

# Herbicide, PCT and Commercial Thinning

## *CTRN & Austin Pond Studies*

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Cooperative Forestry Research Unit

**NERCOFE 2015 Workshop**  
March 10<sup>th</sup>, 2015

**Wells Conference Center, University of Maine**



# What is the CFRU?

*Partnership between Maine's  
forest landowners and  
University of Maine to solve  
most important problems  
facing managers of Maine's  
commercial forestlands*



# CFRU Overview

- Formed in 1975
- One of the oldest industry / university forest research cooperatives in the US
- Funded by private forest landowners (Family, TIMO, REIT, industrial), wood processors, government, NGO, and individual contributors



# 35 CFRU Member Organizations

## LANDOWNER / MANAGER:

- Irving Woodlands, LLC
- Wagner Forest Management
- BBC Land, LLC
- Plum Creek Timber Company, Inc.
- Prentiss and Carlisle Company, Inc.
- Seven Islands Land Company
- Clayton Lake Woodlands Holding, LLC
- Maine Bureau of Parks & Public Lands
- Katahdin Forest Management, LLC
- Canopy Timberlands Maine, LLC
- The Nature Conservancy
- Snowshoe Timberlands, LLC
- The Forestland Group, LLC
- Baskahegan Corporation
- Sylvan Timberlands, LLC
- North Woods Maine, LLC
- Appalachian Mountain Club
- Simorg North Forests LLC
- Frontier Forest, LLC
- Downeast Lakes Land Trust
- Baxter State Park, SFMA
- Robbins Lumber Company
- Timbervest, LLC
- St. John Timber, LLC
- EMC Holdings, LLC
- Mosquito, LLC
- New England Forestry Foundation

## WOOD PROCESSOR:

- SAPPI Fine Paper
- UPM Madison Paper

## CORPORATE and INDIVIDUAL:

- ReEnergy Holdings, LLC
- Huber Engineered Woods, LLC
- James W. Sewall Company
- Forest Society of Maine
- LandVest
- Field Timberlands





# **CT Knowledge 1999**

- **Limited history of thinning in spruce-fir forest**
- **Precommercial thinning (PCT) – new forest condition**
- **No experience or data on commercial thinning response**

# Growth & Yield



## **THINNING IN THE MAINE FOREST**

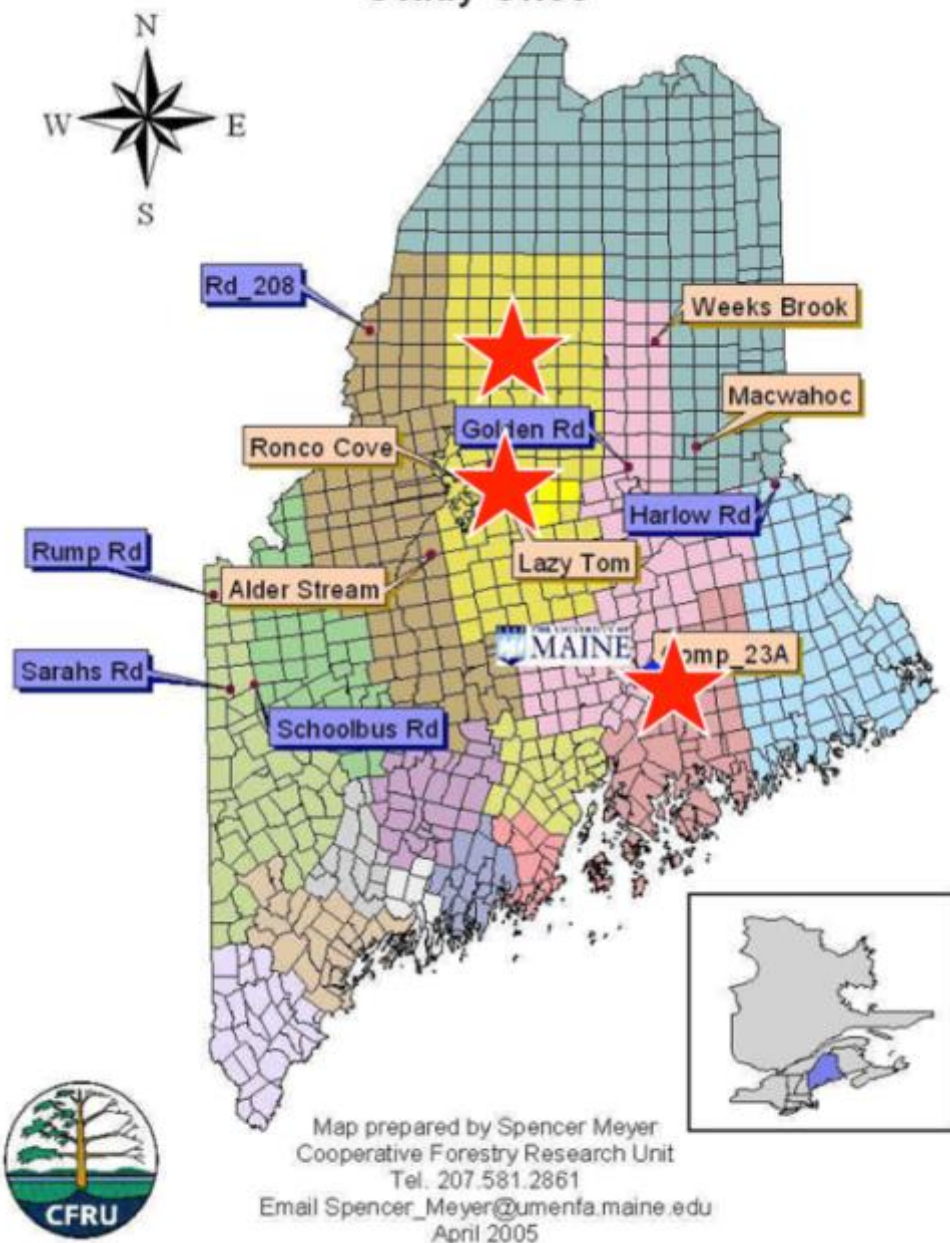
*November 15 - 16, 1999  
Augusta Civic Center  
Augusta, Maine*

**Conference Proceedings**

- **When to thin?**
- **How much to remove?**
- **What method is best?**



# CFRU Commercial Thinning Research Network Study Sites



## Commercial Thinning Research Network (CTRN)

- 15 Sites
- Established 2000-01 and 2010
- Two studies:
  - 6 Natural stands
  - 6 PCT stands + 3 new mid-site stands
- ~19,000 tagged trees
- 141,000 re-measurements

# Previously PCT'd Stands



## IP – Lake Macwahoc

Age: 42 yrs  
PCT yr: 1983  
TPA: 1,880 / ha  
DBH: 14.5 cm  
BA: 33.1 m<sup>2</sup>/ha  
Ht: 11.9 m  
Vol: 155.5 m<sup>3</sup>/ha  
RD: 0.364

