

Northern White-Cedar

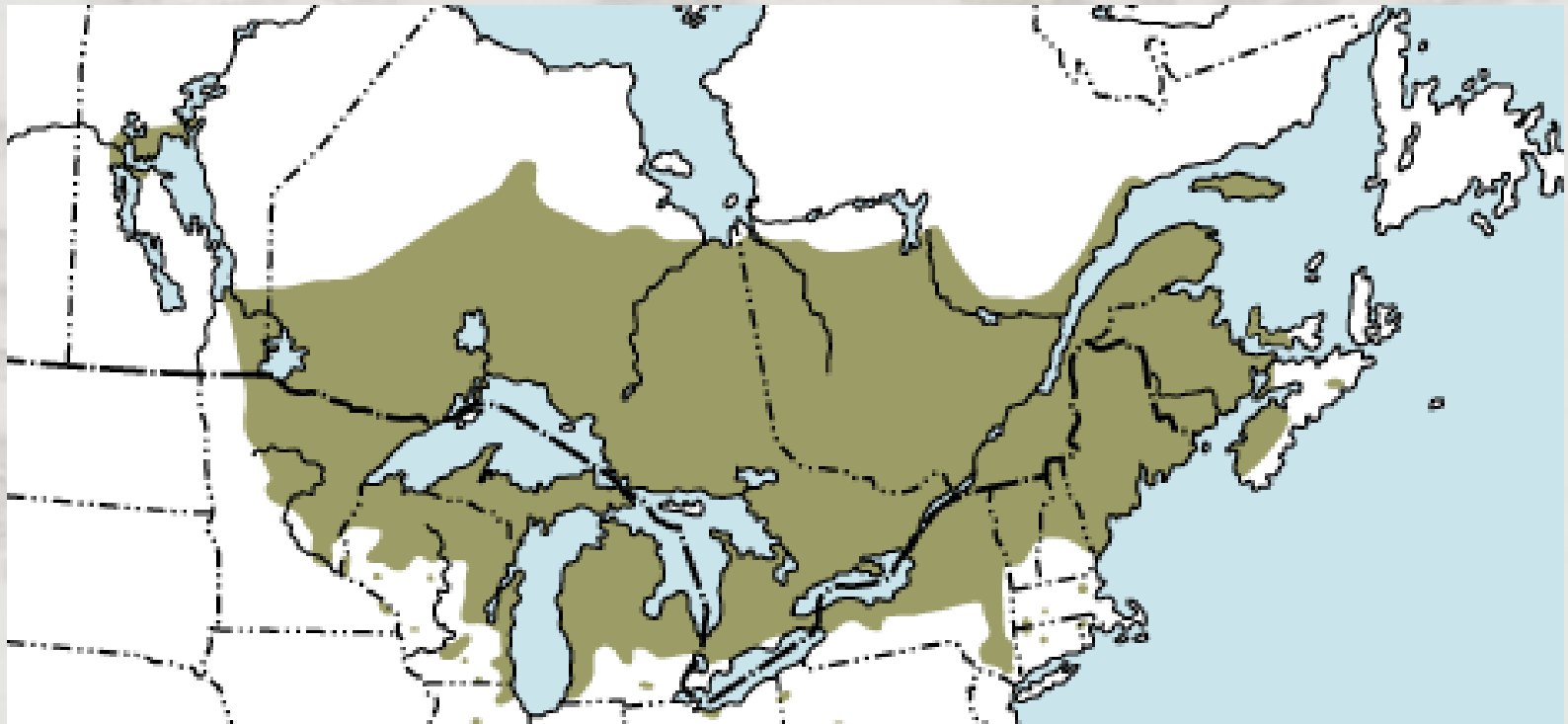
New Guidance for Forest Managers

Laura S. Kenefic

U.S. Department of Agriculture
Forest Service, Northern Research Station



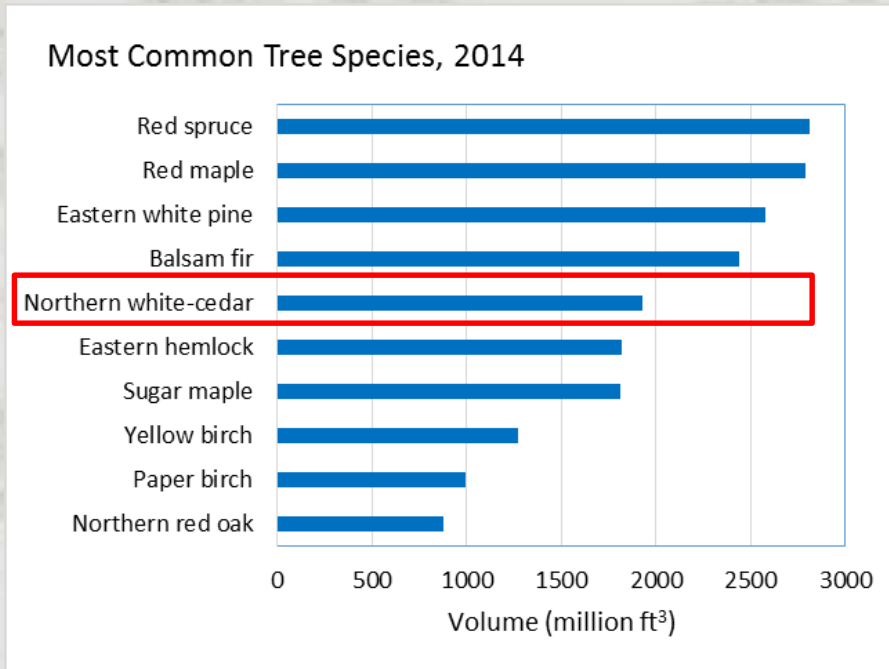
Natural Range of White-Cedar



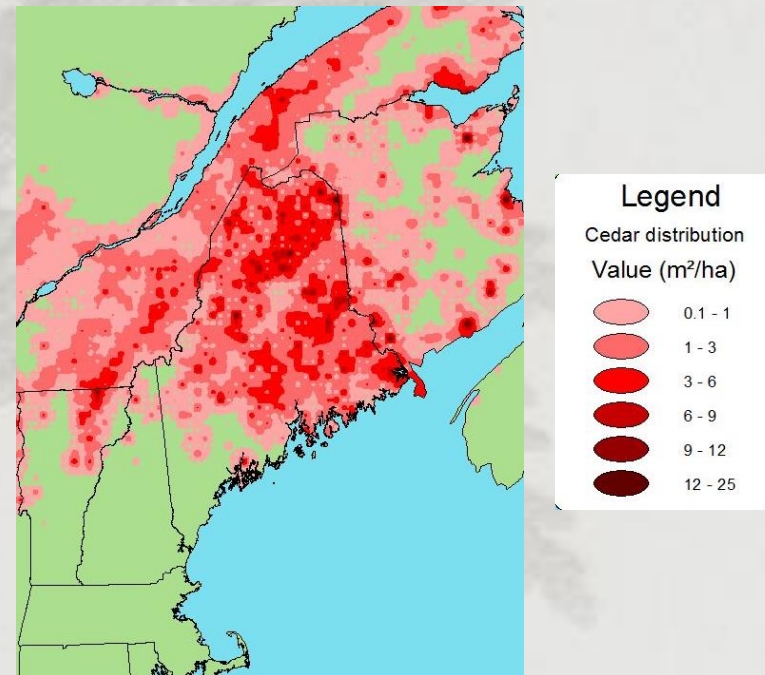
Source: Natural Resources Canada

Cedar in Maine

- One of the most abundant tree species



Forest Inventory and Analysis



Map: Eric Forget, Nova Sylva

Trends

- Reductions of cedar across its U.S. range
 - Harvest exceeds growth in some regions
 - Area of cedar forestland declining
 - Recruitment failures
- Concerns about resource sustainability
 - Wildlife habitat
 - Commodity production

Commodity Production

- 9 to 12 million $\text{ft}^3 \text{yr}^{-1}$ harvested and transformed into products in New England, Ontario, Quebec
- \$15 to \$20 million yr^{-1} in mill-delivered log revenues



Biodiversity Considerations



Photo by KaDonna Randolph



Photo by N.B. Hunter



Photo by Rick Dionne

Maine deer herd rebounding nicely

BY JOHN HOLYOKE
BDN STAFF

BANGOR — Ever since two consecutive harsh winters devastated the state's deer herd — especially those animals that lived in northern Maine — hunters have been impatiently waiting for good news.



Kantar

Here it is: The herd is on the rebound, and the man who has served as the state's top deer biologist said he expects the situation to continue to improve.

An important thing to consider, according to Lee Kantar of the Maine Department of Inland Fisheries and Wildlife, is that deer-rich areas of the state aren't the only places where the herd has seen rapid growth. That trend is also taking place in far northern Maine, where the fall 2012 buck harvest reached 203 animals, a level unseen in that region since 1963.

