

# Developing management guidelines for conserving late-successional forest in the Northern Forest region.

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Late-successional forest can be conserved using in forests under timber management using restoration, retention, & long-rotation forestry.

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<http://www.nsrcforest.org>



# Project Summary

Next to deforestation (i.e., forest conversion), the rapid loss of late-successional (LS) forests (forest older than economic mature forest) from managed forest landscapes is a leading cause of the loss of temperate forest biodiversity worldwide. LS forests are crucial in the Northern Forest region for a limited number of species and ecological processes which will widely disappear unless this forest age class is more appropriately conserved. Reserves occupy such a small percentage of the Northern Forest area that reserves alone are unlikely to conserve LS forest biodiversity. Therefore, active management for LS forest will be an essential part of successful forest conservation in the Northern Forest region. However, land managers lack the tools to effectively conserve LS forests and meet regional economic needs. Therefore, immediate solutions must focus on tools for maintaining and restoring LS forests in managed forests across the region.

Our objectives were to synthesize existing knowledge, to develop LS forest management guidelines, and to provide training to land managers in order to raise capacity of land managers to manage and conserve late-successional forests.

We conducted three studies using existing information to determine way of conserving LS attributes in managed forest in the Northern Forest region. We conducted a synthesis of regional LS (including old growth) scientific literature to describe the unique compositional elements, forest structure, and functions of LS and OG forests. The second project was a meta-analysis of OG studies from the region to identify the natural range of LS attributes that are likely to maintain LS and OG species, structures, and ecological processes in the Northern Forest region. The third project was a meta-analysis of our timber harvest studies to identify the range of LS attributes that are associated with different harvest intensities, effective rotation lengths, and levels of retention.

LS forest contain unique attributes that are rare or lacking from other forest ages and the region including large trees, large snags, and large logs, and moss, lichen, and invertebrate species. An analysis of data from silviculturally managed stands suggests that they can maintain these attributes with structural retention and long-rotation forestry. Both patch and dispersed retention may help maintain LS attributes. Conservation of LS attributes in managed forests of the Northern Forest region will require the use of alternative forestry practices such as retention, long-rotation forestry, and restoration forestry.

### Maintaining LS forest is critical for conservation

- LS forests support unique species, forest structure, & ecological processes.
- Finland: 5% forest species are expected to go extinct due to the loss of LS forest (~1000 species)
- To avoid loss of biodiversity in the Northern Forest, we must conserve LS forests.

# Managed forest is critical for conserving LS forest.

- Little LS forest left (<3% of area) and we are rapidly losing it (>1.5% / year for over 30 years)
- The conservation opportunity lies with public lands & private lands under forest certification because:
  - They must maintain biodiversity, including LS.
  - Most land is privately owned.
- Most LS forest conservation opportunities will have to happen in managed forests because private landowners can't financially afford to preserve land.

