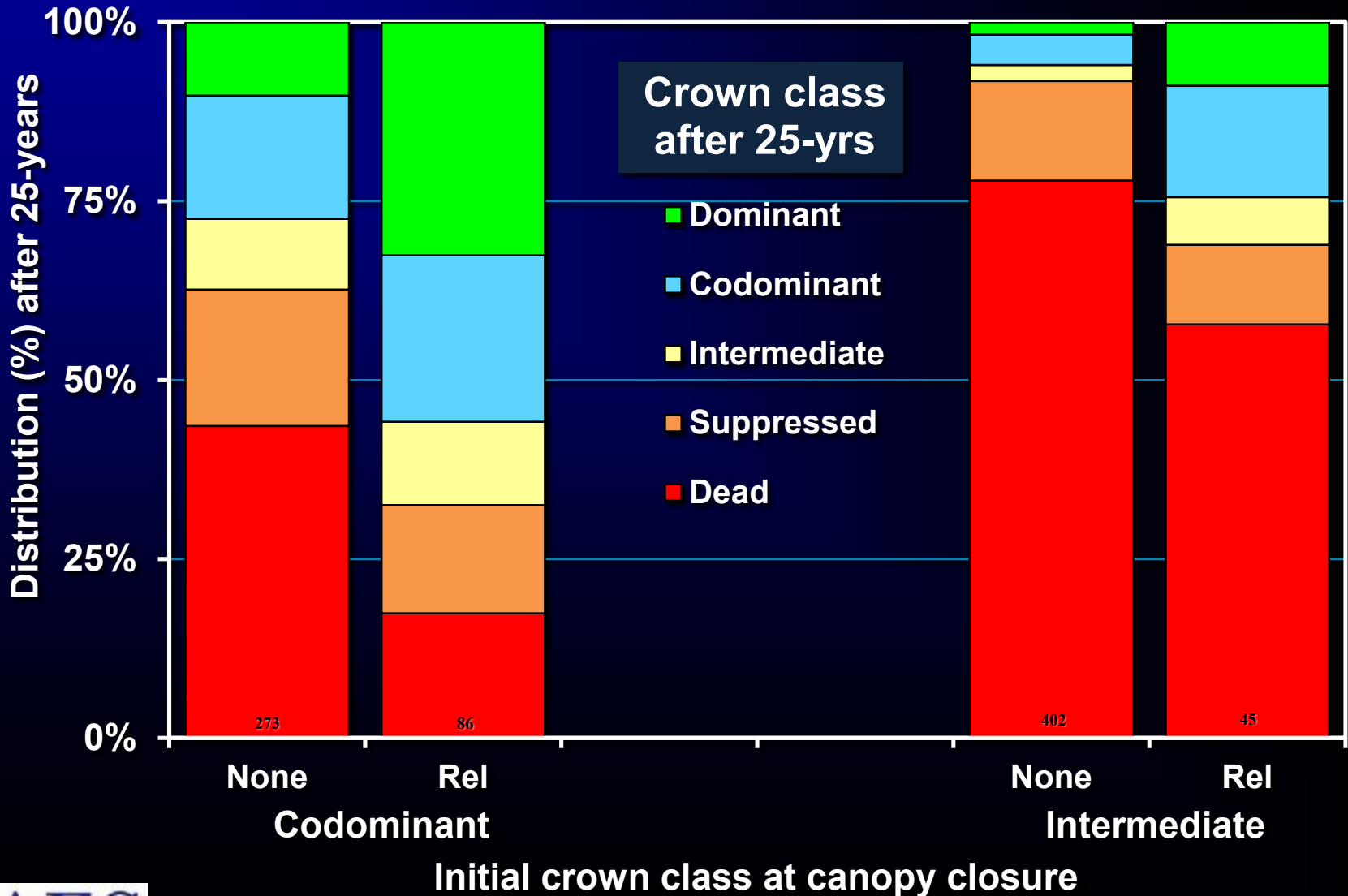


Figure 2. Side (left) and top (right) views of tree crowns following crop-tree release. Crop-trees are indicated by “C”, cut trees are shown in light grey.

