Herbicide, PCT and Commercial Thinning

*CTRN & Austin Pond Studies*

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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 Timberslands Maine, LLC
- The Nature Conservancy
- Snowshoe Timberslands, LLC
- The Forestland Group, LLC
- Baskahegan Corporation
- Sylvan Timberslands, 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

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

Balsam fir dominant with red spruce as minor component

IP – Lake Macwahoc
Age: 42 yrs
PCT yr: 1983
TPA: 1,880 / ha
DBH: 14.5 cm
BA: 33.1 m²/ha
Ht: 11.9 m
Vol: 155.5 m³/ha
RD: 0.364
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
Thinning Treatments:
PCT Stands

Unthinned PCT stand at first entry

33% removal, first entry in PCT stand

50% removal, first entry in PCT stand
Best Predictors of Tree Mortality Following Commercial thinning

Height: Diameter ratio > 80 was best predictor of mortality
• 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

Results – Products & Value Trends (PCT)

Austin Pond Study: History and Long-Term Treatment Effects
First treatment wave – Herbicide Trials

1. 1977 – Herbicide Trials

- 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

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
March 1989
12 yrs after herbicide treatment
3 yrs after pre-commercial thinning
40-Year Outcome of Herbicide Release and PCT at Austin Pond

Olson, Wagner, and Brissette. 2012. CJFR 42:1–11.
40-Year Outcome of Herbicide Release and PCT at Austin Pond

Olson, Wagner, and Brissette. 2012. CJFR 42:1–11.
Fall 2010 – Forty years from Clearcut

- Control
- Herbicide only
- PCT only
- Herbicide + PCT
40-year Outcomes in Austin Pond Study

Merchantable Softwood Volume

No Treatment

Basal Area

- Balsam fir: 27%
- Spruce: 18%
- Aspen: 18%
- Red maple: 4%
- Other: 33%

Herbicide Only

Basal Area

- Balsam fir: 43%
- Spruce: 16%
- Aspen: 15%
- Red maple: 6%
- Other: 20%

Herbicide + PCT

Basal Area

- Balsam fir: 55%
- Spruce: 22%
- Aspen: 12%
- Red maple: 7%
- Other: 4%

Merchandable Softwood Volume

- No Treatment: 285 ft³/acre
- Herbicide Only: 1,072 ft³/acre (3.8X increase)
- Herbicide + PCT: 2001 ft³/acre (7.0X increase)

Commercial Thinning at Austin Pond
Third treatment wave – CT

1. **1977** – Herbicide Trials

   - Released
   - Non-released (Control)

   - Clearcut (1970)

2. **1986** – PCT

   - PCT
   - No PCT

3. **2013** – Commercial Thinnings

   - PCT
   - No PCT

   - Removal: 33% 50%
   - Removal: 33% 50%
PCT’d Stand Before CT
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?