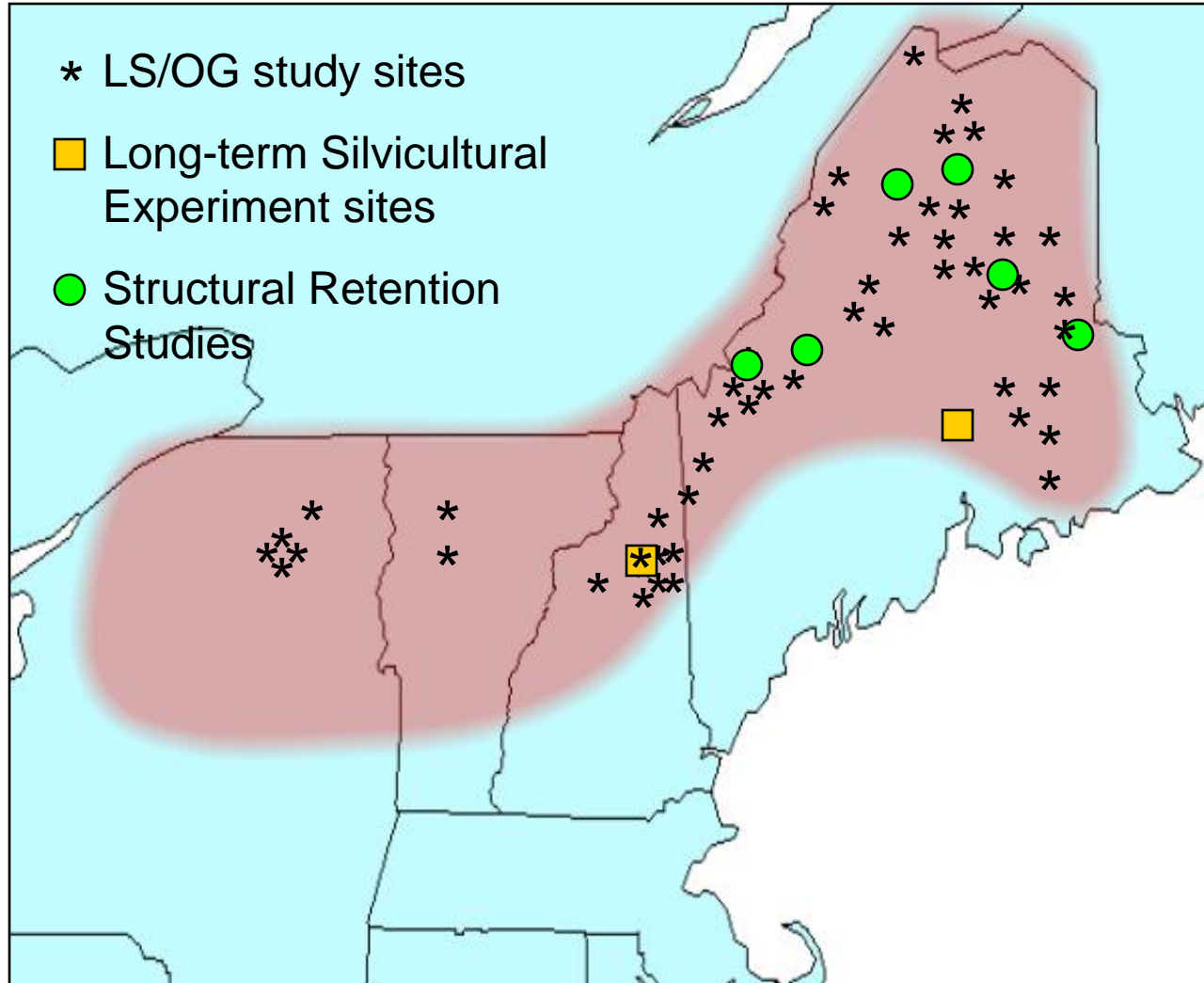
# Management tools are necessary for conserving LS forest

- We lack tools the tools for conserving LS forests in managed areas.
- Three tools are available for conserving Ls forest in the context of managed forests:
  - Structural retention – Retention of LS attributes.
  - Restoration – management to enhance the recovery of LS attributes
  - Long-rotation forestry – Maintain and growth LS attributes through management

## 3 Synthesis Projects

- Synthesis of regional LS (including old growth) scientific literature (McGee)
  - Focus on species, structure, and processes
  - Consider spatial scale
- Meta-analysis of old-growth studies from the region (Keeton)
  - 93 stands in ME, NH, VT, & NY
  - Trees sizes, large trees, snags, deadwood, biomass
- Meta-analysis of timber harvest studies (Whitman)
  - Structural retention experiments (patch retention and dispersed retention studies)
  - Long-term silvicultural experiments (analysis of retrospective data from Penobscot Exp. Forest and Bartlett Exp. Forest – US Forest Service sites)

# Locations



## 3 Methods for Communicating Results

- Management guidelines for maintaining and/or restoring stand-level LS attributes (Manomet): “*Late-successional forest management guidelines for the Northeast*”
- Peer-reviewed papers from synthesis projects
- Workshops for foresters on LS management