**Balsam fir dominant with red spruce as minor component**





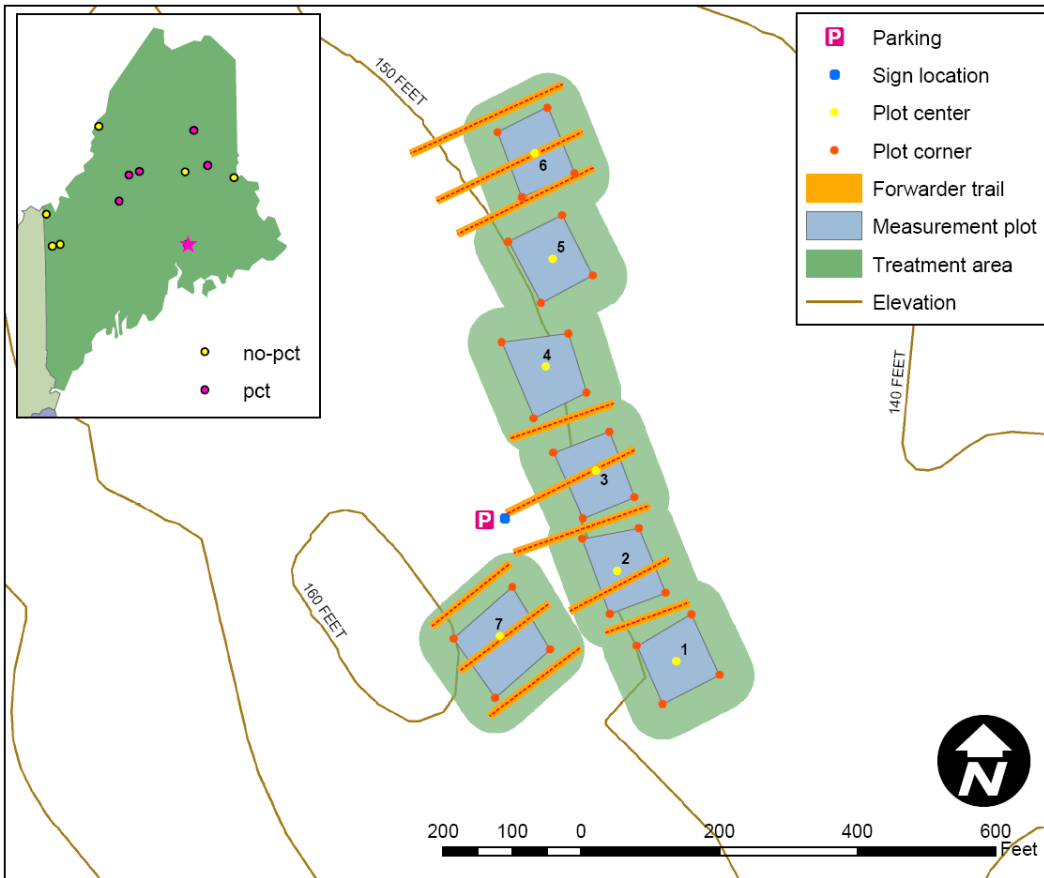
# CT Questions & Treatments

- For PCT stands, what is the influence of:
  - Density reduction (33% and 50% RD)?
  - Timing of entry (Immediate, wait 5 years, wait 10 years)?
    - *recently completed 10-year treatments, not reported here.*



# Experimental Design

- 1.0 ac treatment plots
- 0.2 ac measurement plot
- Randomized complete block design with 6 replications
- Replicated across locations



Penobscot Exp. For. Site Information		Plot Information		
Site name	PEF, Penobscot Exp. For., Compartment 23A Site	Plot	TrtmntDate	Treatment
Township	Bradley	1		Control
County	Penobscot	2	2001-2002	33%
Landowner	University of Maine	3	2001-2002	50%
History	PCT - 1983	4	2011-2012	33%
Plots established	August 2001	5	2011-2012	50%
Commercial Thinning(s)	February 2002, February 2007	6	2006-2007	50%
Location	45-51'-17" N, 68-38'-07" W	7	2006-2007	33%
For more information contact the Cooperative Forestry Research Unit at (207) 581-2893				



Cartographer: Benjamin Gannon  
 Date: August 16, 2007  
 Projection: UTM Zone 19 North  
 Datum: NAD 1983



