

Management Impacts on the Sustainability of Lowland Northern White-Cedar

By Katie Schulz

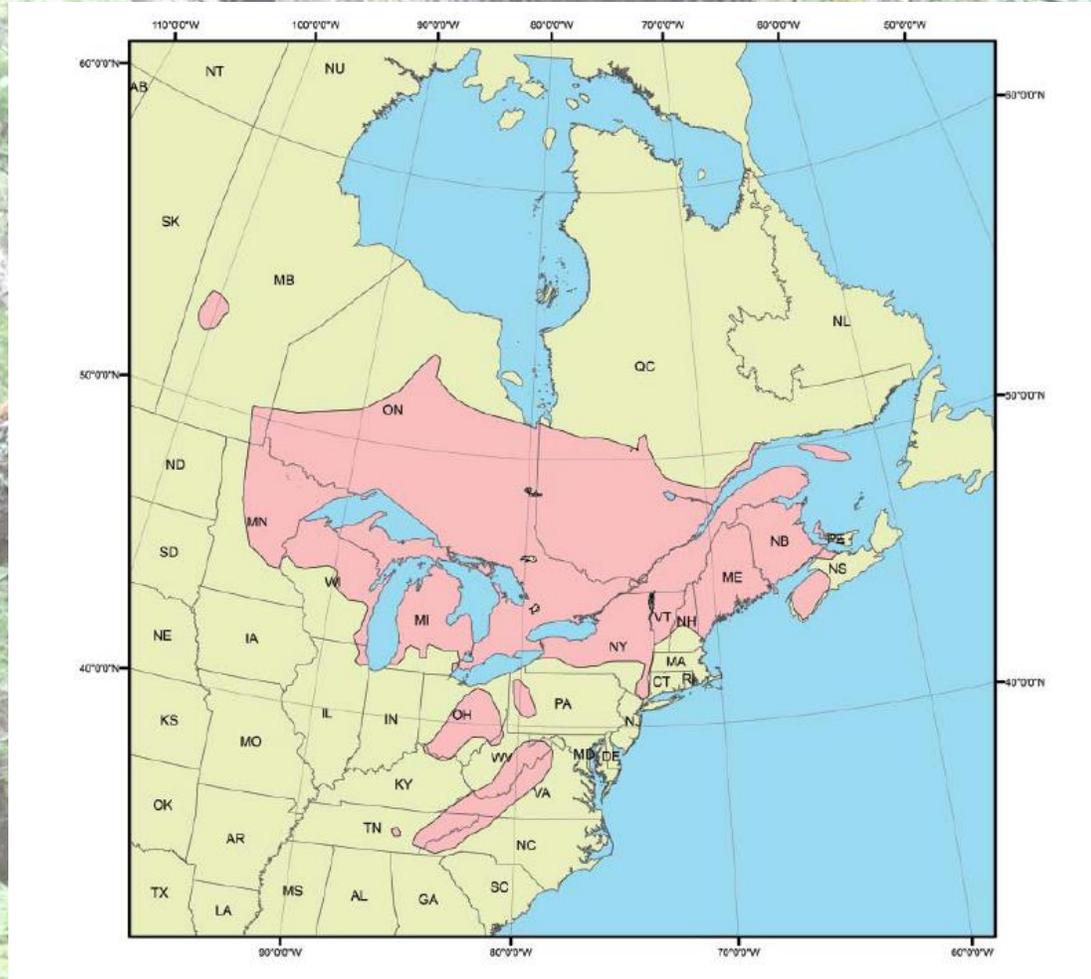
Advisors: Dr. Jay Wason and Dr. Laura Kenefic



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University of Maine



Northern White-Cedar: *Thuja occidentalis*



- Boreal Conifer
- Slow-growing
- Shade-tolerant
- Long-lived

Least studied
commercial tree
in N. America

Lowland cedar systems:

- Wet, swamp-like conditions
- Composition ~70% Cedar
- Other 30% is mix of deciduous and evergreen species
- Highly sensitive

Managing Northern White-Cedar is Challenging



Poor Management Practices

+

Excessive Harvesting



Seasonal Flooding

+

Specific Site Requirements

+

Competition and Canopy Suppression

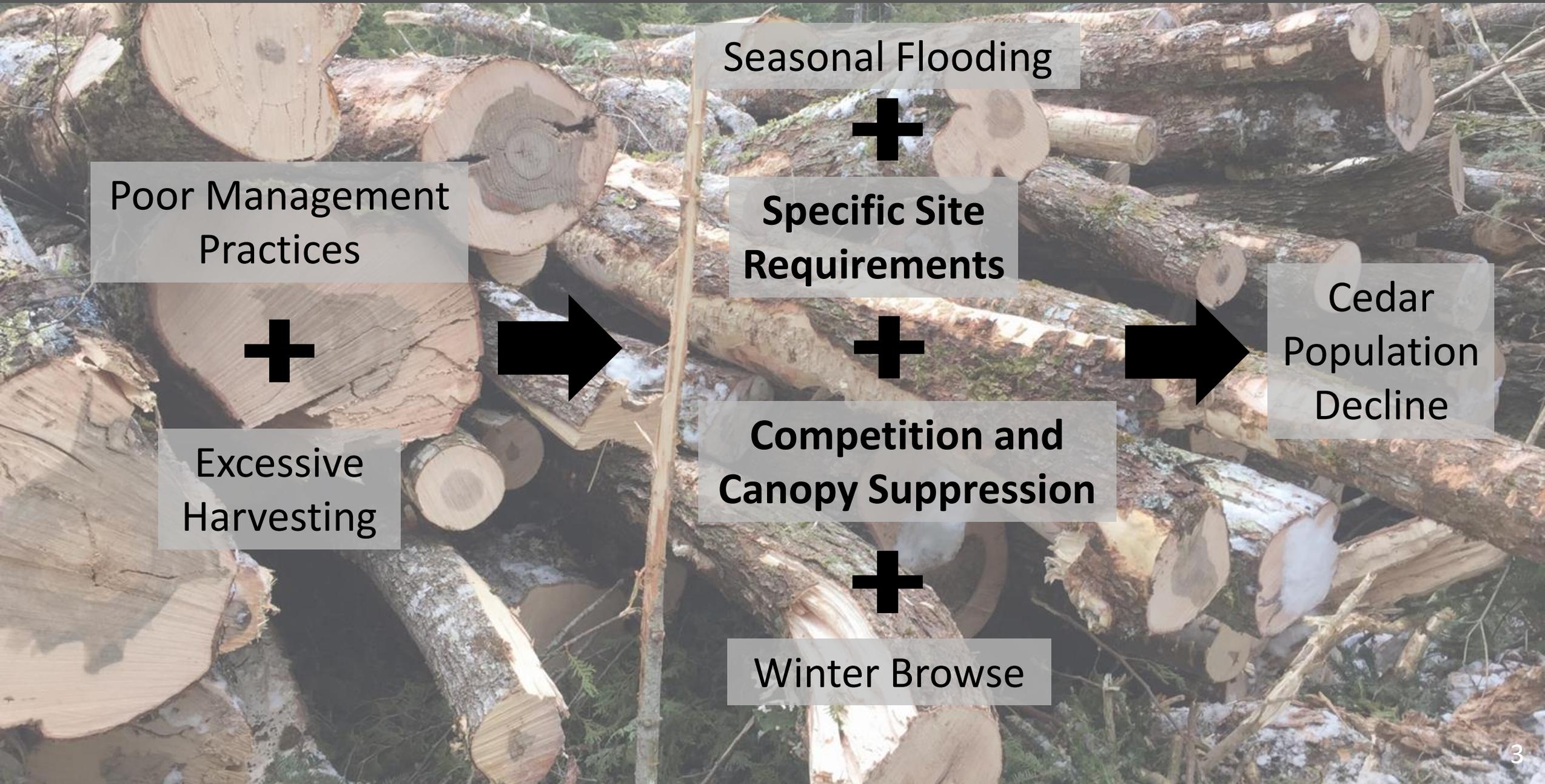
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Winter Browse