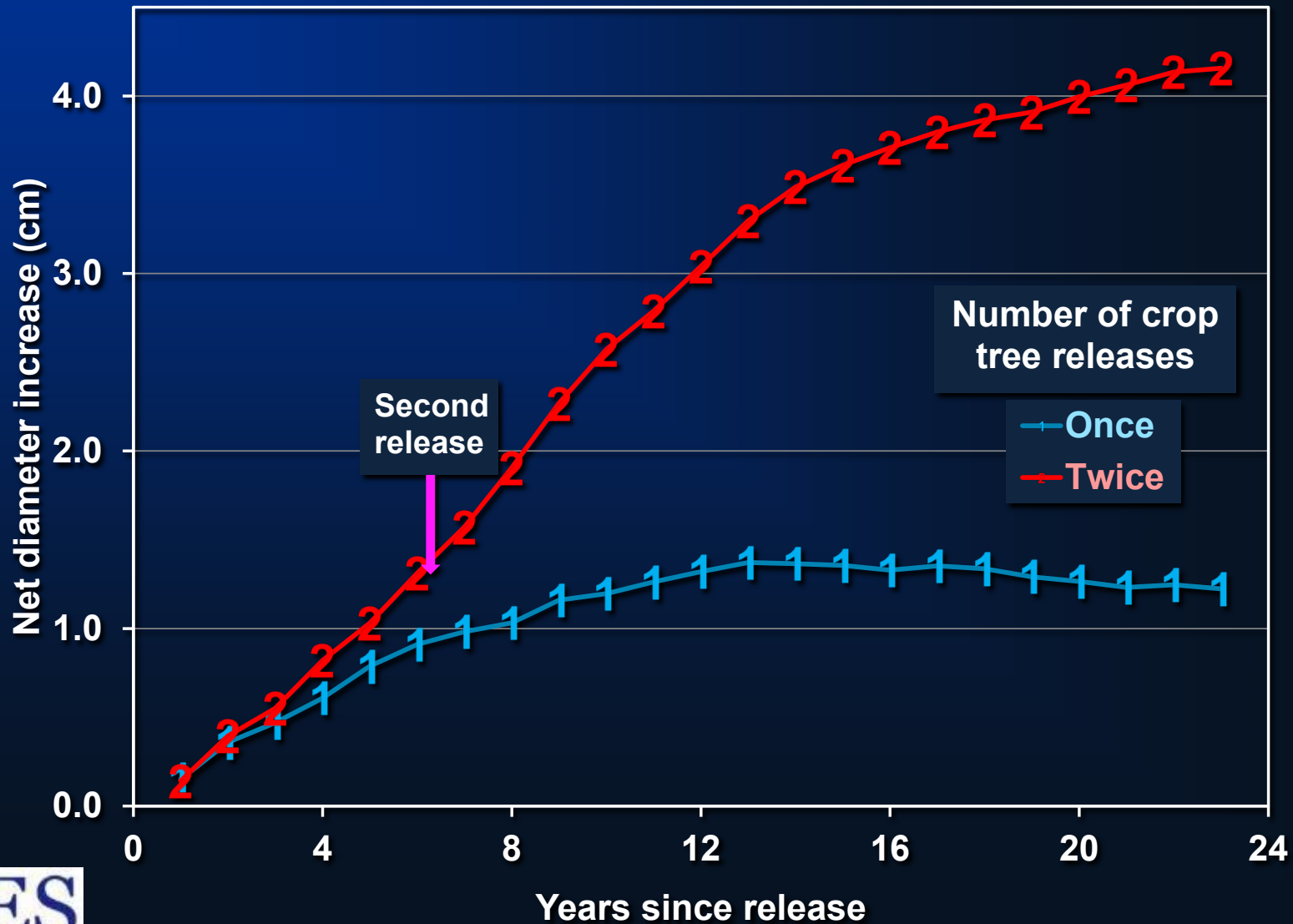


Precommercial red oak release



Rel - minimum 50% canopy release

Needed 2nd release to increase growth