Unthinned PCT stand at first entry

# Thinning Treatments: PCT Stands

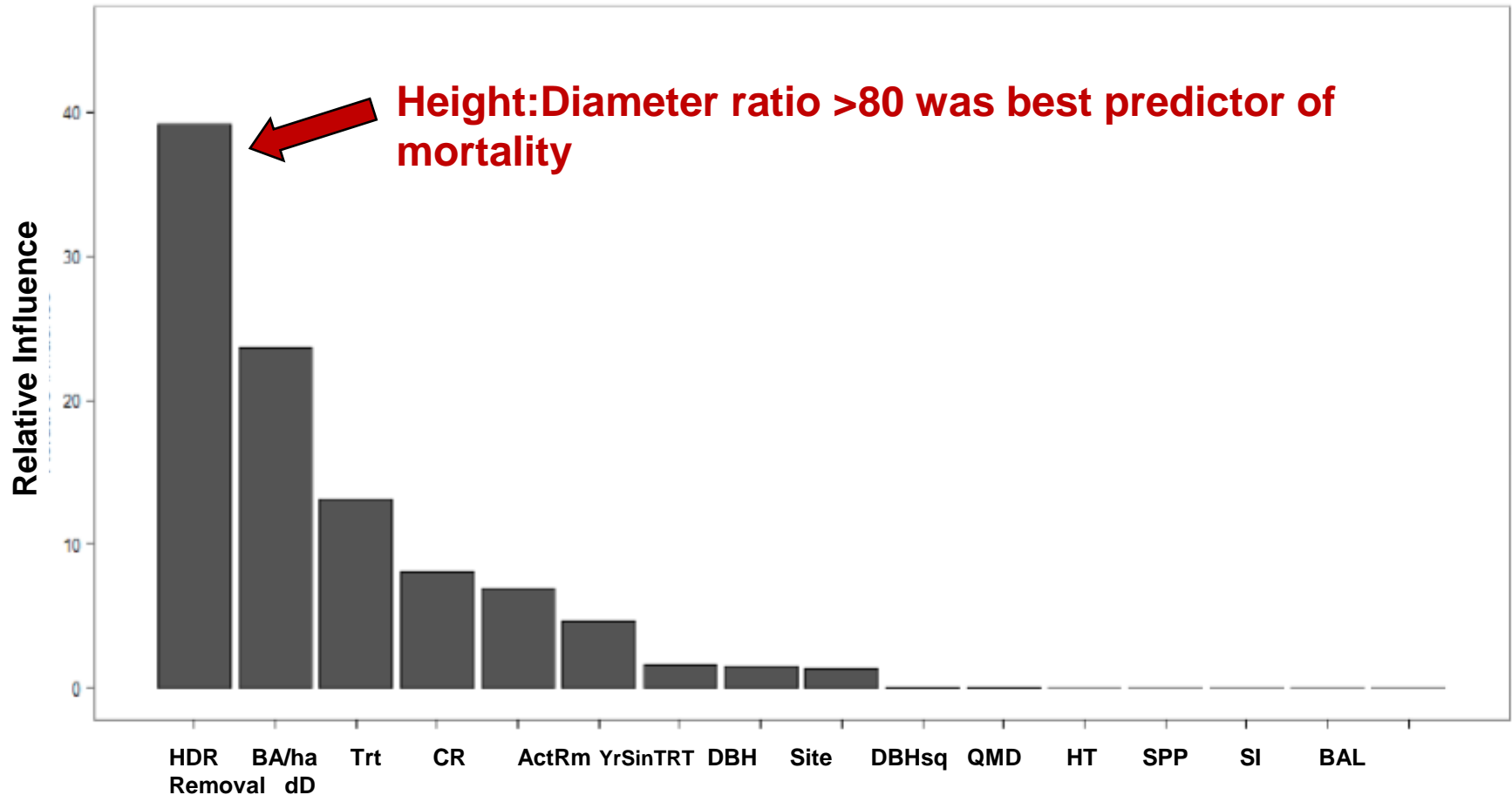


33% removal, first entry in PCT stand

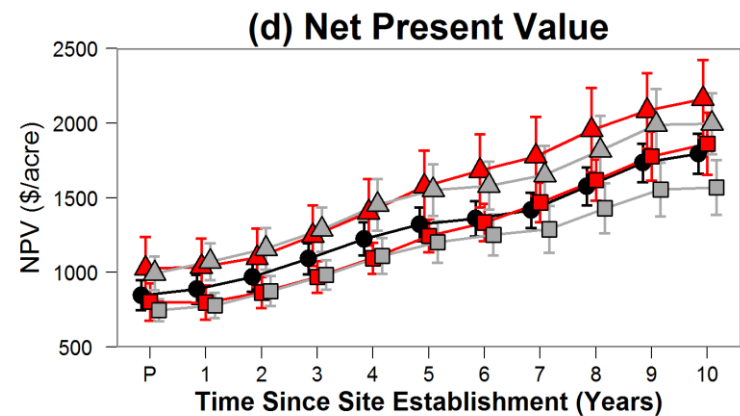
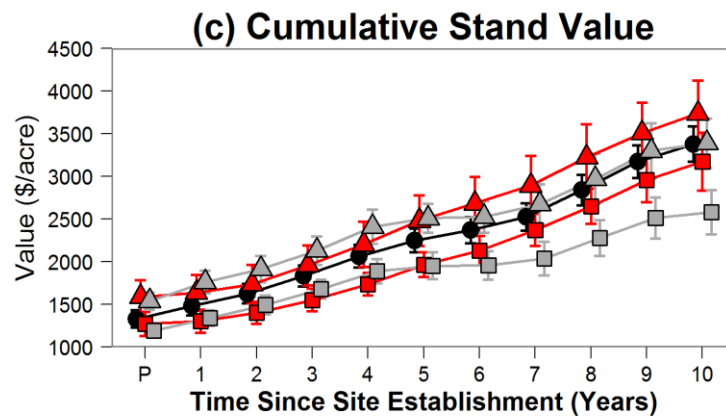
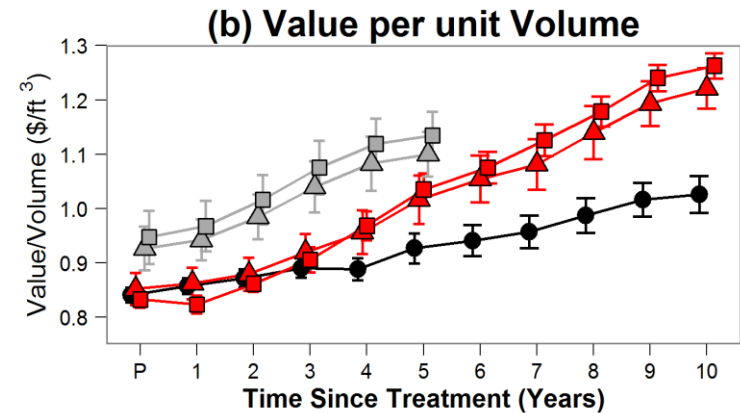
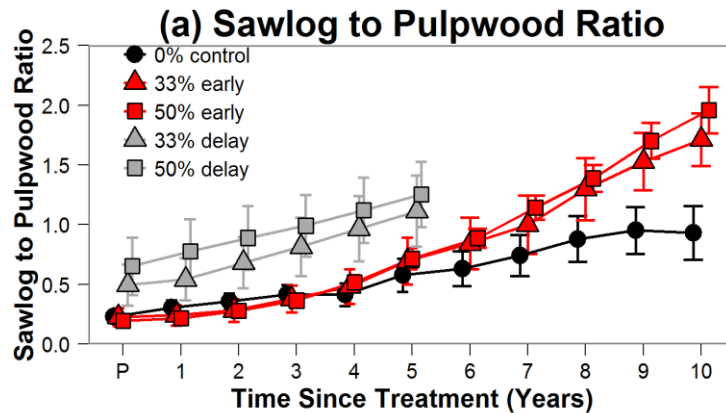


50% removal, first entry in PCT stand

# Best Predictors of Tree Mortality Following Commercial thinning



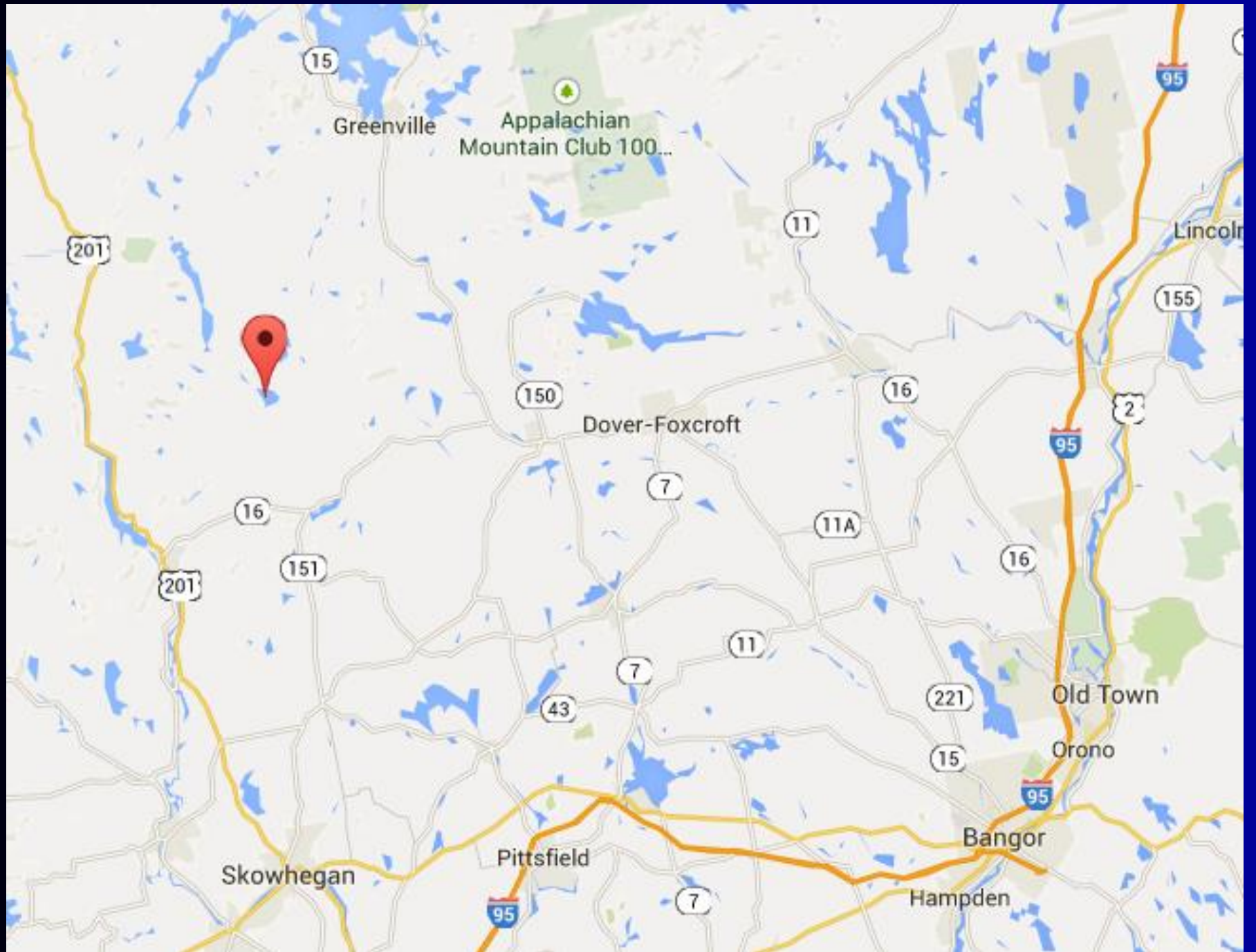
# Results – Products & Value Trends (PCT)