Cedar Population Decline

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Cedar Population Decline

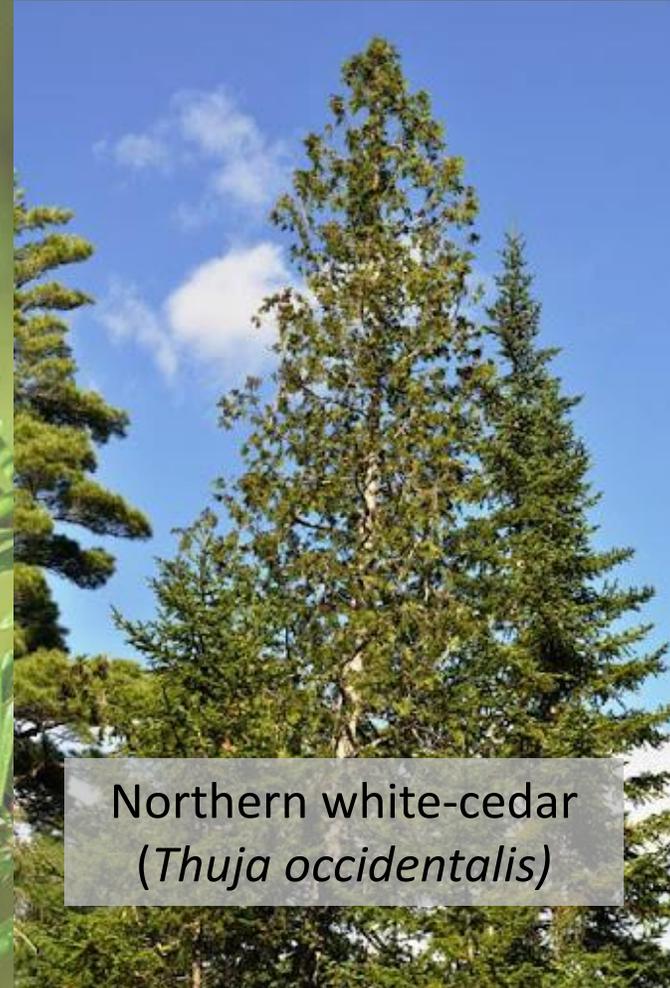
Competition Will Influence Cedar and Fir Dynamics



Balsam fir
(*Abies balsamea*)



VS.



Northern white-cedar
(*Thuja occidentalis*)

Will management create more suitable habitat for **fir** or for **cedar** regeneration?

Study Goals



Managing cedar in lowland stands is challenging!

