



United States Department of Agriculture
National Institute of Food and Agriculture

Location, location, location: Mapping trees to evaluate the neighborhood

Jacob Beidler

Lebanon Valley College



Assessing Forest Competition

- Light availability and soil resource availability are regulated heavily by surrounding trees as a result of their own consumption (Keddy 1989)
- Competition indices originally used to predict growth rate (Radtke *et al.* 2003)
 - Have been repurposed in management and research (Weldon & Slauson 1986, Morris & MacDonald 1991, Brunner & Nigh 2000)

Equation and Model

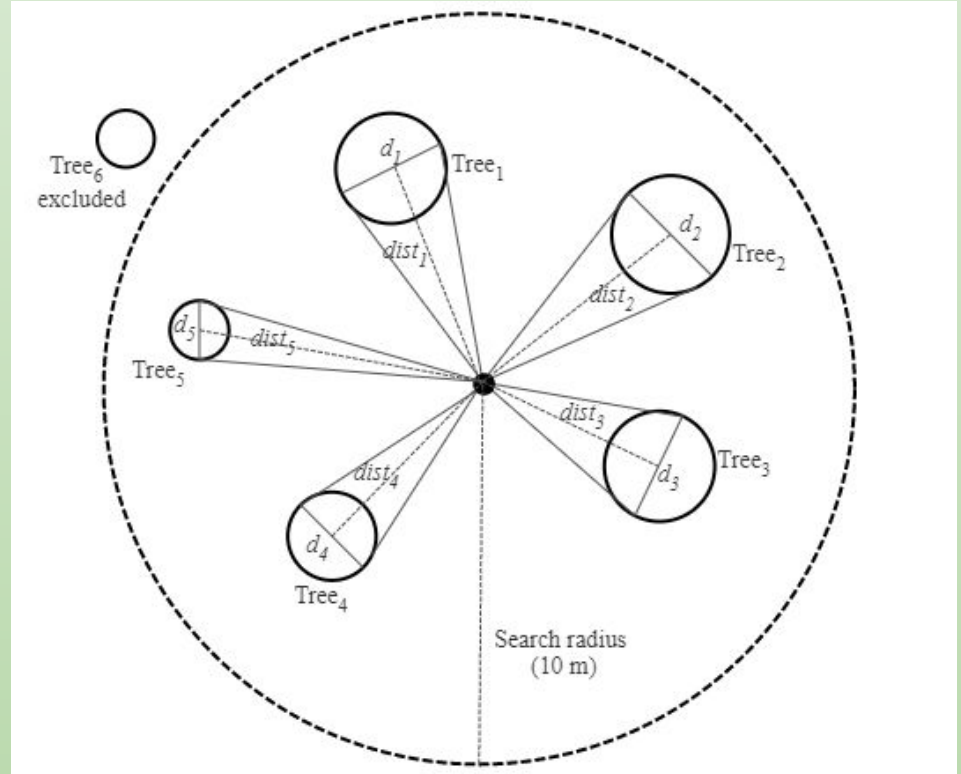
$$CI = \sum_{i=1}^n \arctan(d_i / dist_i)$$

Equation from Rouvinen and Kuuluvainen (1997)

Where:

d_i = tree DBH (cm)

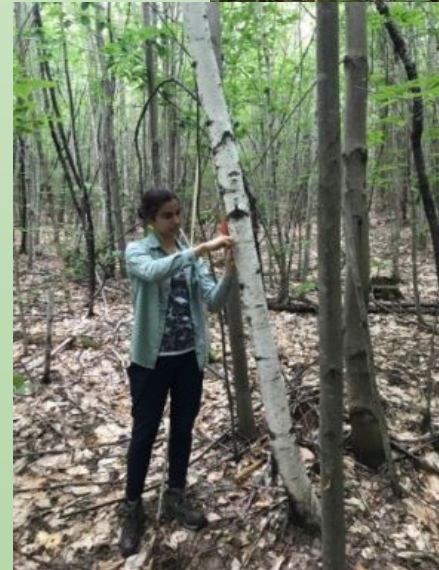
$dist_i$ = distance (m) to tree



Model based on Contreras *et al.* (2011)

Tree Inventory and Stem Mapping

- Long-term inventory: pretreatment, 2015, and 2019
- Record species and diameter of trees
- Measure locations of trees > 10 cm DBH
- Trees within measurement area were tagged and spatial located
 - Buffer trees are measured for DBH and located but not tagged



Results

- Future woody and herbs will find more success at low competition
- May explain patterns in:
 - Soil respiration
 - Herb cover
 - Root density
 - Tree recruitment



1 x 1 meter
Competition Index



C7 Trees

Species

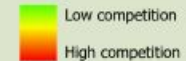
- ASH
- BE
- EH
- HEM
- RM
- SM
- WB
- YB
- <all other values>