- **SPR highest in delayed CT. Early CT diverging from control**
- **Val/vol highest in delayed CT. Early CT diverging from control**
- **Cumulative value highest in 33% early, lowest in 50% delayed**
- **No significant difference in NPV among treatments**

# Austin Pond Study: History and Long-Term Treatment Effects



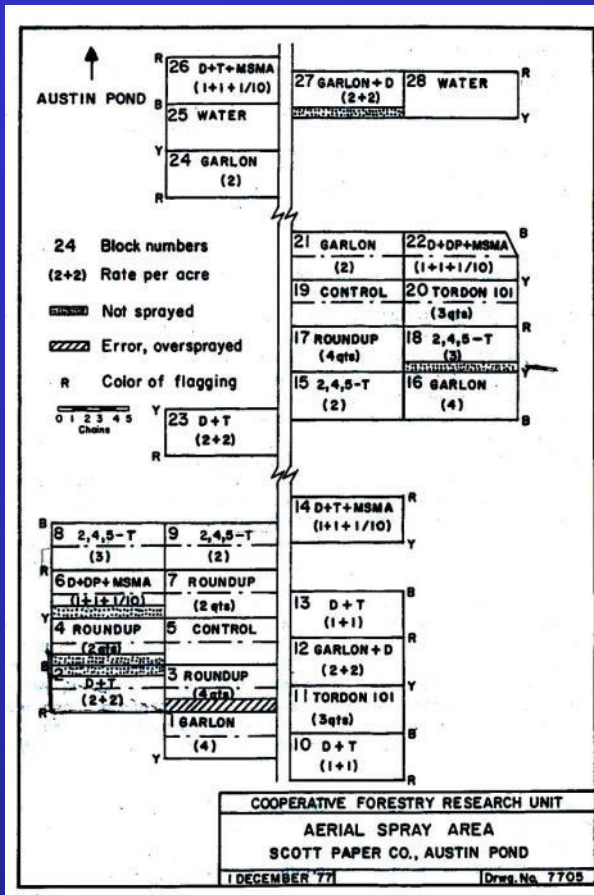


# First treatment wave – Herbicide Trials

Clearcut (1970)

## 1. 1977 – Herbicide Trials

Released  
Unreleased (Control)



- 14 treatments
- 2 replications
- Treatment units  
= 3.3 X 8 chains  
= 218 x 528 ft  
= 2.64 acres

### Historical note:

- First aerial applications of glyphosate and triclopyr in northeastern US forests
- Oldest surviving glyphosate and triclopyr forest plots in US



# Austin Pond Study

July 1978

1 year after herbicide treatment



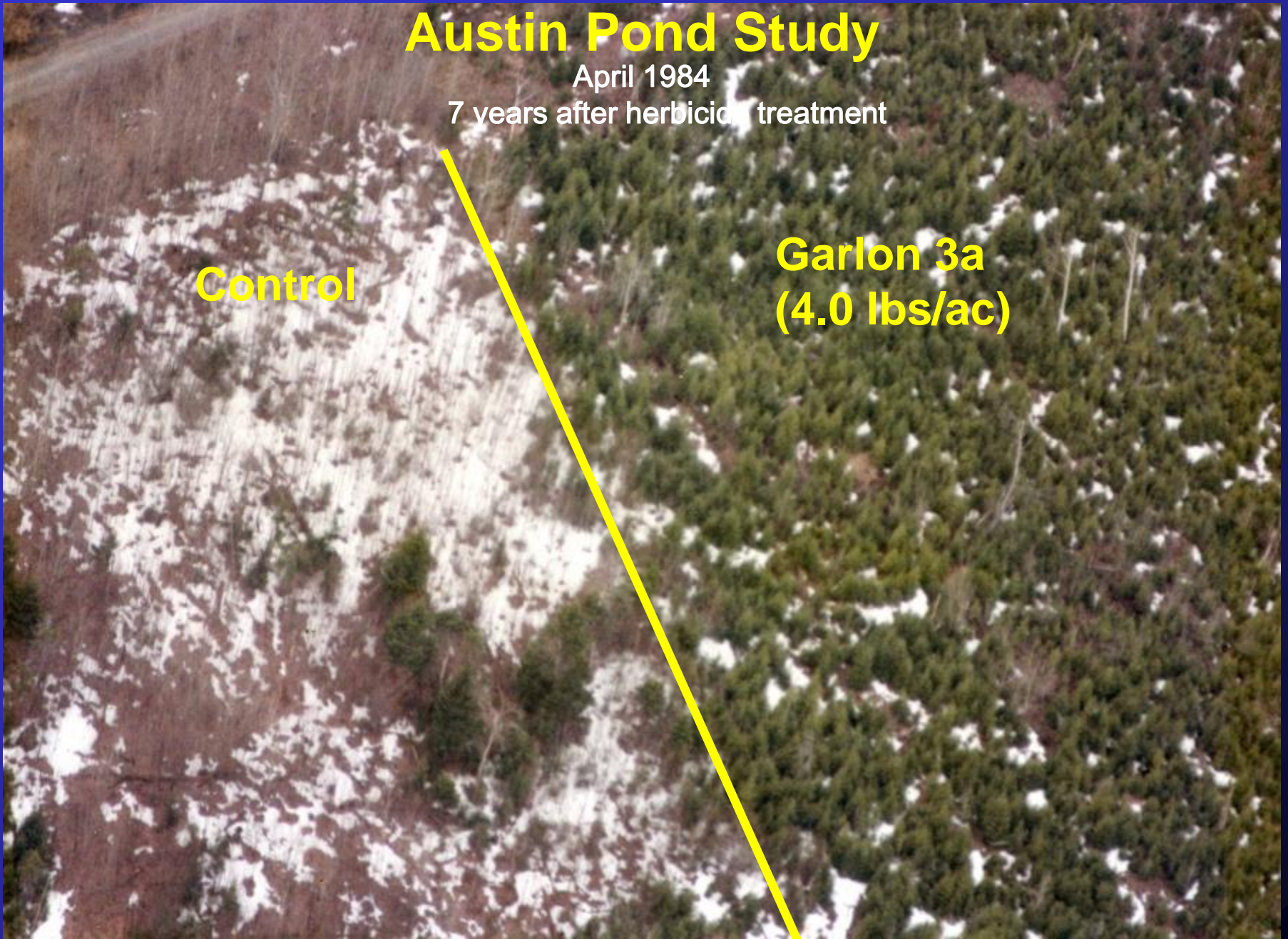
# Austin Pond Study

April 1984

7 years after herbicide treatment

**Control**

**Garlon 3a  
(4.0 lbs/ac)**



# Austin Pond Study

1982, 5 years after herbicide treatment



Unreleased      Released  
**Red Spruce**



Unreleased      Released  
**Balsam fir**

# Second treatment wave - PCT

Clearcut (1970)

