Adaptation Forestry and Conifer Strongholds in the Northwoods: Partnerships to Take on Climate Change

Meredith Cornett, Director of Science, TNC
Mark White, Lead Scientist – Forests, TNC
Julie Etterson, University of Minnesota – Duluth
Katie Frerker, Superior National Forest
Introduction

- Study region

- Forest restoration and research partnerships:
  - Climate adaptation I: Facilitation-Adaptation Forestry
  - Climate adaptation II: Resilience-Conifer Strongholds

- Summary
TNC Restoration Sites Portfolio

- 18,000 Acres to Date
- 4 million trees planted

Restoration Partnerships:
- Superior National Forest
- Chippewa National Forest
- Leech Lake Band of Ojibwe
- MN Department of Natural Resources
- Lake County
- St. Louis County
- Cook County

Chris Dunham, Resiliency Forestry Manager
Restoration: Real world forestry context for addressing critical applied research questions
Complementary Approaches to Forest Adaptation

- Strengthen connectivity and flow
- Build resilience
- Facilitate transitions
- Enhance genetic variability

Northern Institute of Applied Climate Science (NIACS)
Complementary Approaches to Forest Adaptation

1. **Adaptation Forestry**: Facilitate transition through species adjustments

   Photo by L. Kavajecz

2. **Conifer Strongholds**: Target restoration to climate-resilient sites

   Photo: John Gregor, Coldsnap Photography

Wildlife Conservation Society’s Climate Adaptation Fund & Doris Duke Charitable Foundation

- SFEC
- 1854 Treaty Authority
- NIACS
- UMN
- UMD
- MNDNR
Facilitate Transitions: Adaptation Forestry

Photo: J. Etterson
Rapid Warming Drives Boreal to Temperate Shift

Current Distribution

Projected Future Habitat

paper birch (Betula papyrifera)

Model Reliability: High
Rapid Warming Drives Boreal to Temperate Shift

Hypothesis: Local ecotypes may already be maladapted to current climate

- Plant red and bur oak: local seed zone, one zone south
- 16 sites, ~3,000 trees, randomized block design
- **Southern Seed Source**: higher survival

- **Fixed Seed Zones**: Based on past climate no longer appropriate

- **Flexible Seed Zones?**

- **Natural selection**: favors southern traits
  - Longer leaf retention
  - Thicker leaves

---

Build Resilience: Conifer Strongholds

Photo: John Gregor – Cold Snap Photography
Scientists planting 400 acres of Minnesota pines to survive climate change

Scientists are identifying planting spots for trees that will withstand shifting forces

By Josephine Marcotty Star Tribune | MAY 23, 2017 — 10:34PM

The forest north of Park Rapids, Minnesota, is a mix of aspen, birch and conifers.

In NE Minnesota, a 'test kitchen' for saving northern forests

Dan Kraker · St. Louis County, Minn. · May 24, 2017

The Nature Conservancy hopes to restore this recently logged site into a "conifer stronghold," were boreal species can survive in a changing climate. Dan Kraker | MPR News
Hypothesis: Planting boreal conifers on “resilient” sites (high landscape diversity/cool temperatures) will result in higher survival and growth.

> 100,000 conifer seedlings across resilient and non-resilient sites.
Conifer Strongholds:

Does it work?

Stay tuned....
Forest Restoration and Resilience Plan for Minnesota

Map courtesy of Jim Manolis, Andrea Brandon, Natalie McCormack, Mark White