

What Does the Future of Red Pine Look Like on the Huron-Manistee NF?

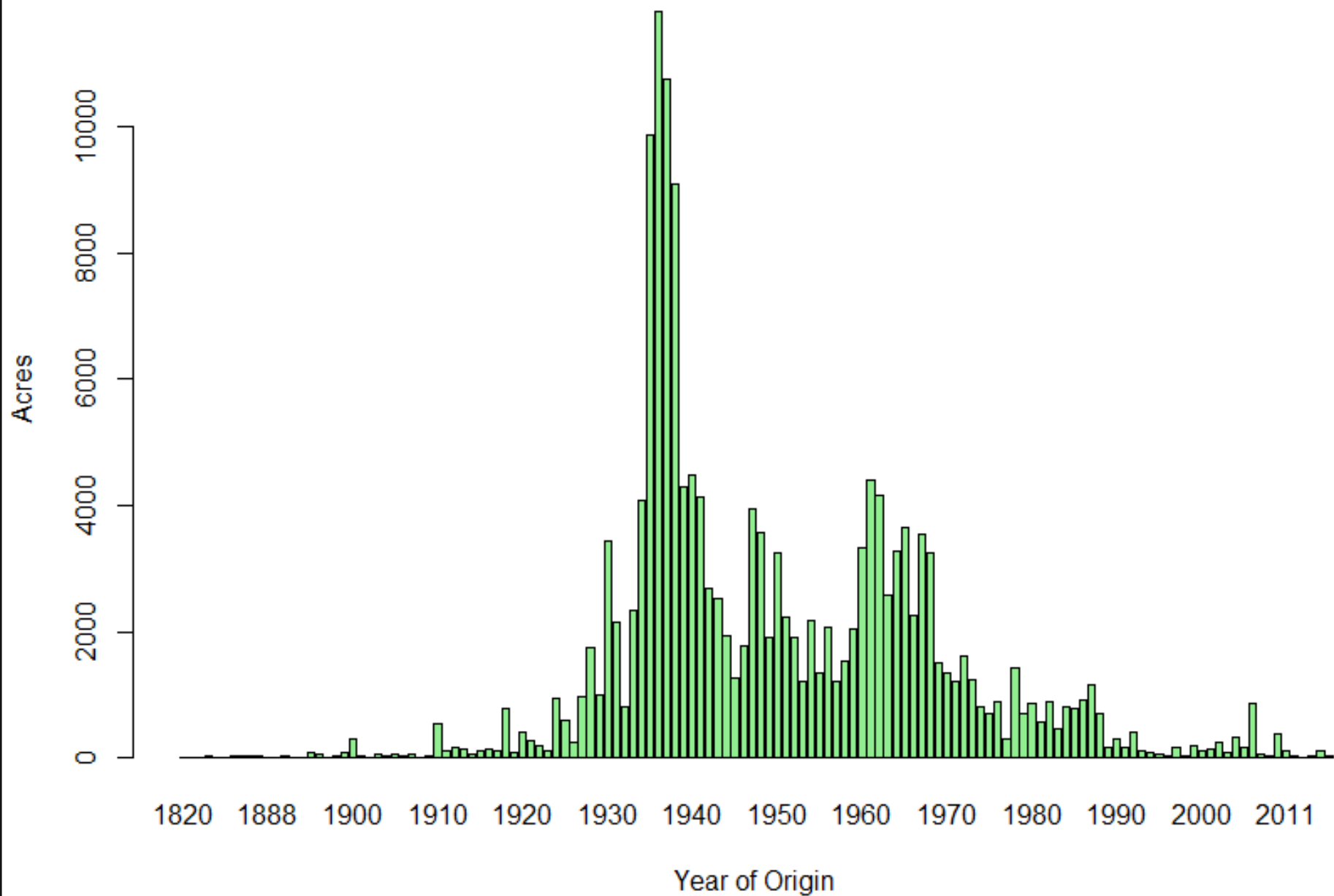


Trevor Hobbs
Resource Information Manager

Our Current Perception of Red Pine

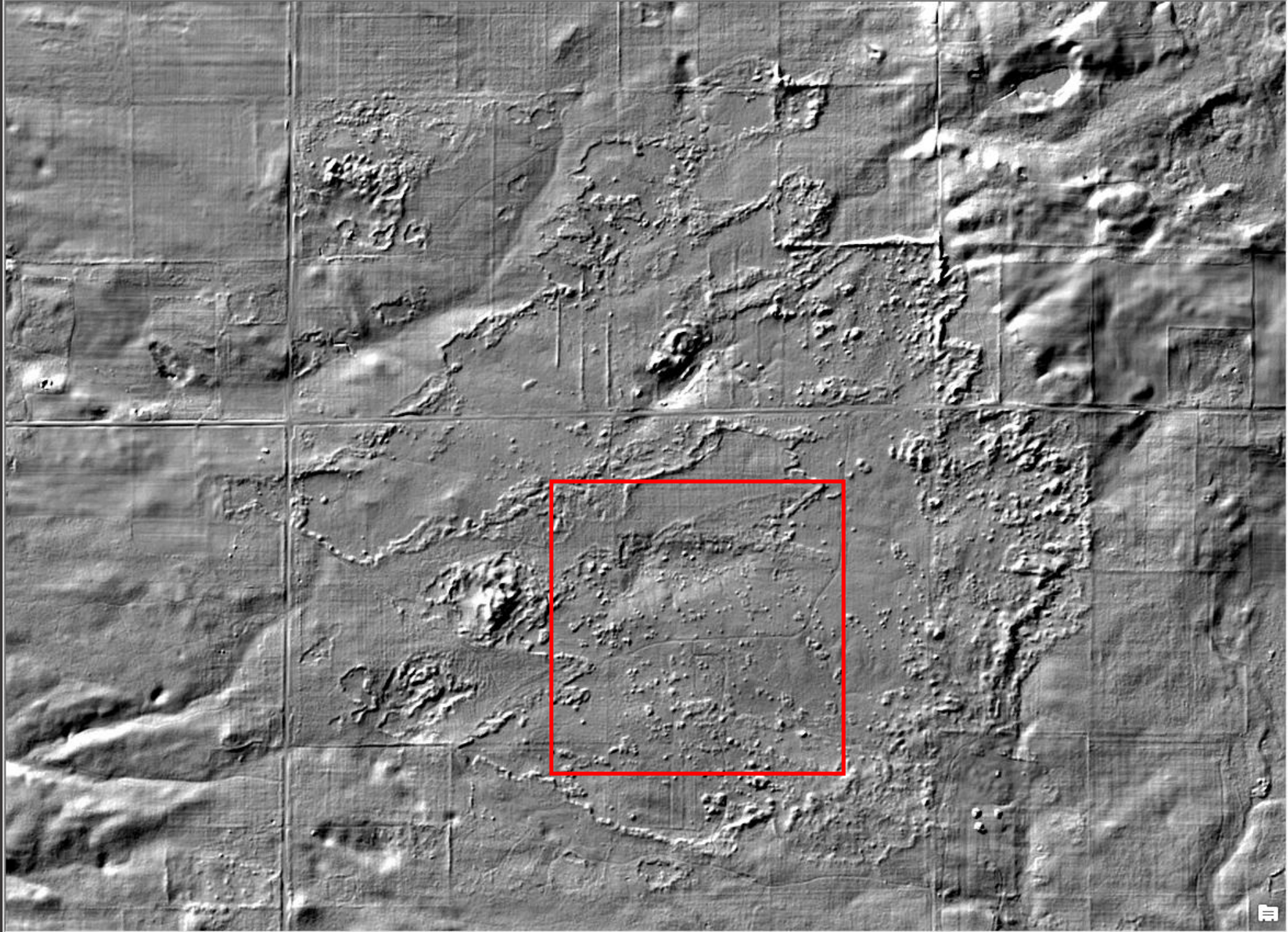
- Current red pine distribution is heavily influenced by past land use/disturbance history...
 - Civilian Conservation Corps (CCC) Plantings in the 1930's
 - Another wave of planting in the '50s-60's