The DIF&W announced last week that the state's total deer harvest in 2012 was 21,365 deer, which marked a 13 percent increase over the 18,839 deer taken in 2011. Even more impressive was the increase in the number of bucks that were taken statewide: 15,271 adult male deer were tagged in 2012, which was an increase of 2,473, or 19 percent.

Kantar said some new data have been derived through a

winters, counting the most recent one, have helped deer survive the winter. And the fact that the deer that would have been most affected back in 2008 and 2009 are now older contributes to a changing scenario for deer.

Typically there aren't many 4-, 5- or 6-year-old deer on a landscape, as many are shot by hunters or die of natural causes. Now, four years removed from those harsh winters, the total deer population is less dependent on those age classes that were decimated in the winters of 2008 and 2009. Add in the fact that state biologists have been very conservative in allowing the harvest of female deer (which can typically only be shot by hunters holding an any-deer permit), and the recovery-in-progress makes sense.

"Last year demonstrated that we're getting back to a harvest that we'd seen prior to 2008," Kantar said. "That's a really critical element, because there seems like there's a lag time for people to fully understand the positive gains that we have.

"We're expecting bigger and better things in 2013, but in 2012 in southern Maine we were back at capacity. In the far southern part of the state, in Wildlife Management District 20, we had a record buck harvest," he said.

Add that to the marked improvement in WMD 3 north of Caribou in Aroostook County and hunters have good reason to be optimistic, Kantar said.

"We talk about two different Maines, but in the north country we've had four below-average



FILE PHOTO COURTESY OF KELLY DUMOND

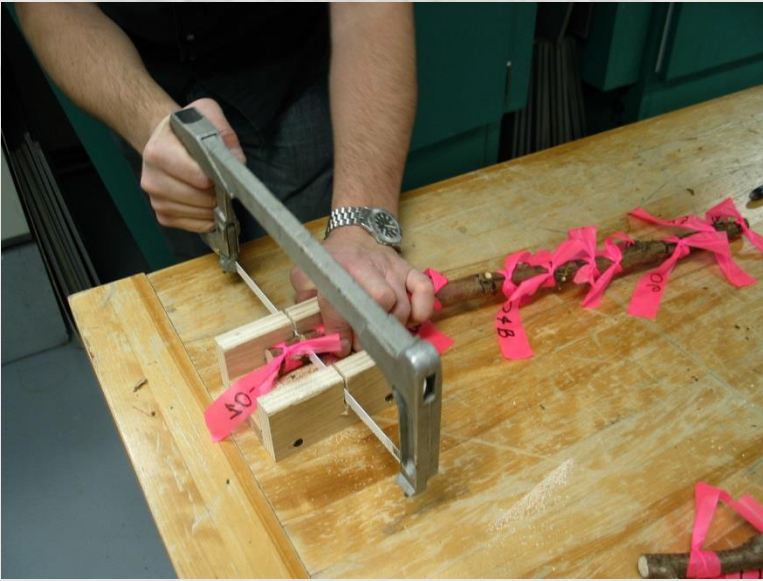
Two deer wait at a photographer as they wait to feed in Allagash near the end of a harsh winter in

Questions

- Regeneration and recruitment
- Growth and decay
- Influence of site
- Responses to silvicultural treatment