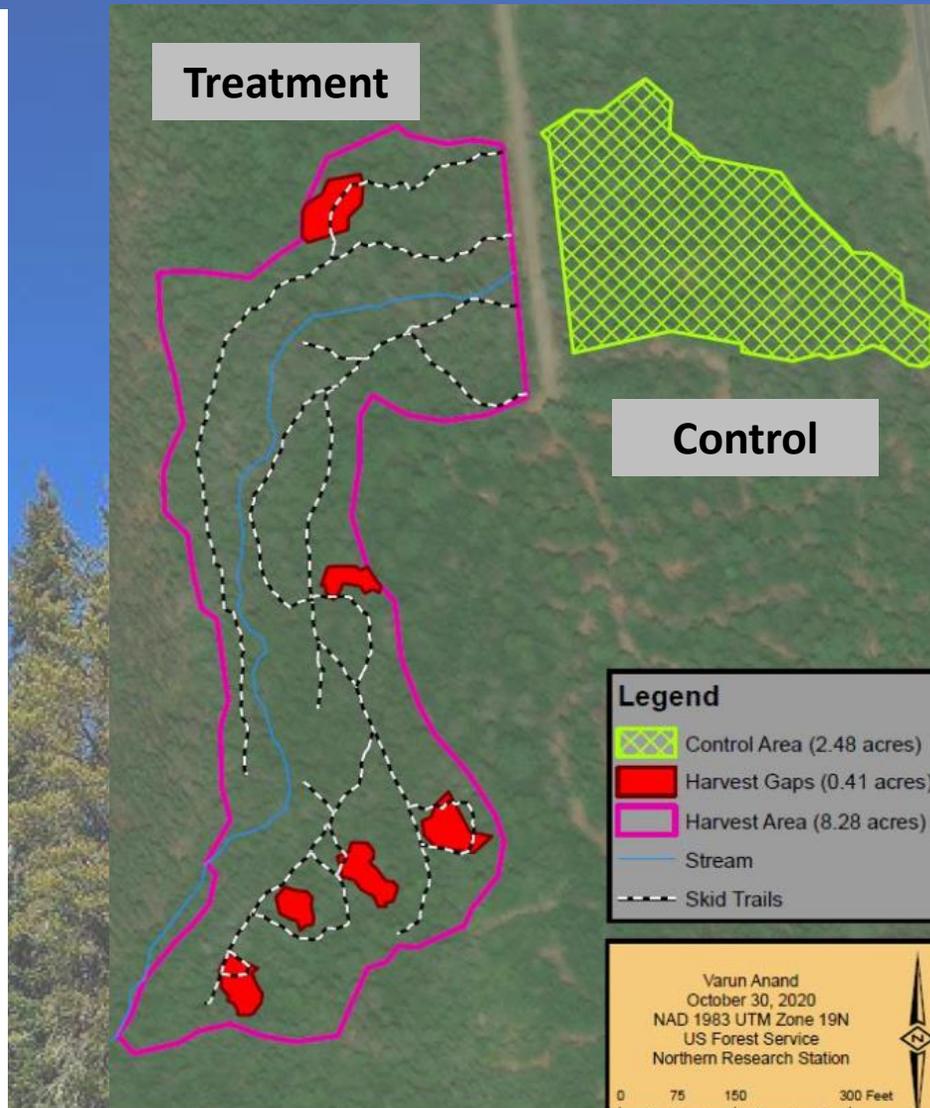
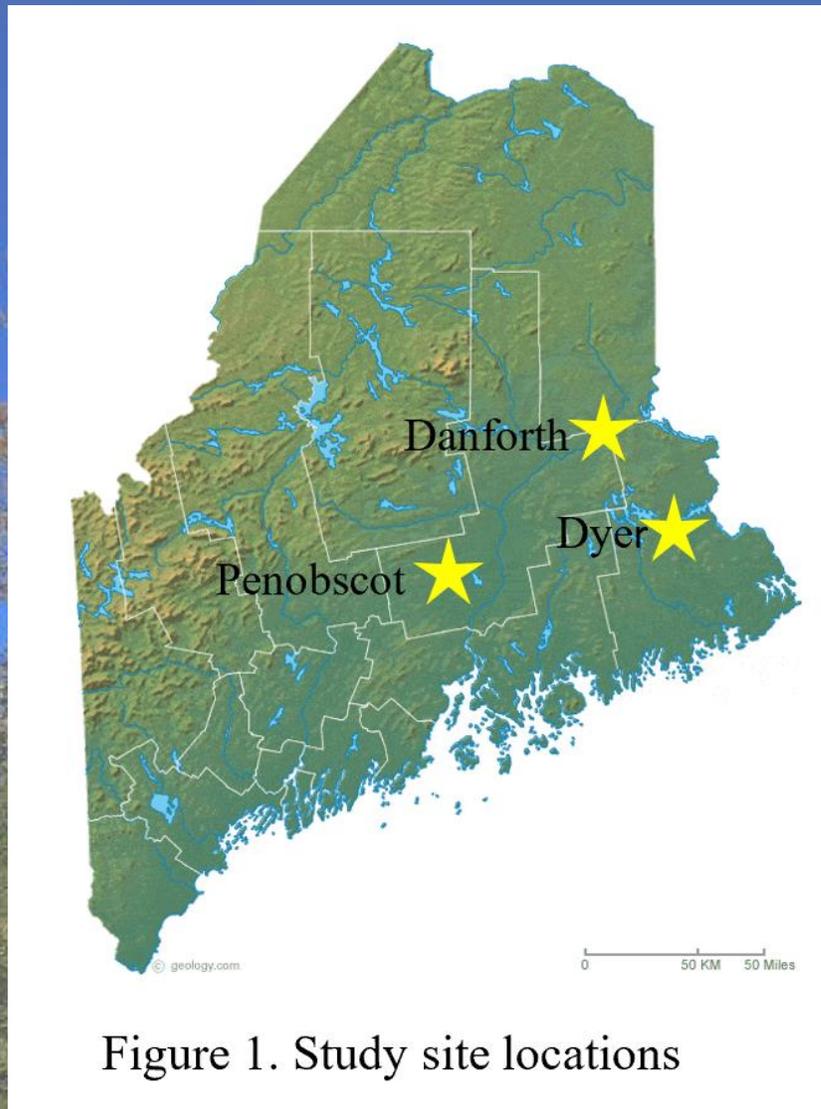
Research from drier upland stands suggests **partial harvesting** is effective in promoting growth, regeneration, and recruitment



Goals:

- Determine the conditions that are associated with northern white-cedar and balsam fir regeneration in lowland cedar stands
- Increase understanding of partial harvesting effects on structure, composition, regeneration, and microsites

Methods: Silvicultural Outcomes



Study Sites

- 5 control stands
- 3 treated stands
 - 36 permanent sample plots
 - 3 transects per plot
 - 87 mil-plots

Methods: Silvicultural Outcomes

Compare pre- and post-harvest conditions



Pre-harvest



Post-harvest

The goal of these treatments was to thin the stand, capture mortality, and improve stand vigor and quality while maintaining structural complexity and opening canopy for cedar regeneration



Pre- and Post-Harvest Measurements

Composition and Structure:

- Overstory trees (live and dead)
- Seedlings, Saplings, Shrubs
- Stumps (newly recruited and historical)

Harvesting Impact:

- Area in trails
- Regeneration in gaps
- Canopy cover
- Canopy closure
- Water level
- Downed logs

Regeneration Microsite:

- Microtopography
- Regeneration substrate
- Browsing
- Understory vegetation inventory
- Temperature and vapor pressure deficit
- Deadwood volume



