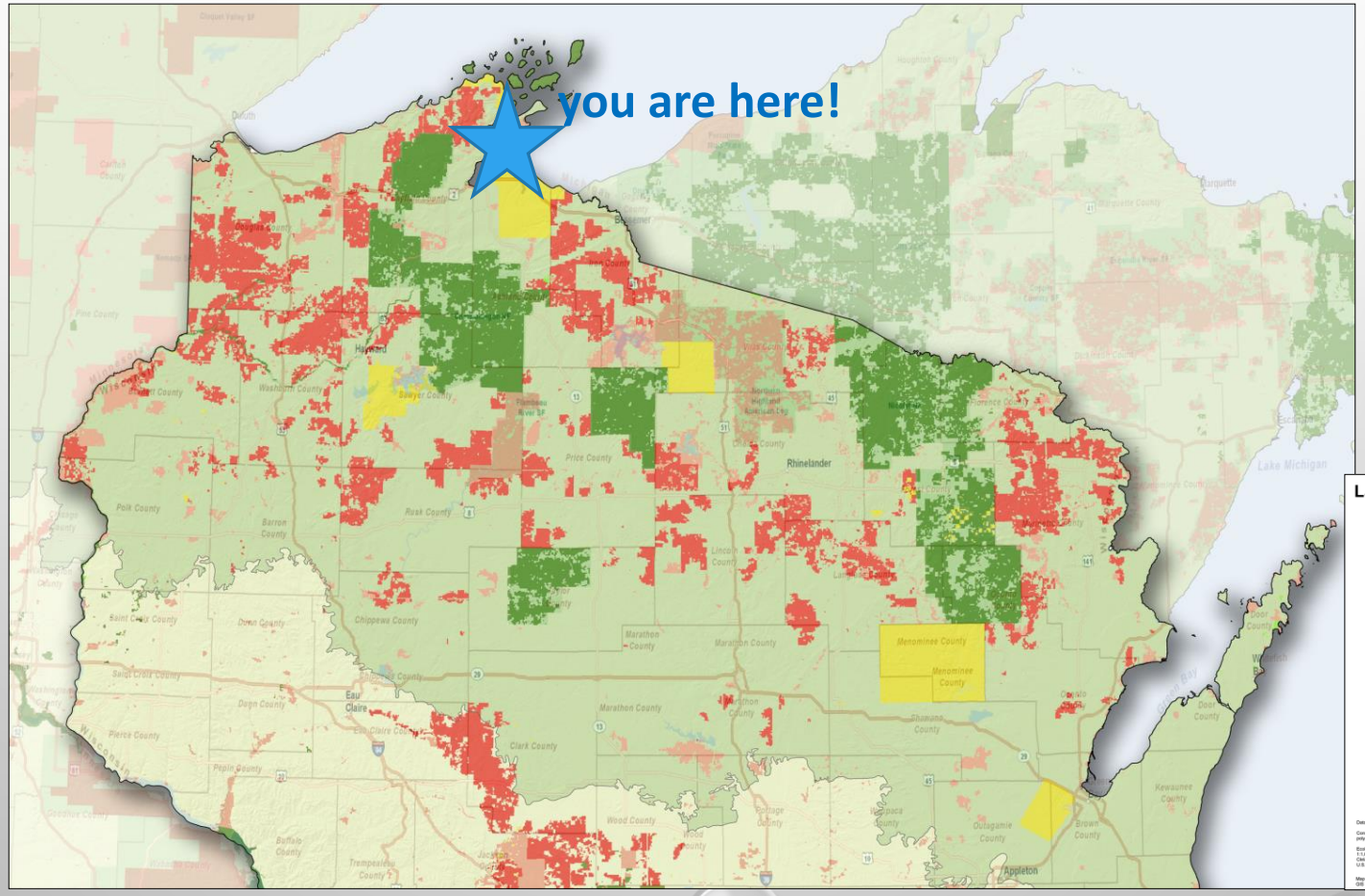
WELCOME TO THE CHEQUAMEGON-NICOLET NATIONAL FOREST

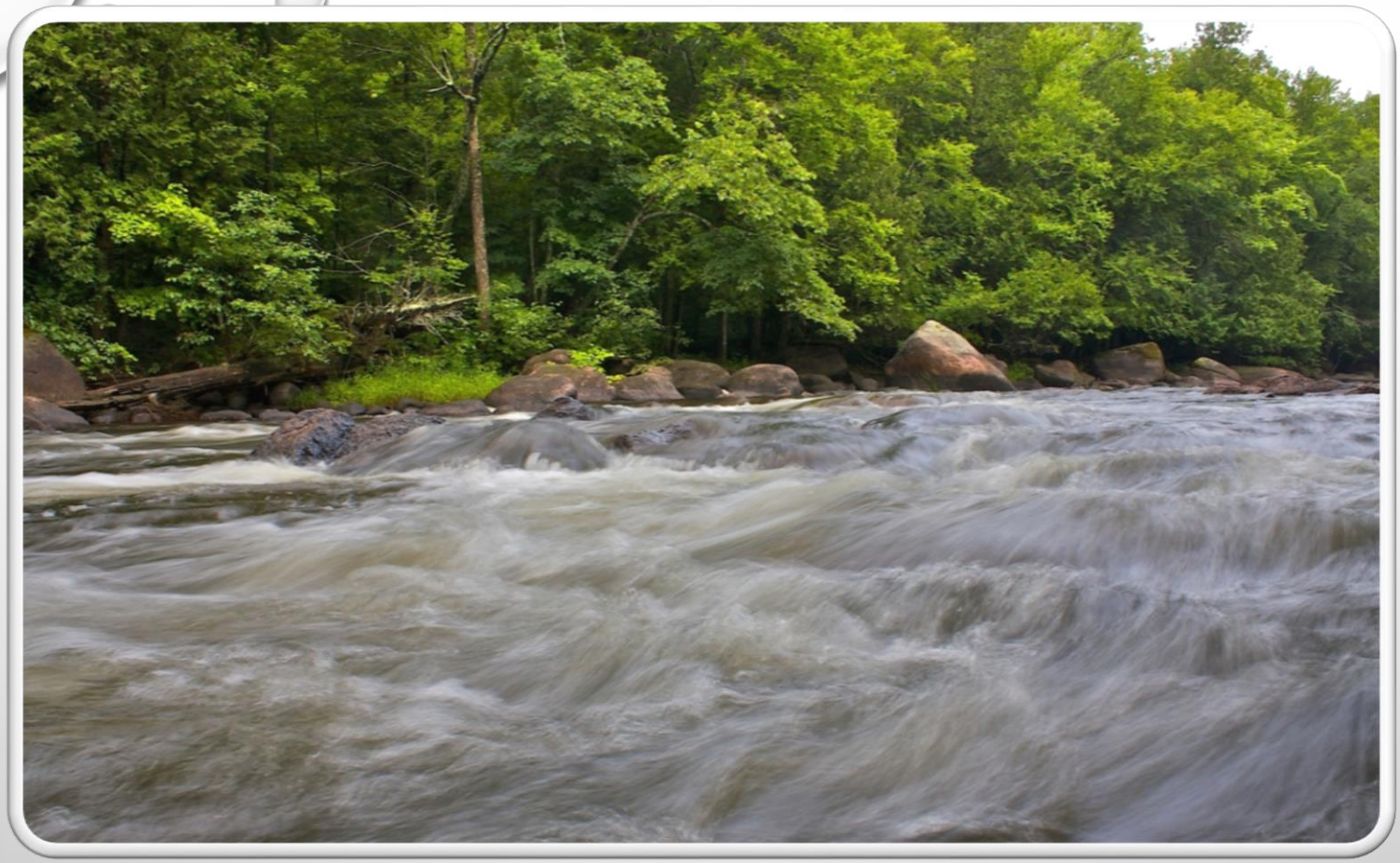
LAND OF MANY STORMS

CHEQUAMEGON-NICOLET NATIONAL FOREST



ORIGINAL CLIMATE CHANGE DREAM TEAM

2010



WATERSHED ADAPTATION– CATCHIN UP REAL QUICK

DULUTH MN

"MEGA STORM" OF 2012

OVER 10" OF RAIN

ZOO FLOODED –

POLAR BEAR AND SEALS ESCAPED

"Feisty" the harbor seal


Well, listen up, there's a storm coming

WATERSHED VULNERABILITY

THREATS AND IMPACTS

- **WARMER WATER TEMPS –** IMPACTS TO TROUT
- **MORE INTENSE STORMS –** INCREASED RUN OFF AND SEDIMENTATION
- **MORE FLOODS – DAMAGE TO INFRASTRUCTURE**
- **TREE SPECIES DECLINE –** LESS SHADE ALONG STREAMS

ADAPTATION ACTIONS

- INSTALL LARGER CULVERTS
- DIVERSIFY RIPARIAN FORESTS
- UNDER PLANT CONIFER
- PROMOTE LONG-LIVED SPECIES ALONG STREAMS
- STABILIZE ERODING BANKS

EXAMPLE:

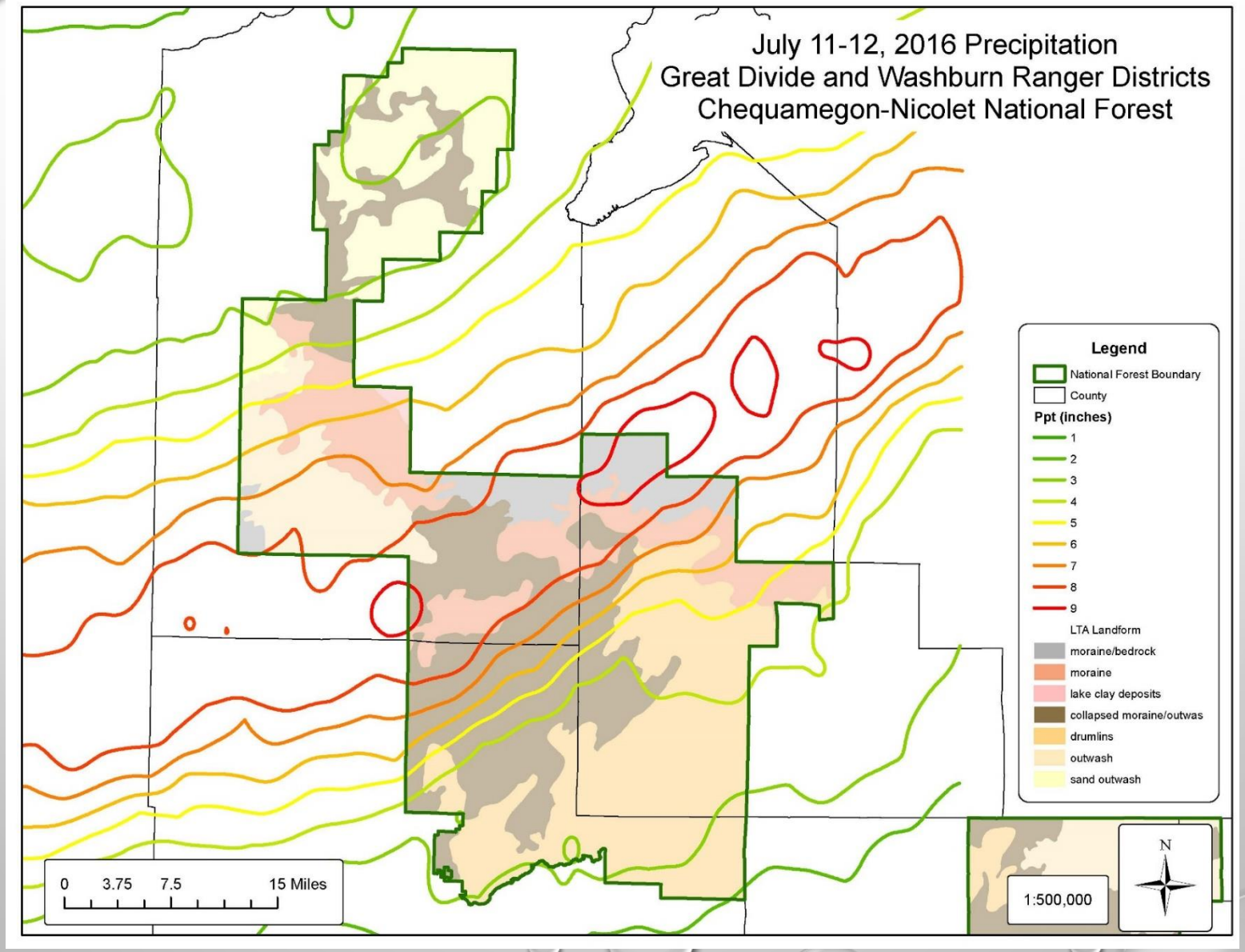
UNNAMED TRIBUTARY TO WHISKEY CREEK (FR 198)

BEFORE UPGRADE (2013)

AFTER UPGRADE (2014)