1. 1977 – Herbicide Trials

Released

Non-released (Control)

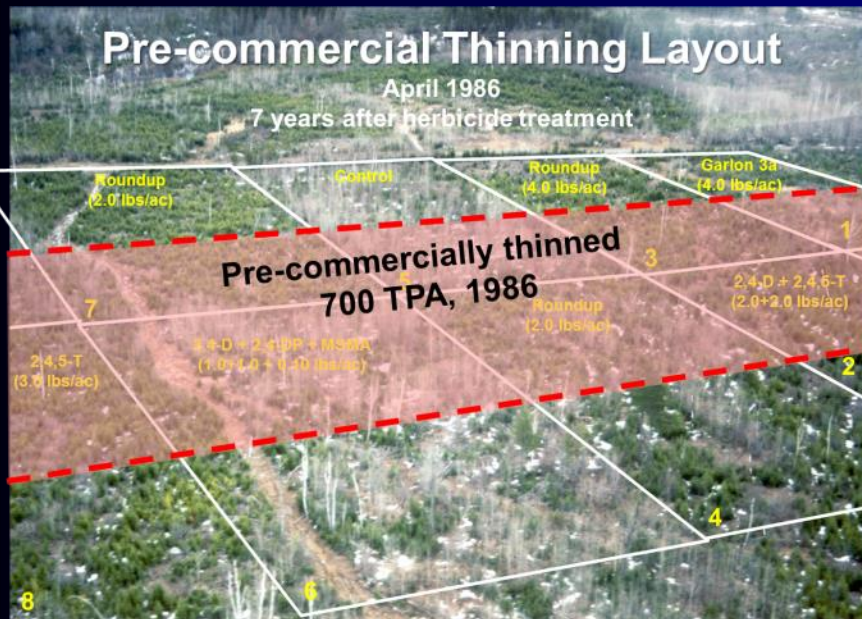
2. 1986 – PCT

Thinned

Non-thinned

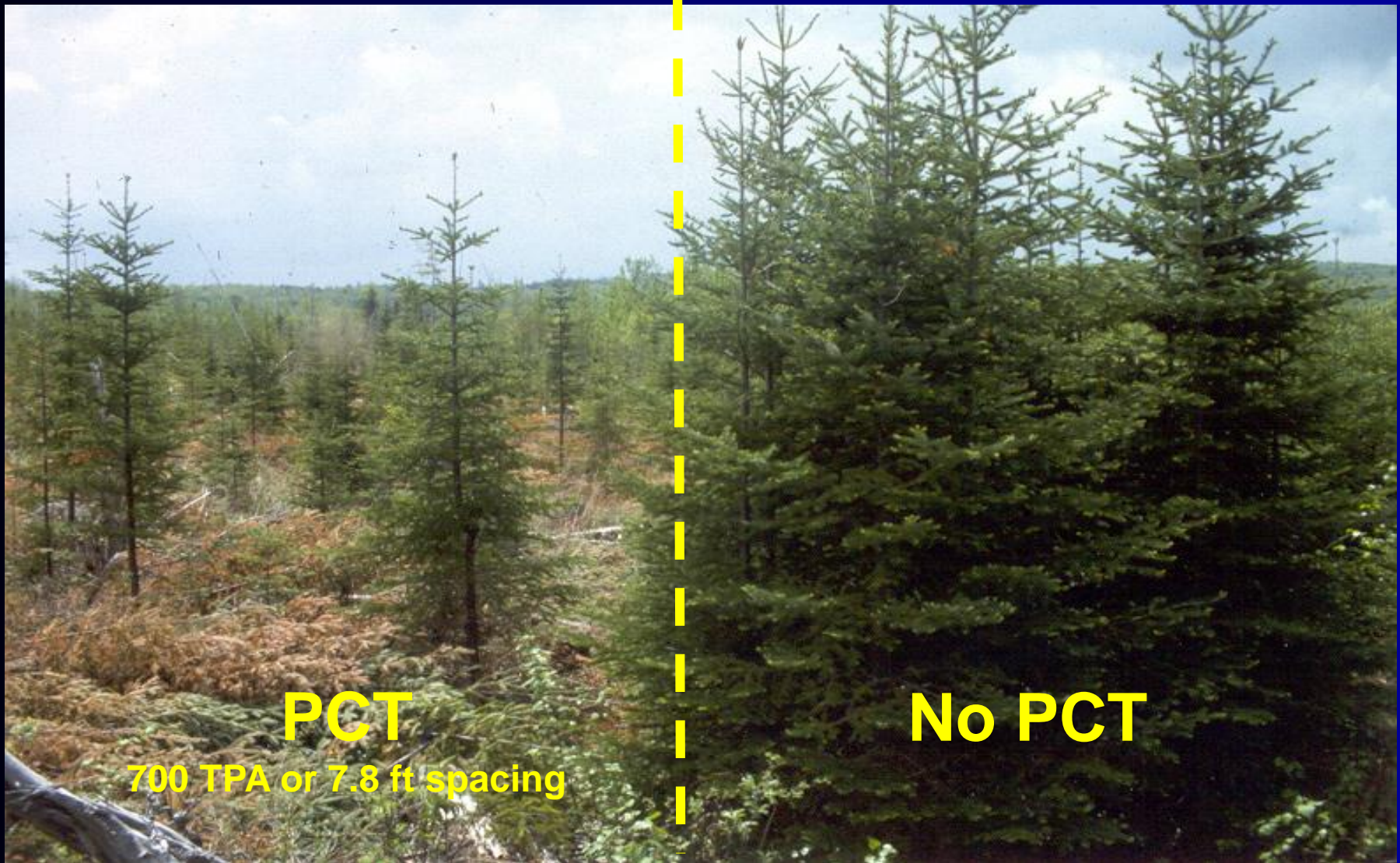
Thinned

Non-thinned



Spruce cross section 7 years post PCT, 16 years post release, and 23 years post stand harvest (Block 16)