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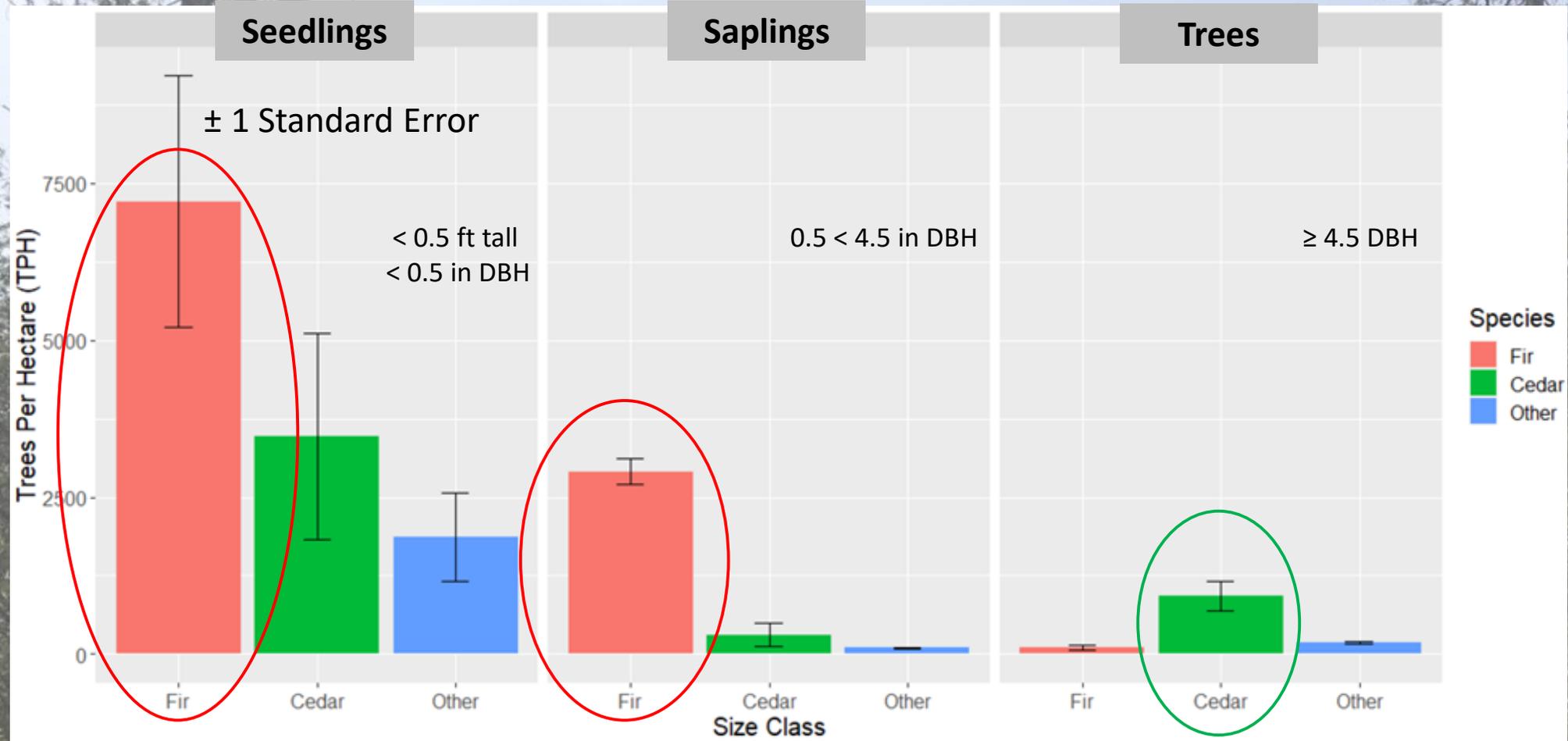