What We Learned



Tree Growth

- Stem analysis
- Trees 0.5 to 22 inches DBH
- Reconstructed growth patterns



Photo courtesy of Catherine Larouche

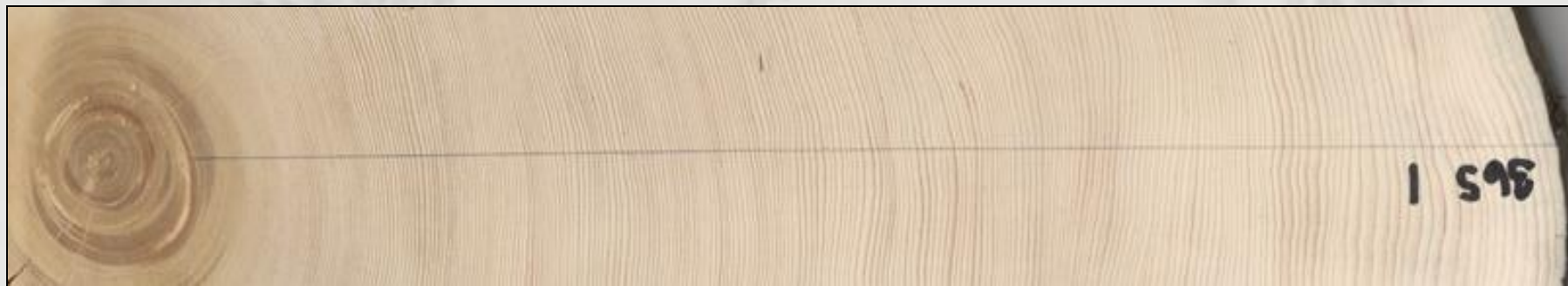
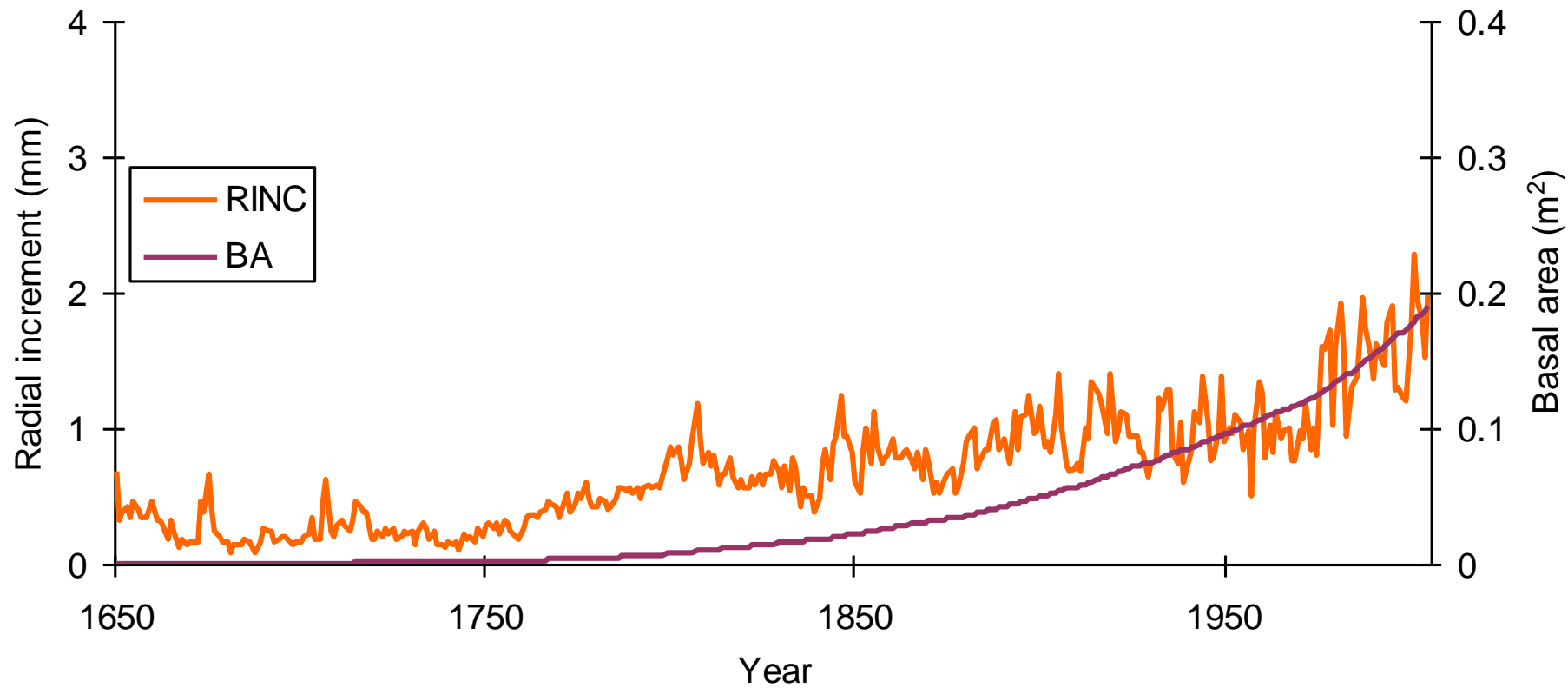