**1986 PCT**  
**9 years after herbicide treatment**

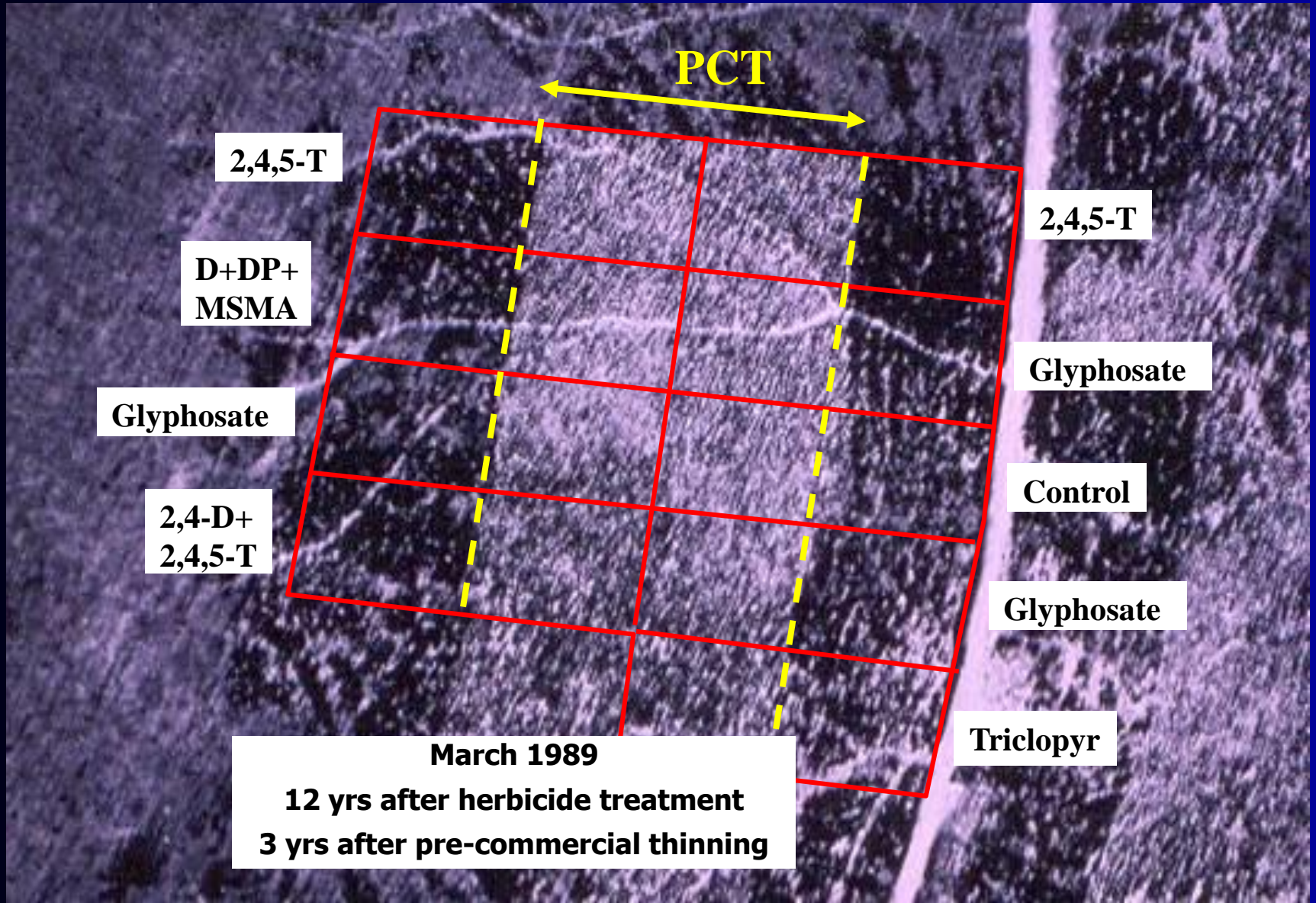


**PCT**

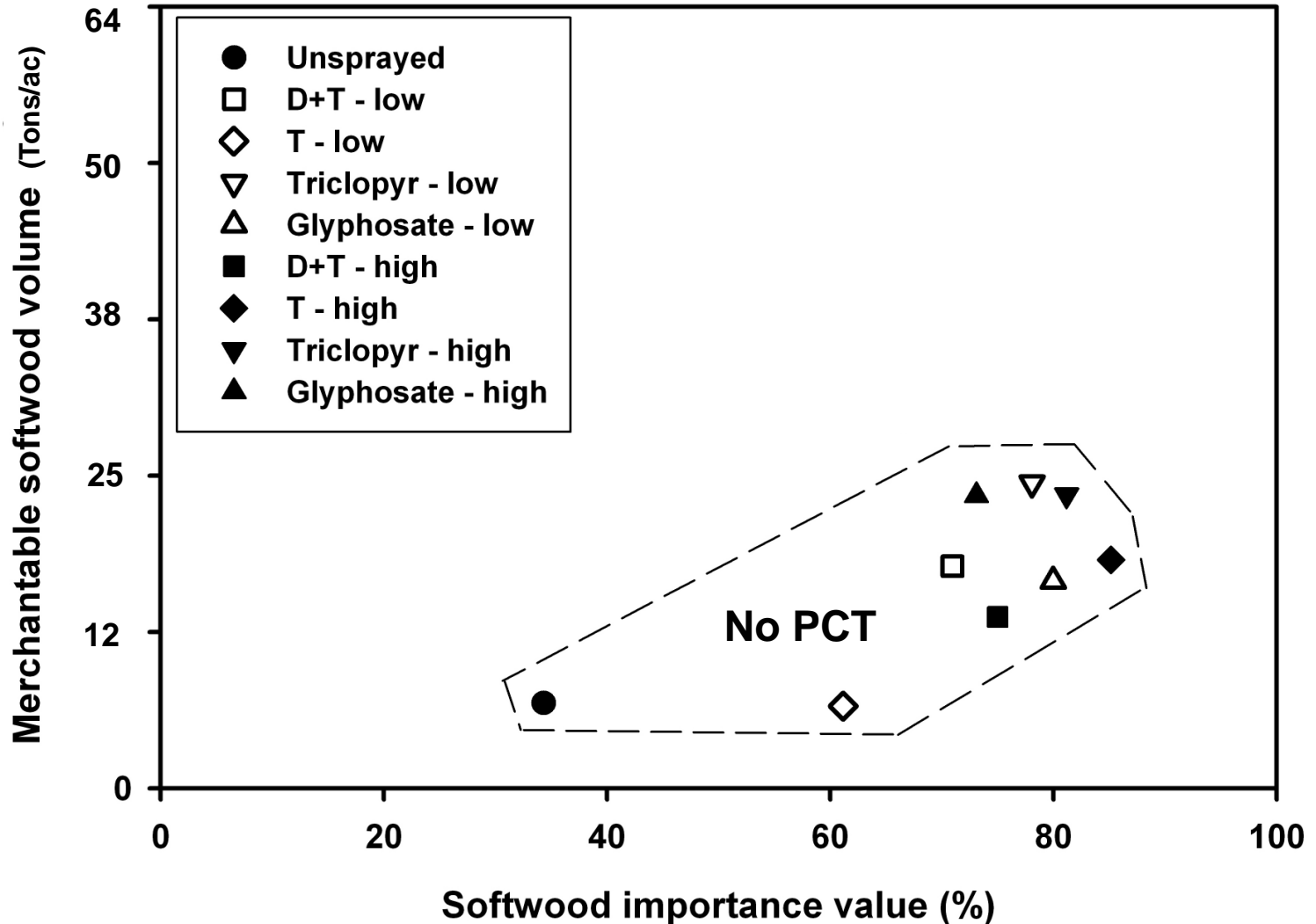
**700 TPA or 7.8 ft spacing**

**No PCT**

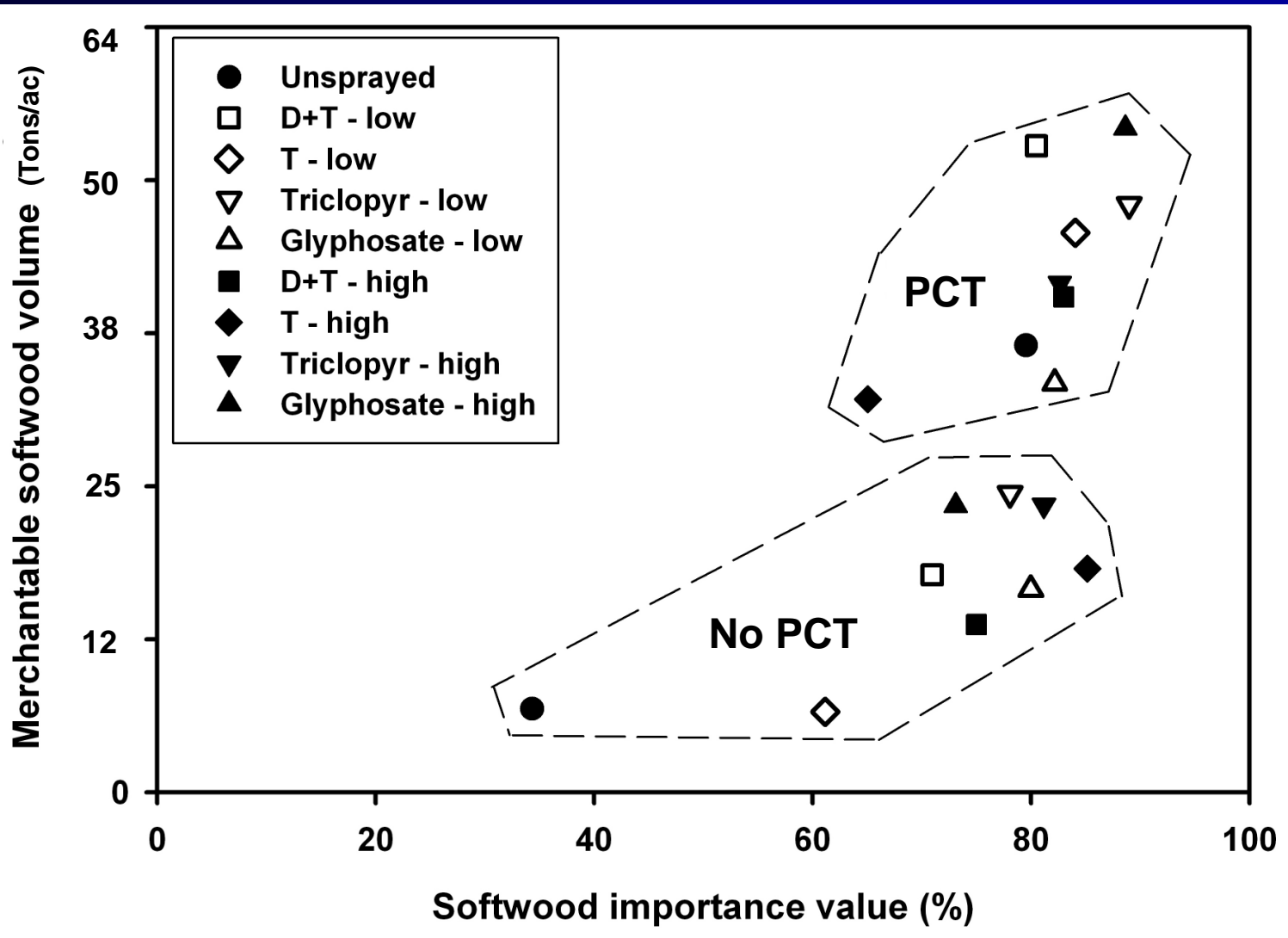
# PCT Treatment



# 40-Year Outcome of Herbicide Release and PCT at Austin Pond



# 40-Year Outcome of Herbicide Release and PCT at