Results: Pre-Harvest Conditions

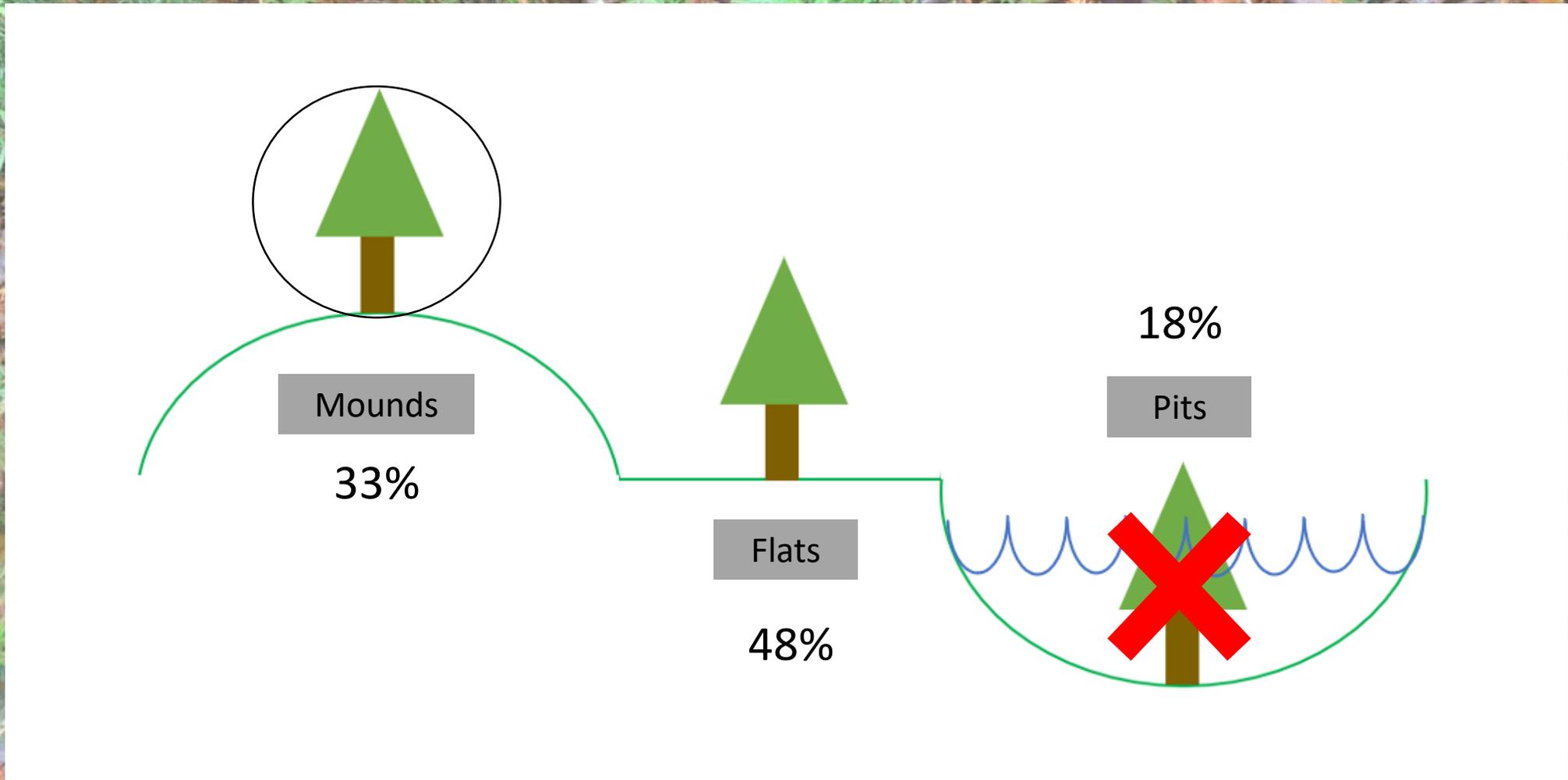


Pre-Harvest Conditions: Trees per Hectare



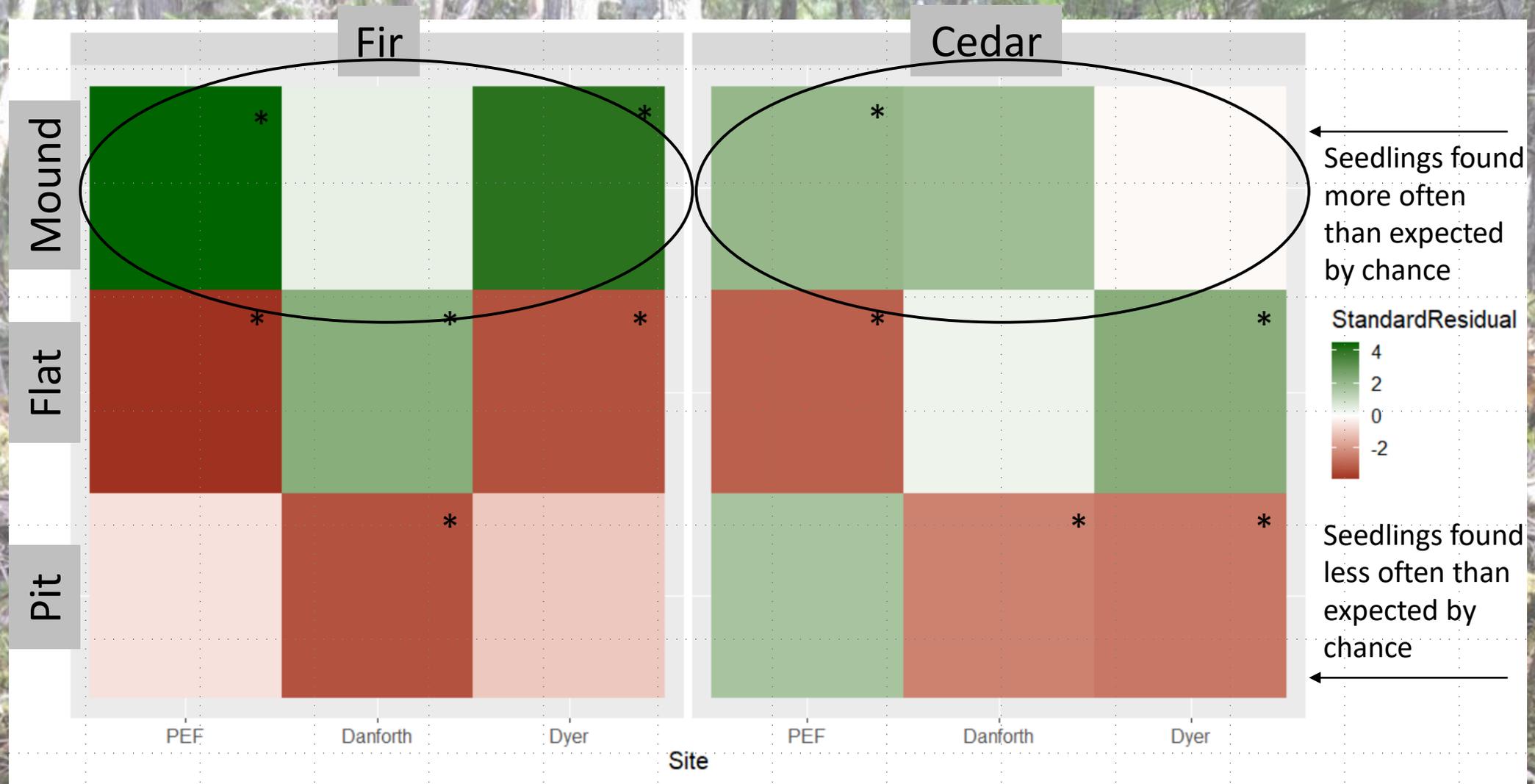
Fir dominates the seedling and sapling size class, and cedar dominates the overstory

Pre-Harvest Conditions: Microtopography



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Pre-Harvest Conditions: Microtopographic Conditions