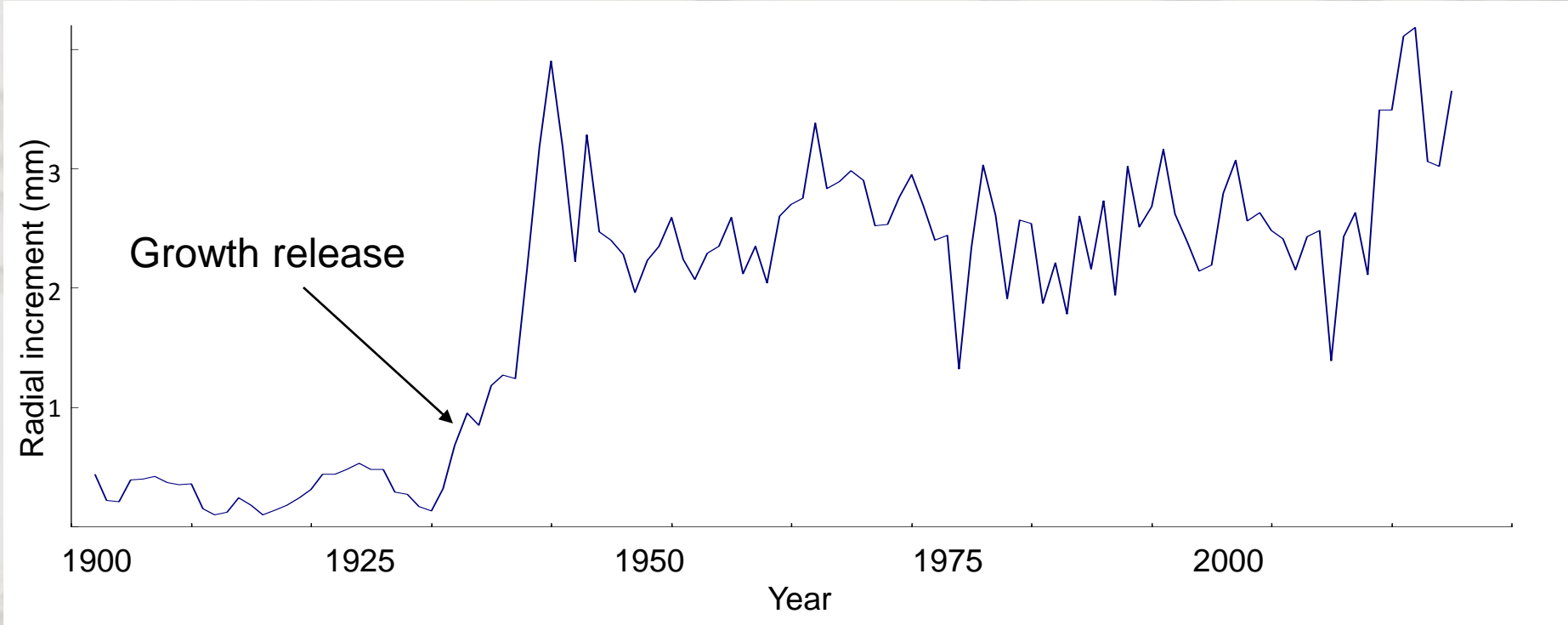
Photo courtesy of Phil Hofmeyer

Observations

- 80% showed initial growth suppression followed by release
- Mean initial suppression > 60 years
- Some trees responded to release after 200 years





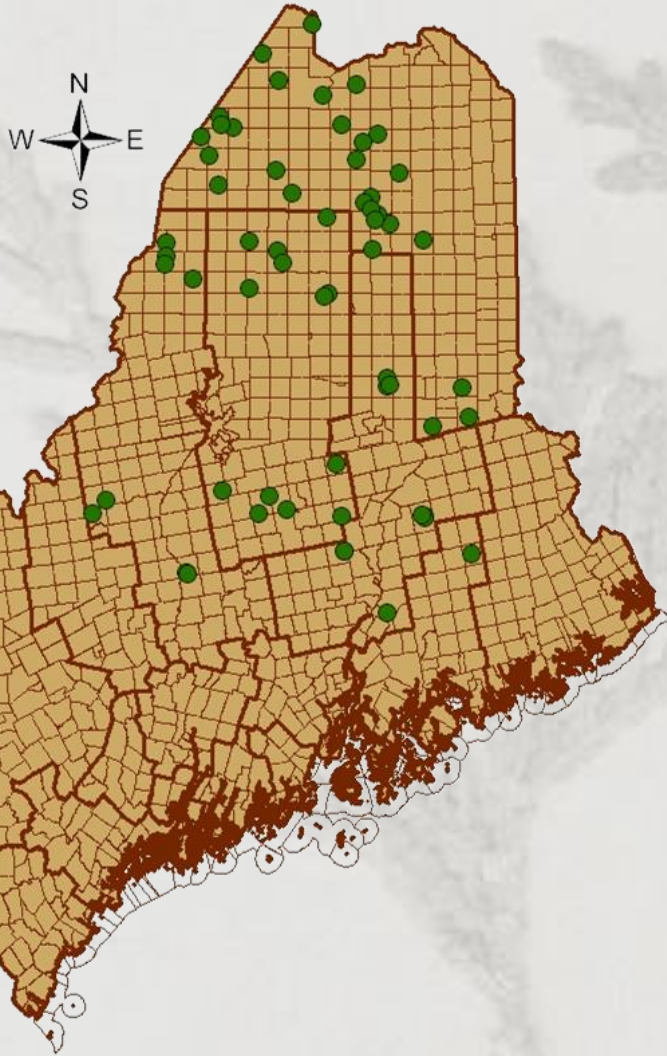


Number of Years to Reach a Given Size from stump height (1 ft.)