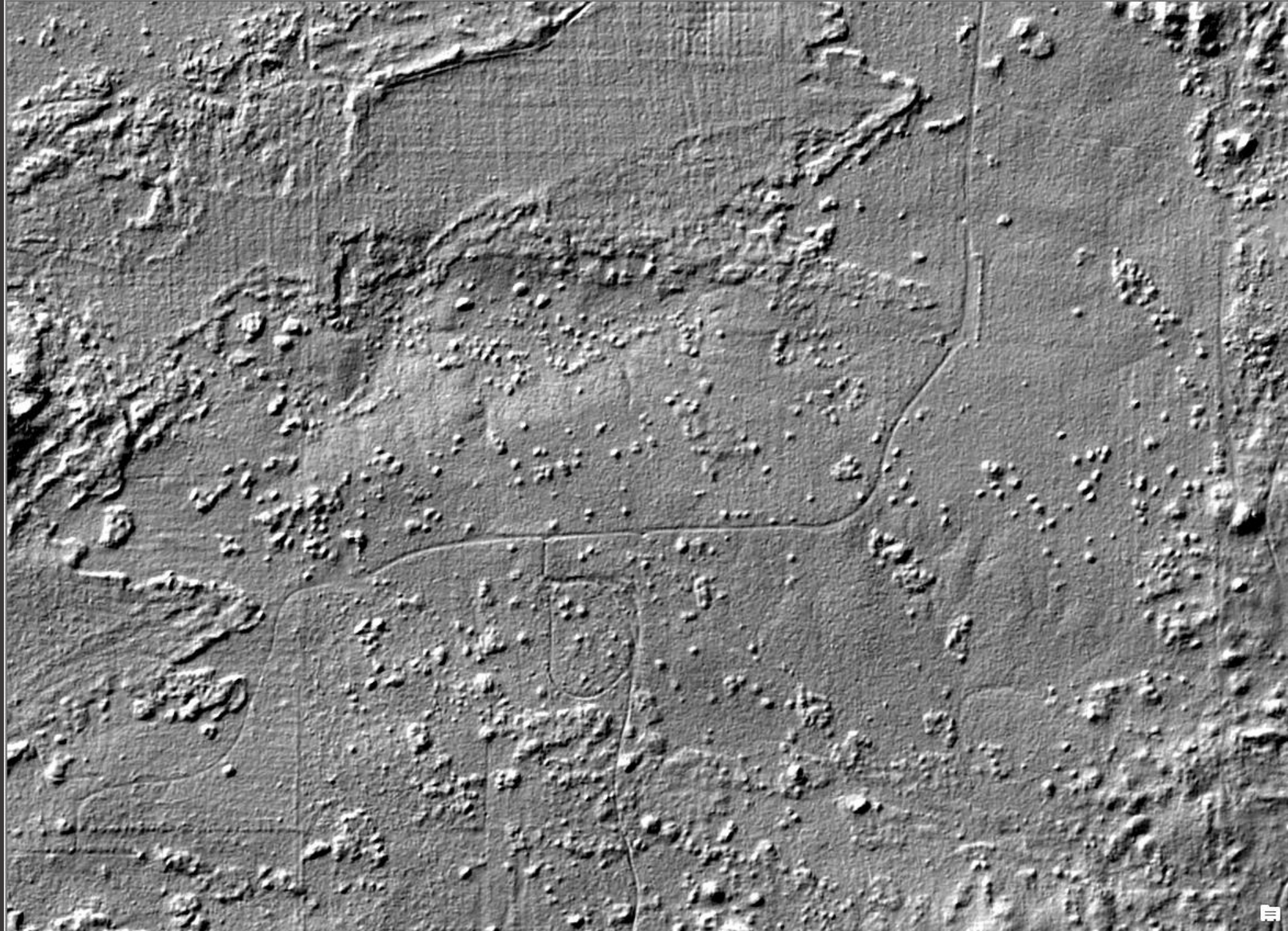
Age Class Distribution of Red Pine Across the Huron-Manistee NF

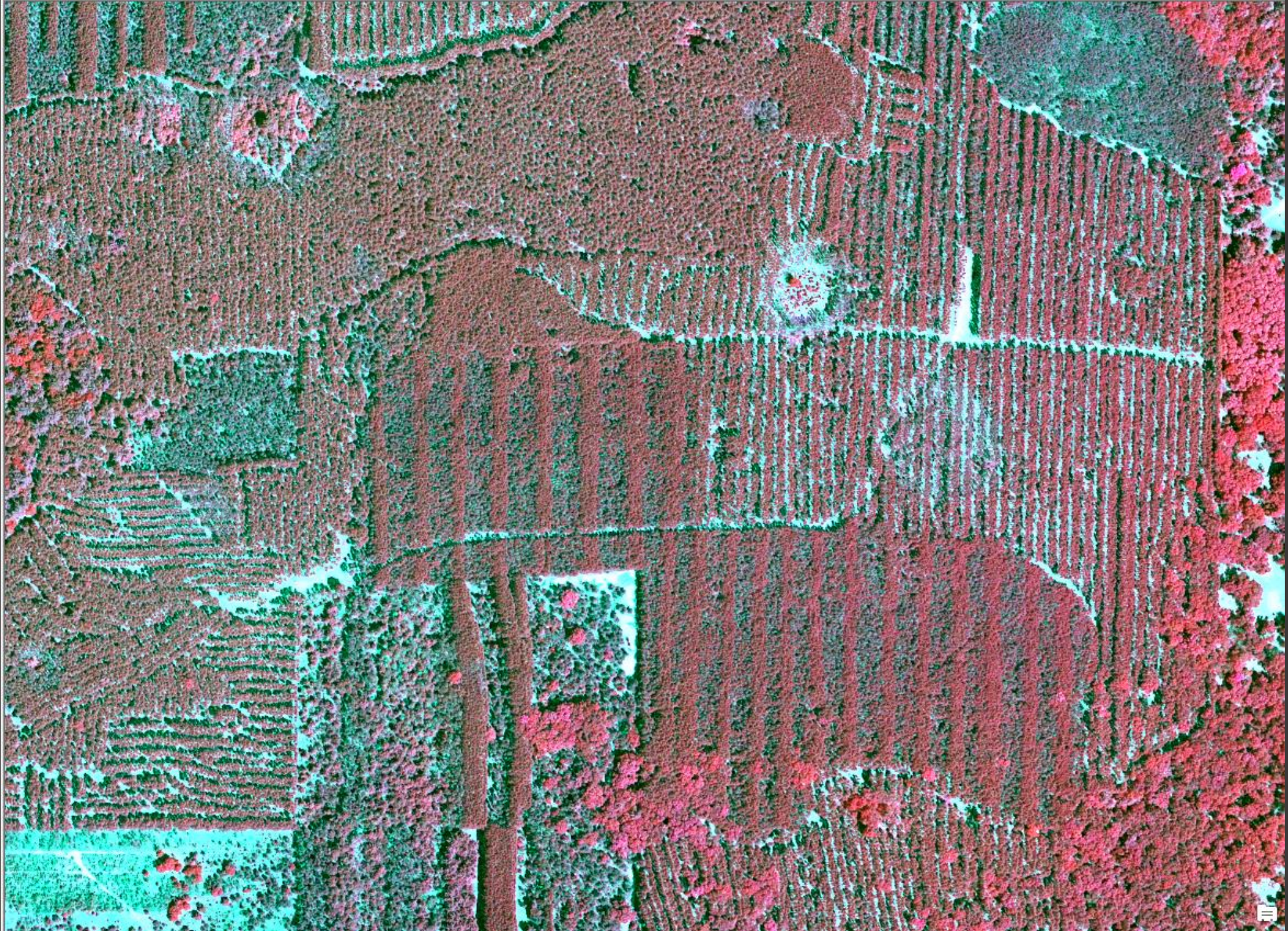


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- Red pine stands are “biological deserts”

