MAINE'S COMMERCIAL THINNING RESEARCH NETWORK

Patrick Clune, Robert Wagner, Robert Seymour, Aaron Weiskittel, Spencer Meyer and Matthew Russell

Objectives & Hypotheses

Natural Stands (No-PCT)

Objective: Compare the influence of relative density reduction and method on residual stand volume growth following commercial thinning of 50-70 year old natural spruce-fir stands in Maine.

Hypothesis 1: Stands with lower relative density will have lower volume growth after thinning than stands of higher relative density because higher relative density stands have a larger number of trees to capture a smaller amount of growing space per tree.

Hypothesis 2: Stands that received low thinning will have higher volume growth than stands that received crown thinning as well as higher volume growth than those that received dominant thinning because stands with larger trees are more capable of capturing the growing space.

Hypothesis 3: There will be a positive interaction effect between relative density reduction and thinning method because low thinned stands with higher relative density have a greater number of large trees to capture a smaller amount of growing space.

Previously Precommercially Thinned Stands (PCT)

Objective: Compare the influence of relative density reduction and timing of entry on residual stand volume growth following commercial thinning of previously pre-commercially thinned spruce-fir stands in Maine.

Hypothesis 1: Stands with lower relative density will have lower volume growth after thinning than stands of higher relative density because higher relative density stands have a larger number of trees to capture a smaller amount of growing space per tree.

Hypothesis 2: Stands that were thinned earlier will have higher volume growth than stands that were thinned later because stands with a greater number of trees with larger crowns are more capable of capturing the growing space.

Hypothesis 3: There will be a positive interaction effect between the relative density reduction and timing of entry because higher relative density stands that are thinned earlier have a greater number of trees with larger crowns that are able to capture a smaller amount of growing space.

Stand Response (No-PCT)

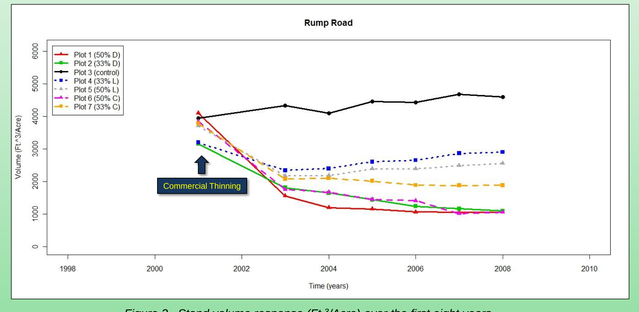


Figure 2. Stand volume response (Ft.³/Acre) over the first eight years

Stand Response (PCT)

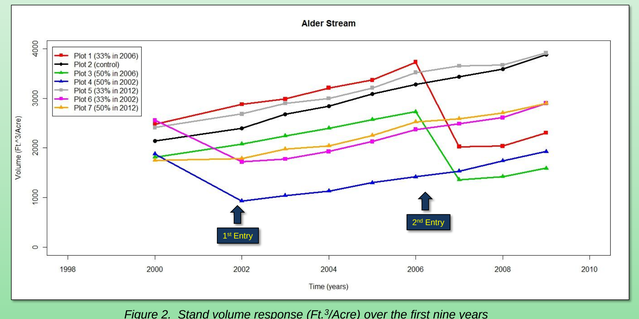


Figure 2. Stand volume response (Ft.³/Acre) over the first nine years

BACKGROUND

Maine's Cooperative Forestry Research Unit (CFRU) identified a better understanding about growth & yield responses to commercial thinning as a top research priority for 2000-2005. As a result, the CFRU Commercial Thinning Research Network (CTRN) was initiated in 2000 to establish a set of long-term commercial thinning study sites across the state of Maine.

Research installations in natural spruce-fir stands across the state are answering two key questions:

For stands that have not received PCT, (precommercial thinning) what is the influence of
(1) method of commercial thinning and
(2) residual density on subsequent stand response?

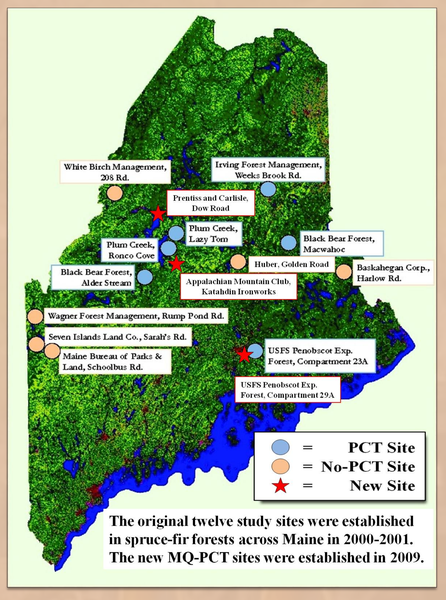
For stands that have received PCT, what is the influence of
(1) timing of first commercial thinning entry and
(2) residual density on subsequent stand response?

