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CLIMATE ADAPTATION STRATEGY

Project Title: Adaptation Forestry in Minnesota's Northwoods

Headline Title (2-5 words): Planting future forests in northern Minnesota

Brief Summary (Abstract): A place-based demonstration of climate-informed forestry practices emphasizing a combination of management and planting that increases complexity and bolsters resilience.

Project Location: Northeastern Minnesota

Partners: Northern Institute of Applied Climate Science, University of Minnesota – Duluth, Wildlife Conservation Society, Minnesota Forest Resources Council, Sustainable Forests Education Cooperative, US Forest Service, Minnesota Department of Natural Resources, Lake County, Saint Louis County

Background: Northern forests in the Great Lakes region are entering the climate change era in a compromised condition. Harvesting practices over the past century have drastically homogenized composition and structure (e.g., more low diversity, even-aged stands of trees), leaving forests vulnerable to emerging stressors. Forest-dependent wildlife, most notably migratory songbirds, has experienced associated declines. Traditionally, restoration goals have focused almost entirely on reintroducing historically abundant boreal conifers to the landscape. Recent research findings from The Nature Conservancy in Minnesota and University of Wisconsin Madison show that warmer, drier conditions over the coming decades are likely to undermine the current ("climate-uniformed") restoration management. Our project focuses on new "climate informed" tactics to favor diverse suites of tree species best-suited to thrive under changed climate conditions. We call our approach adaptation forestry, a combination of management and planting that increases complexity and bolsters. Proposed adaptation tactics depart significantly from the restoration status quo. Our strategy is based on Landis model results (Ravenscroft et al. 2010), current and future (modeled) range maps for trees and emphasizes within-range plantings of tree species anticipated to thrive under warmer, drier conditions. Species of emphasis are all native to the Laurentian Mixed Forest, but uncommon due to the legacy of past harvesting practices, a climate that historically favored boreal species, and dispersal limitations (e.g., white pine, red oak, and basswood). Although suited to new conditions, without management intervention these species are unlikely to realize the full extent of their ranges as the rate of climate change outpaces their ability to disperse.

Project Goals: The goal of this project is to implement adaptation forestry practices at 12 sites for a total of 2,000 acres. We will plant a total of 88,000 climate-adapted native tree species, including red oak, bur oak, and white pine from two different seed sources. We will compare the performance of seedlings of different species and origin under different conditions created by contrasting silvicultural treatments across four distinct forest plant communities.

Strategy Goals Implemented:

Goal 2, Strategy 2.1, Action 2.1.2- Develop and implement best management practices to support habitat resilience in a changing climate.



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Goal 2, Strategy 2.2, Action 2.2.3- Where appropriate, actively manage populations (e.g., using harvest limits, seasons, translocation, captive breeding, and supplementation) of vulnerable species to ensure sustainability and maintain biodiversity, human use, and other ecological functions.

Climate Impacts Addressed: Range shifting, transforming habitats

Status of Project Implementation (Timeline, Milestones, Next Steps):

- Timeline: October, 2012 – November, 2014
- Milestones: During the 2013 field season, we planted 33,000 bur oak and red oak tree seedlings in 105 planting blocks within the 12 sites/clusters. We installed tall black protective mesh on approximately 20,000 trees in 38 planting blocks, which we will monitor closely over the long term. We will also monitor an additional 250 trees per planting block at other sites.
- Next steps: We have ordered a total of 52,000 seedlings (7,000 bur oak, 20,000 red oak, and 25,000 white pine) to be planted during the 2014 season, which is scheduled to commence in mid-May, depending on snow melt and soil conditions.

Project Outcomes: The context for this project is an adaptive management framework designed to explicitly test effectiveness in transitioning to future suites of climate-adapted species. The monitoring framework includes site level indicators of forest management effectiveness, as well as details on performance characteristics of survival, growth rate, and stage of leaf maturation. We will compare the suitability of the tree species and provenances to assess whether accounting for climate change indeed results in better phenological responses and how these are influenced by variations in climate. Our goal is to leverage the learning from this project through communicating results and engaging land managers involved in the Northern Institute of Applied Climate Science network throughout the Great Lakes Region. The first 2,000 acres and 88,000 seedlings are intended to be a starting point for assessing the possibilities for helping forests transition to an uncertain future throughout the Great Lakes region.

Funding Sources:

- Wildlife Conservation Society Climate Change Adaptation Fund, with initial funding from the Doris Duke Charitable Foundation
- Conservation Partners Legacy Fund (Minnesota)
- Cox Family Fund for Science and Research (The Nature Conservancy)
- University of Minnesota - Duluth

Contact Info:

Meredith Cornett, Director of Conservation Science
The Nature Conservancy in Minnesota, North Dakota, and South Dakota
218-727-6119
mcornett@tnc.org

Photos/Attachments:



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Suggested Photo Captions:

- NAJ12- Forest Ecologist Mark White installs a mesh cage around a newly planted oak seedling to protect it from deer browsing.
- NAJ25- Forester Chris Dunham of The Nature Conservancy selects a bur oak seedling for planting.
- NAJ 32- Anna Reoh (right) leads the planting at a northern hardwoods site, assisted by Chris Dunham.
- NAJ 44- Mark White assists Kira Reoh as she plants oak seedlings in Lake County, Minnesota.