DBH at dowel (cm)

- 10
- 20
- 30
- 40

C7 Comp Index

Comp



Jake Beidler - intern for MELNHE
Tree geolocation performed by
Denise Rauschendorfer and Alex Young
in 2016 and 2020

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Stem locations from Denise Rauschendorfer and Alex Young



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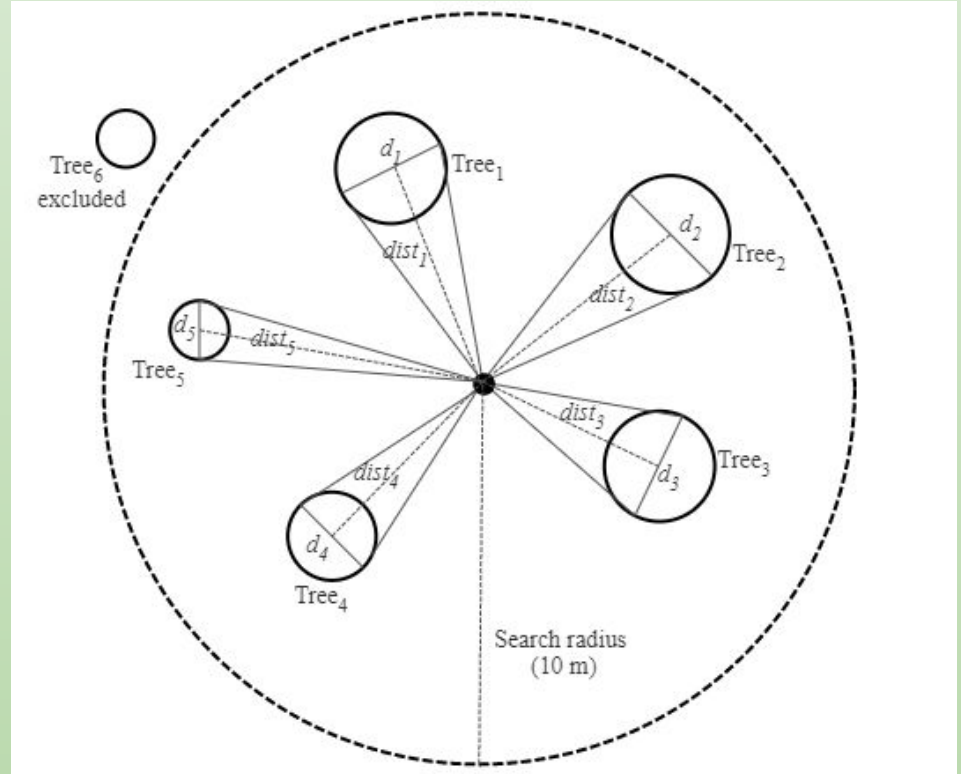
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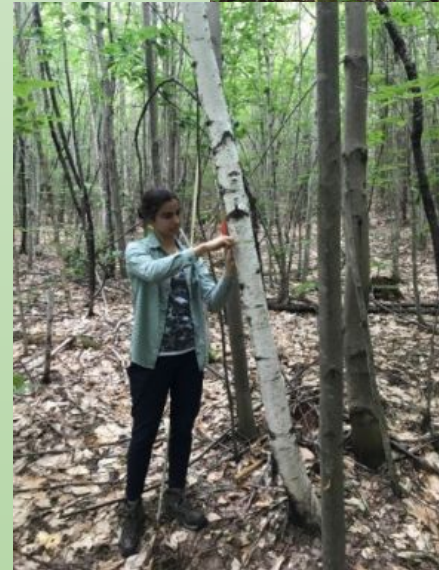
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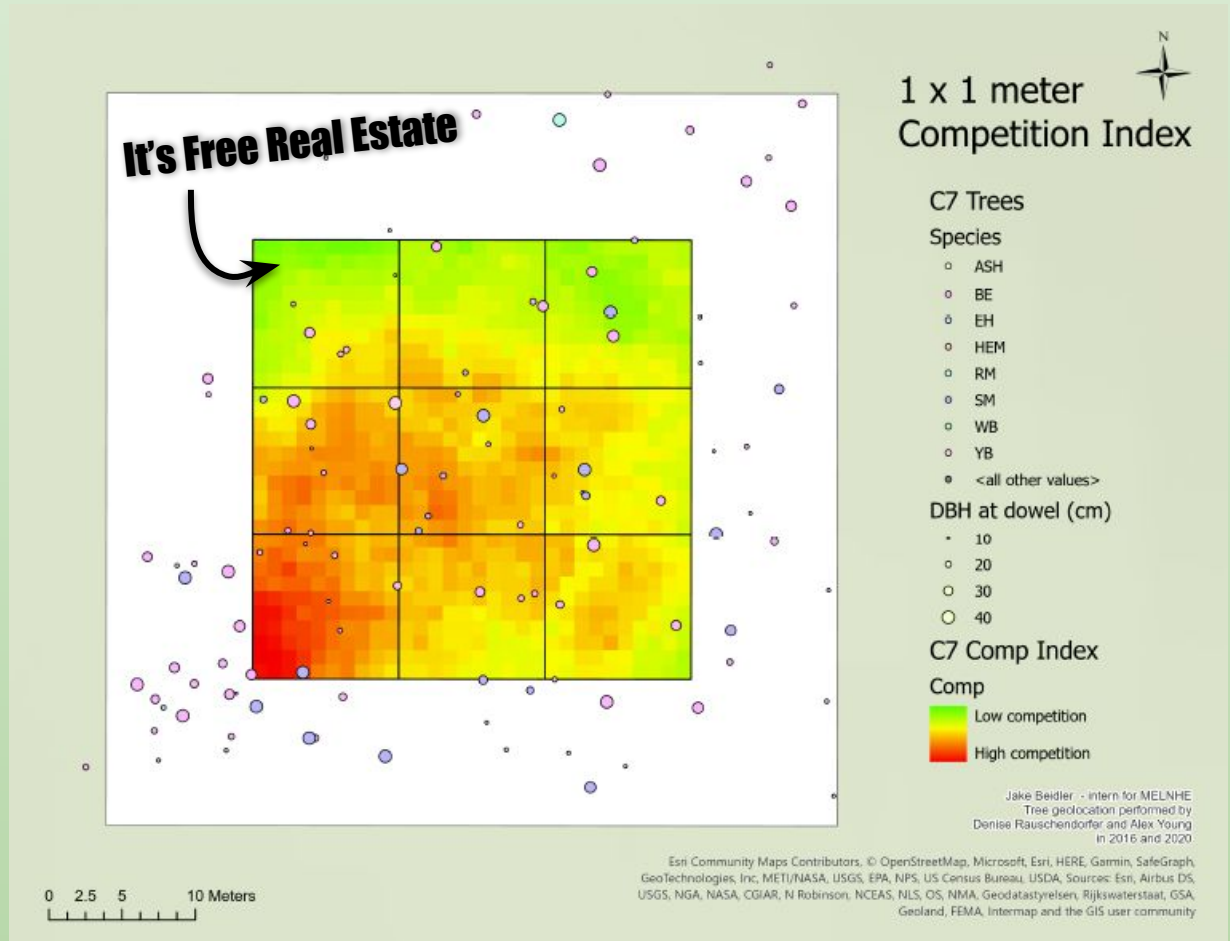