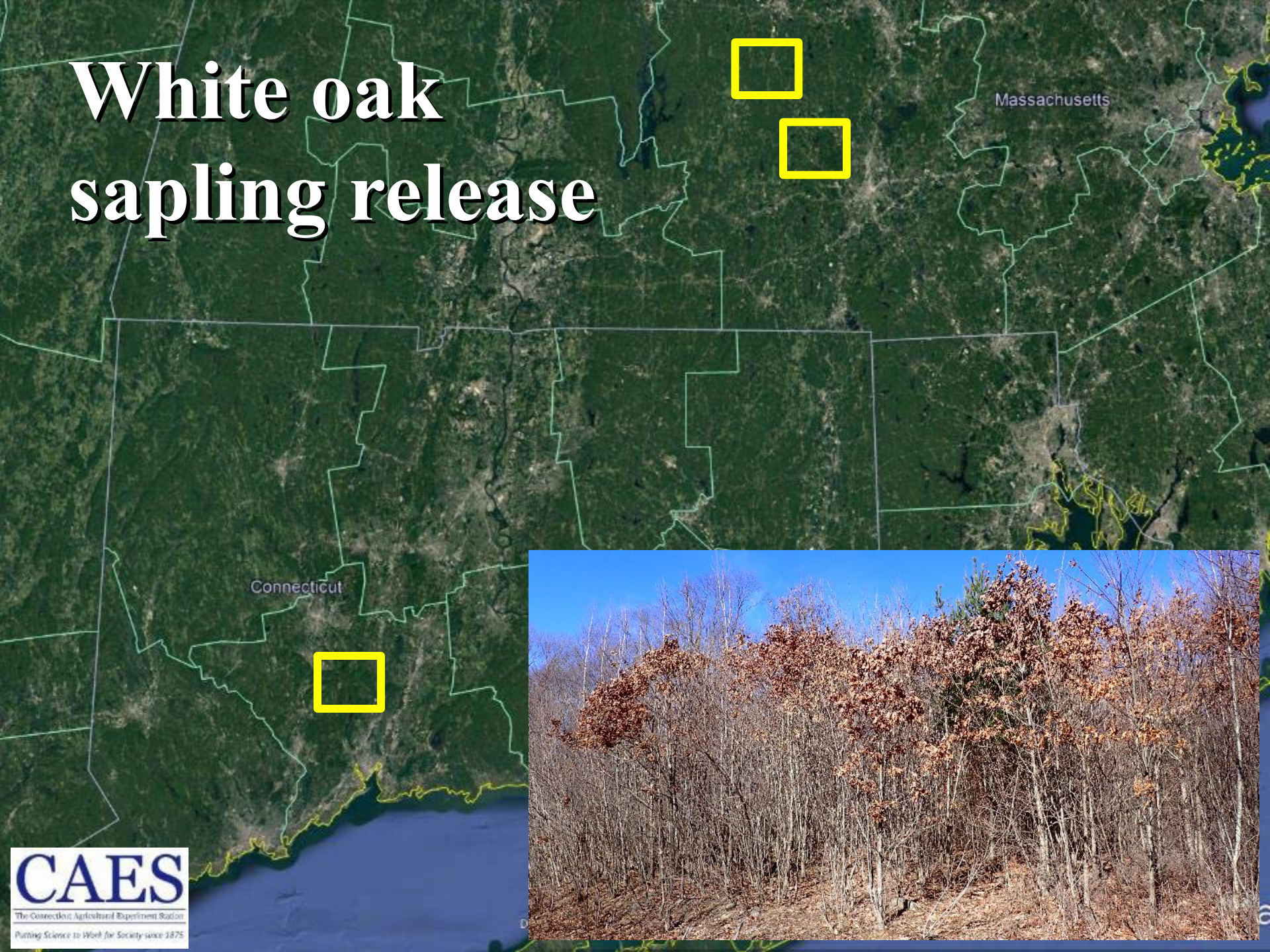


White oak sapling release



USDA Forest Service - GRANT 19-DG-11420000-177. Increasing Resiliency in Southern New England Oak Forests