Austin Pond





# Fall 2010 – Forty years from Clearcut



# 40-year Outcomes in Austin Pond Study

Merchantable  
Softwood  
Volume

285 ft<sup>3</sup>/acre

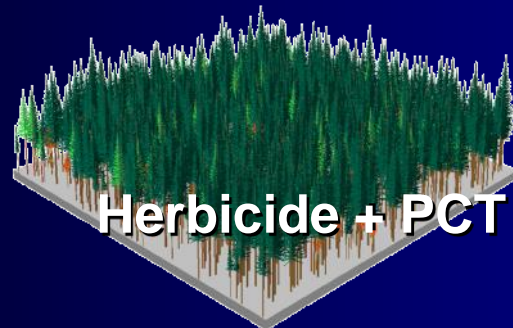


1,072 ft<sup>3</sup>/acre



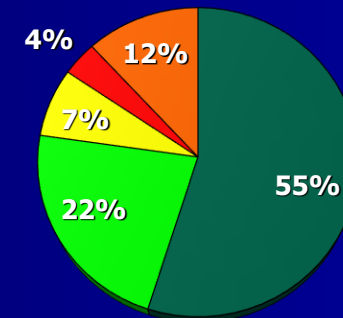
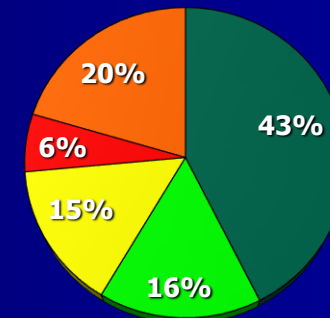
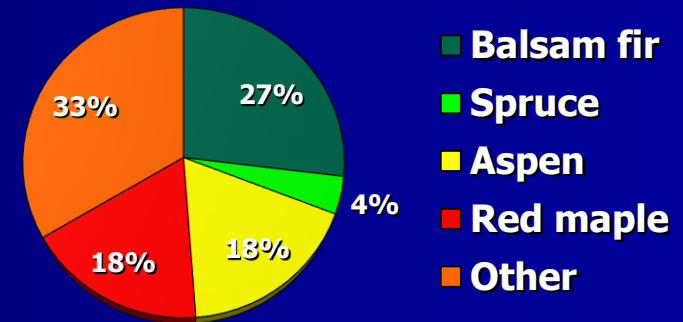
↑ 3.8X

