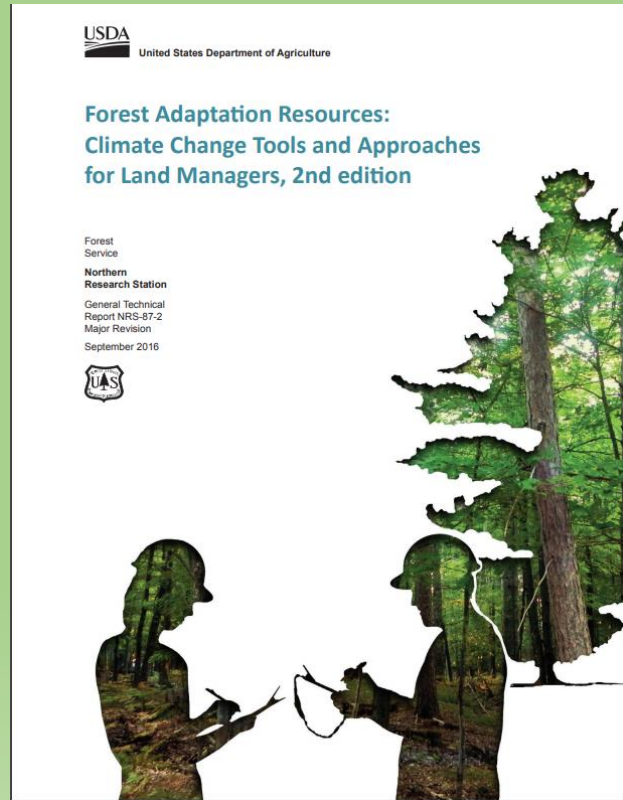
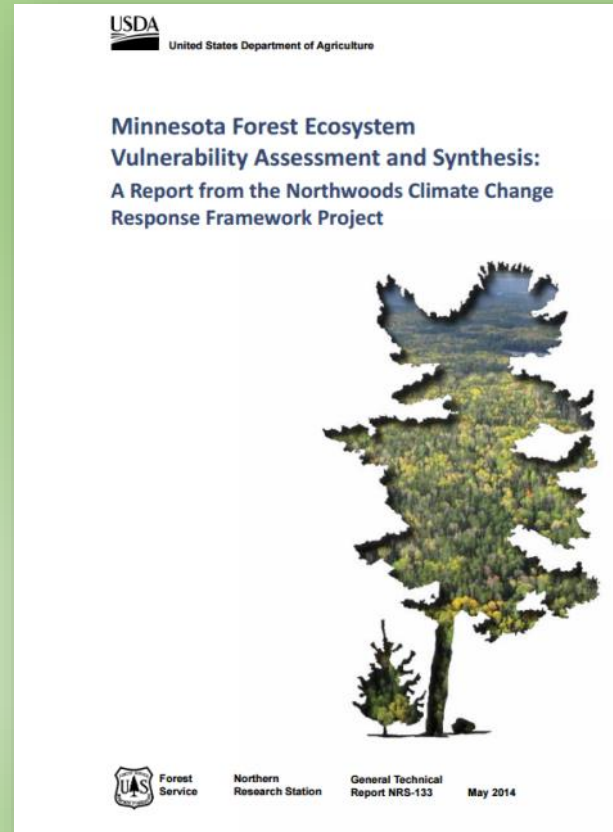