Size		Mean (years)	Range (years)
1 in. DBH	Sapling	42.0	9 - 86
5 in. DBH	Poletimber	96.0	28 - 171
9 in. DBH	Sawtimber	139.9	54 - 238
15 in. DSH	Shingle Stock	170.1	81 - 317

DBH = diameter at breast height, DSH = diameter at stump height

Influence of Site



- Cedar volume growth and decay
- 60 mixed-species stands in central and northern Maine



Habitat Types

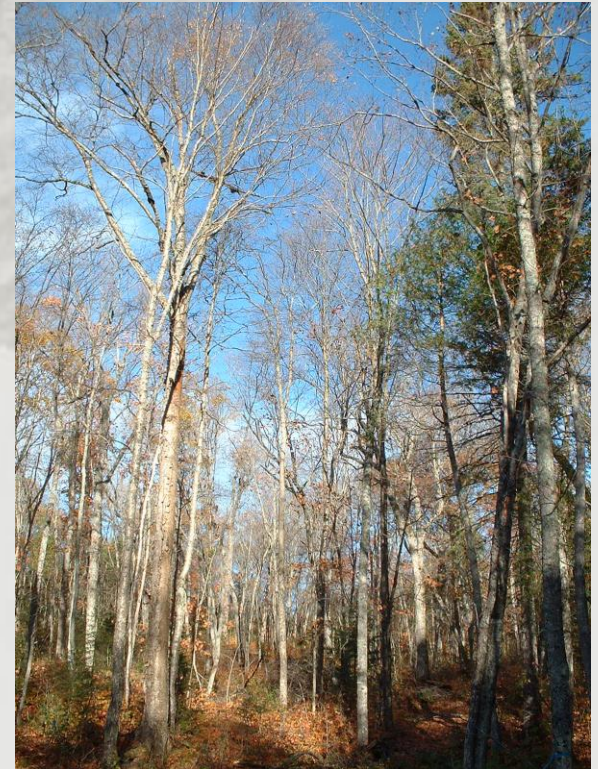
Lowland, swamp



Mid-slope, seepage



Upland



Photos courtesy of Phil Hofmeyer

Photo courtesy of Catherine Larouche

Observations

- On average, cedar growth rates are similar to red spruce but less than balsam fir
- Cedar growth rates on upland and seepage sites are greater than in swamps
- A greater proportion of cedar trees are decayed on upland and seepage sites
= Result of harvesting



Establishment and Early Growth

- Seepage and upland: mineral soil, decayed wood



Photo courtesy of Catherine Larouche



Photo courtesy of Rod Chimner

- Lowland, swamps: mounds (hummocks)

Silvicultural Experiment

120 ft²ac⁻¹



Control

90 ft²ac⁻¹



Selection (25% removal)

60 ft²ac⁻¹



Shelterwood (50% removal)

90-ft. diameter
gaps (0.15 acre)



Patch Cutting

Observations

- Establishment
 - Best in selection and shelterwood cutting
 - Worst in patch cutting
- Growth of established seedlings
 - Positively correlated with light



Influence of Herbivory

- Deer density: 0 versus 15 per mi²
- At both densities, many seedlings < 6 inches
- At high density
 - Few seedlings 6 to 12 inches
 - Almost none > 1 foot



Sapling Recruitment

- Penobscot Experimental Forest, partial harvesting
- ~ 15 deer per square mile
- >90% of white-cedar seedlings and small saplings browsed (2005)