JULY 2016

THE TEST

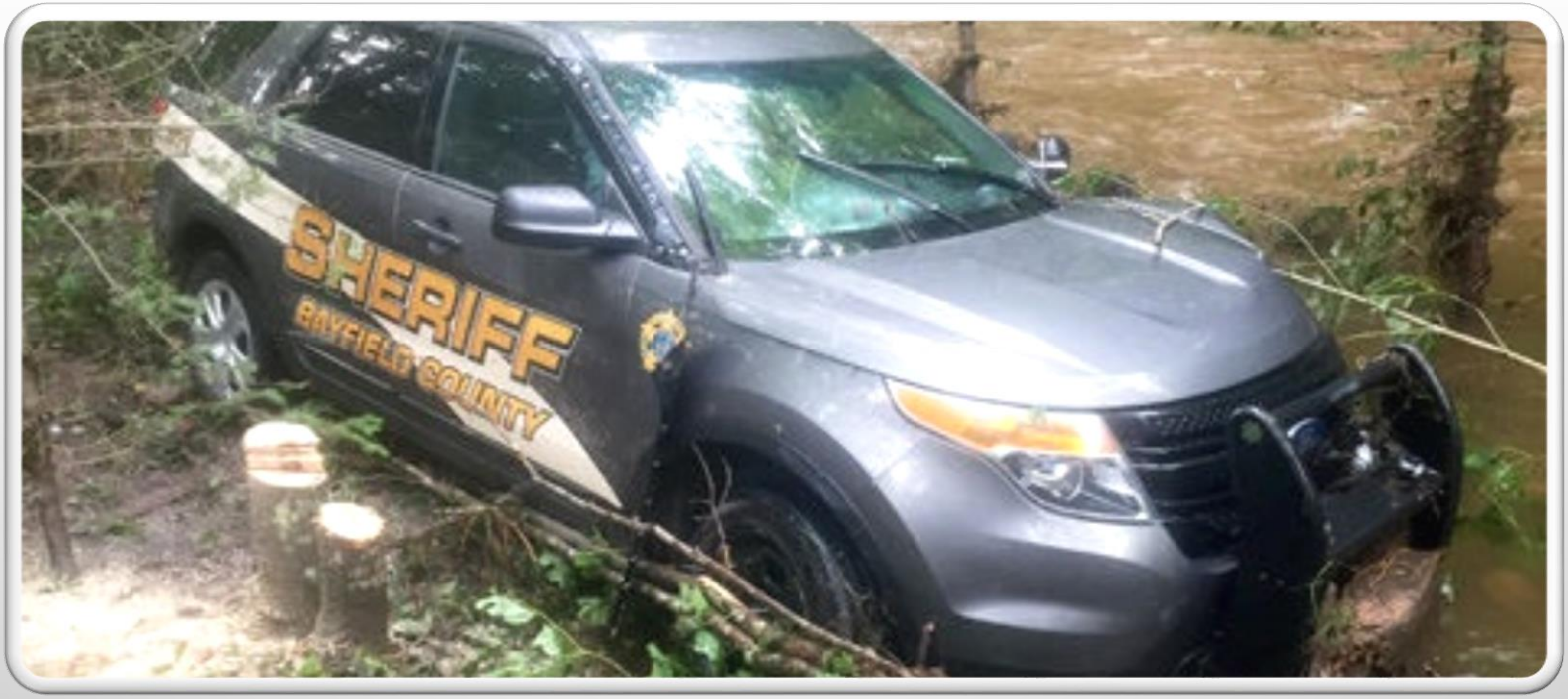

July 11-12, 2016 Precipitation
Great Divide and Washburn Ranger Districts
Chequamegon-Nicolet National Forest
Legend
National Forest Boundary
County
Ppt (inches)
1
2
3
4
5
6
7
8
9
LTA Landform
moraine/bedrock
moraine
lake clay deposits
collapsed moraine/outwas
drumlins
outwash
sand outwash
0 3.75 7.5 15 Miles
1:500,000
N

- ONE STREAM WENT FROM **400** CUBIC FEET PER SECOND TO OVER **7,000** CUBIC FEET PER SECOND (CFS) IN JUST A MATTER OF MINUTES.

- BAD RIVER GAGE PEAKED AT ABOUT 40,000 CFS. THE PREVIOUS PEAK WAS ABOUT 26,000 CFS

DEADLY CONSEQUENCES

Hwy 63 in Bayfield County, WI



$30 MILLION IN REPAIRS

280 HOMES DESTROYED

ON THE CNNF….

- MORE THAN A DOZEN ROAD-STREAM CROSSING WASHED OUT
- THREE BRIDGES DAMAGED
- GULLIES UP TO 10 FEET DEEP AND 20 FEET WIDE
- EROSION AND WASHOUTS DAMAGED STREAMS, RIVERS, WETLANDS

ADAPTATION ACTIONS…DID THEY WORK?

Unnamed Tributary to Whiskey Creek at Forest Road 198

OUT OF **20** CULVERTS INSTALLED BY THE CNNF, **17** SURVIVED THE STORM DESPITE BEING OVERTOPPED BY FLOODWATERS.