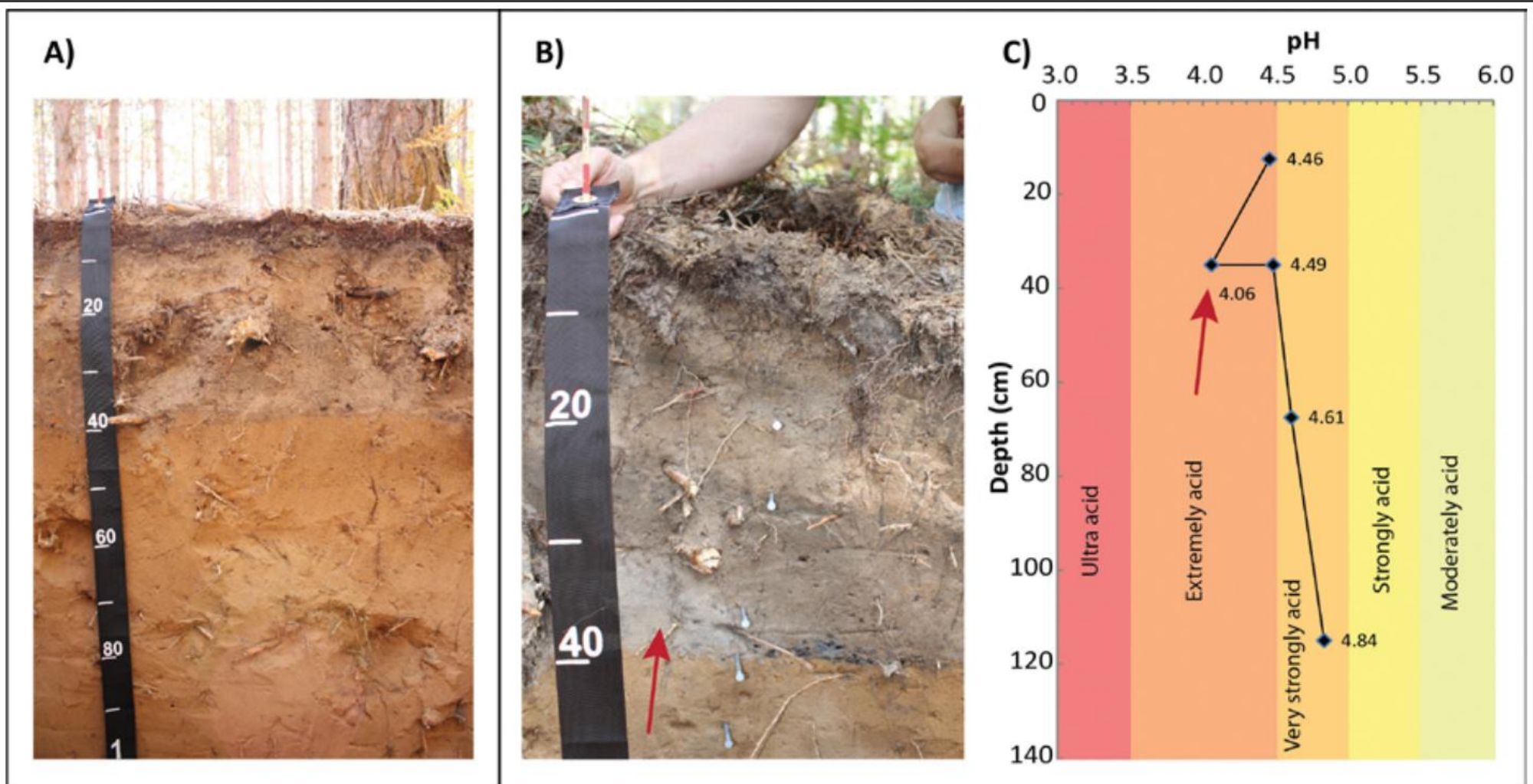


Figure 9.—Soil pit at A) site 4 and B) site 1, Osborn Creek watershed. Note the lighter-colored buried plow (Apb) horizon between 20 and 40 cm compared to the overlying A-horizon in A). Red arrow in B) points to the portion of the Apb horizon that appears to be leached relative to the remainder of the horizon, as shown by C) the sharp decline to an extremely low pH within that horizon. Photos by Trevor Hobbs, Huron-Manistee National Forests.