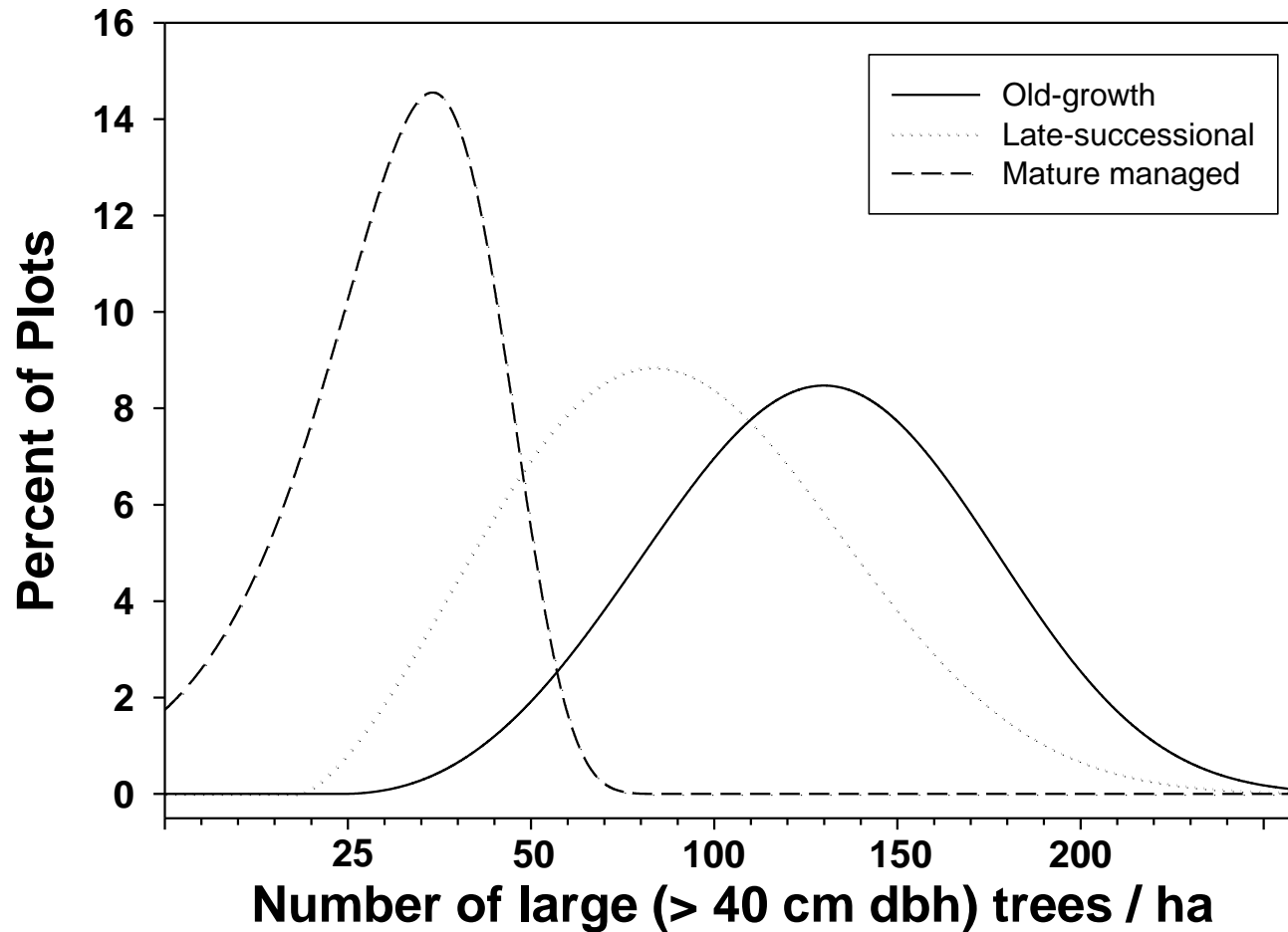


## Synthesis of Northern Forest LS scientific literature

- Unique features of LS forests
  - Forest Structure: High densities of large trees, large logs, and deadwood.
  - ~ 10% linked of obscure linked taxa to LS forests, including:
    - Mosses
    - Lichens
    - Oribatid mites
    - Beetles
  - Disturbance regimes: less frequent with larger tree fall gaps
- Key features for forest managers to conserve:
  - Large trees (keystone for many spp; create other OG features)
  - LS & OG patches (0.1-2 ha)(for tolerant species)
  - Stands (2-100 ha) (for OG specialists)
  - Riparian areas (landscape function as corridors)