PREMIER RUNNER-UP

2017 PRIZE FOR PROGRESS

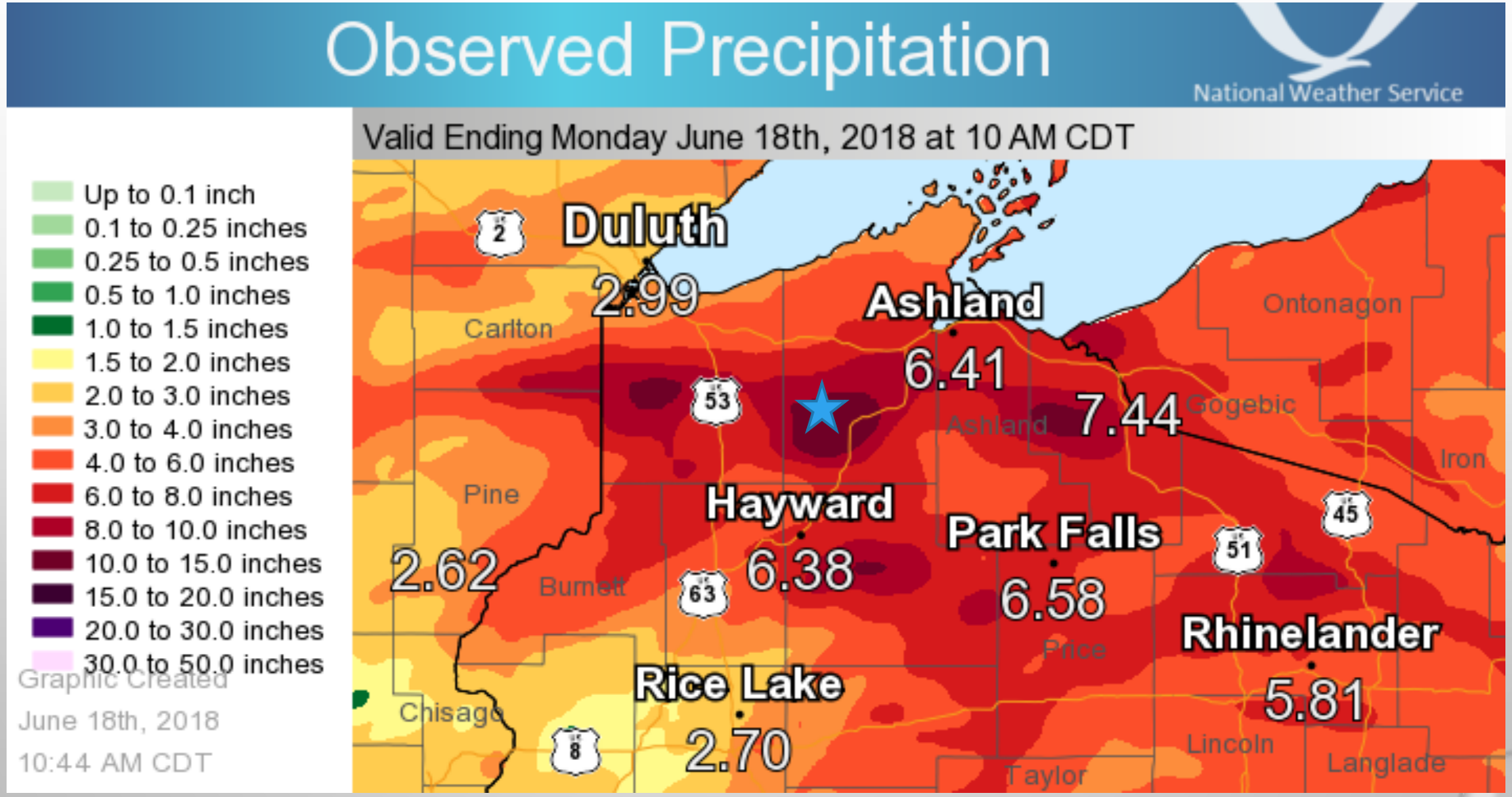
BY THE

AMERICAN SOCIETY OF ADAPTATION PROFESSIONALS

2018 FATHERS DAY FLOOD

SAY WHAT?????

FATHERS DAY FLOOD 2018

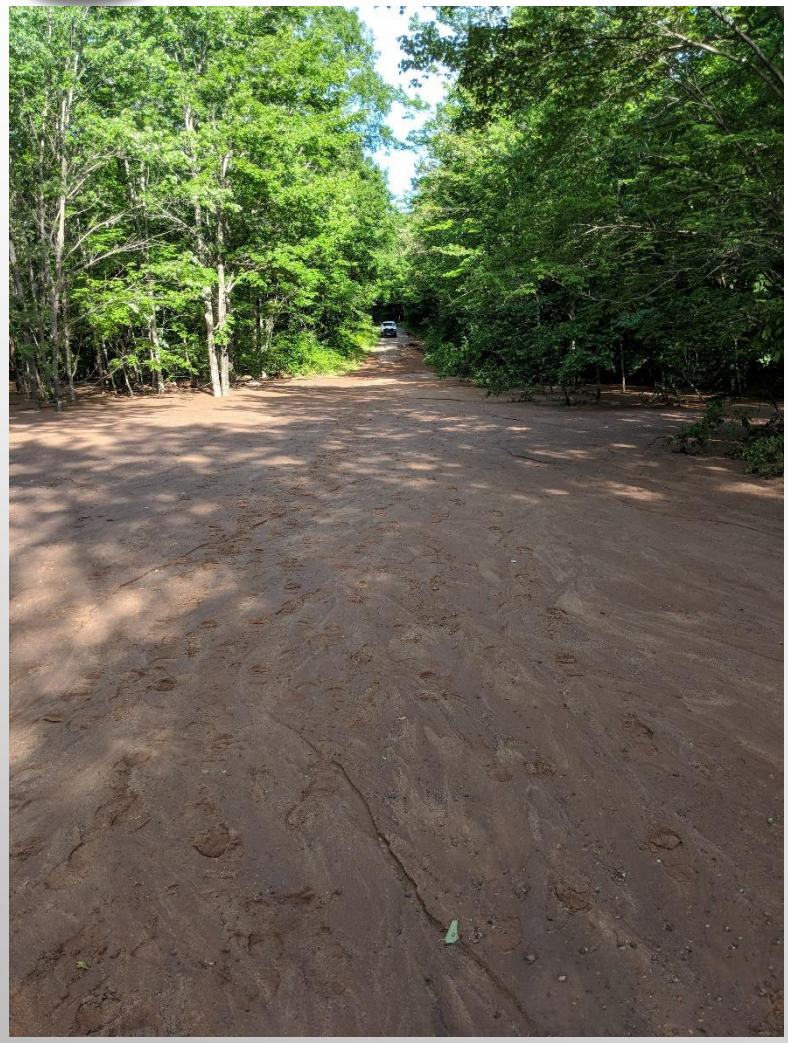


Fifteen inches of rain

Northern Great Lakes Visitor Center

Photo credit: Airfox Photography

- 6 TO 10 INCHES OF RAIN FELL IN PORTIONS OF DOUGLAS, BAYFIELD, AND ASHLAND
- **15 INCHES** OF RAIN FELL IN BAYFIELD COUNTY IN THE DRUMMOND AREA.
- **STATE OF EMERGENCY** WAS DECLARED IN DOUGLAS AND BAYFIELD COUNTIES
- HEAVY RAINS CAUSED SEVERE DAMAGE
- THE FOREST ACTIVATED A **TYPE 3 INCIDENT MANAGEMENT TEAM** MONDAY MORNING



