

The effect of PCT on the abundance of herbaceous species



Kerienne La France
and
Mark Roberts

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Forest Ecology Lab
Faculty of Forestry and Environmental Management,
University of New Brunswick

Introduction & Methodology

- Impact on crop trees well documented, but what about other ecosystem components?

The effect of PCT on herbaceous species is not fully understood



Herbaceous layer includes all vascular plants < 1 m in height

- Majority of plant species diversity
- Nutrient cycling and energy flow

Plant survival, growth and germination may be influenced by the following:



Stand-level characteristics:

- Light availability
- Growing space

Fine-scale disturbance features:

- Slash
- Substrates
- Microtopography

All of these environmental features can be directly affected by thinning activities

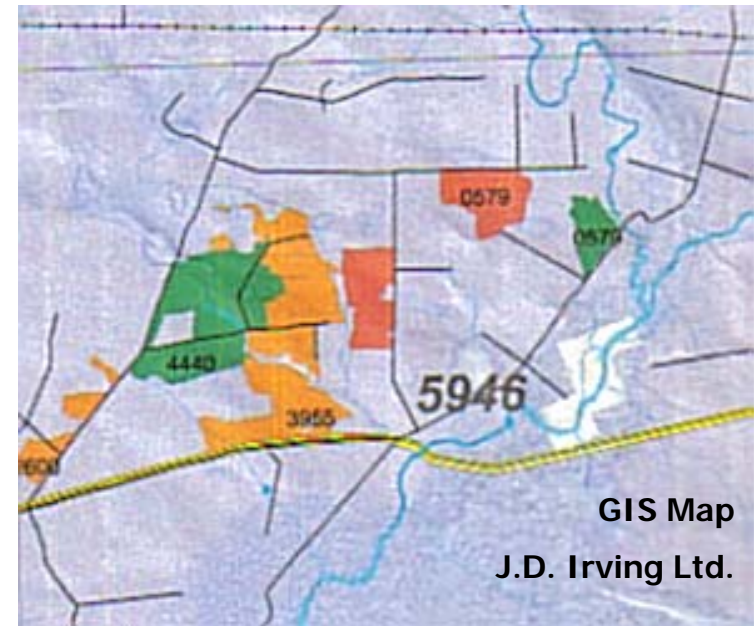
Objectives

- 1) Compare species abundance and environmental features between PCT stands and unthinned controls over time.
- 2) Identify relationships between plant species abundance and possible causal factors (ie: environmental variables).

Methodology

Study Area

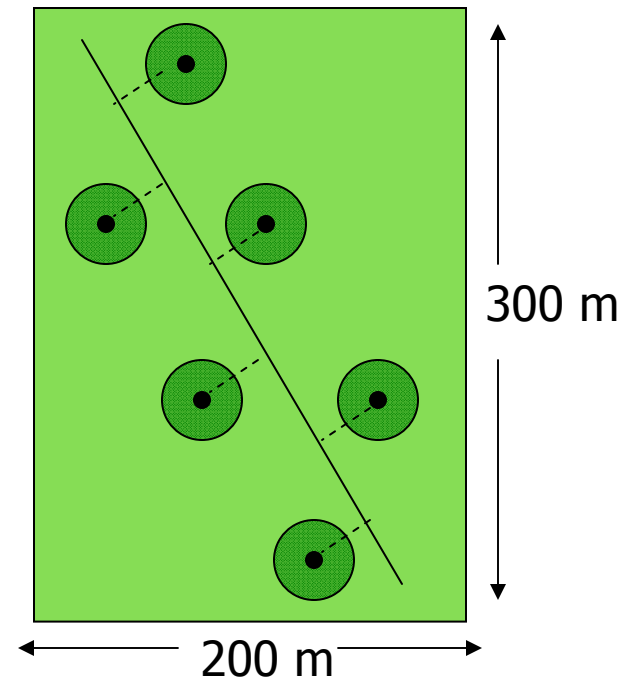
- South-East New Brunswick
- moist soils, soft-wood dominated
- Clear-cut, naturally regenerating stands
- Sites were selected using GIS records (where available).
- Age range 16-42 years.