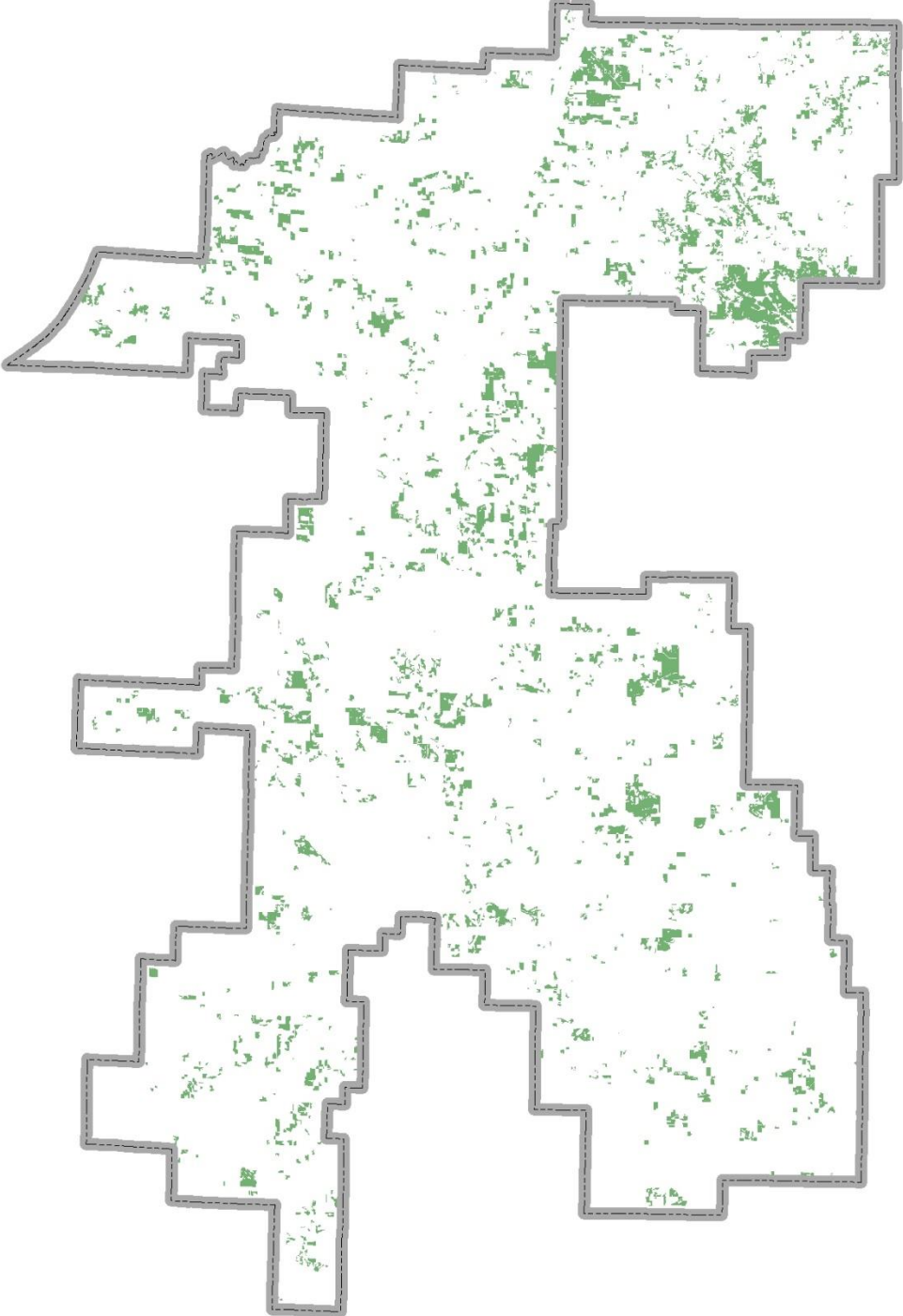
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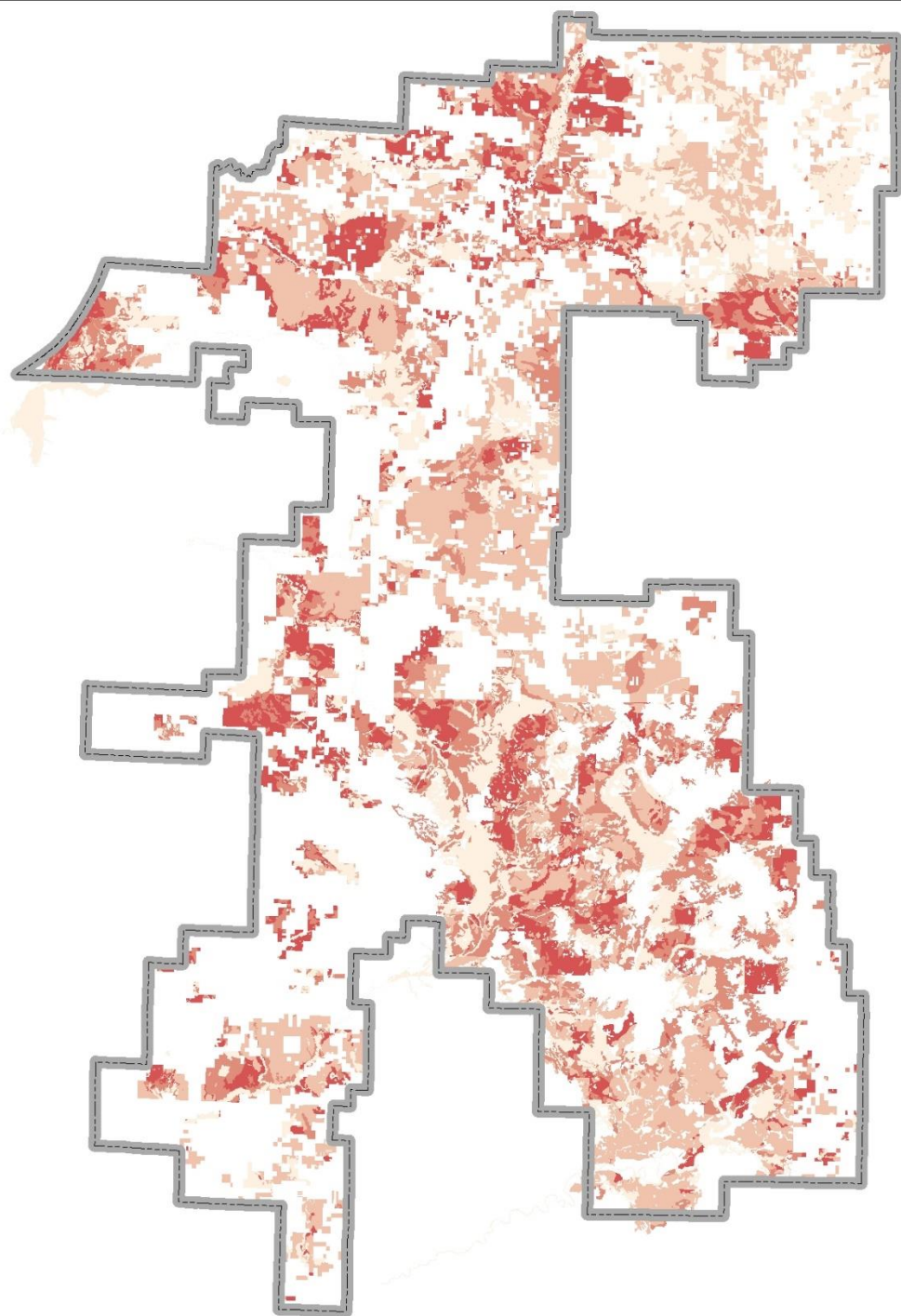
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- Red pine stands are “biological deserts”
- Plantations are predictable, easy to cruise, and simple to manage for timber focused outcomes

What if we could shift red pine on the landscape to more ecologically suitable sites? Could this be a climate change adaptation strategy?

- Approach – use GLO tree point data and summarize historic species occurrence by Ecological Landtype Phase map units
- Potential Natural Communities

Current Red Pine Acres – Manistee NF
(west zone)

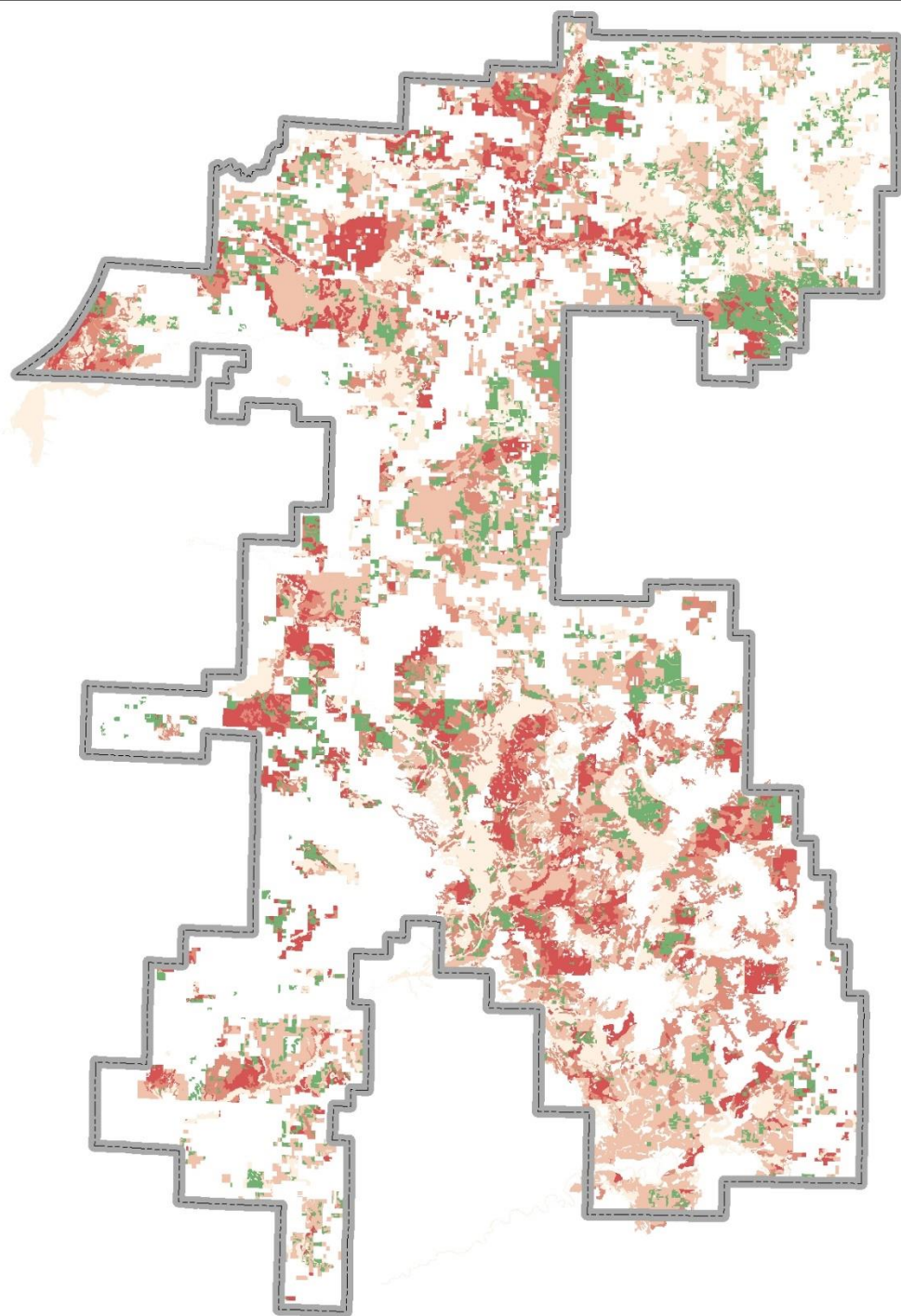




Legend

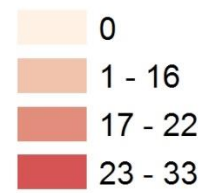
Potential Natural Communities - Red Pine
Percent Red Pine Composition (Quantiles)