Forest Road 227 Rocky Run Road

River of Sand

Forest Road 227 Rocky Run Road

Rocky Run Road

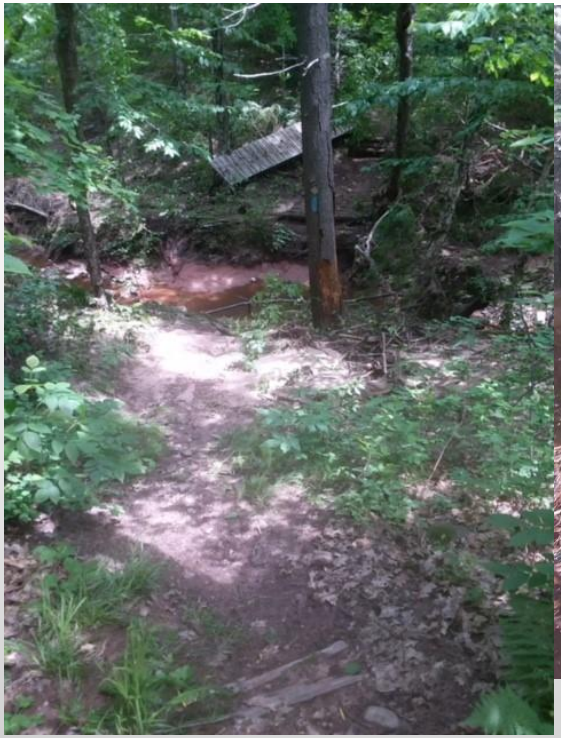
This culvert traveled about 200 feet off the road and into the woods

Forest Road 224 - Star Lake Road

Forest Road 231

RAINBOW LAKES WILDERNESS – NORTH COUNTRY TRAIL

Washouts on Trail and downed trees



Bridge Washout

Portions of the Trail are 4-10 feet under water

Sedimentation flowing into Lake Superior

CNNF employee (after two 1000-year floods in two years, and a winter of record snowfall)

WISCONSIN INITIATIVE ON CLIMATE CHANGE IMPACTS

FORESTRY WORKING GROUP

WICCI

- 2006: UW-Madison's Nelson Institute for Environmental Studies and the Wisconsin Department of Natural Resources
- 2007: Working groups created through grass-roots efforts
- 2011: 200 participants; 15 working groups; advisory council and a science council

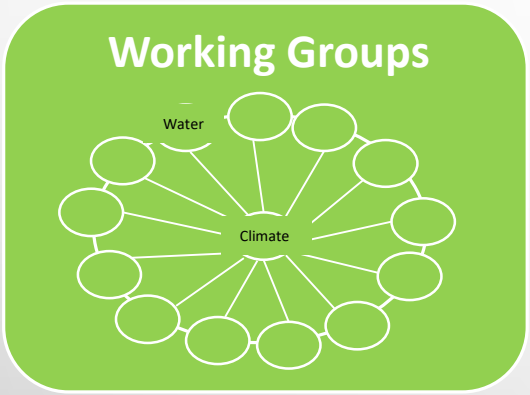
WISCONSIN INITIATIVE ON CLIMATE CHANGE IMPACTS

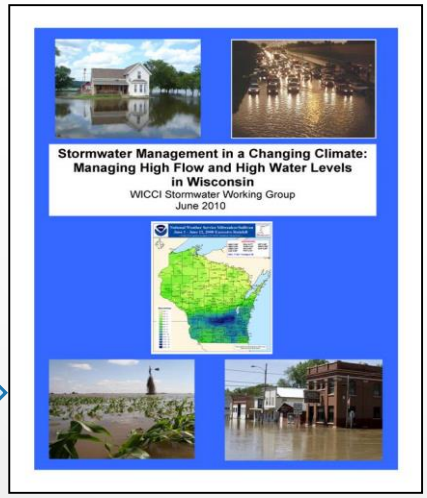
- **Assess and anticipate climate change impacts** on specific Wisconsin natural resources, ecosystems and regions
- **Evaluate potential effects** on industry, agriculture, tourism, and other human activities
- Develop and recommend **adaptation strategies**