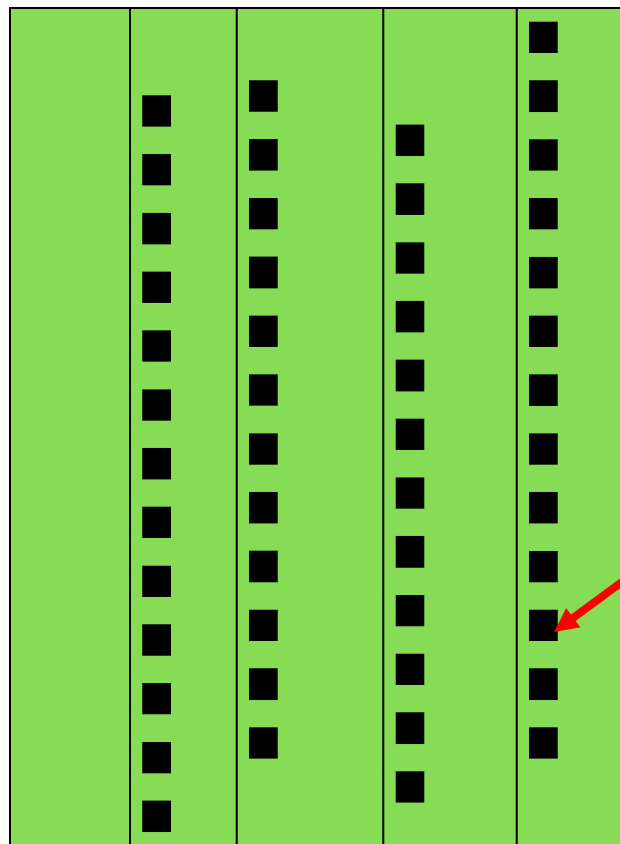
Stand-level features:

Sampled in six 5.64 m fixed radius plots per stand:

- volume of CWD (perpendicular distance method)
- tree height and DBH
- tree density
- tree species



Study Design



- Sampling area \approx 6 ha
- 4 parallel transects
- 50 1m^2 quadrats

Vegetation & environmental variables measured within each quadrat

← 200 m →

300 m

Vegetation & Environmental Variables:

- Percent cover for each species
- Percent cover & number of regenerating seedlings
- Canopy cover – HW & SW (available light)
- Ground disturbance
 - percent cover & depth of tracks
- Slash (HW & SW)
 - <0.5 cm
 - 0.5-7 cm
 - > 7 cm
- Substrates
 - mineral soil
 - humus
 - HW & SW litter



Results

Stand-level Environmental Variables:

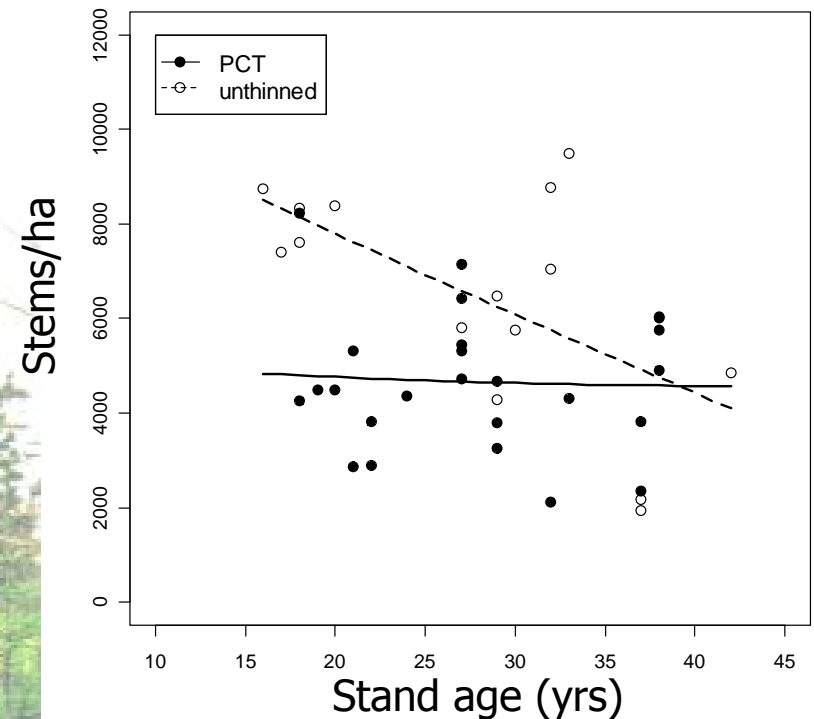
Significant Treatment*Age interactions:

- Total Stem Density
- Stump Density

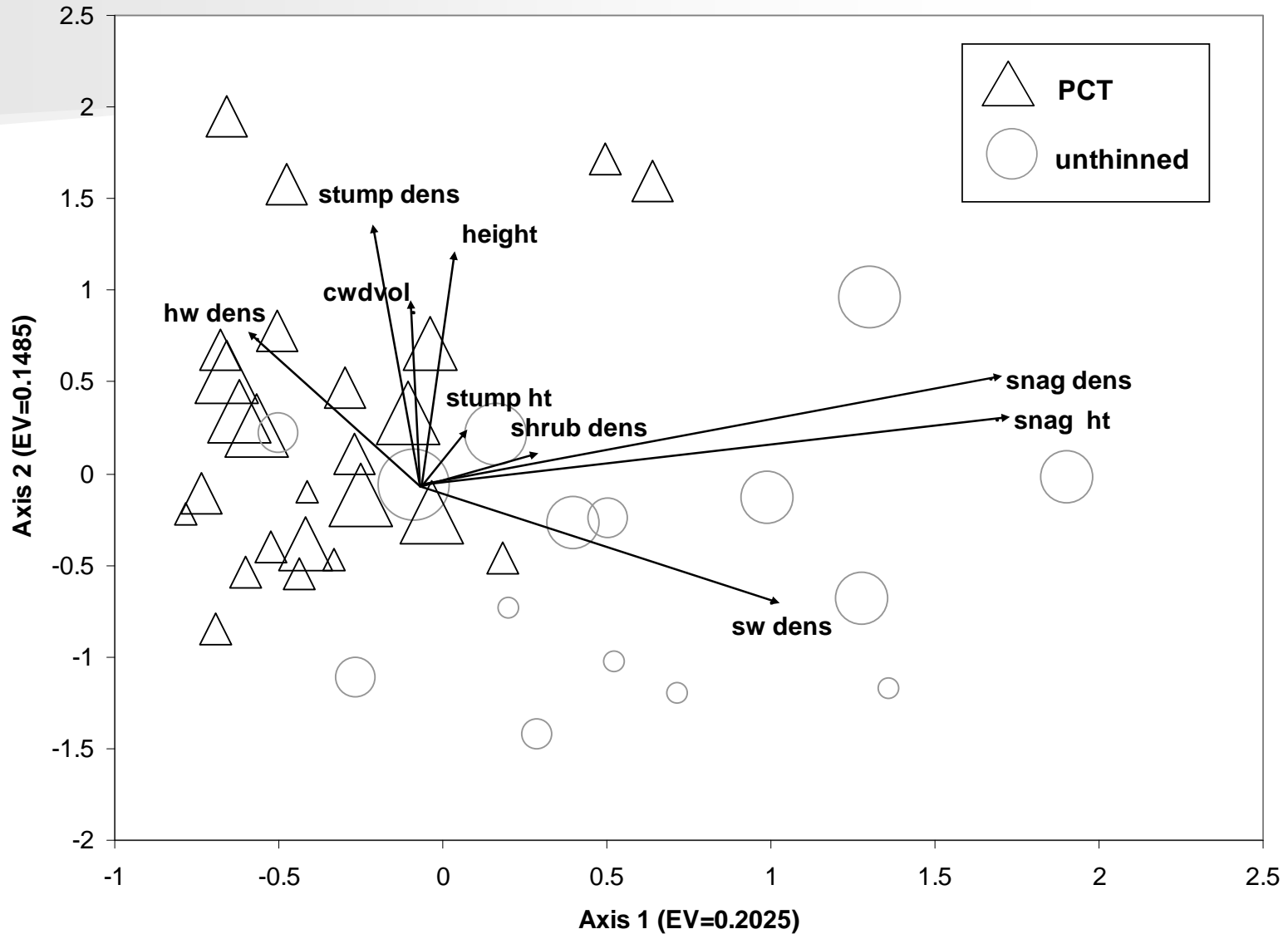
Other significant differences:

- Snag Density (decreased in PCT)

Total Stem Density



Stand-level Environmental Variables PCA :



Quadrat-level Environmental Variables:

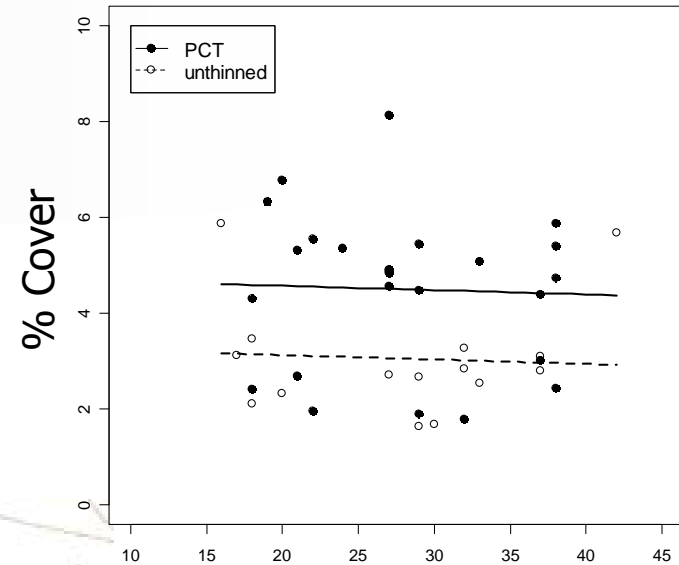
Significant Treatment effects on:

- Slash

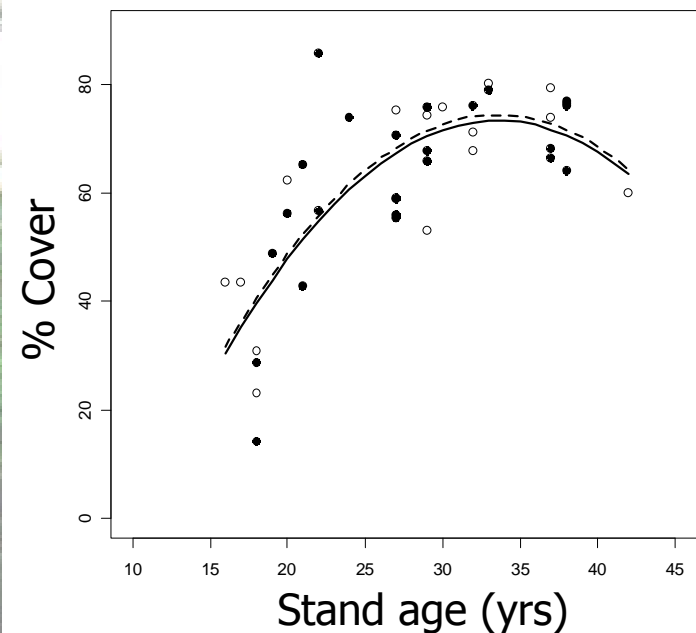
Several variables showed a sig. change over time:

- Slash height (decreased)
- Softwood canopy cover (increased)
- SW litter (increased)