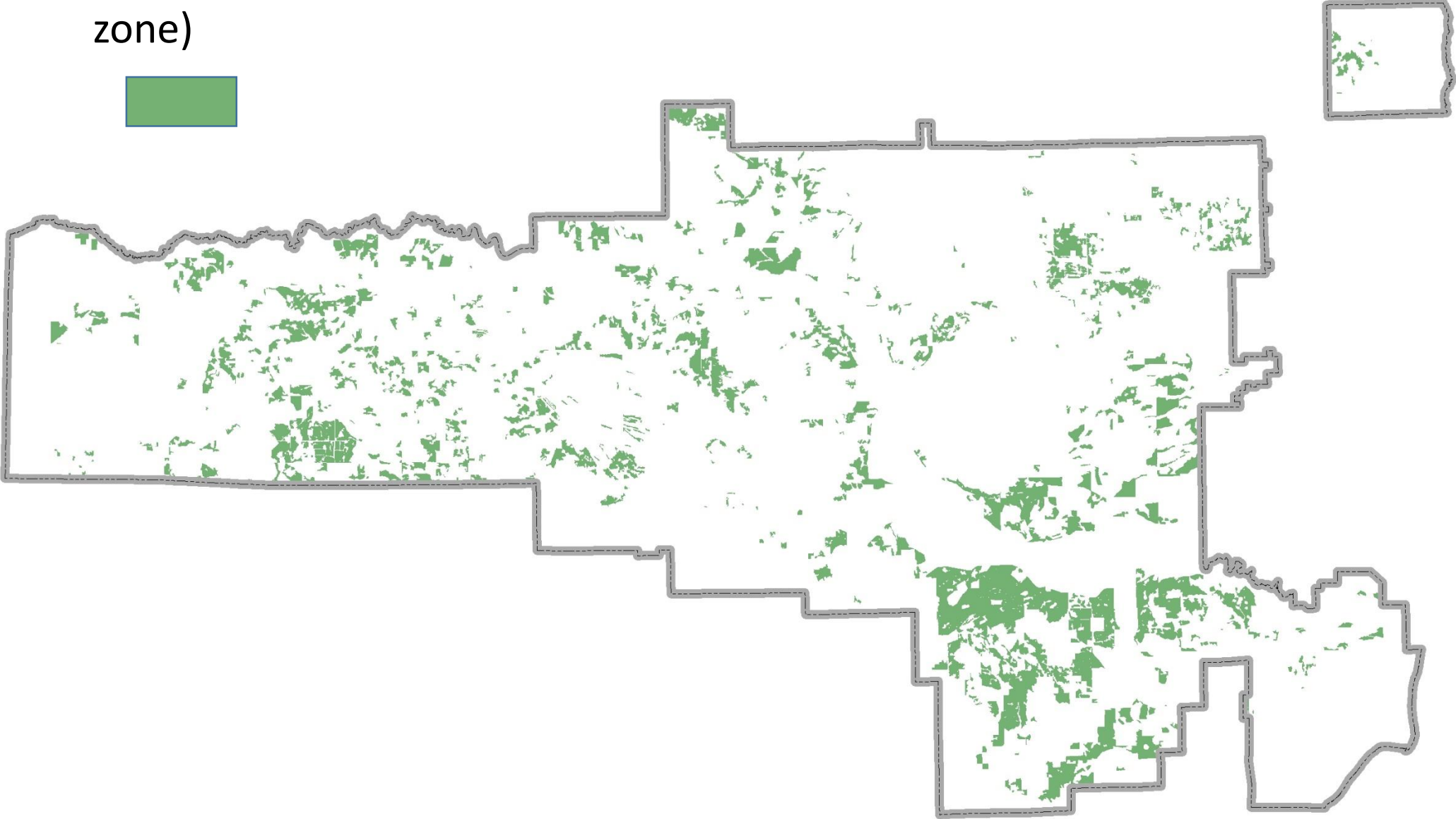


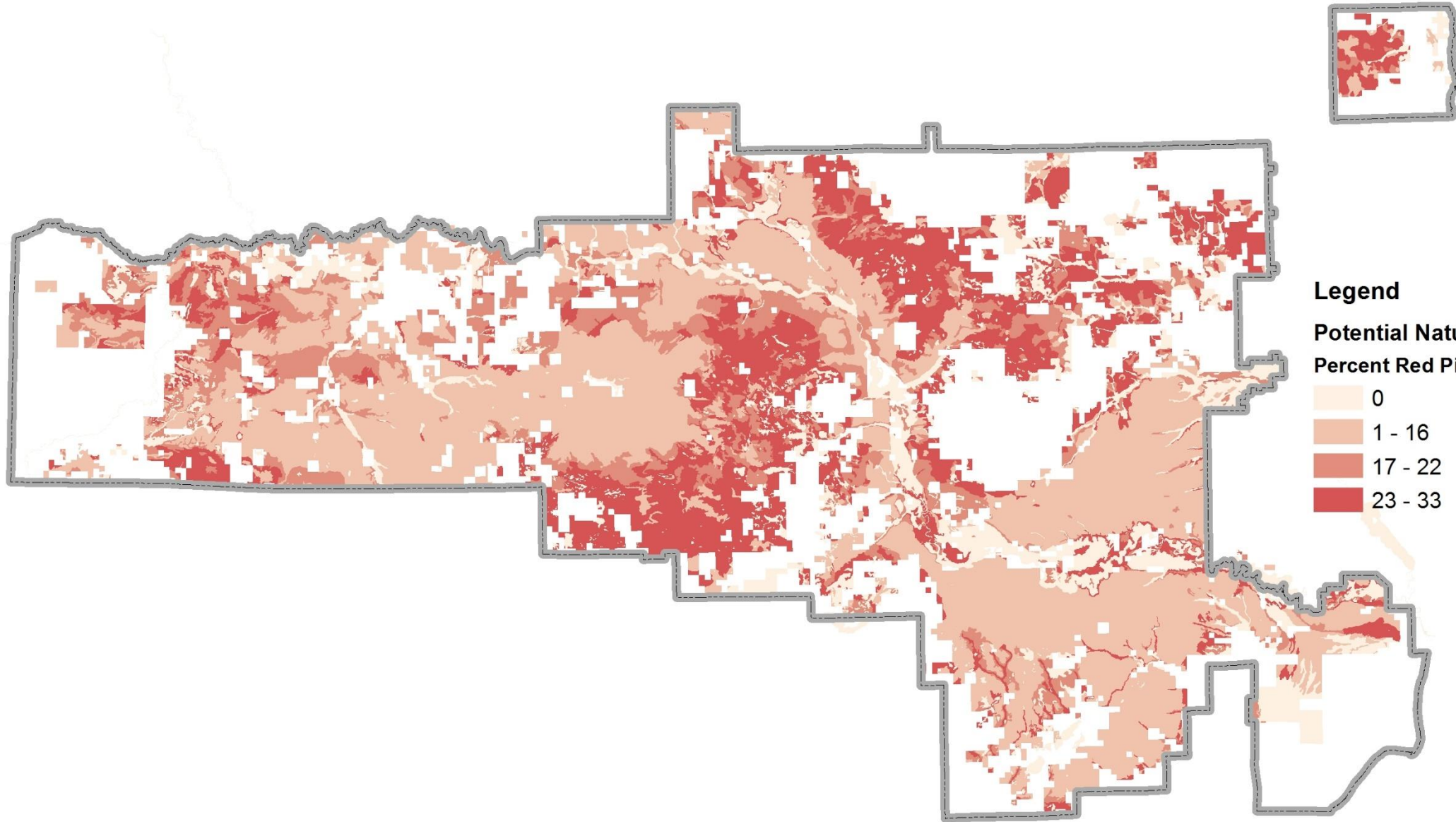
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Potential Natural Communities - Red Pine
Percent Red Pine Composition (Quantiles)