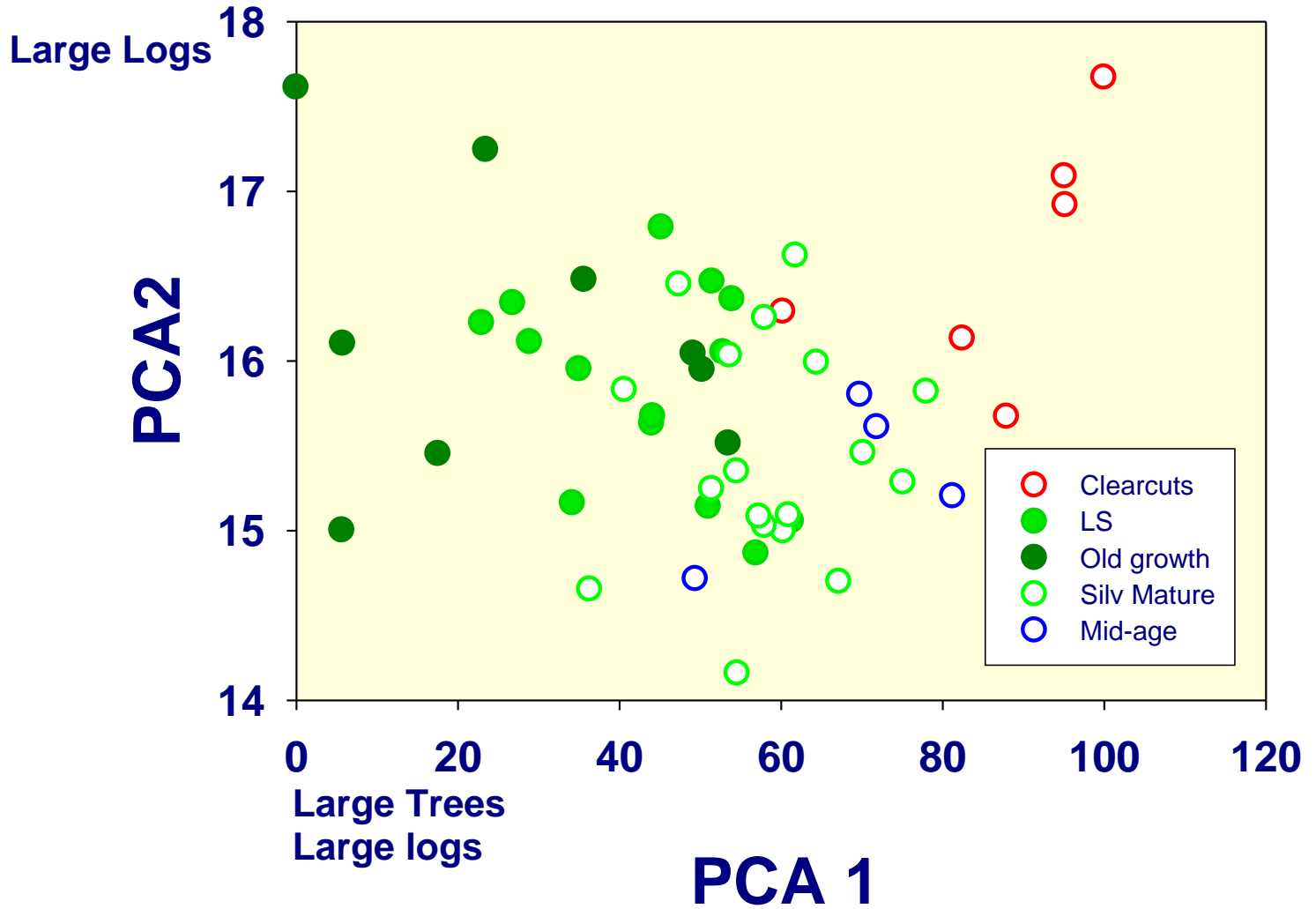
# Results/Project outcomes

## Meta-analysis of OG studies from the region



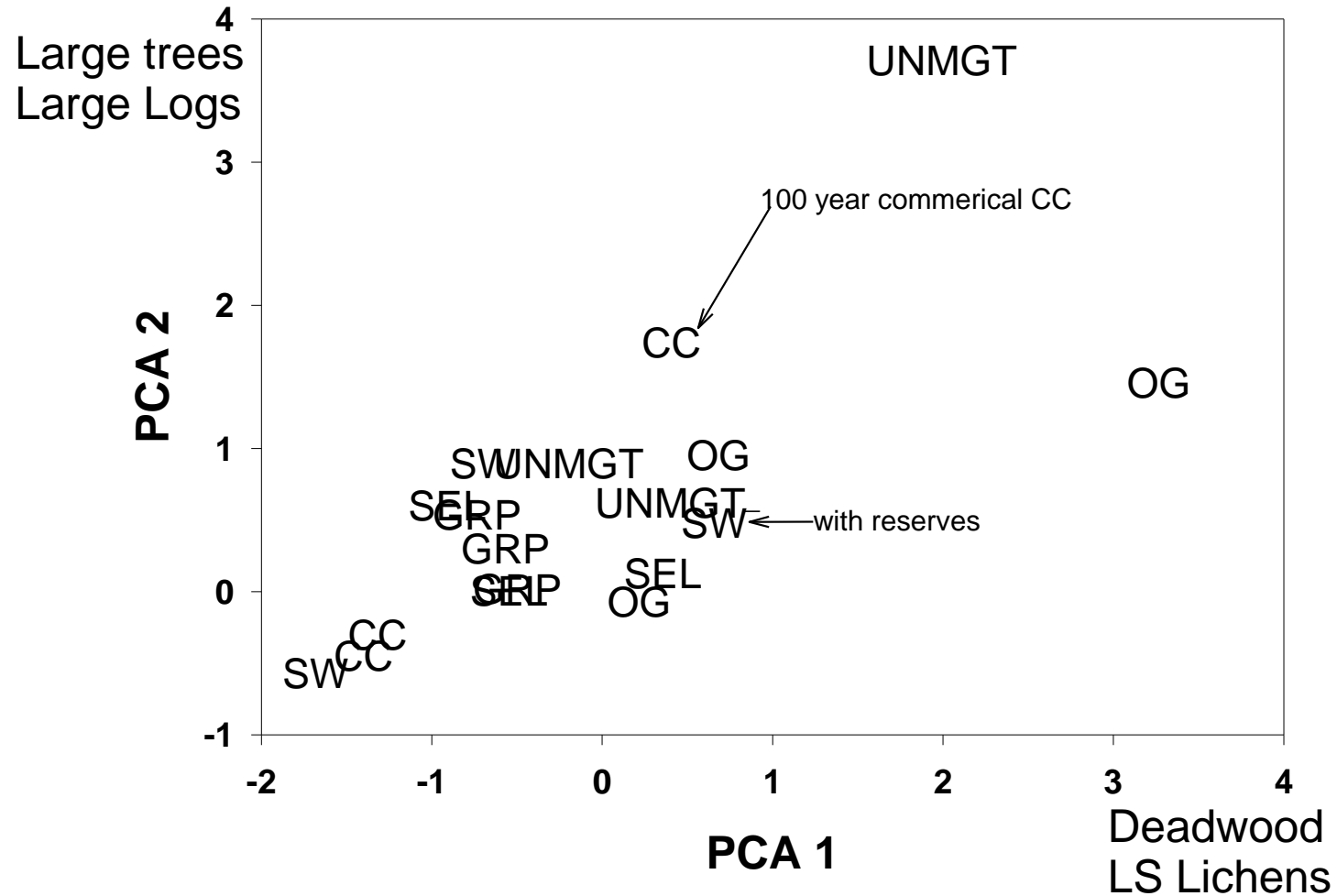
# Results/Project outcomes

## Meta-analysis of OG studies from the region



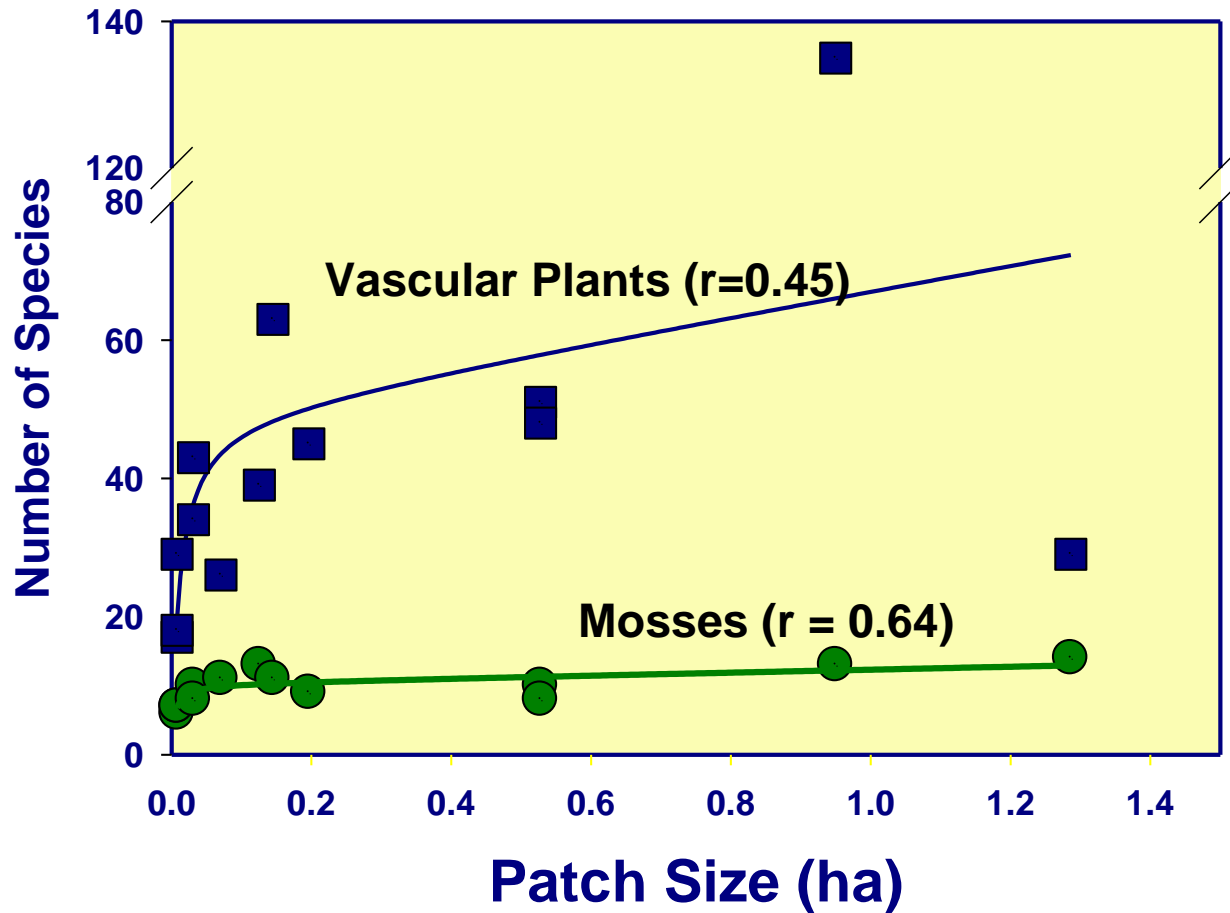
# Results/Project outcomes

## A meta-analysis of LS forest management studies



# Results/Project outcomes

## A meta-analysis of LS forest management studies



## Project Workshops

- “Conserving late-successional forest in managed forests” May 25 2006, Orono ME (57 foresters)
- “Management strategies for conserving late-successional forest”, Oct 26 2006, Ashland ME (10 foresters)
- “Structural Retention”, Feb. 27 2007, Bingham, ME (29 foresters)