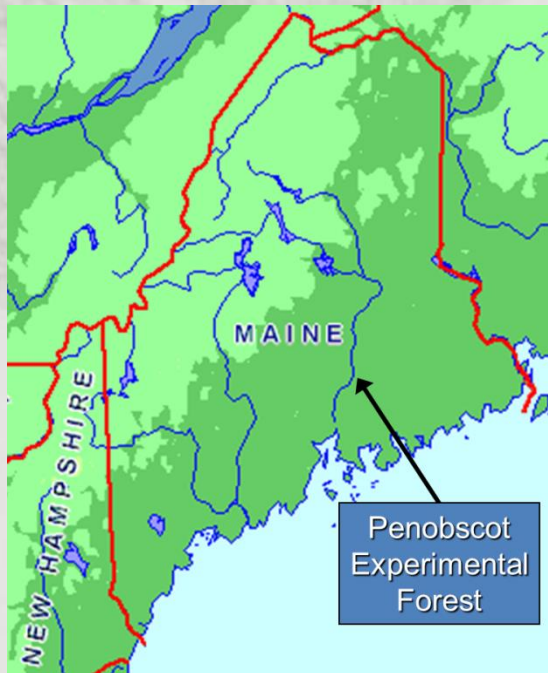


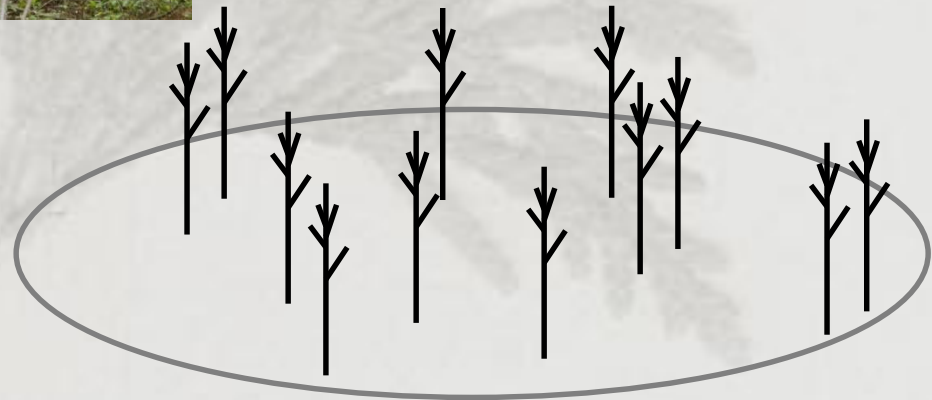
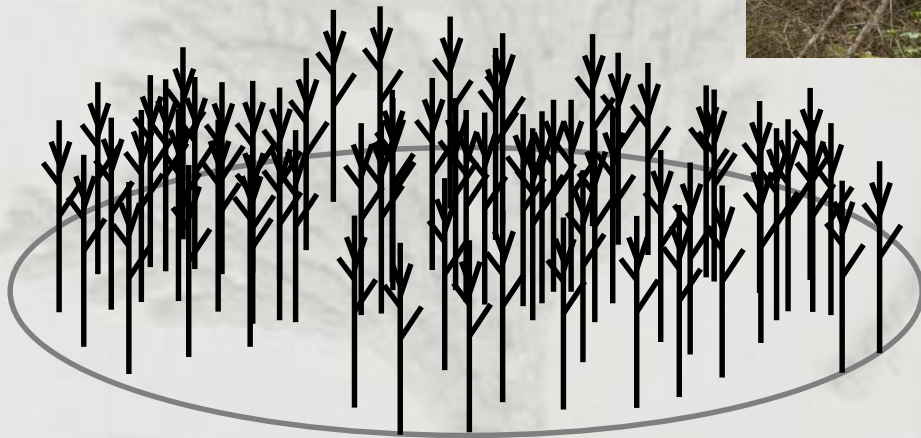
Photo courtesy of Catherine Larouche

Change Over Time



1975

2005



Large cedar saplings: 28 ac⁻¹

Large cedar saplings: 5 ac⁻¹

Key Points

- Often originate beneath the canopy
- Long-lived
- Slow growing
- Withstand long periods of suppression
- Increasing growth over time
- Potential to respond to release



Photo courtesy of Catherine Larouche,

- Regeneration establishment best under a partial canopy
- Growth is best in gaps
- Recruitment problems
- Cedar very vulnerable to logging damage



Photo by Phil Hofmeyer



Photo courtesy of Catherine Larouche

Recommendations: Regeneration

- Take advantage of what is already there
 - Establish
 - Protect
 - Release
- Control substrate and competition
- Consider browsing
- Retain seed trees for more than one rotation



Photo courtesy of Catherine Larouche

Recommendations: Tending

- Use intermediate treatments to improve growth of existing trees
- Protect cedar stems and exposed roots during harvesting