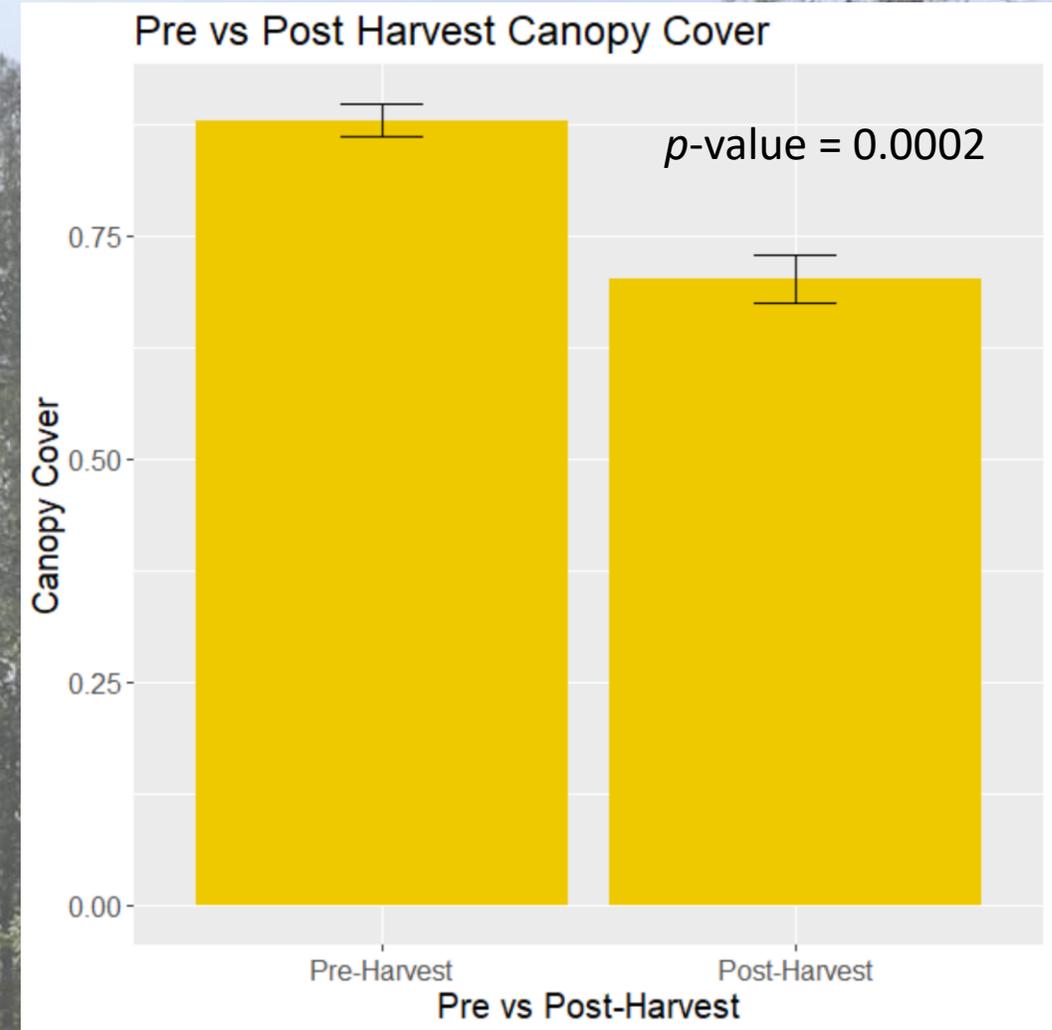
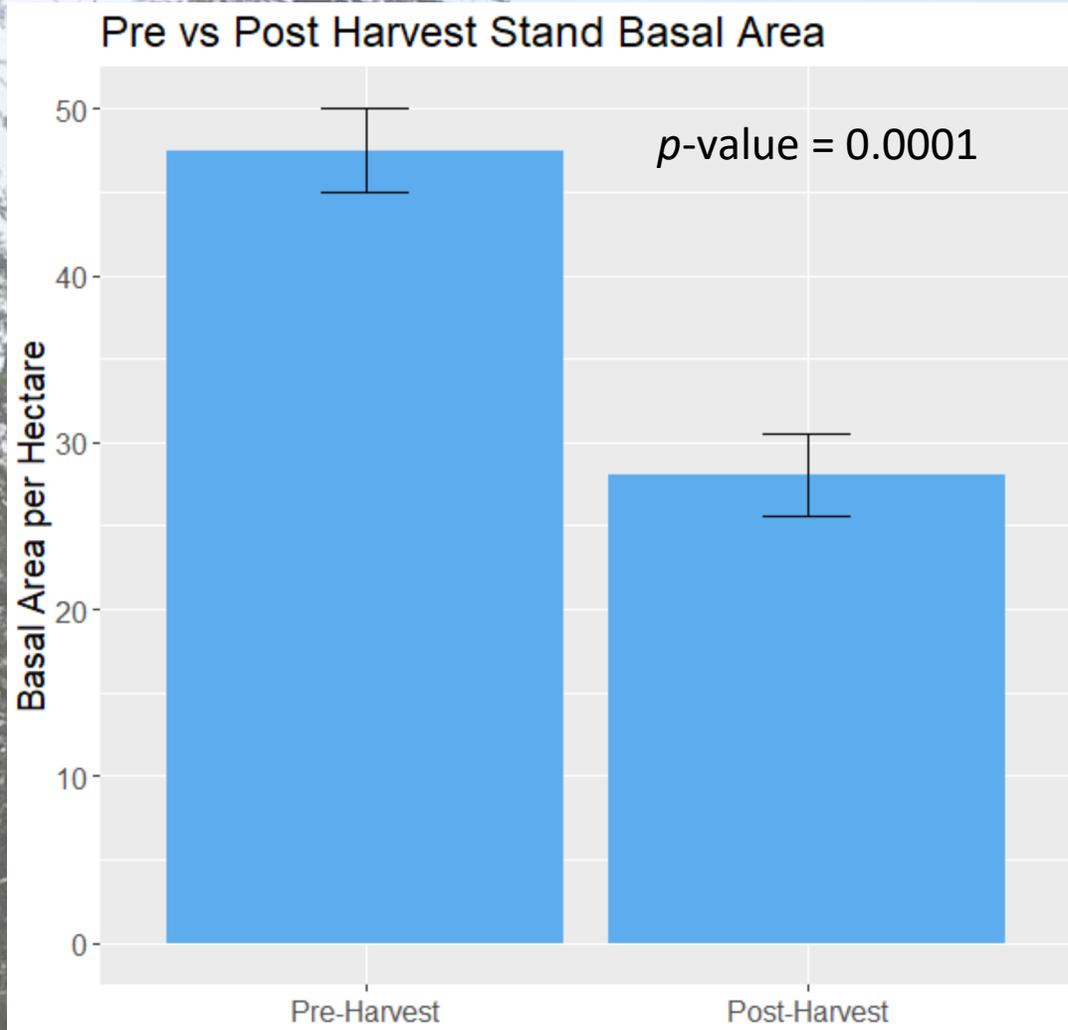
Fir seedling abundance has a greater association with mounds than cedar seedlings