# Results/Project outcomes

## Future workshop Syllabus: LS Management Workshop for foresters (September 16 & 17 2008)

### **Workshop Agenda**

#### **September 16, 2008**

- |            |  |
|------------|--|
| 0900-1030  | Introduction to Workshop<br>Fundamental Concepts of LS Management (indoor classroom)                       |
| 1030-11:15 | Travel to field site   |
| 11:15-1400 | Using 'green tree' retention as a conservation tool in forestry.<br>-patch retention<br>-uniform retention |
| 1400-1530  | Applying long-rotation forestry to conserve LS forests – an example from ME Bureau of Parks and Lands      |
| 1530-1700  | Challenges of restoration forestry – an example in a degraded northern hardwood stand                      |

#### **September 17, 2008**

- |           |  |
|-----------|--|
| 0800-1000 | Practicum: Develop a harvest prescription for a late-successional stand                                    |
| 1000-1100 | Managing riparian zones as a landscape strategy for conserving LS attributes                               |
| 1100-1200 | Management options for late-successional forest stands: finding win-win solutions for ecology and economy. |
| 1230-1330 | Managing landscape configuration for ecological value  |
| 1330-1600 | Harvest plan presentations   |
| 1600-1700 | Discussion   |
| 1700      | Adjourn- Return to base  |

# Future directions

## Three areas of future work:

- Develop new tools for enhancing conservation of old-growth forest in the Northern Forest region (Manomet with ME Forest Service and Maine Wilderness Guides Association)
- Explore existing policy instruments including the High-value Conservation Forestry concept for conserving old forest in the Northern Forest region (Manomet with Trust to Conserve Northern Forest Lands)
- Value of Carbon in LS and OG forest for carbon offsets (Keeton with others)



Conservation of LS attributes (including biodiversity) in managed forests of the Northern Forest region will require the use of alternative forestry practices:

- Structural retention
- Long-rotation forestry
- Restoration forestry

# List of products

- **Publications:**
  - Whitman, A. and J. Hagan. (accepted with minor revisions). Structural retention. Northern Journal of Applied Forestry.
- **Workshops:**
  - “Conserving late-successional forest in managed forests” May 25 2006, Orono ME (57 foresters)
  - “Management strategies for conserving late-successional forest”, Oct 26, 2006, Ashland ME (10 foresters)
  - “Structural Retention”, Feb. 27<sup>th</sup> 2007, Bingham, ME (29 foresters)
- **Manuscripts:**
  - A review of the ecology of late-successional and old-growth forests in northeastern U.S.” (McGee).
  - “A meta-analysis of LS forest management studies from the northeastern U.S.” (Whitman and Hagan).

# List of products (con't)

- **Reports:**
  - Whitman, A.A. 2008. Late-successional forest management guidelines for the Northeast. Forest Mosaic Science Note FMSN-2008-1. Manomet Center for Conservation Sciences, Brunswick, ME 04011.
- **Future publications, presentations, or other products:**
  - Manuscript: "Old-growth as a reference for managing late-successional forests in northeastern U.S." (Keeton)
  - Workshop: LS Management Workshop (for foresters), planned for 16-17 September 2008, (Whitman).
- **Leveraged grants:**
  - "Cost effective methods for tracking late-successional structural attributes important to forest biodiversity" a Manomet project funded by the University of Maine Cooperative Forest Research Unit, 2007, \$30,000.
  - "Multi-Resource Harvest Assessment Protocol – Biodiversity Module" a Manomet project with the ME Forest Service and University of Maine, funded by USDA Forest Service, 2007-08, \$20,000.