Current Red Pine Acres – Huron NF (east zone)

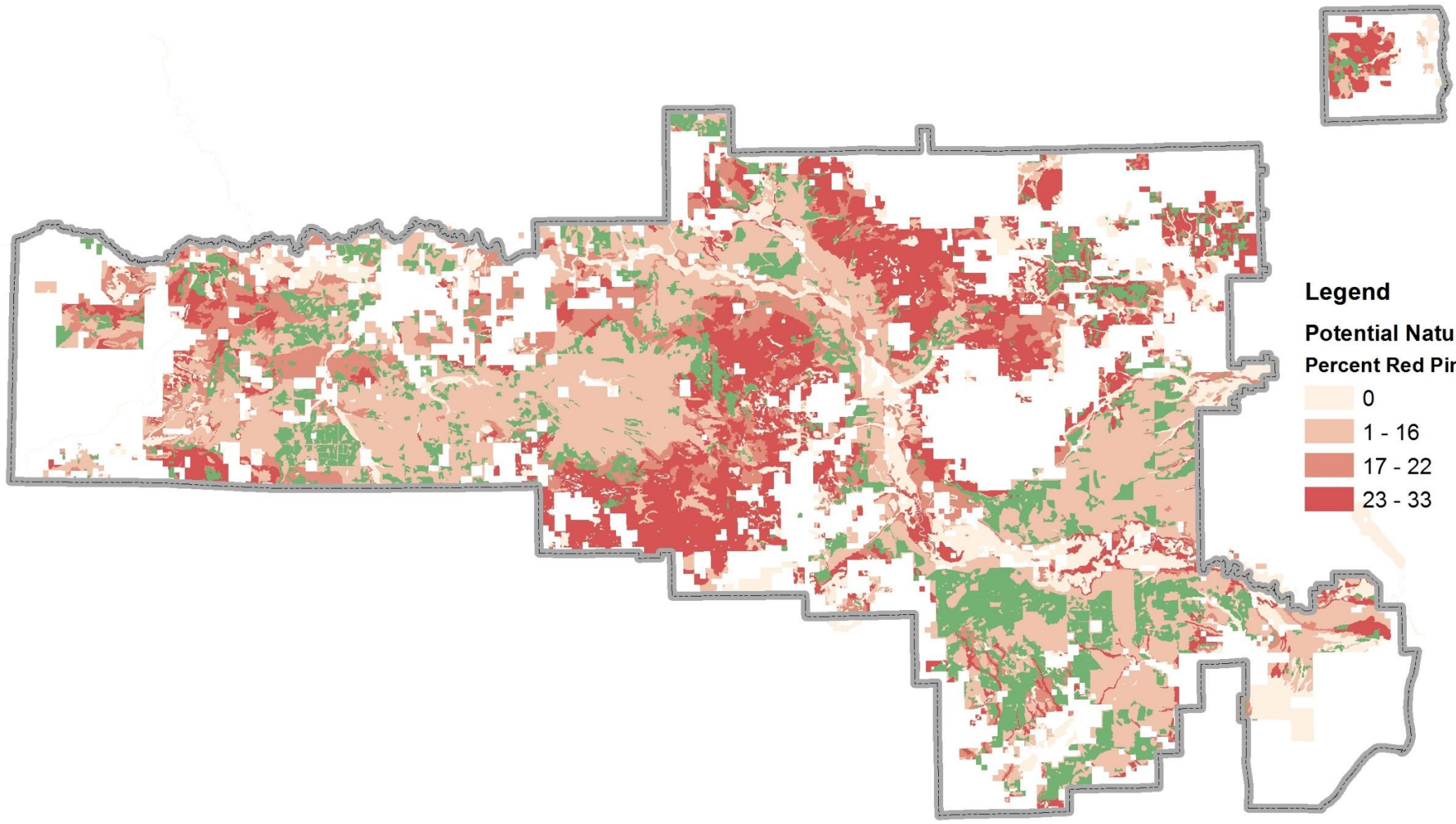




Legend

**Potential Natural Communities - Red Pine
Percent Red Pine Composition (Quantiles)**

- 0
- 1 - 16
- 17 - 22
- 23 - 33



Legend

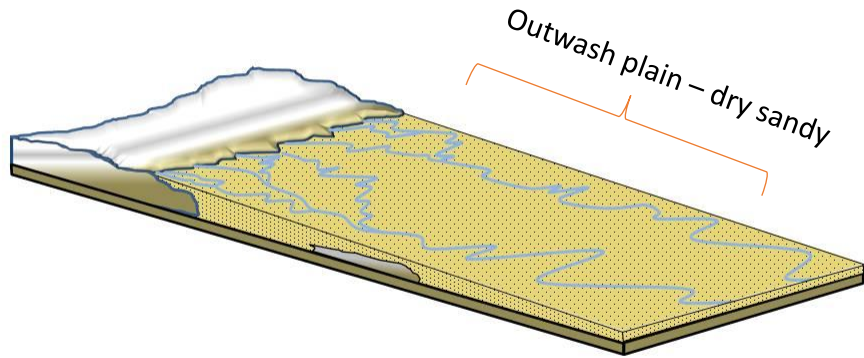
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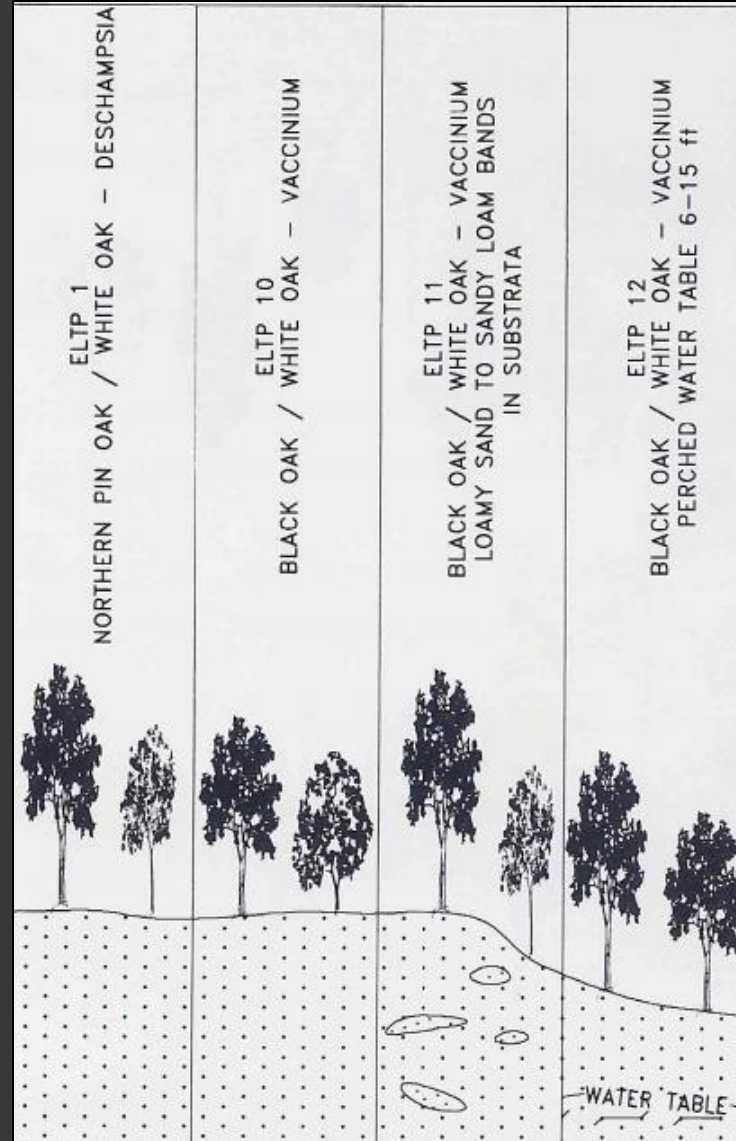
Shifting red pine from LTA 1 to LTA 2...