White oak sapling release



White oak sapling release

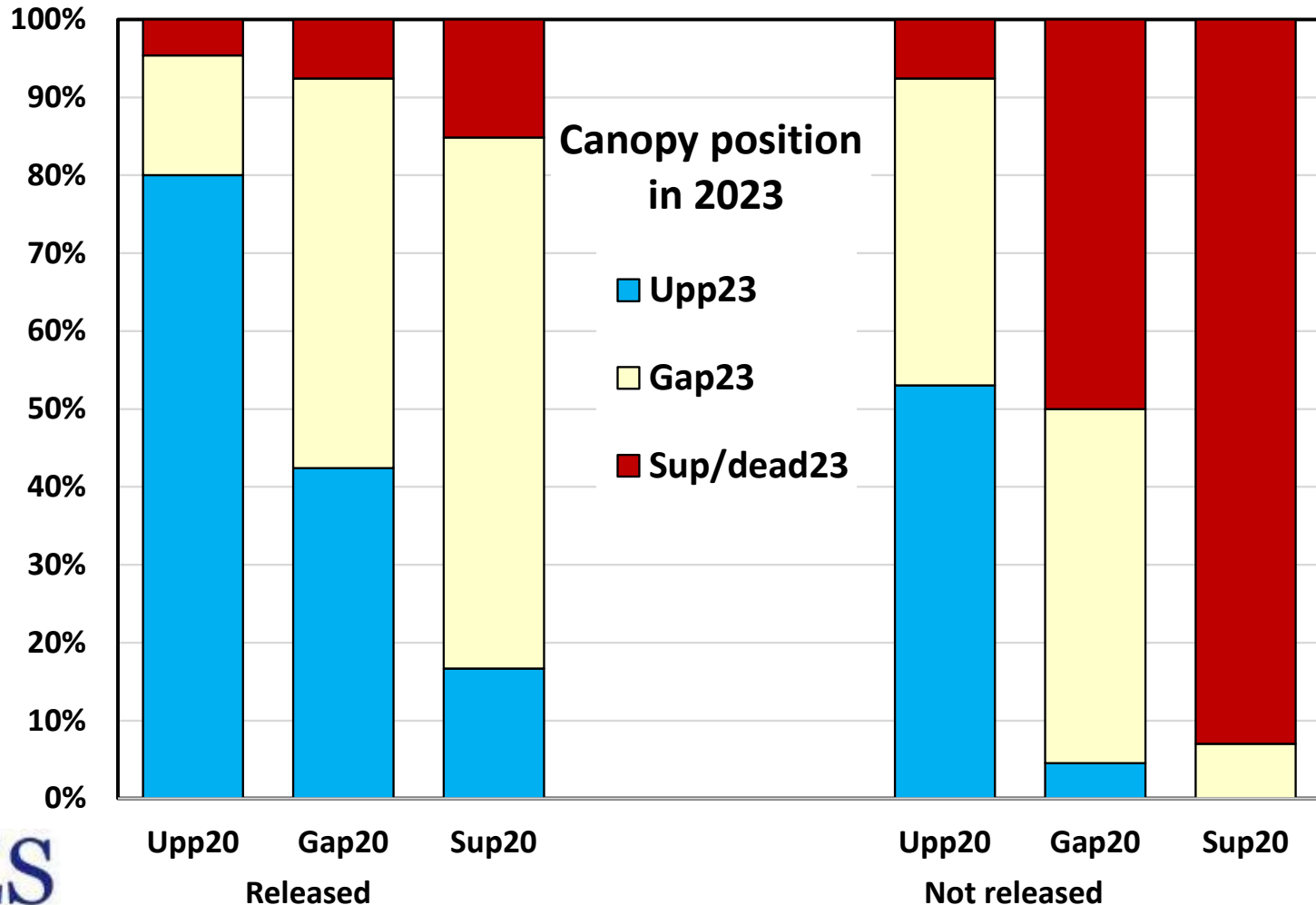
	Released			
	Upper canopy	Intermediate/ Gap	Suppressed	Total
DCRhubb	27	26	26	79
RWAbeth	26	25	25	76
DCRoak	12	15	15	42
Combined	65	66	66	197
	Not released/control			
	Upper canopy	Intermediate/ Gap	Suppressed	Not released
DCRhubb	24	25	25	74
RWAbeth	26	25	24	75
DCRoak	16	16	20	52
Combined	66	66	69	201