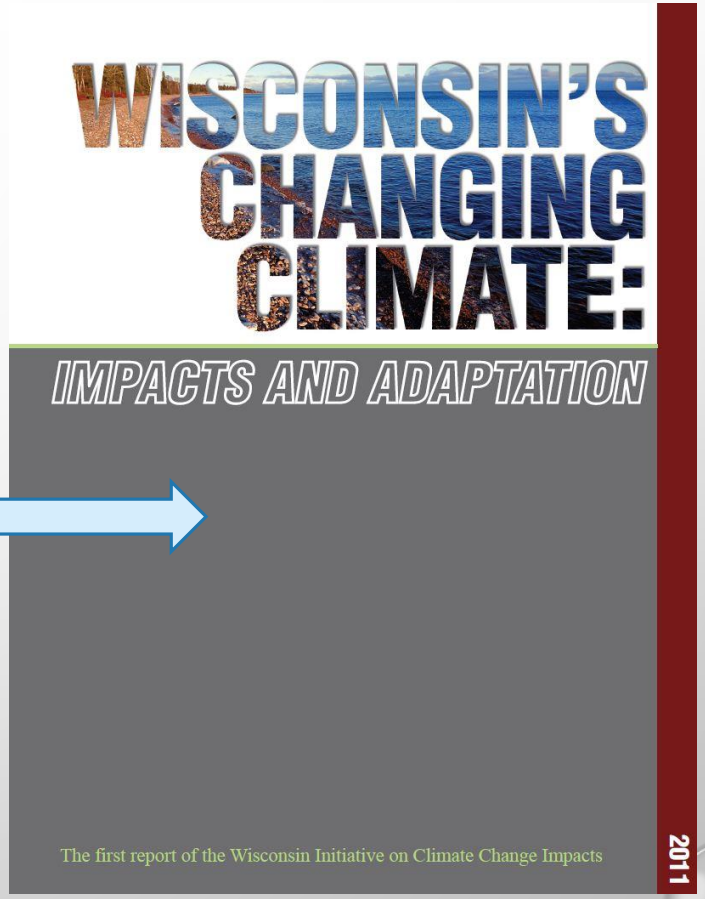
WISCONSIN INITIATIVE ON CLIMATE CHANGE IMPACTS

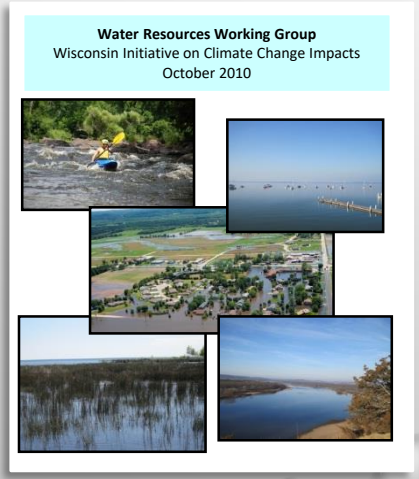
FIRST ASSESSMENT REPORT

2011









wicci.wisc.edu/

WISCONSIN INITIATIVE ON CLIMATE CHANGE IMPACTS

WISCONSIN INITIATIVE ON CLIMATE CHANGE IMPACTS

WICCI Collaborators

Federal

U.S. Department of Agriculture
U.S.D.A. Natural Resources Conservation Service
U.S. Fish and Wildlife Service
U.S. Forest Service
U.S. Geological Survey

State

State of Wisconsin Commissioner of Insurance
Wisconsin Coastal Management Program
Wisconsin Conservation Congress
Wisconsin Council on Forestry
Wisconsin Department of Transportation
Wisconsin Department of Agriculture, Trade and Consumer Protection
Wisconsin Department of Health and Family Services
Wisconsin Department of Natural Resources
Wisconsin Emergency Management
Wisconsin Geological and Natural History Survey
Wisconsin Public Service Commission
Wisconsin State Climatology Office
Wisconsin State Legislature

Tribal Groups

Great Lakes Indian Fish & Wildlife Commission

Local/Municipal

City of Fitchburg Engineering
City of Madison Storm Water Utility
City of Racine Water & Wastewater Utility
Columbia County Land & Water Conservation
Dane County Land Conservation Division
Greater Milwaukee Committee
League of Wisconsin Municipalities
Madison & Dane County Public Health Department
Madison Metropolitan Sewerage District
Milwaukee Metropolitan Sewerage District
Southeast Wisconsin Regional Planning Commission
Wisconsin Towns Association

Universities

Lakehead University
UW Extension
UW Sea Grant
UW-Engineering Professional Development
UW-Green Bay
UW-La Crosse
UW-Madison
UW-Milwaukee
UW-Milwaukee Great Lakes WATER Institute
UW-Stevens Point

NGO's

1000 Friends of Wisconsin
American Birkebeiner Ski Foundation
Clean Wisconsin
Education Communications Board
Fox-Wolf Rivers Environmental History Project
Grow North Regional Economic Development Corporation, Inc.
Natural Areas Preservation Council
Nature Net
New North, Inc.
Professional Dairy Producers of Wisconsin
Second Look Holsteins
The Association of State Floodplain Managers
The Nature Conservancy
Trout Unlimited
Wisconsin Citizen-Based Monitoring Network
Wisconsin Environmental Initiative
Wisconsin River Alliance
Wisconsin Paper Council
Wisconsin Wetlands Association
Wisconsin Wildlife Federation

Private Sector

AECOM
Alliant Energy
HNTB Corporation
Montgomery Associates-Resource Solutions
MSA Professional Services, Inc.
S.C. Johnson
Short Elliott Hendrickson, Inc.
We Energies


Human Health
Water Resources
Milwaukee
Soil Conservation
Coldwater Fish
Agriculture
Stormwater
Climate
Adaptation
Wildlife
Plants and Natural Communities
Green Bay
Central Sands Hydrology
Forestry
Coastal Communities
Wisconsin Initiative on Climate Change Impacts

Forestry | Climate Wisconsin from ECB on Vimeo.

Climate change is a game-changing issue for Wisconsin's forests, and we all have a stake in maintaining their health and sustainability.

The WICCI Forestry Working Group shares information about climate change impacts and adaptation across the forestry community. We help put information into action by helping foresters and land managers adapt and prepare for future change.