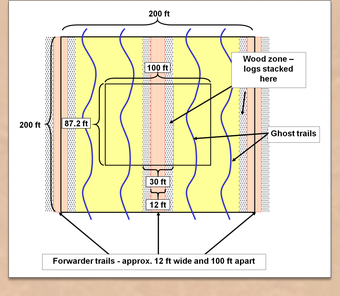
EXPERIMENTAL DESIGN

- **Randomized complete block design with 6 sites or replications**
- **Seven 0.92 A (200 x 200 ft) treatment plots containing 0.20 A (100 x 87.2 ft) measurement plot installed per site (see diagram at bottom left)**
- **Pre-treatment tree measurements included tree species, DBH, height, and location in plot (summer 2000)**
- **Plots were thinned using a single-grip processor with forwarder and ghost trails (see diagram at bottom right) in 2001-2002**
- **Merchantable volume removed was measured**
- **Residual trees are numbered with aluminum tag, location within plot recorded, and DBH, height, and live crown monitored over long-term**

THE NETWORK

The research potential of the CTRN quickly became apparent and the primary experiments spawned several new research objectives. The Network now includes more than 10 studies and continues to inspire new research ideas.





PLOT LAYOUT

HARVESTING EQUIPMENT

Plans for Future Analysis

A thorough analysis of the decade-long growth response data is beginning this year as part of a new graduate student research project and will include:

1) Stand-level growth & yield comparisons among treatments in both NoPCT and PCT studies

2) An analysis of individual-tree growth responses to thinning to better understand how tree attributes at the time of thinning are related to post-thinning growth responses

3) A financial analysis of commercial thinning treatments based on stand growth responses and projected responses, and

4) Refined growth equations for predicting the response of spruce-fir stands to commercial thinning to improve regional growth & yield models.

New Medium Quality PCT Sites (MQ-PCT)

To expand the range of sites within the CTRN, three new medium quality PCT (MQ-PCT) sites were added to the network to represent stands of lower site quality than the original six PCT sites. In 2009 efforts were focused on locating three ideal sites for the new medium quality PCT (MQ-PCT) locations and installing the research plots once the sites were found. With many thanks to **Katahdin Forest Management**, **Prentiss and Carlisle**, the **Appalachian Mountain Club** and the **U.S. Forest Service**, we surveyed more than a dozen stands across the Maine woods, trying to meet the following criteria:

- Well-stocked, fir/spruce,
- Precommercially thinned sometime before 1990, at a spacing of 8x8 ft
- Briggs site class 3-4 (somewhat poorly to poorly drained) soils,
- Site index of roughly 45-60, and
- 25-40 years old.

In the end, we chose three sites, *PEF Compartment 29a* on the Penobcot Experimental Forest, *DowRoad* on land managed by Prentiss and Carlisle, and *Katahdin Ironworks* on land owned by the Appalachian Mountain Club and manged by Huber Resources. We are very grateful to the land managers, including Kevin and Dave Dow, **Kenny Fergusson**, **Ted Shina**, **David Publicover**, **John Brissette**, **Al Kimball**, and **Robin Avery** for their support in getting these new sites initiated. We thankthe land managers and landowners of these properties for their ongoing support of the study and of the CFRU. Now, with 15 sites representing 12 CFRU members, the CTRN has truly become a CFRU-wide research study.

Making it Possible

CFRU Members

Appalachian Mountain Club
Baskahegan Corporation
Baxter State Park, SFMA
Black Bear Forest, Inc.
Canopy Timberlands Maine, LLC
Clayton Lake Woodland Holdings, LLC
EMC Holdings, LLC
Field Timberlands
Finestkind Tree Farms
Forest Society of Maine
The Forestland Group, LLC
Frontier Forest, LLC
Huber Resources Corporation
Huber Wood Products
Irving Woodlands, LLC
Katahdin Forest Management
Landvest
Maine Bureau of Parks and Lands
Mosquito, LLC
The Nature Conservancy
Peavey Manufacturing Company
Plum Creek Timber Company, Inc.
Prentiss & Carlisle Company, Inc.
Robbins Lumber Company
SAPPI Fine Paper
Seven Islands Land Company
Timbervest, LLC
Wagner Forest Management

About the CFRU

Since 1975, the Cooperative Forestry Research Unit (CFRU) has been working to improve the stewardship of Maine's forests. As Maine's forests have evolved, this unique partnership between Maine's forest managers and the University of Maine has kept pace by researching all aspect of forest ecosystems from the sustainability of wood supplies to the effects of forest management on wildlife habitat, water quality, and biodiversity. With over twenty member organizations, including private forest managers, wood processors, public agencies, and conservation organizations, the unit is continually seeking ways to help sustain Maine's tremendous forest resource.

CFRU scientists and Advisory Committee members gathered on a recent site visit.

www.umaine.edu/cfru

For more information about the CTRN or the CFRU contact us:
Tel: (207) 581-2893 or email: patrick.clune@maine.edu