White oak sapling release

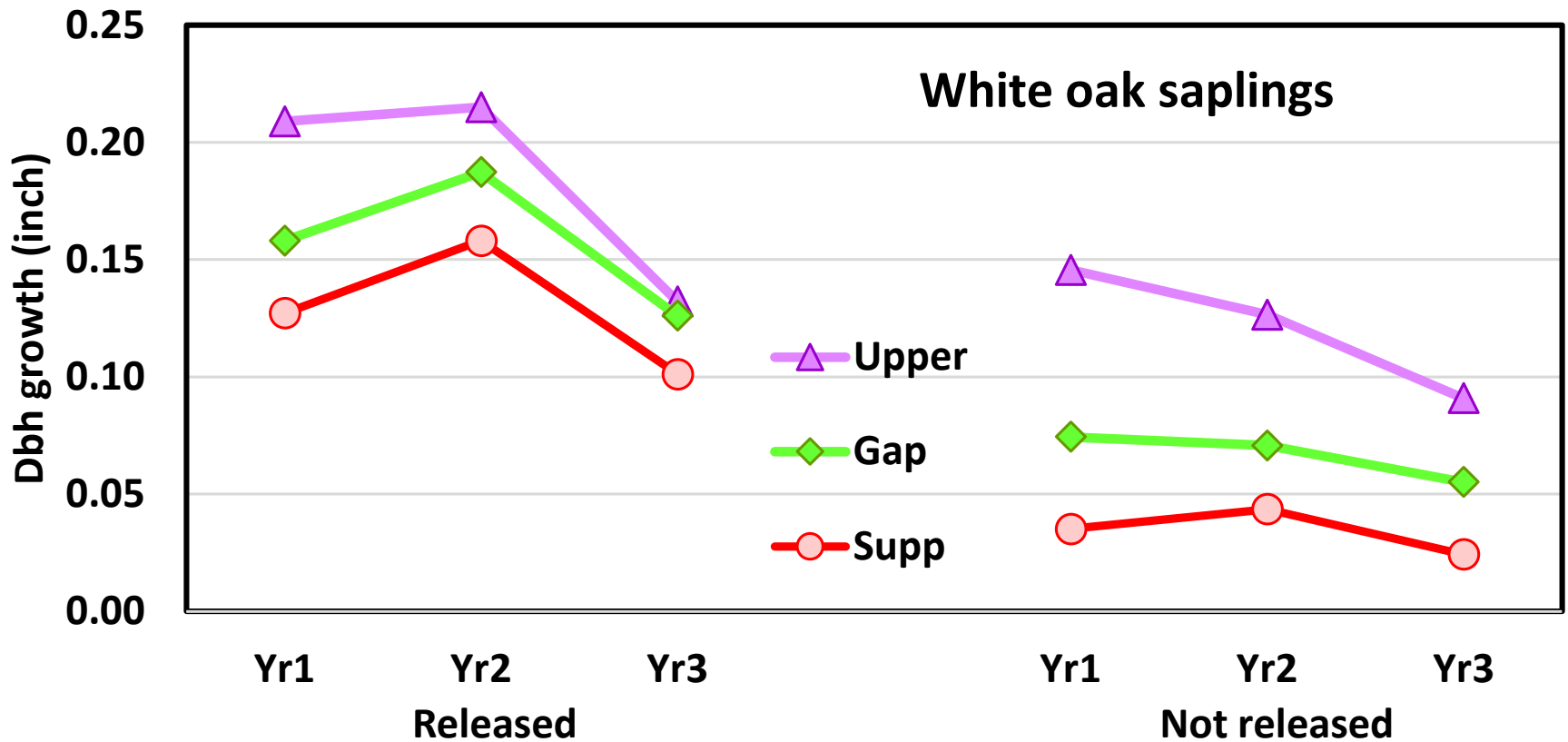
Plot	Subplot	Treatment Date	Number Released	Treatment Time	Minutes Per Tree	CutStems	Notes
RWAbeth	Primary	4/14/2021	37	90	2.4	designated	
RWAbeth	Secondary	4/23/2021	39	120	3.1	free form	
DCRhubb	Primary	4/27/2021	40	75	1.9	designated	9:50-10:35 and 11:10-11:40, JPB battery saw
DCRhubb	Secondary	4/27/2021	39	105	2.7	free form	12:30-2:15, JPB gas chainsaw
DCRoak	Secondary	5/6/2021	42	210	5.0	free form	9:40-11:40, 12:30-2:00 JSW gas chain saws (30-45 m lopping), and [JPB 03 min, 7May2021]
Average			197	600	3.0		

Plot	Treatment Date	Number Released	Treat time (minutes)	Minutes Per Tree	Associated species	Soils
DCRhubb	4/27/2021	79	180	2.3	Aspen, red oak, red maple	Charlton-Paxton association
DCRoak	5/6/2021	42	210	5.0	White pine, black oak	Merrimac fine sandy loam
RWAbeth	4/14/2021	76	210	2.8	Black birch, red maple	Cheshire f.s.l and Manchester gravelly s.l.
Average		197	600	3.0		

Release improved/increased upper canopy persistence over first 3 years



DBH growth increased until 3rd year



Why?