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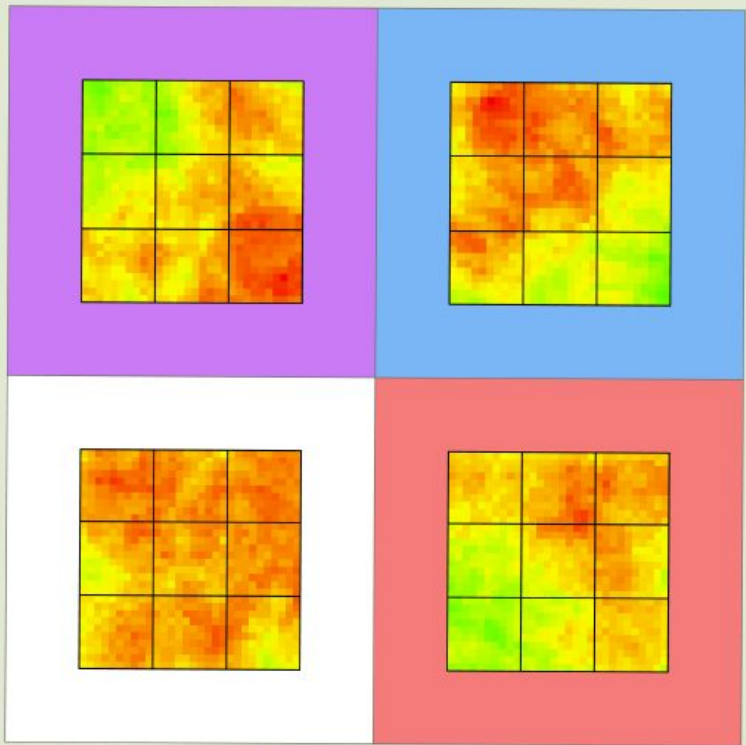
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Stem locations from Denise Rauschendorfer and Alex Young

Stand C6



Competition

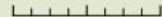


Low

High



0 5 10 20 Meters

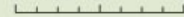


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Stand C7



0 12.5 25 50 Meters



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