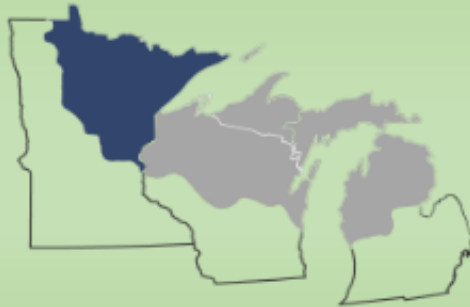
CLIMATE CHANGE ACTIVITIES
ON THE
SUPERIOR NATIONAL FOREST



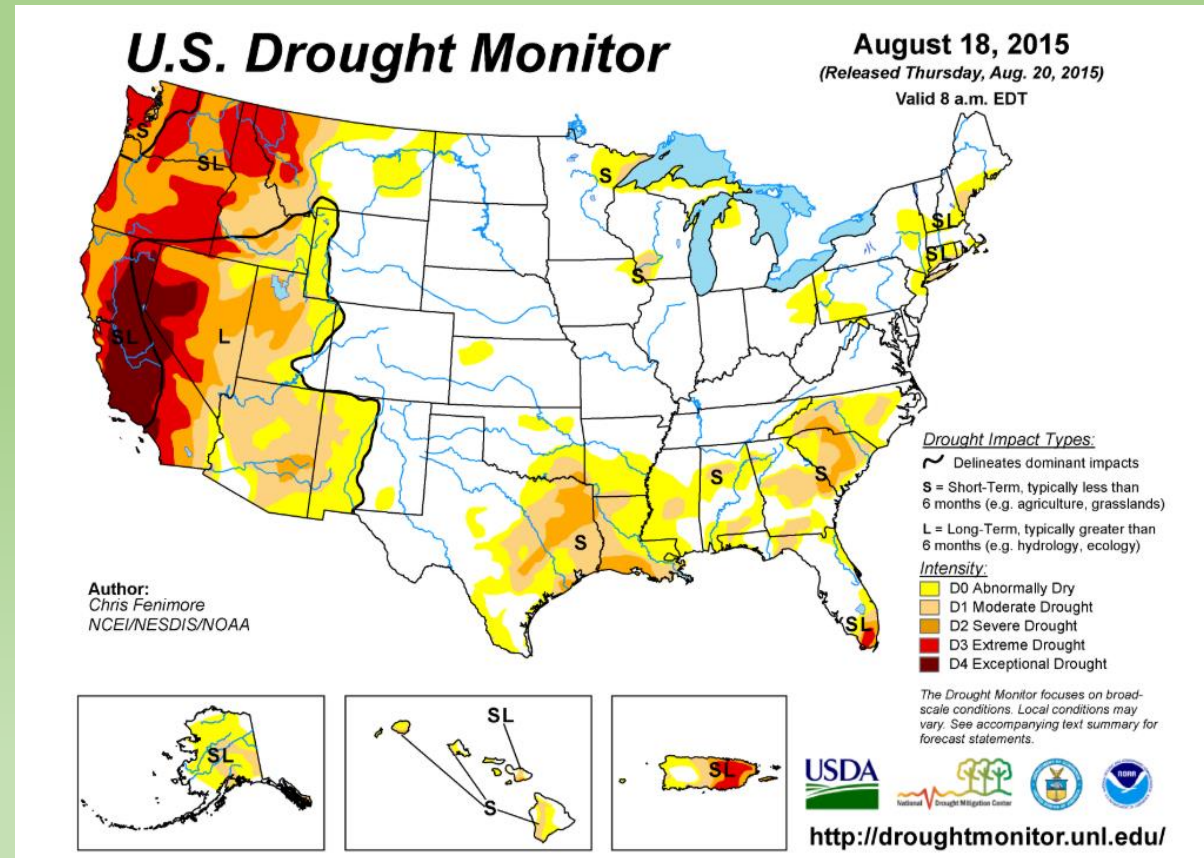
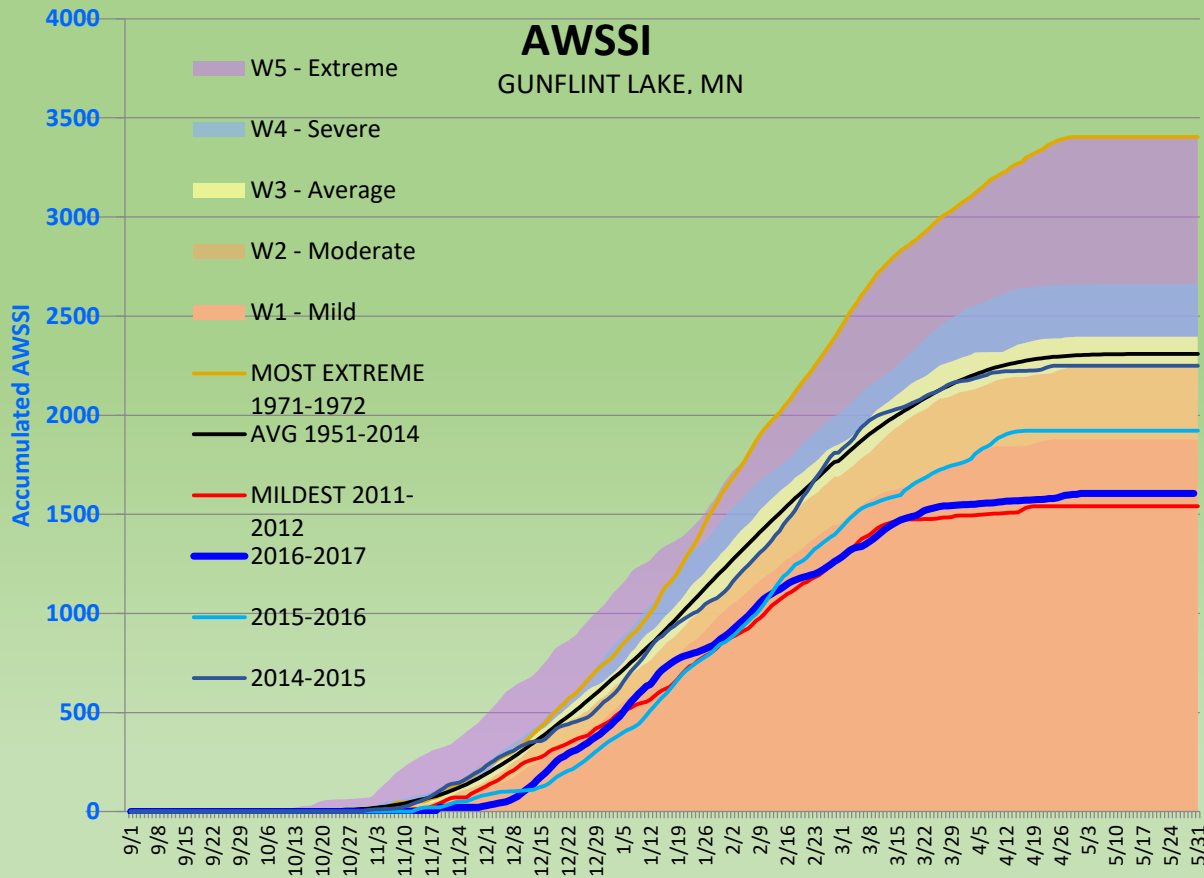
NIACS RESOURCES:



VULNERABILITY ASSESSMENT AND ADAPTATION WORKBOOK

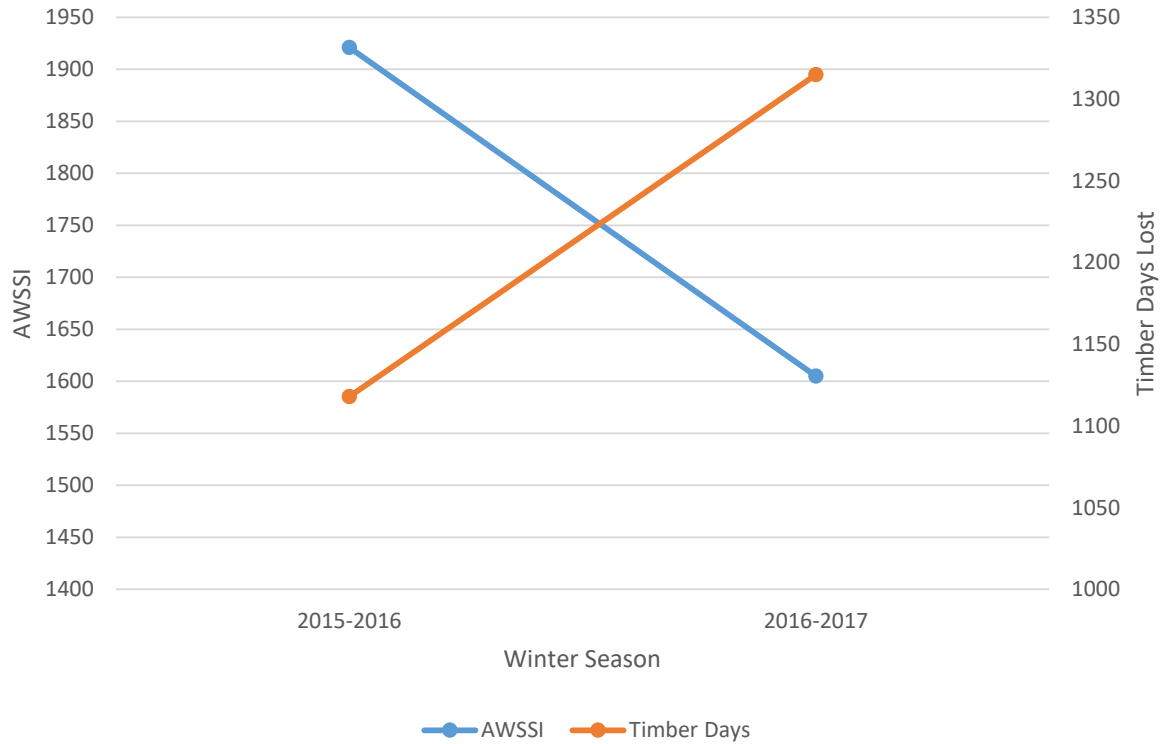


CLIMATE CHANGE MONITORING

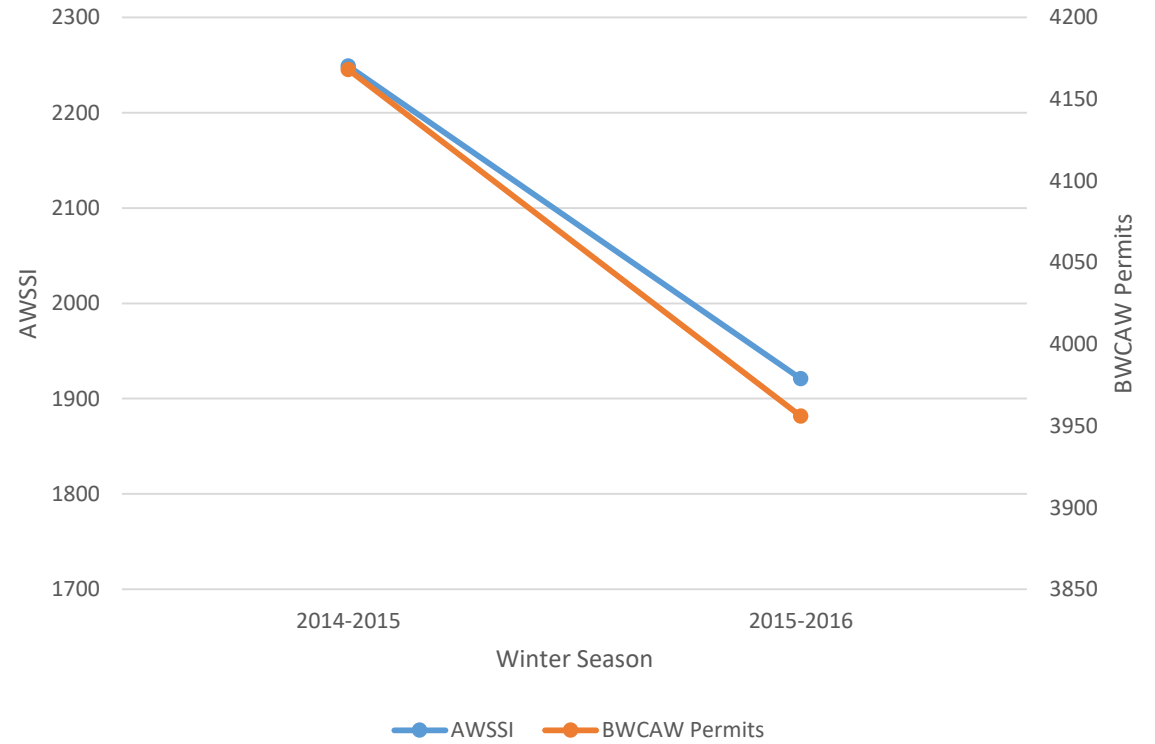