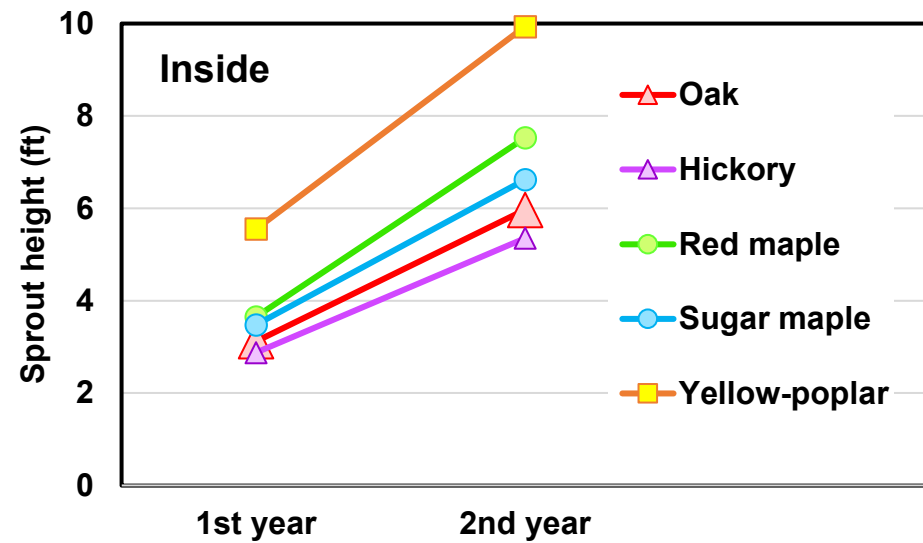
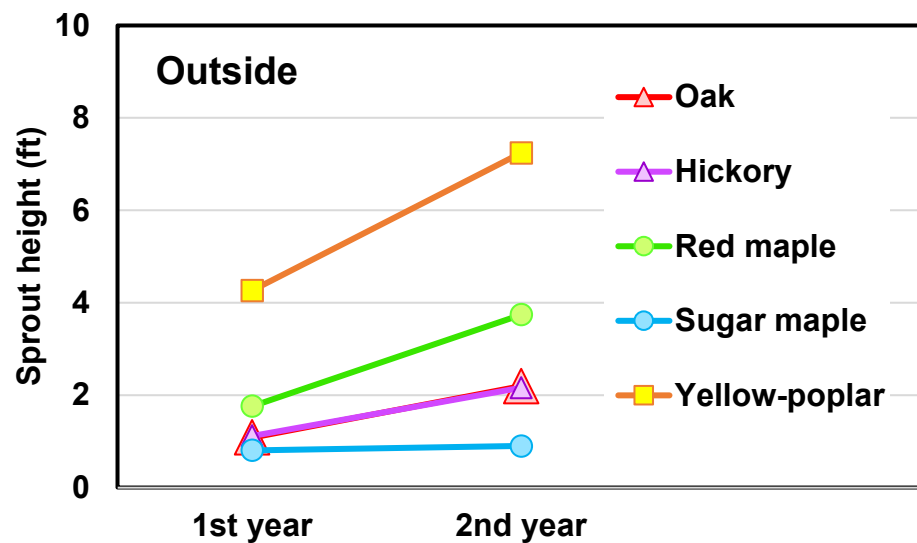