Slash

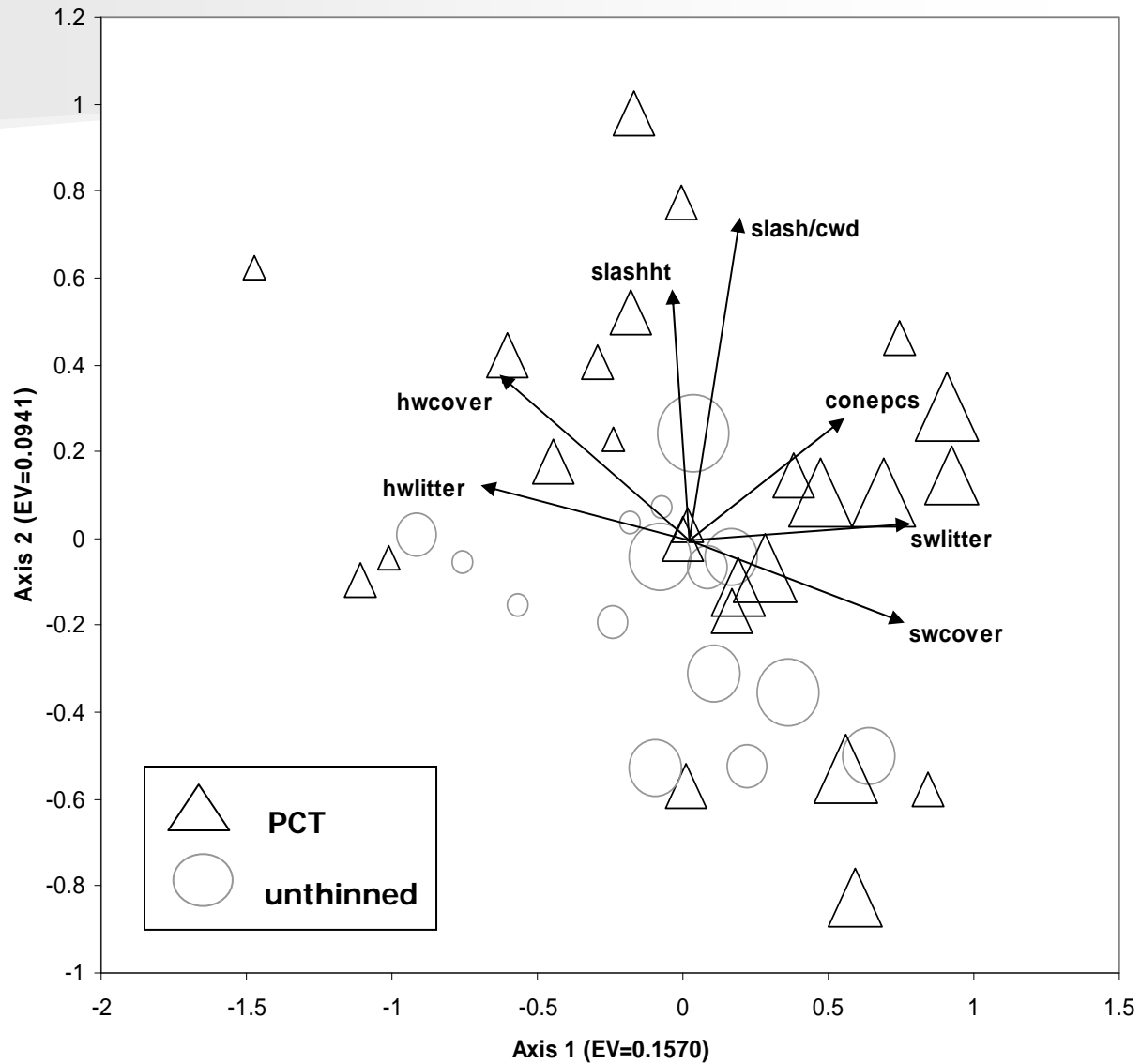


SW Canopy Cover



Results

Quadrat-level Environmental Variables PCA :



Species Diversity:

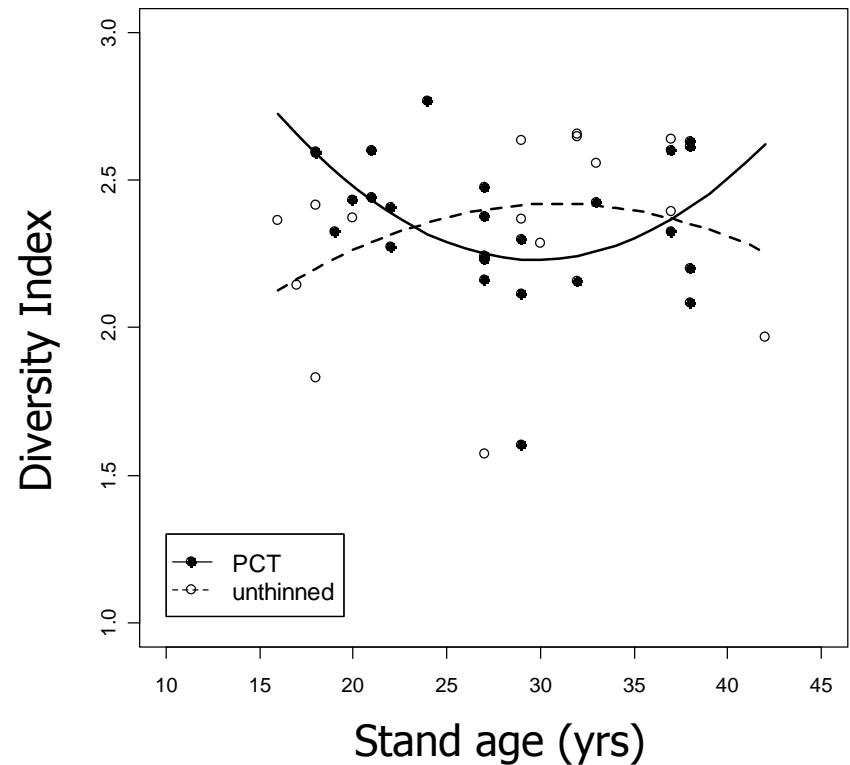
Sig. treatment*Age interaction:

- Shannon's Diversity

No sig. difference between PCT & Control stands for:

- Simpson's Diversity
- Species Richness
- Evenness

Shannon's Diversity



Individual Species Cover:

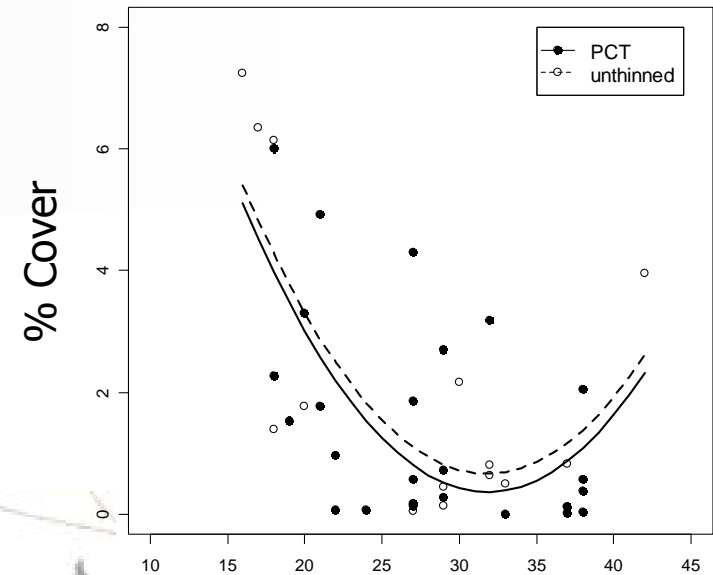
Several species showed a sig. decrease over time:

- *Vaccinium angustifolium*
- *Vaccinium myrtilloides*
- *Kalmia angustifolia*
- *Viburnum nudum*

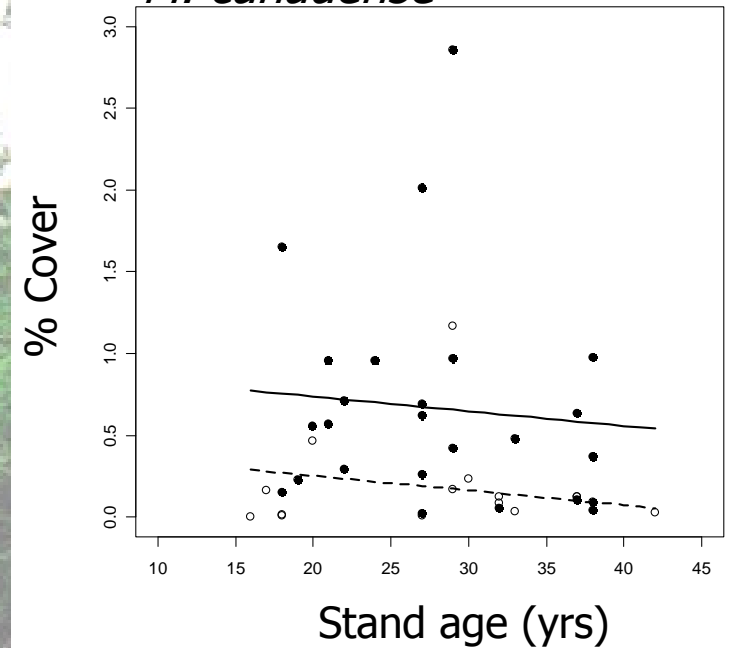
PCT had a sig. effect on several species:

- *Aralia nudicaulis*
- *Maianthemum canadense*
- *Trientalis borealis*
- *Clintonia borealis*