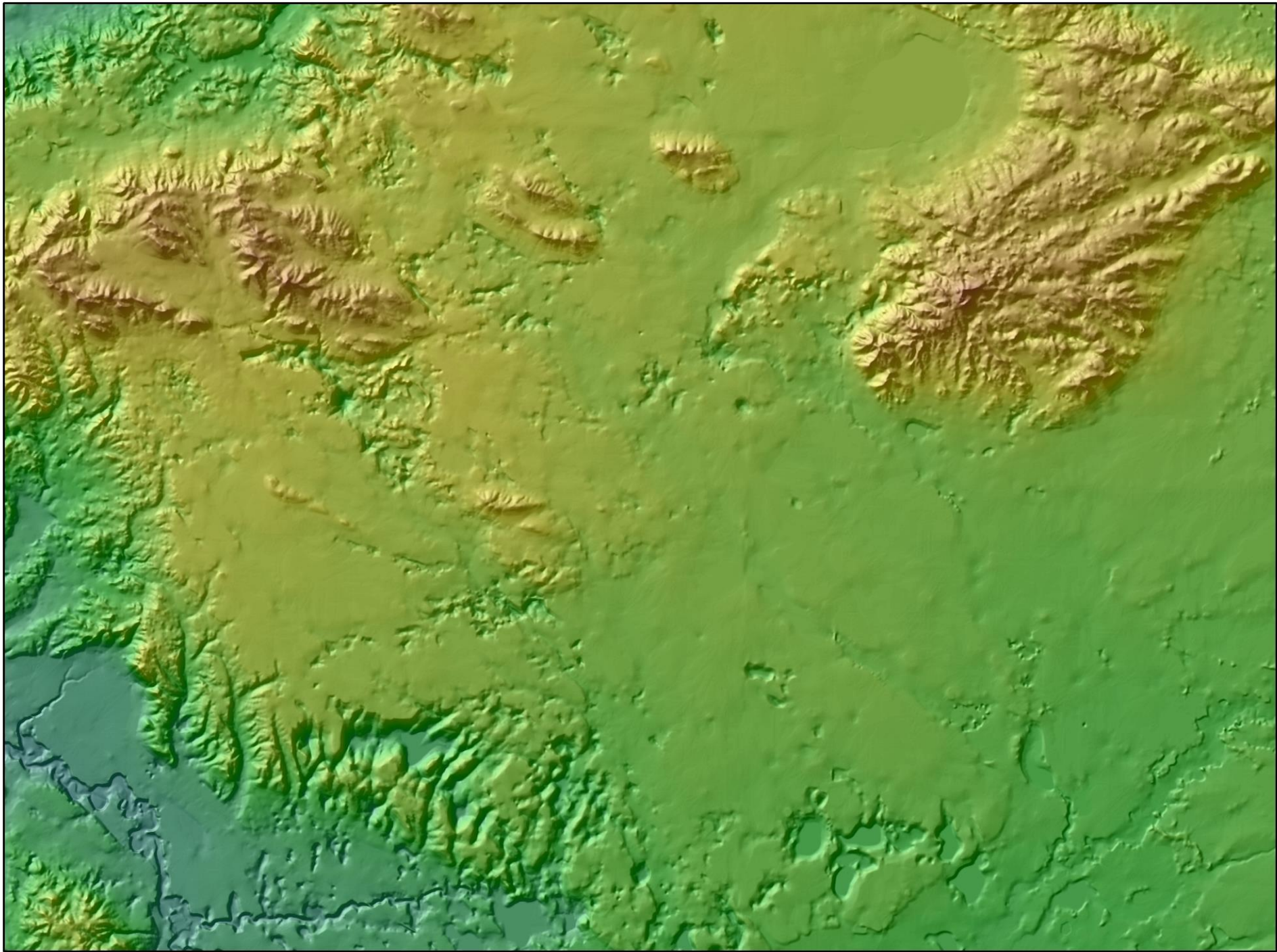
LTA 1 – Outwash Plains

Glacial Environment



Associated ELTPs...

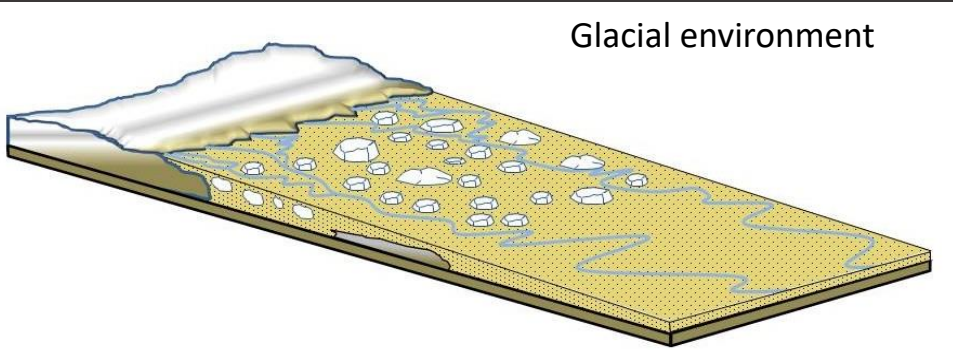




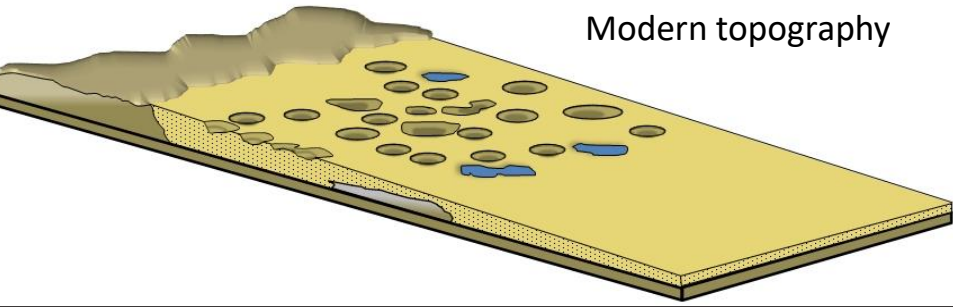
Shifting red pine from LTA 1 to LTA 2...