WINTER SEVERITY MONITORING

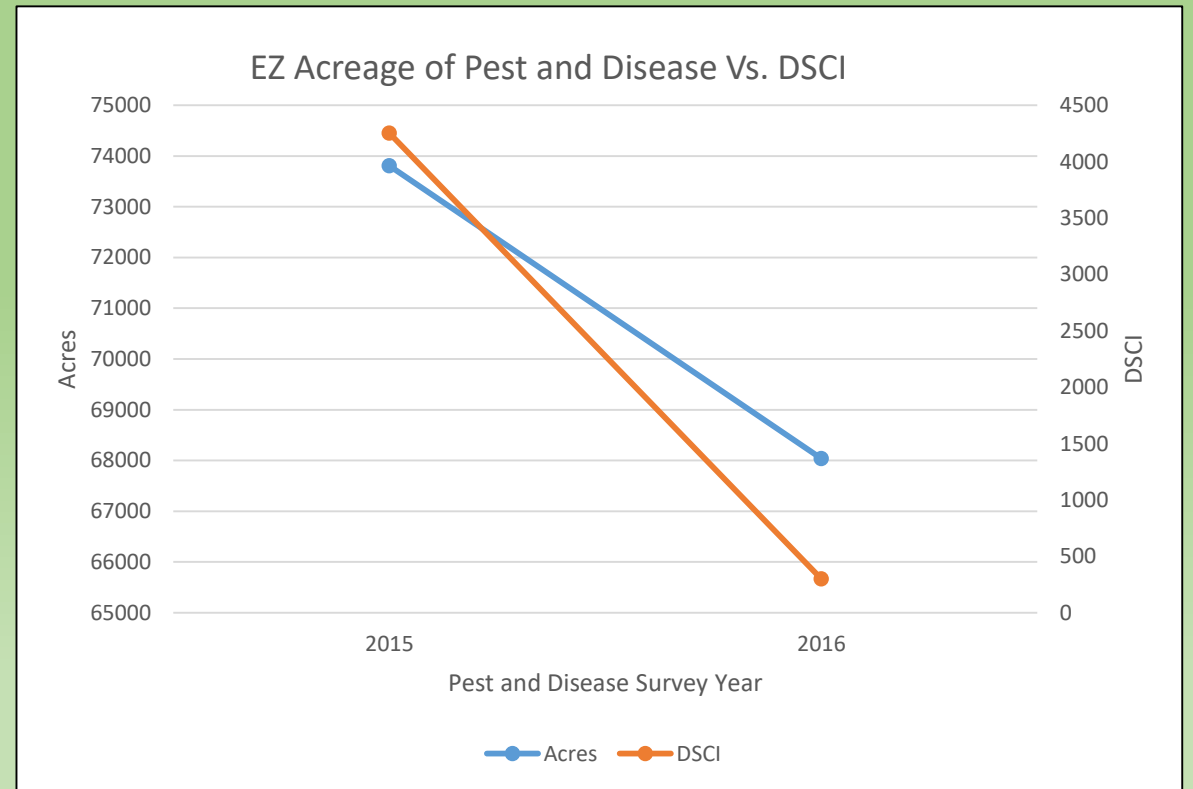
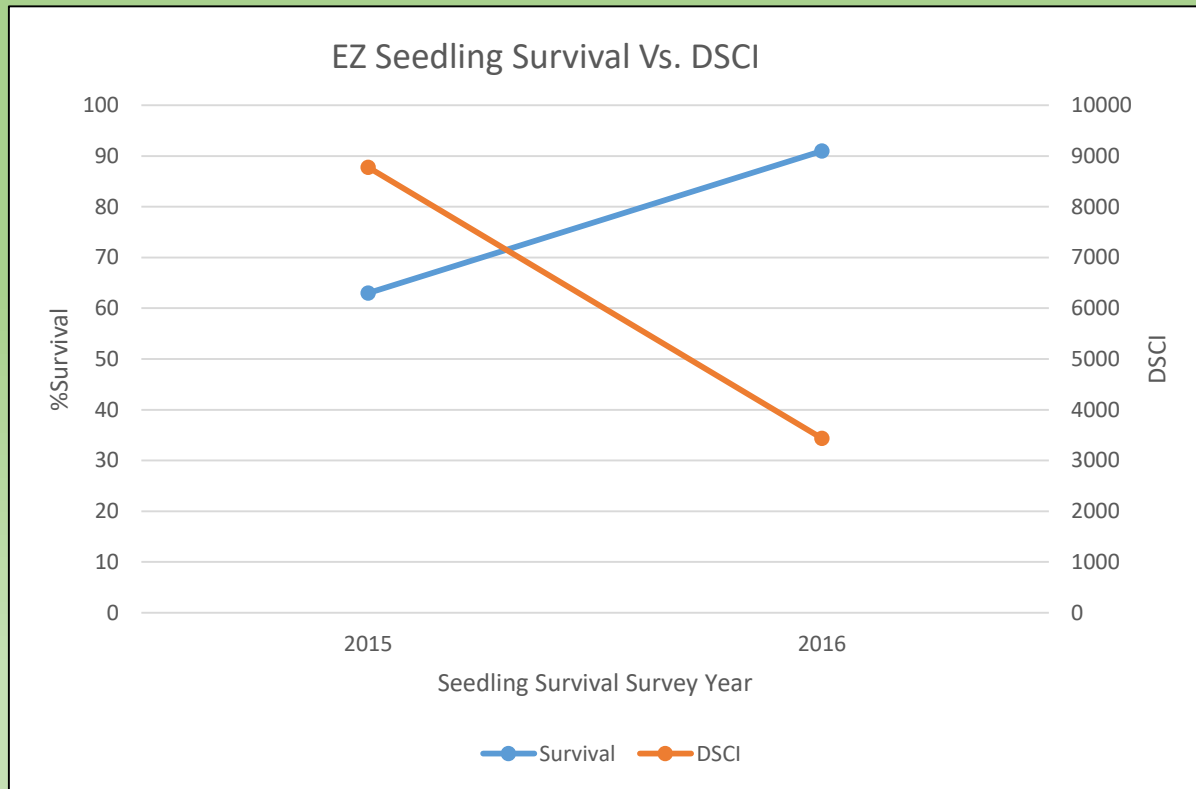
Timber Days Lost Vs. AWSSI