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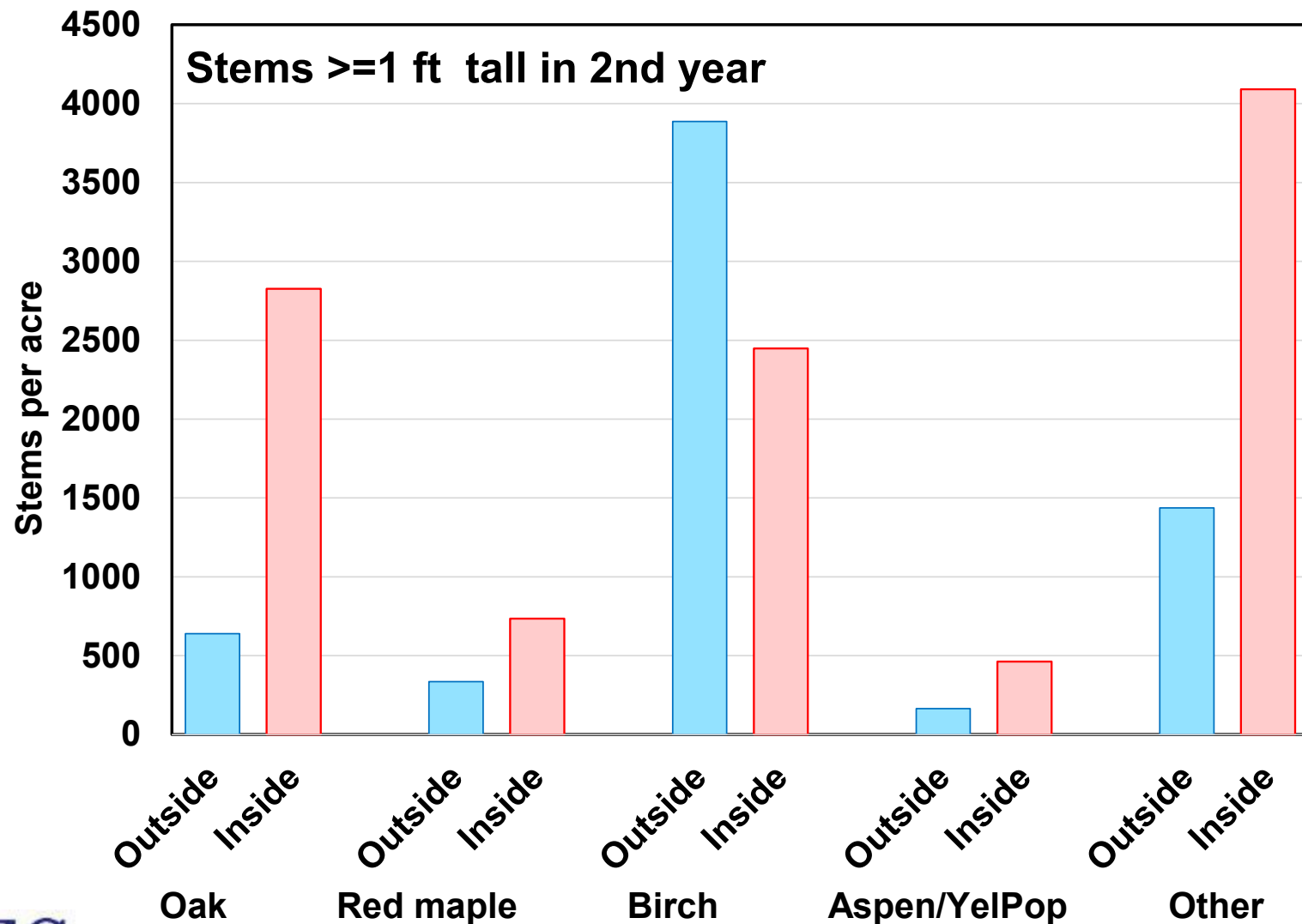
Sprout height growth

Stump sprouts are 3-5 feet taller inside than outside the slash walls and sprouts inside continue to grow 2-3x faster than outside – except for yellow-poplar

		Height (feet)			
		1st year	2nd year	Growth	n
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Sugar maple	Outside	0.8	0.9	0.1	18
	Inside	3.5	6.6	3.1	33
Yellow-poplar	Outside	4.3	7.2	3.0	18
	Inside	5.6	9.9	4.4	46