LTA 2 – Ice-Contact Hills

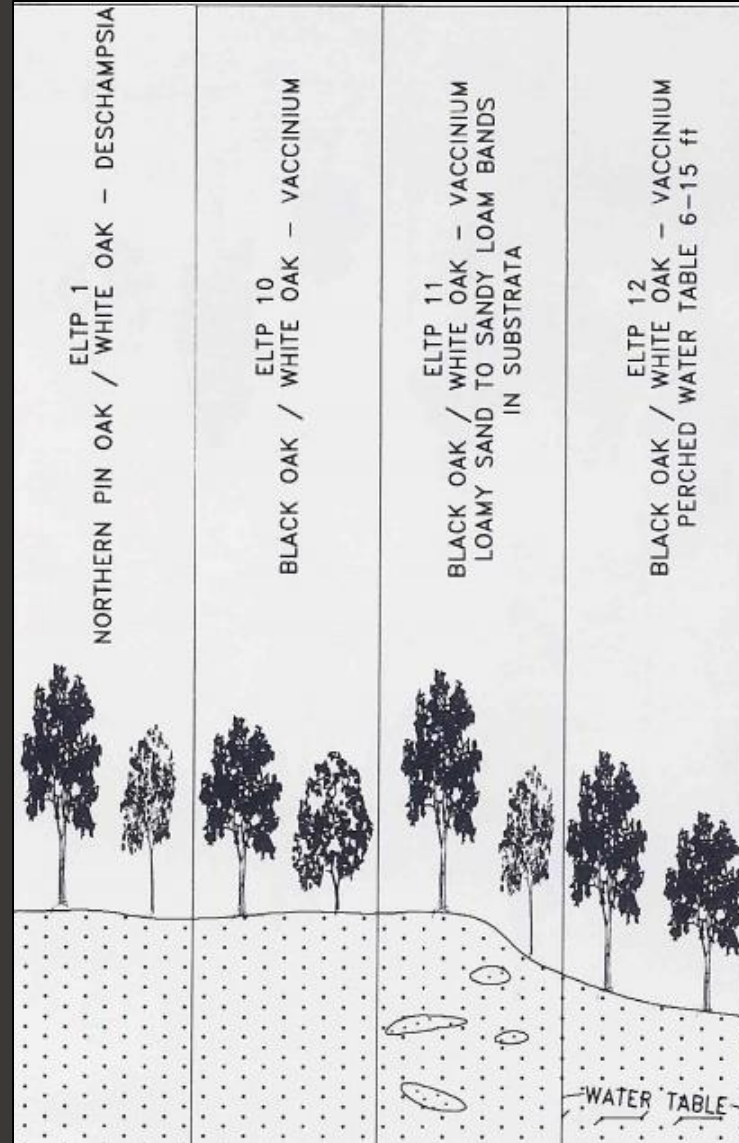
Glacial environment

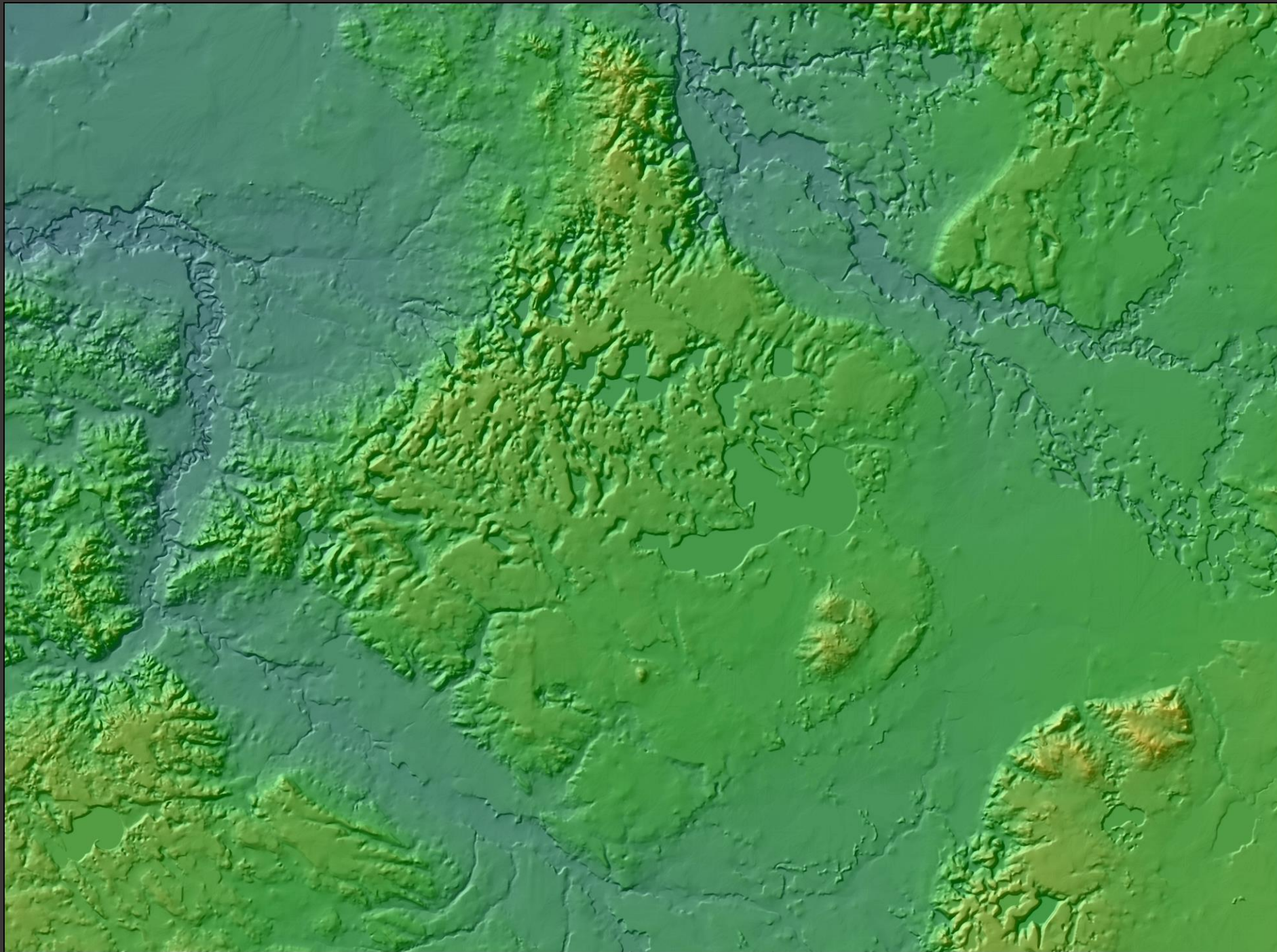


Modern topography



Associated ELTPs...





The Problem(s)

- Current capacity will make it difficult/impossible to treat existing red pine plantations before decline from old age, stress, disease, and climate change
- Making room for red pine - shifting red pine to more suitable sites (ecologically) over time would require shifting other forest types that currently exist there



Red Pine-White Pine**High-Moderate Vulnerability (limited-medium evidence, medium agreement)**

A major threat to red pine and white pine forests is the potential for greater pest and disease activity, along with the potential for interactions among stressors. Tolerance for drought and disturbance increases the adaptive capacity of these forests, and the future fire regime is a primary uncertainty.

Moderate Potential Impacts

Drivers: More frequent moisture stress or more extensive droughts could benefit red pine and white pine (RP-WP) forests on mesic soils, but could impair stands on the driest sites. Moisture stress could favor jack pine or northern pin oak on already marginal RP-WP sites. Increased surface fires could be a positive influence for these forest types, but a shift to more frequent crown fires could hamper regeneration and favor jack pine. Management has maintained red pine across much of the assessment area, and regeneration of this species usually relies on planted seedlings. Seasonal shifts in precipitation patterns, particularly the trend toward wetter springs and drier summers, may impair the survival of planted seedlings.

Dominant Species: Considering the range of possible climate futures, models project declines in suitable habitat and biomass for red pine across the assessment area. Projections are mixed for white pine, but models indicate that this species will fare worse under the hotter, drier GFDL A1FI scenario. Pine forests may be able to increase productivity with warmer conditions and longer growing seasons, but this depends on the potential effects of CO₂ fertilization. Minor components of RP-WP forests like northern red oak, black oak, and red maple also have mixed projections, although jack pine is anticipated to decline.

Stressors: Insect pests and diseases such as white pine tip weevil and red pine shoot blight may become more virulent and damaging under a warmer climate. The continued shift toward mesic species in these forests may continue if fire suppression activities remain constant and broadleaf species like red maple and black cherry increase under climate change. With the anticipated increase in white-tailed deer populations resulting from warmer winters, herbivory on preferred species may continue to hinder regeneration. Red pine in particular may be limited by warm temperatures, so projected warming in the assessment area may exceed the physiological limits of this species.

Moderate-Low Adaptive Capacity

Red pine and white pine forests are generally tolerant of drought and disturbances, which lends these forests greater adaptive capacity to climate change. This forest type could also expand to new favorable locations on the landscape if overall conditions result in increased drying. Thus, RP-WP forests could gain territory in mesic aspen-birch, oak, or northern hardwood sites. Low species diversity is a drawback for this forest type in general. White pine can tolerate a wider range of soil and moisture conditions than can red pine, and red pine has relatively low genetic diversity. Natural regeneration of red pine is often limited following harvest, particularly in the southern portion of the assessment area.

Red Pine Climate Vulnerabilities

- More frequent moisture stress could impair stands on the driest sites
- Models project declines in suitable habitat and biomass for red pine
- Insect pests and diseases such as red pine shoot blight (and Heterobasidial Root Disease) may become more virulent
- Projected warming in the assessment area may exceed the physiological limits of red pine
- *Adaptive capacity – Red pine could expand to new favorable locations on the landscape if overall conditions result in increased drying

Feedback – how do we navigate planning these changes for red pine using the climate change tools we have?