BWCAW Permits Vs. AWSSI



DROUGHT MONITORING



A Superior Research Reader

Volume 15, May 2016

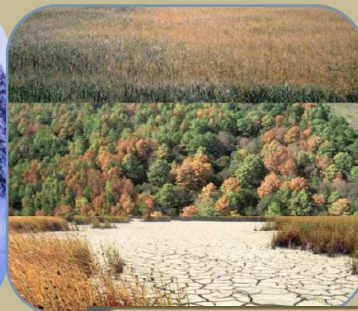
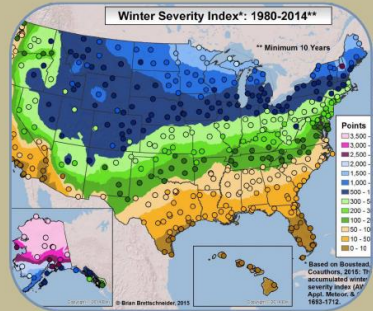


Photo Credit: Midwestern Regional Climate Center, Boreal.org, US Forest Service

Greetings and welcome to A Superior Research Reader, a monthly reader on current and relevant research to science and resource management on the Superior.

This Month's Edition: Climate Change Monitoring

As part of the new Planning Rule, National Forests are now required to incorporate

CLIMATE SCIENCE DISTRIBUTION

A Superior Research Reader

Volume 24, May 2017

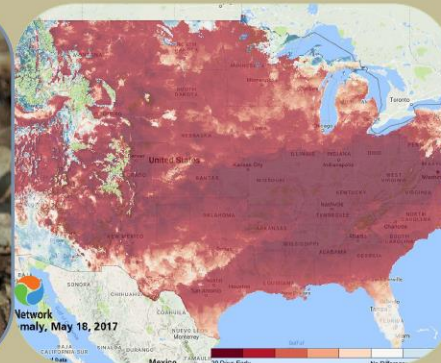


Photo Credit: Minnesota Wildflowers, National Phenology Network, My Minnesota Woods

Greetings and welcome to A Superior Research Reader, a monthly reader on what we believe is current and relevant research to science and resource management on the Superior.

This Month's Edition: Phenology



College of Food, Agricultural
and Natural Resource Sciences
UNIVERSITY OF MINNESOTA

Climate Change Field Guide for Northern Minnesota Forests: Site-level considerations and adaptation