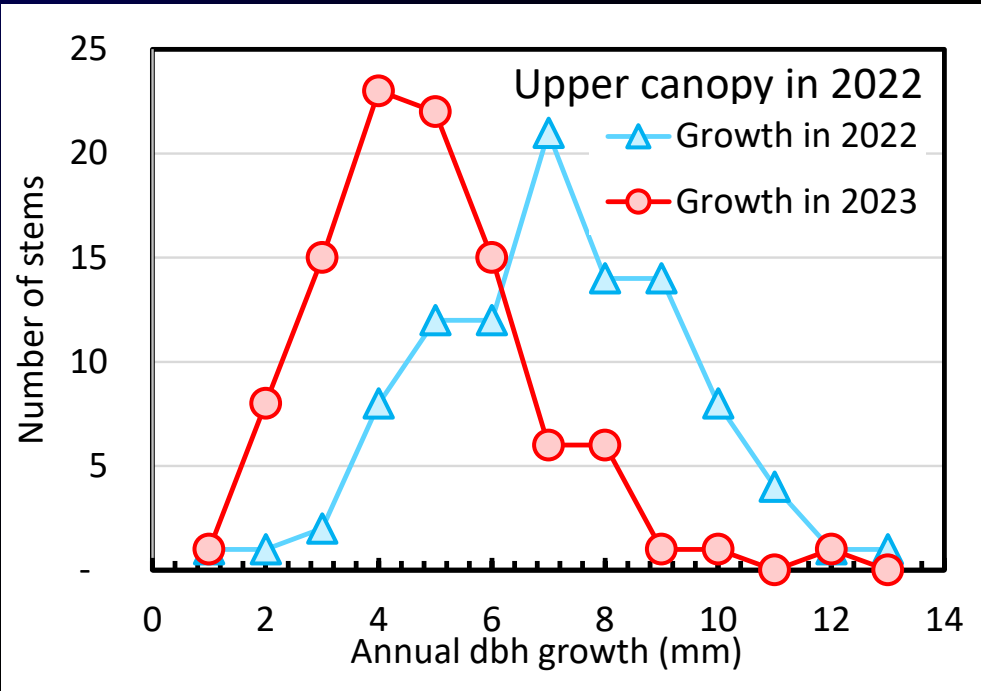
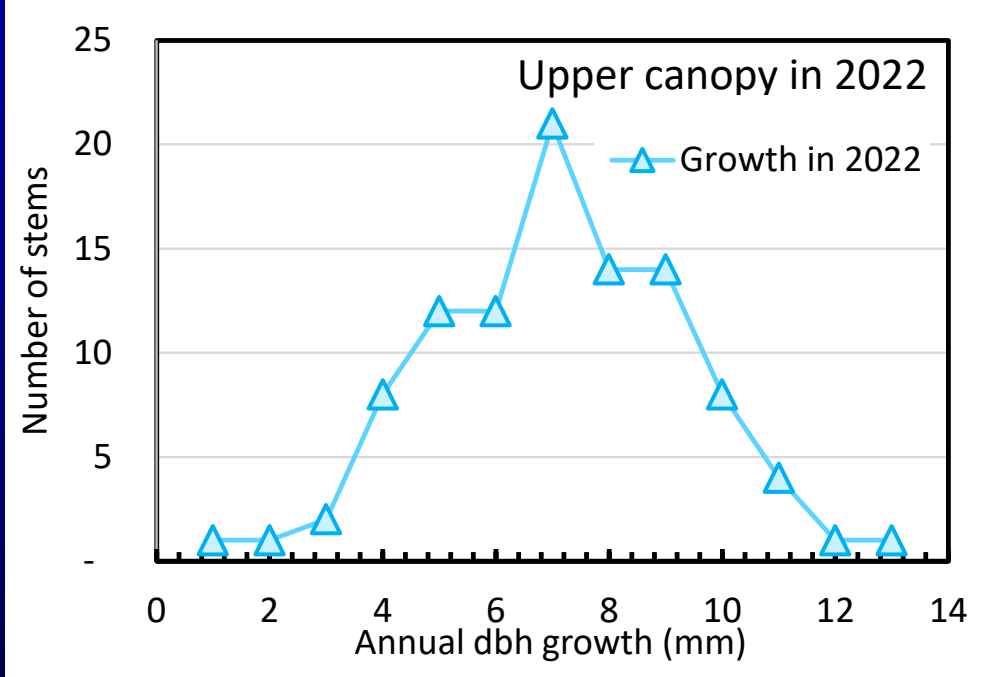


Regeneration density



Sprout height growth

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Oak	Outside	1.1	2.2	1.1	49
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	Inside	5.6	9.9	4.4	46



Bad advice if you want oak and diversity



Leave
the trees



Hug an
alien

Ward, J.S. 2015. Improving competitive status of oak regeneration using stand management and prescribed fires. *Journal of Sustainable Forestry* 34: 105-124.



Encourage
wildlife

Unbalanced age structure