Results: Pre-Harvest vs Post-Harvest Conditions Overstory

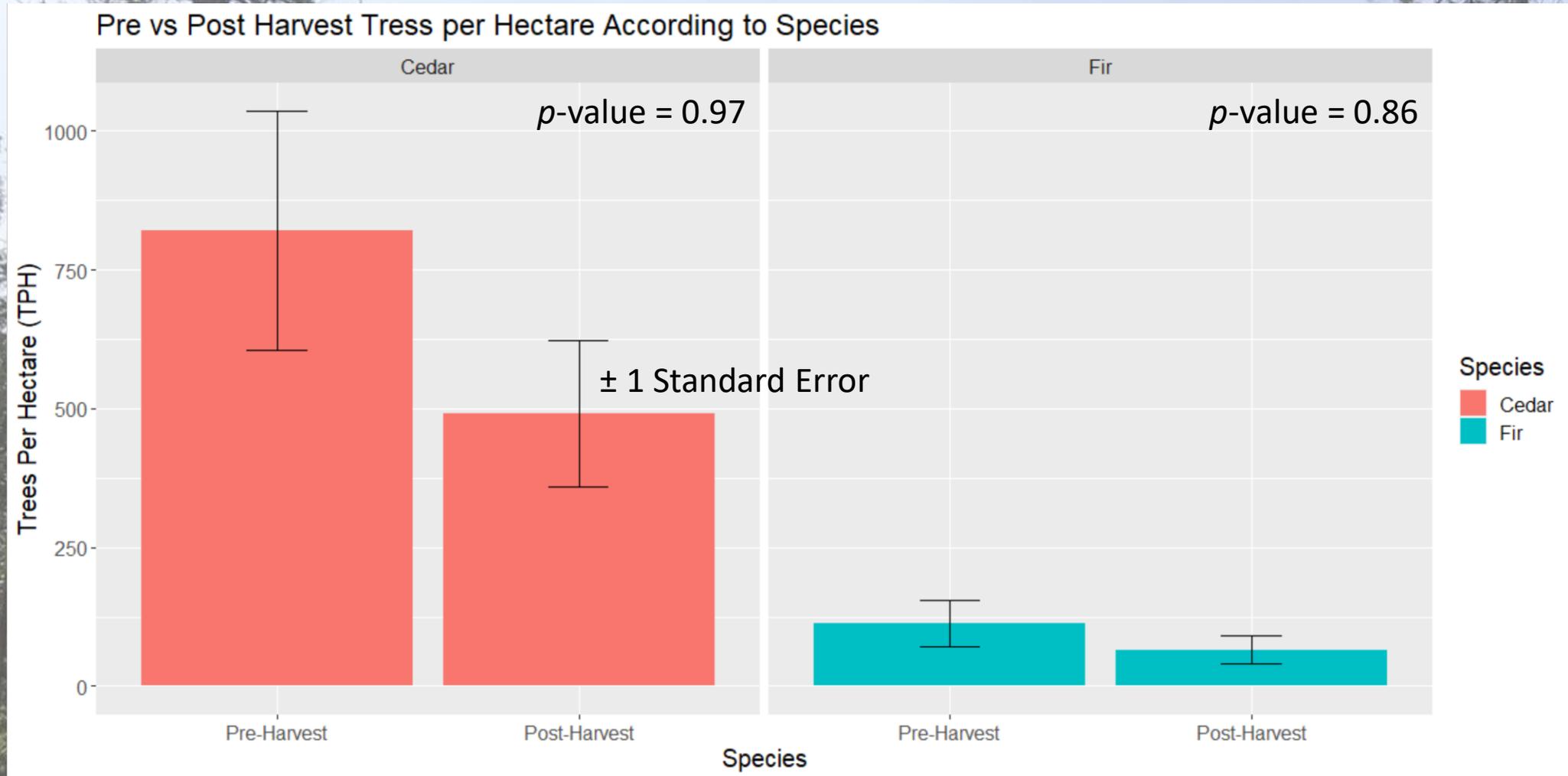


Overstory Pre-Harvest vs Post-Harvest Conditions



Reductions in basal area and canopy cover indicate that the stand was thinned

Overstory Pre-Harvest vs Post-Harvest Trees Per Hectare



Overstory trees per hectare did not significantly change from pre-harvest to post-harvest