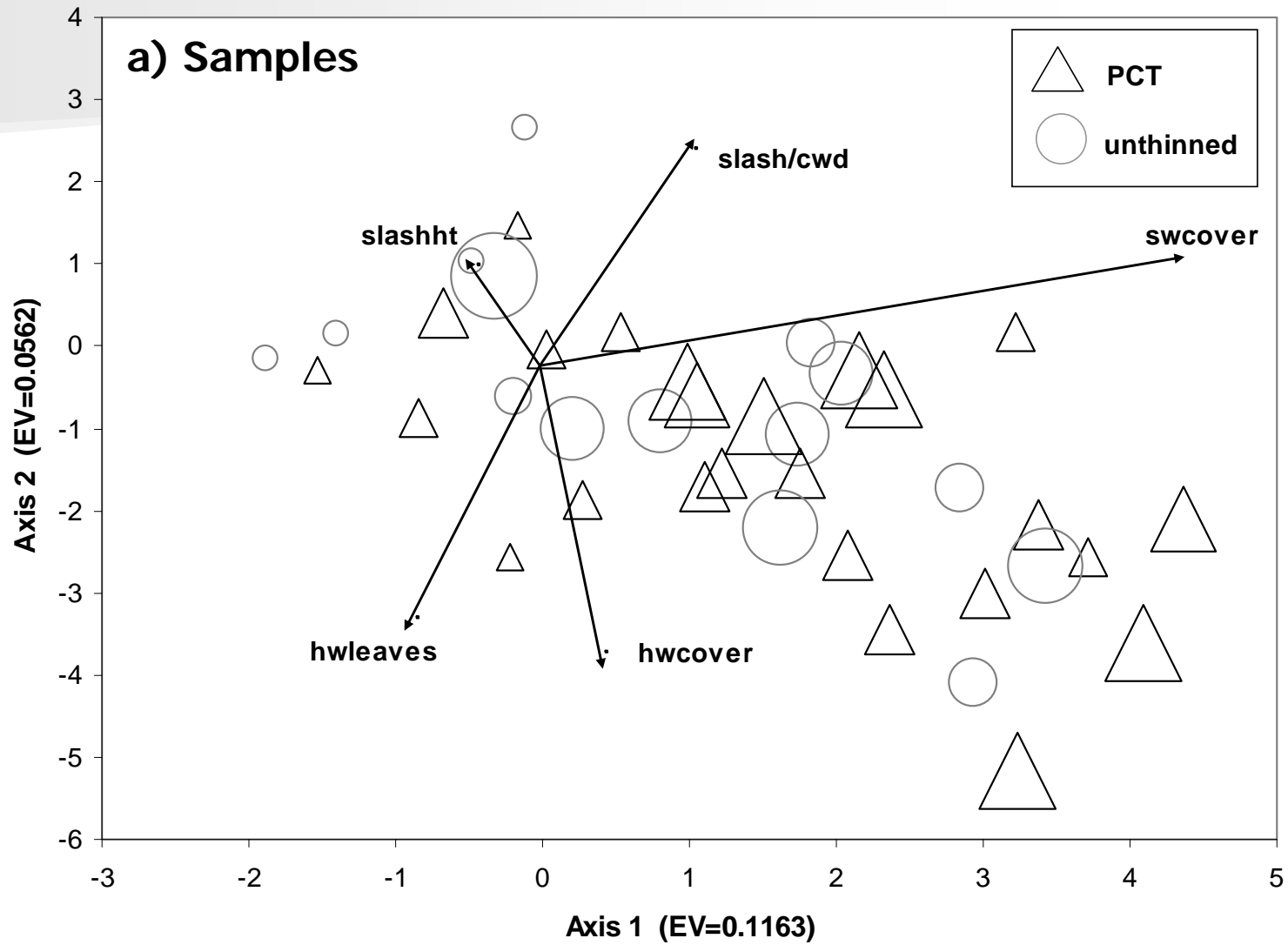
V. angustifolium



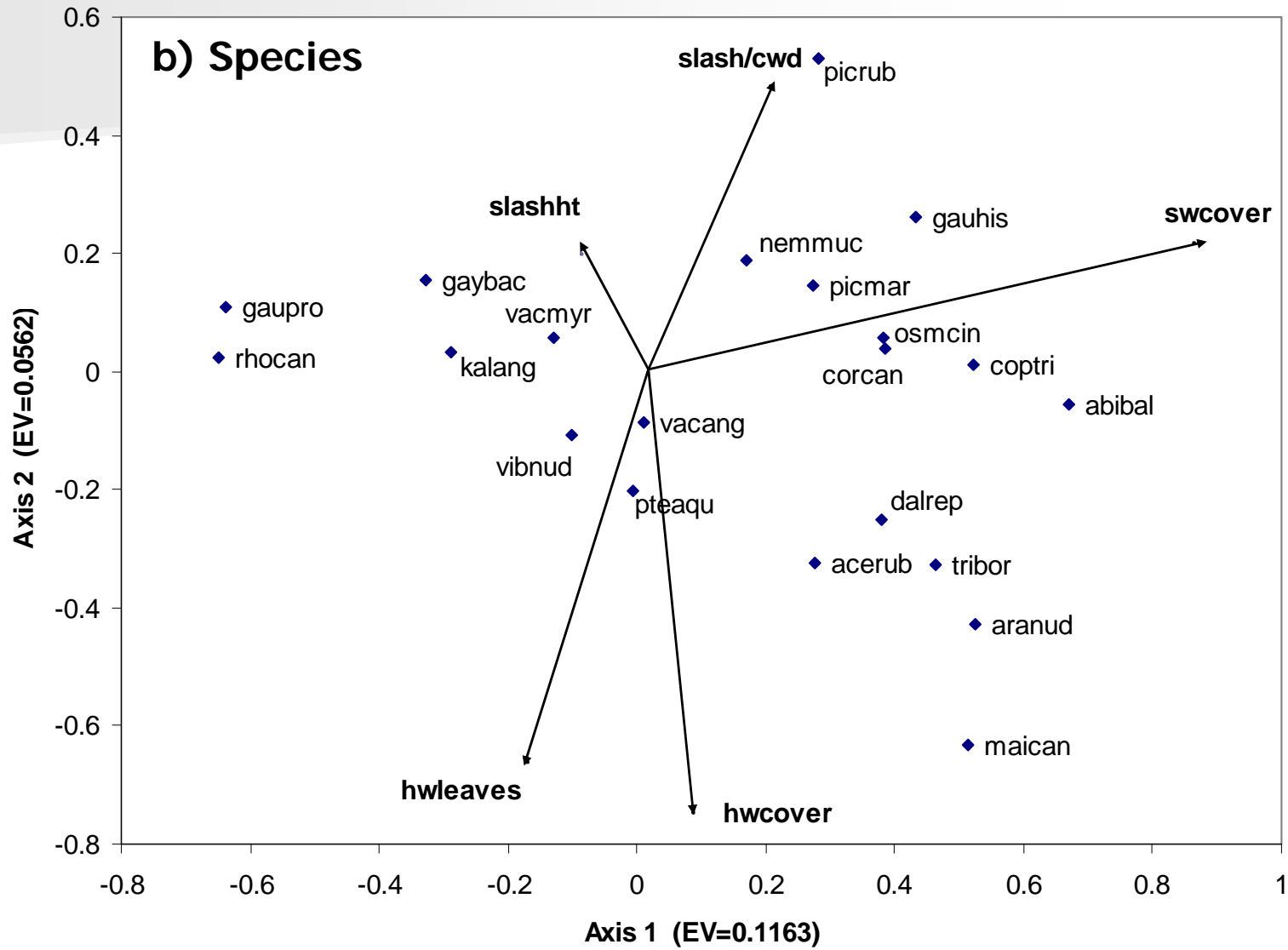
M. canadense



Quadrat-level Environmental/Vegetation CCA:



Quadrat-level Environmental/Vegetation CCA:



Conclusions & Recommendations

- PCT sites initially have lower stem density & fewer snags



- PCT sites have more slash, although slash height was similar in both treatments

Managers may consider avoiding large slash piles that may inhibit germination

Conclusions

- PCT increases cover for some species (ecologically sig.?)
- Changes in overall herbaceous species composition are attributed to stand age rather than treatment.



Increasing canopy cover over time seems to be the driving factor in overall species composition.

The effects of PCT do not exceed the natural range of variability

Conclusions

- Additional patterns in species composition may be clearer by analysing species by groups:
 - Growth Form (trees, shrubs, forbs, ferns, etc.)
 - Raunkaier's Life Forms (Ph, Ch, Cr, etc)
 - Reproductive Mechanism (veg vs. seed)



Acknowledgments



Advisory Committee:

Supervisor: Mark Roberts

Graham Forbes

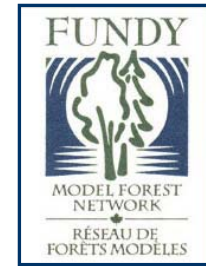
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Sustainable Forest Management Network



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