USDA Northern Forests Climate Hub
U.S. DEPARTMENT OF AGRICULTURE



TRAINING AND EDUCATION

Climate Change Vulnerability Assessment and Adaptation Plan

1854 Ceded Territory Including
the Bois Forte, Fond du Lac,
and Grand Portage Reservations



Photo Credit: Sustainable Forests Education Cooperative

RESEARCH PARTNER

Saving Conifer Strongholds in the Northwoods

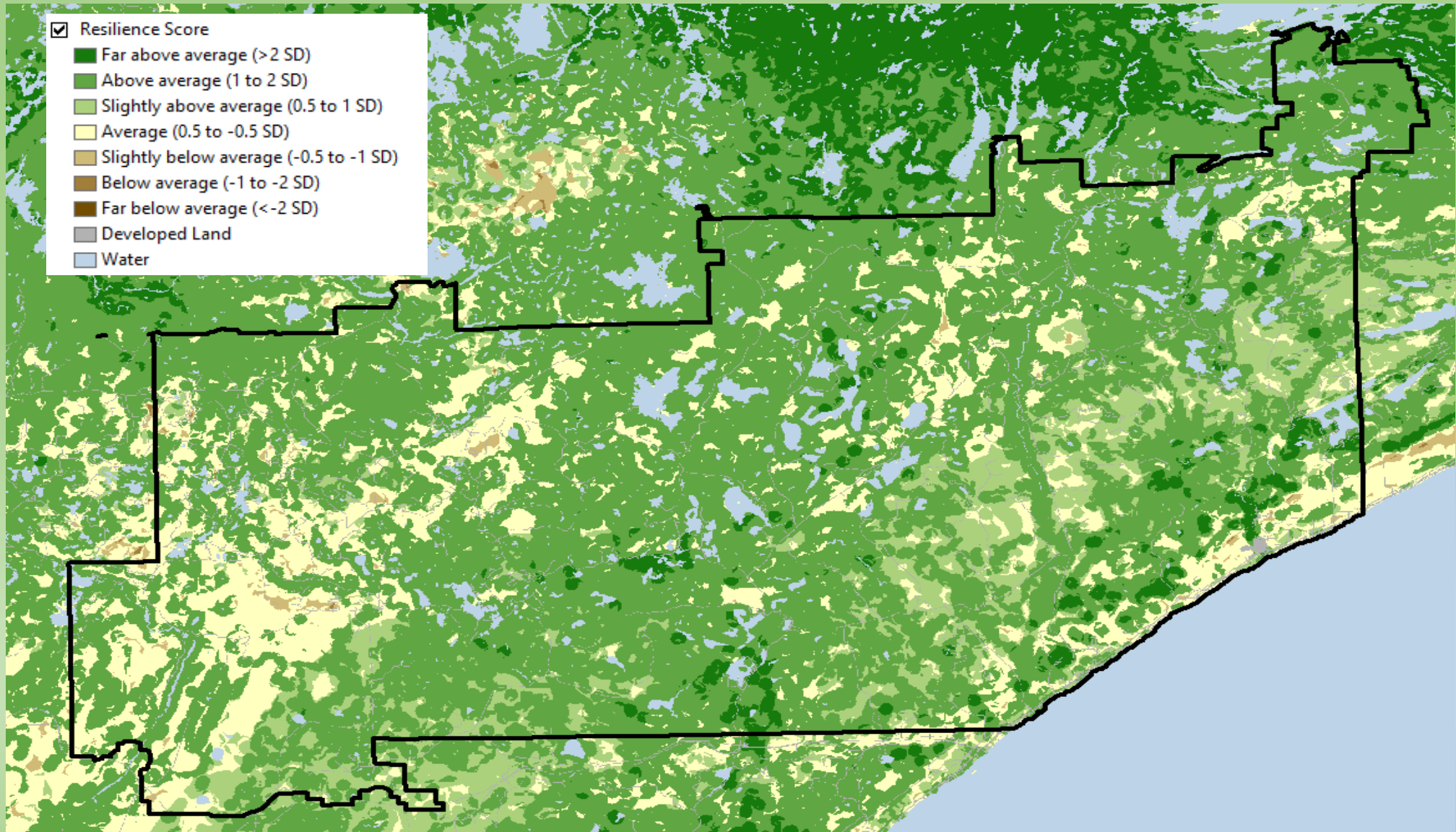
BY MEREDITH CORNETT

FEBRUARY 20, 2019



Photo Credits: Christian Dalbec Photography and MPR News

RESILIENCY PLANNING




NE MINNESOTA CLIMATE CHANGE GROUP

The Nature Conservancy 

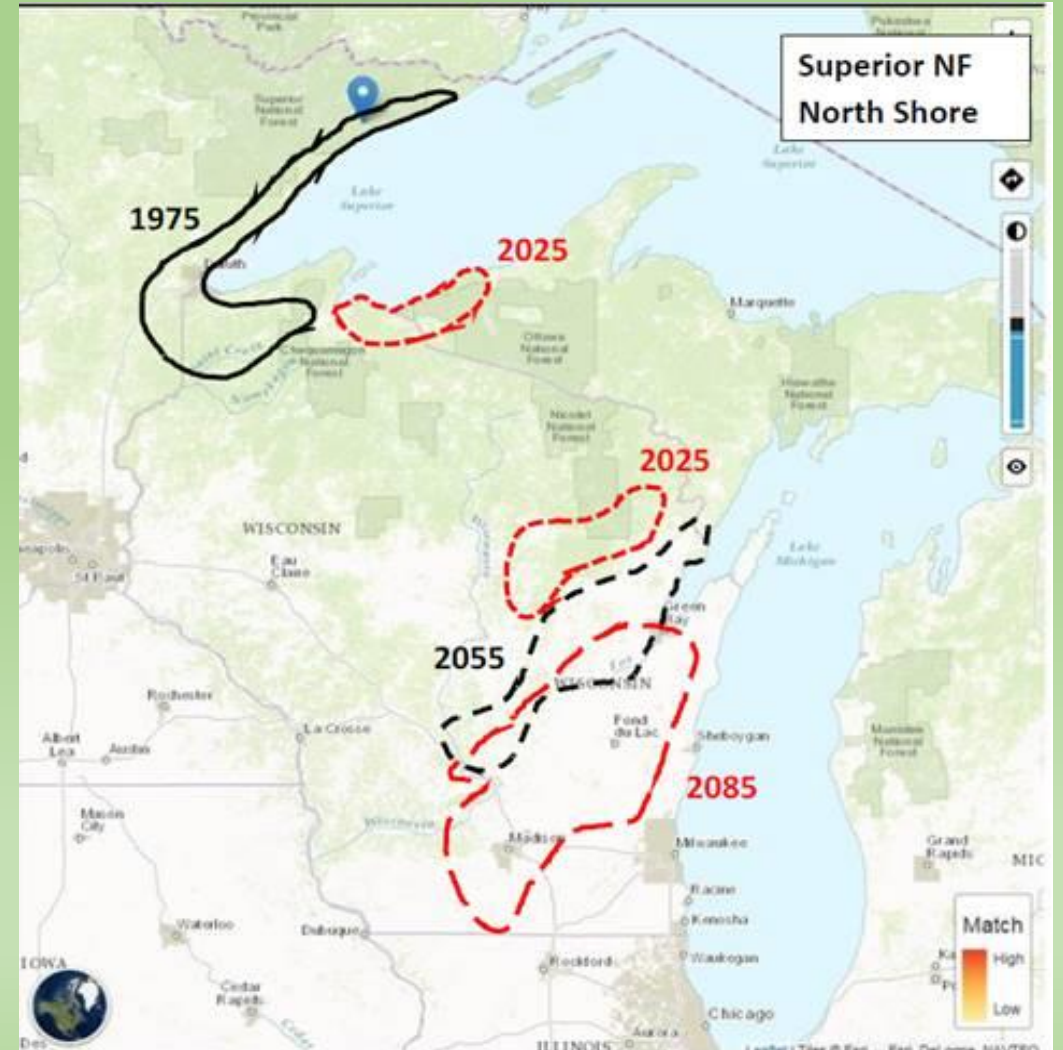
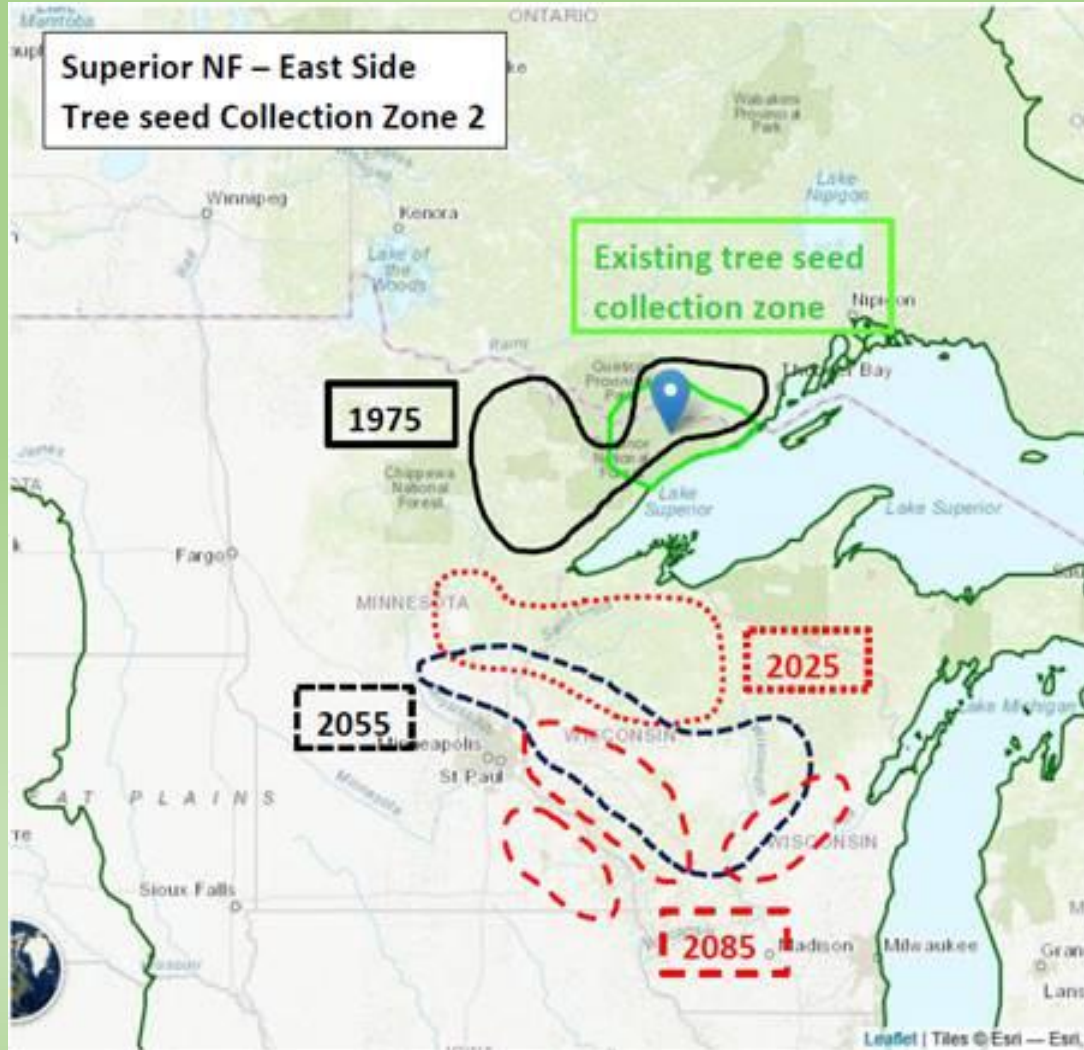