2001 ft<sup>3</sup>/acre



↑ 7.0X

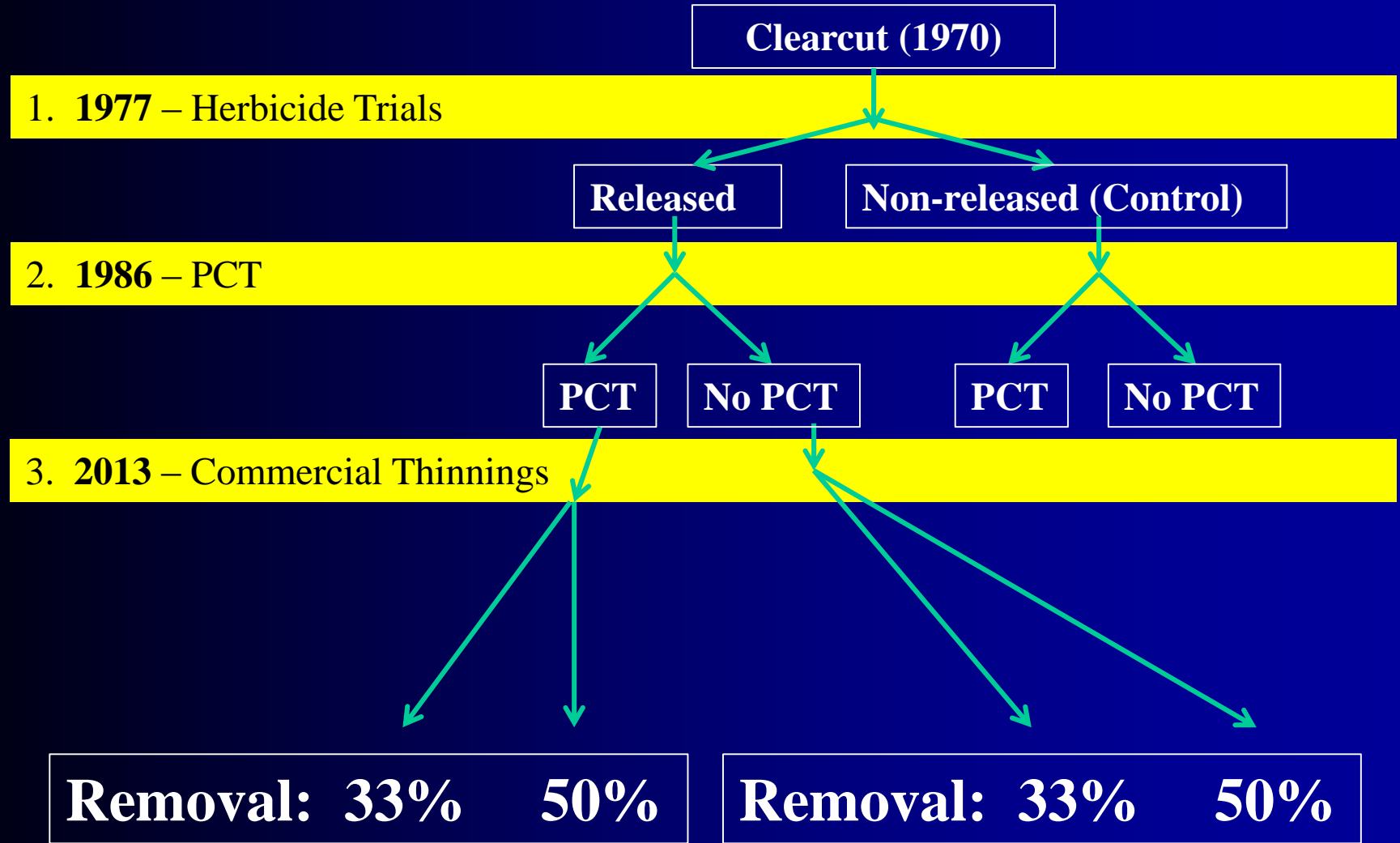
Basal Area

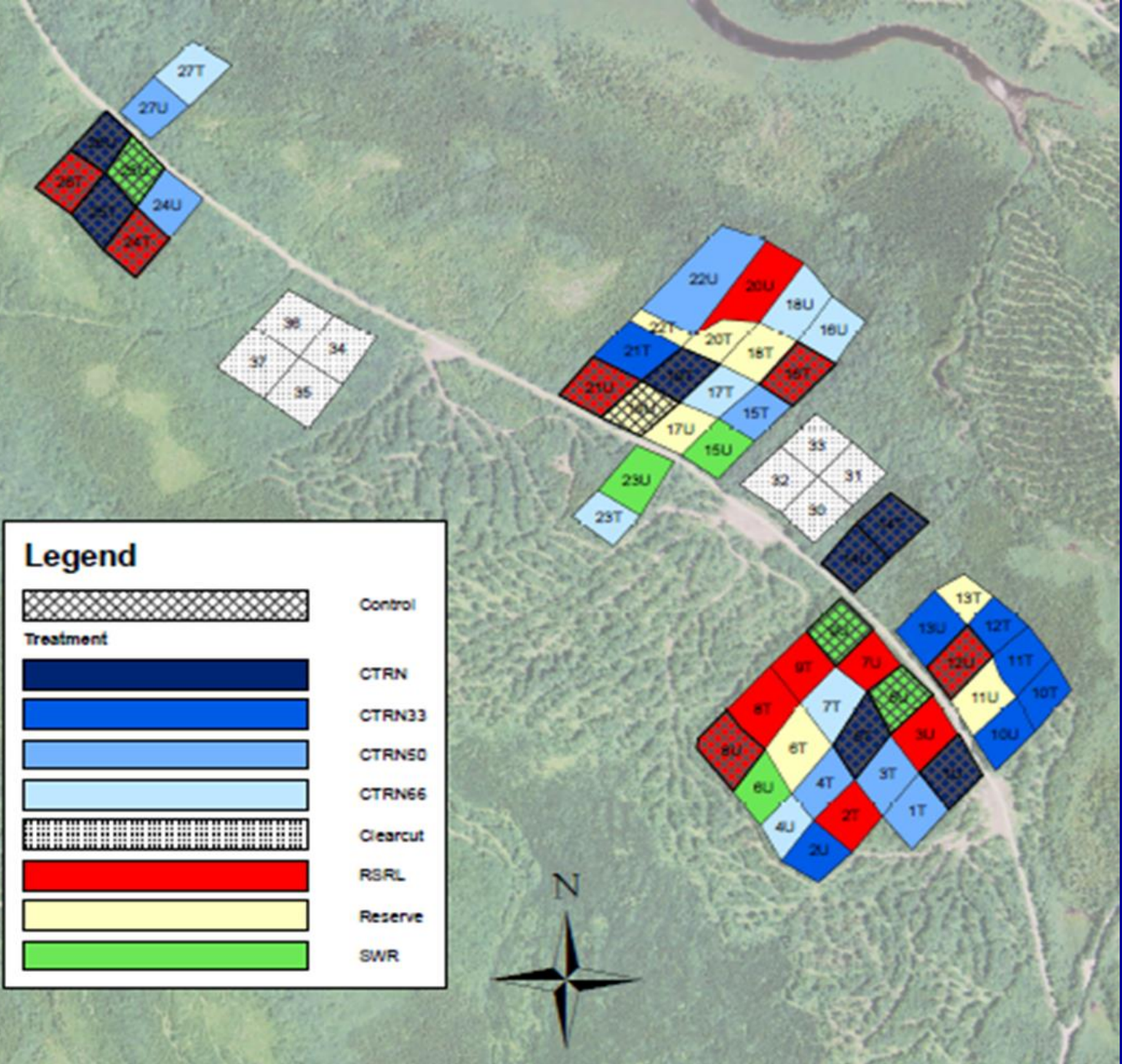


# Commercial Thinning at Austin Pond



# Third treatment wave – CT





# PCT'd Stand Before CT



# PCT'd Stand 33% CT Removal



# PCT'd Stand 50% CT Removal





**No – PCT stand during CT**





**No – PCT stand 50% CT Removal**



**Question:**

**Does PCT Influence  
Commercial Thinning  
Costs and Profit?**