Photo courtesy of Catherine Larouche

Mixed-Species Management

- Multiple-treatment approach



Photo courtesy of CERFO



Photo courtesy of Catherine Larouche

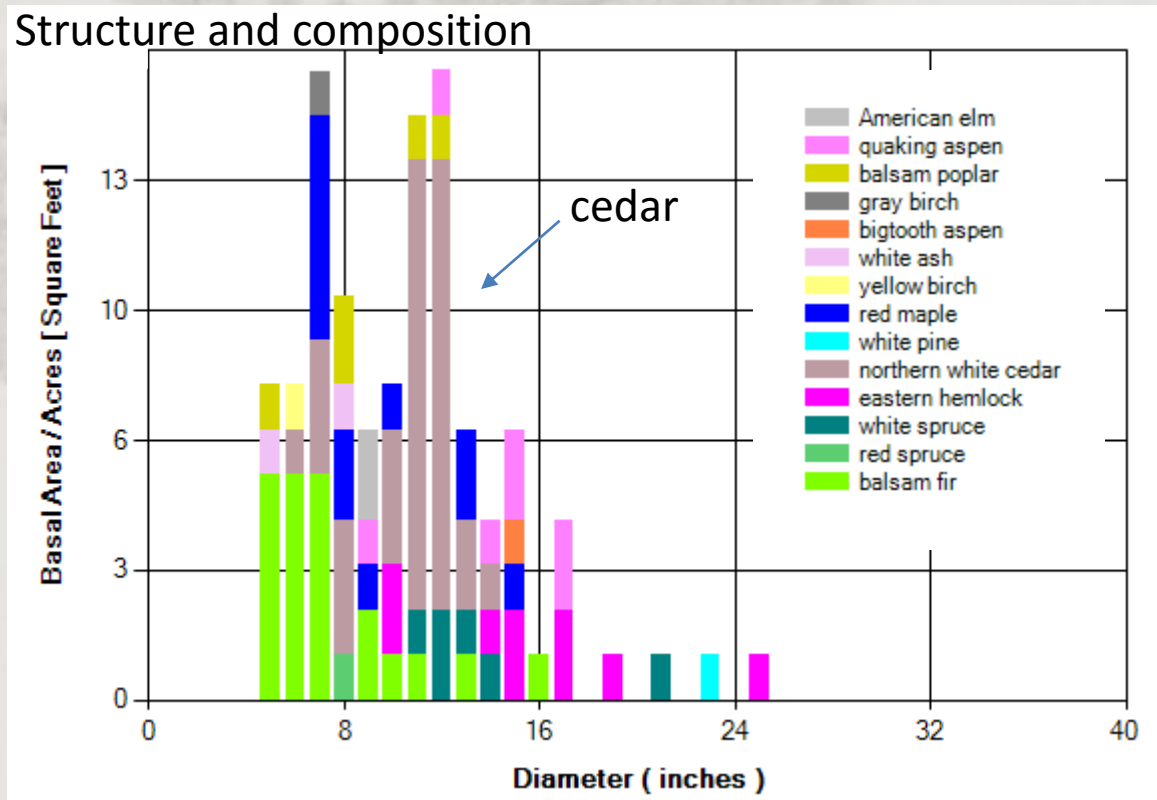
Irregular Shelterwood

- Multiple treatment approach
 - Treat cedar micro-stands
 - Protect and release regeneration
 - Tend immature classes
 - Retain some cedar for > 1 rotation



Cutting Trial

- University of Maine, Bradford lot
- 120 ft²ac⁻¹
- mixedwood
- cedar, fir, red maple, aspen



Graph courtesy of University of Maine Forests Office

Cutting Trial



The Silvicultural Guide

Silvicultural Guide for Northern White-Cedar (Eastern White Cedar)

General Technical
Report NRS-98
2012



English:

<http://www.treesearch.fs.fed.us/pubs/41699>

French:

<http://cfs.nrcan.gc.ca/publications?id=34189>

Coming Soon



Photo credit: The Nature Conservancy



Photo courtesy of Catherine Larouche

QUESTIONS?

lkenefic@fs.fed.us

This presentation includes work by these Cedar Club researchers:

- Catherine Larouche, Ministère des ressources naturelles et de la faune du Québec
- Jean-Claude Ruel, Université Laval
- Jean-Martin Lussier, Canadian Forest Service
- Phil Hofmeyer, Morrisville State College
- Laura Kenefic, U.S. Forest Service
- Bob Seymour, University of Maine
- Aaron Weiskittel, University of Maine
- Shawn Fraver, University of Maine
- Nathan Wesely, University of Maine
- Rod Chimner, Michigan Tech



Cedar Field Tour, Ashland, Maine (2013)



Cedar Field Tour, Lower Enchanted Township, Maine (2015)