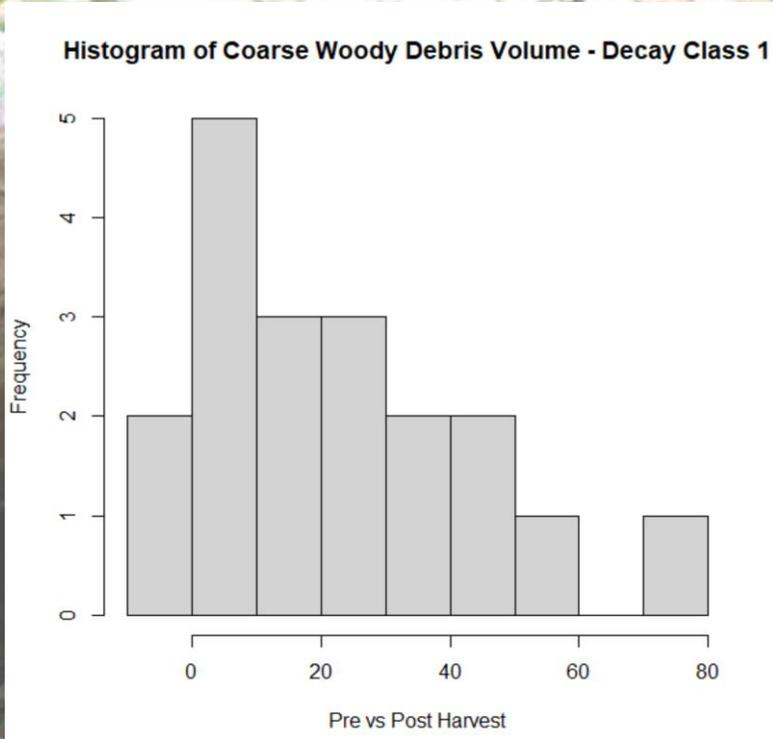


Results: Pre-Harvest vs Post-Harvest Conditions Understory



Understory Pre-Harvest vs Post-Harvest Conditions

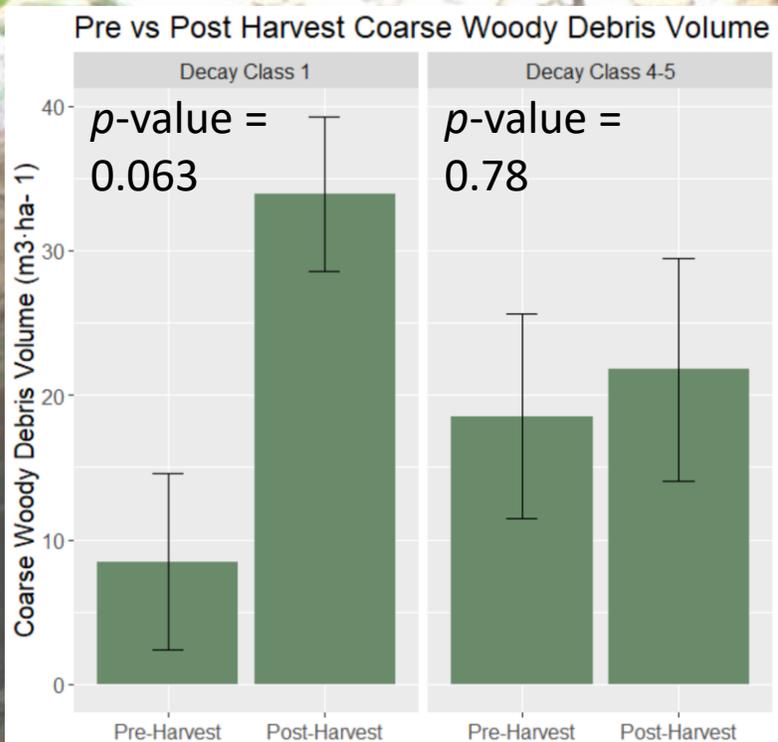
Coarse Woody Debris



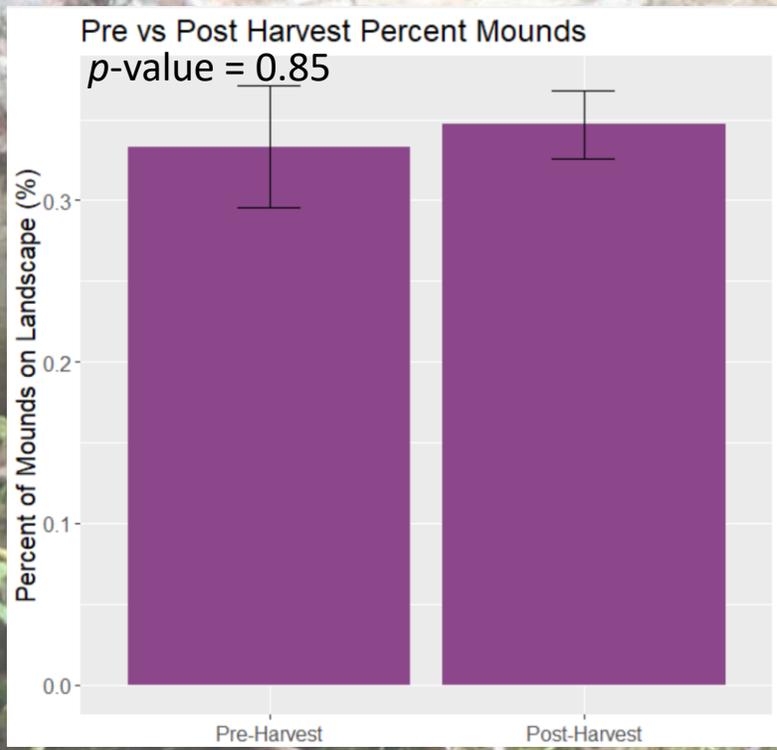
Harvest did not significantly change understory conditions (with exception of coarse woody debris in decay class 1)

Understory Pre-Harvest vs Post-Harvest Conditions

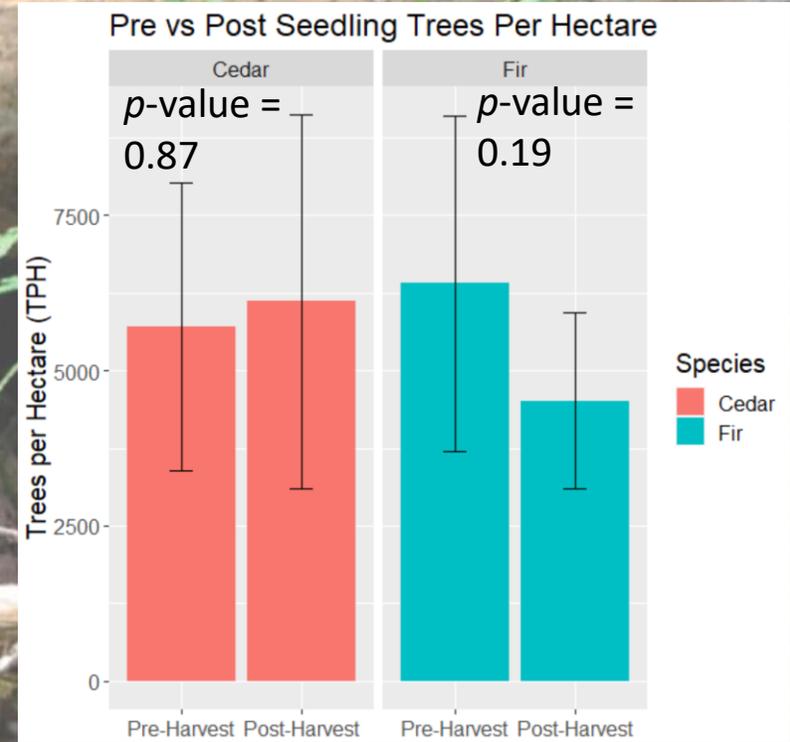
Coarse Woody Debris



Percent Mounds



Trees Per Hectare



Harvest did not significantly change understory conditions (with exception of coarse woody debris in decay classes 1, 2, and 3)

Summary of Results



Stands are dominated by fir in the understory and cedar in the overstory

Stands may not currently support cedar regeneration and recruitment (microtopographic variability)

Our treatment objective (to thin the stand while opening the canopy for cedar regeneration and maintaining structural complexity) was achieved

Harvesting did not significantly alter coarse woody debris, the percent of mounds, or seedling density in the understory

Management Suggestions and Implications



Increase microtopographic variability and the volume of coarse woody debris

Leave coarse woody debris and logs generated from harvest on site

Use minimum number of skid trails

Guidelines for lowland cedar stand management

Thank you! Any Questions?

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