DEPARTMENT OF
NATURAL RESOURCES


UNIVERSITY OF MINNESOTA


NIACS
Northern Institute of
Applied Climate Science

SEED ZONE / ASSISTED MIGRATION



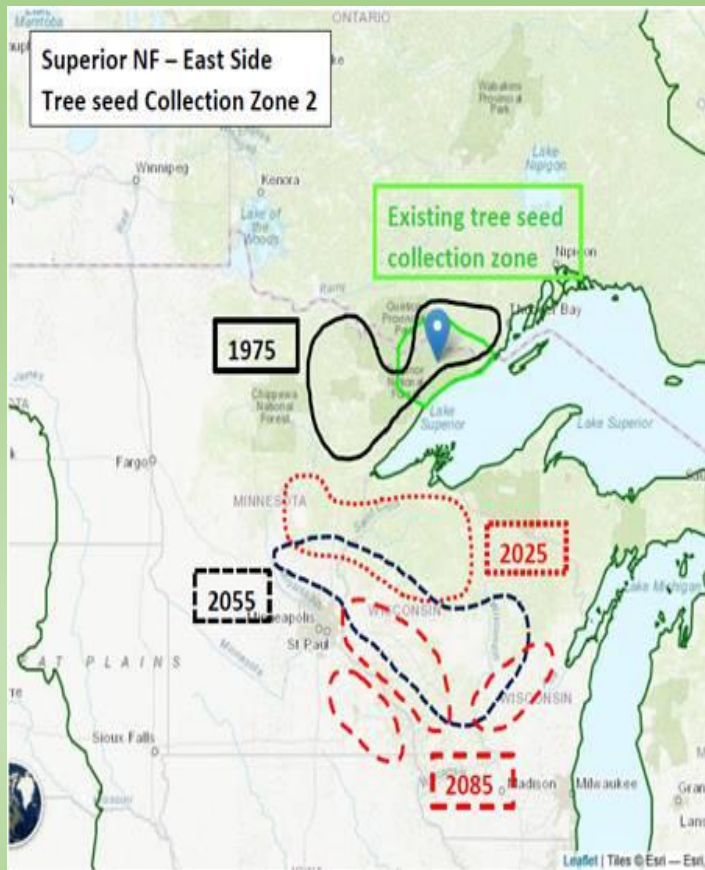
<https://seedlotselectiontool.org/sst/>

SNF TOOLS

<https://seedlotselectiontool.org/sst/>

<https://forestadaptation.org/>

<http://maps.tnc.org/resilientland/>



CLIMATE CHANGE PROJECTIONS FOR INDIVIDUAL TREE SPECIES

NORTHERN MINNESOTA

Northern forests will be affected by climate change during this century. A team of forest managers and researchers created a report that describes the vulnerability of forests in northern Minnesota (Handler et al. 2014). This report includes information on the current landscape, observed climate trends, and a range of projected future climates. It also describes many potential climate change impacts to forests and summarizes key vulnerabilities for major forest types. This handout is summarized from the full report.

Remember that models are just tools, and they're not perfect. Models don't account for some factors that could be modified by climate change, like droughts, wildfire activity, and invasive species. If a species is rare or confined to a small area, Tree Atlas results may also be less reliable. These factors, and others, could cause a particular species to perform better or worse than a model projects. Human choices will also continue to influence forest distribution, especially for tree species that are projected to increase. Planting programs may assist the movement of future-adapted species, but this will depend on management decisions.

Despite these limits, models provide useful information about future expectations. It's perhaps best to think of these projections as indicators of possibility and potential change. The model results presented here were combined with information from published reports and local management expertise to draw conclusions about potential risk and change in the state's forests.

TREE SPECIES INFORMATION:
This report uses two climate scenarios to "bracket" a range of possible futures. These future climate projections were used with two forest impact models (Tree Atlas and LANDIS) to provide information about how individual tree species may respond to a changing climate. More information on the climate and forest impact models can be found in the full report. This page shows the most common tree species in this local area, organized into general categories of future expectations. Results for all species can be compared side-by-side on page 2.

SPECIES	ADDITIONAL CONSIDERATIONS
LIKELY TO DECREASE	
Balsam fir	Requires cold climate and susceptible to drought, fire, and insects
Balsam poplar	Early-successional colonizer, but susceptible to drought
Black spruce	Requires cold climate, susceptible to insect pests and drought
Paper birch	Early-successional colonizer, but susceptible to insects and drought
Quaking aspen	Early-successional colonizer, but susceptible to heat and drought
Tamarack	Requires cold climate and susceptible to drought, fire, and insects
White spruce	Requires cold climate, susceptible to insect pests
MAY DECREASE	
Black ash	Emerald ash borer causes mortality
Northern white-cedar	Requires cold climate and susceptible to fire and herbivory
Pin cherry	Establishes well and regenerates after fire
MIXED MODEL RESULTS	
Bigtooth aspen	Early-successional colonizer, but susceptible to drought
Jack pine	Tolerates drought and fire, but susceptible to insect pests
Northern red oak	Susceptible to some insect pests and oak wilt
Red pine	Susceptible to insect pests and diseases, and limited dispersal
Yellow birch	Good disperser, but susceptible to fire, insects, and disease
NO CHANGE	
Bur oak	Tolerates drought and fire
MAY INCREASE	
American basswood	Tolerates shade but susceptible to fire
American elm	Affected by Dutch elm disease, grows across a variety of sites
American hornbeam	Shade-tolerant, but susceptible to fire and drought
Black cherry	Susceptible to insects and fire, tolerates some drought
Bowlder	Tolerates drought, also disperses and establishes well
Eastern red cedar	Tolerates drought, but susceptible to fire and insect pests
Eastern white pine	Good disperser, but susceptible to drought and insects
Green ash	Emerald ash borer causes mortality
Ironwood	Grows across a variety of sites and tolerates shade
Northern pin oak	Tolerates drought and fire
Red maple	Competitive colonizer tolerant of disturbance and diverse sites
Silver maple	Good disperser and tolerates wet soils, but vulnerable to drought
Sugar maple	Grows across a variety of sites and tolerates shade
White oak	Fire-adapted and grows on a variety of sites

NIACS
Northern Invasive Assessment and Control System

www.forestadaptation.org

Get this handout online at: www.forestadaptation.org/Northwoods_treehandouts