Forestry Resources

- Climate Wisconsin 2050: Forestry (PDF) | November 2016
- Climate change vulnerability assessment for northern WI forests
- Real-world examples of climate change adaptation and forest management
- Adaptation Workbook
- Recorded presentation on climate change impacts and Northwoods forests
- Climate Wisconsin video on Forestry
- WICCI climate maps
- Climate Change Resource Center

FORESTRY WORKING GROUP MEMBERS

- STEPHEN HANDLER, USDA FOREST SERVICE
- MATT DALLMAN, THE NATURE CONSERVANCY
- JASON HOLMES, BAYFIELD COUNTY
- BRAD HUTNIK, WISCONSIN DNR
- LINDA PARKER, USDA FOREST SERVICE
- KRIS TILES, UW-EXTENSION
- ALEX WROEBEL, GLIFWC

FORESTRY ROUNDTABLES

THREE ROUNDTABLE DISCUSSIONS AROUND THE STATE IN APRIL 2016.

- NEARLY 50 PEOPLE ATTENDED THESE SESSIONS:
  - FORESTERS, LOGGERS, TIMBER COMPANIES, MILLS, COUNTY FORESTRY, DNR, USFS, TRIBAL, TRIBAL NATURAL RESOURCES PROGRAMS, ACADEMIC AND OTHER ORGANIZATIONS)

Climate Wisconsin 2050

Scenarios of a State of Change: Forestry

Wisconsin's climate is changing, and our forests will continue to experience direct and indirect impacts from these changes.

This publication provides guidance on how **forest managers and landowners are addressing these impacts, and how they are helping forests adapt and respond to change.**

Wisconsin has more than 17 million acres of forest land, covering nearly 50% of the state's total land area. Over 55% of Wisconsin's forests are owned by families, and 32% are owned by public agencies (federal, state, or county). These forests help sustain the state ecologically, economically, and culturally. For example, the combined forest products industries in Wisconsin account for 65,000 jobs and an economic output of nearly $25 billion.

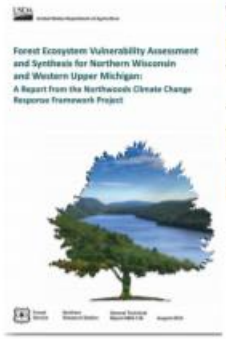
Look inside for a snapshot of what we can expect from Wisconsin's climate and weather by the year 2050, and how forest managers can help adapt to these changing conditions.

WISCONSIN INITIATIVE ON CLIMATE CHANGE IMPACTS

Forestry Working Group

2015-2017 Work Plan Summary

(1) Forest ecosystem vulnerability assessment and synthesis for northern Wisconsin and western Upper Michigan

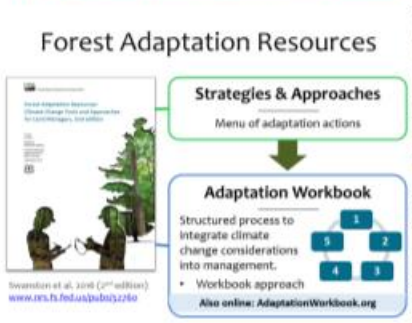


The Northern Institute of Applied Climate Science (NIACS) published a forest ecosystem vulnerability assessment, focusing on forests in northern Wisconsin and the western Upper Peninsula of Michigan. Over 40 managers and researchers contributed to the report, from a range of federal, state, tribal, non-profit, academic, and private organizations. In addition to the vulnerability assessment, several companion pieces were produced, including tree species specific handouts. These can be found at:

https://forestadaptation.org/Northwoods_treehandouts

In total, 1,300 copies of the assessment have been distributed, in addition to online views and downloads.

(2) Adaptation and Forest Management in Wisconsin: a flexible workbook approach



The Northern Institute of Applied Climate Science is providing resources and assistance to help forest managers and landowners develop custom, place-based adaptation plans. A second edition of Forest Adaptation Resources was released in 2016 with a revised Adaptation Workbook and new adaptation menu for Urban Forestry, and an online version was relaunched. The workbook contains a flexible process to guide users through a series of key considerations, as well as a "menu" of possible adaptation actions for forest management. The process is designed to help translate broad-scale information on climate vulnerabilities to project-specific concerns, and to help managers figure out how they can continue to meet their own unique management goals through adaptation. The online resource currently houses over 30 adaptation demonstrations projects in Wisconsin.

Two Wisconsin projects were recently recognized as Finalists for the 2017 American Society for Adaptation Professionals Prize for Progress.

CLIMATE CHANGE PROJECTIONS FOR INDIVIDUAL TREE SPECIES

NORTHERN WISCONSIN AND WESTERN UPPER MICHIGAN

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 Wisconsin and western Upper Michigan (Janowiak 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.

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.

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 region's forests.

SPECIES	ADDITIONAL CONSIDERATIONS
LIKELY TO DECREASE	
Balsam fir	Requires cold climate and susceptible to drought, fire, and insects
Black ash	Emerald ash borer causes mortality
Black spruce	Requires cold climate, susceptible to insect pests and drought
Northern white-cedar	Requires cold climate and susceptible to fire and herbivory
Paper birch	Early-sucessional colonizer, but susceptible to insects and drought
Quaking aspen	Early-sucessional colonizer, but susceptible to heat and drought
White spruce	Requires cold climate, susceptible to insect pests
Yellow birch	Good disperser, but susceptible to fire, insects, and disease
MAY DECREASE	
Balsam poplar	Early-sucessional colonizer, but susceptible to drought
Eastern white pine	Good disperser, but susceptible to drought and insects
Jack pine	Tolerates drought and fire, but susceptible to insect pests
Red pine	Susceptible to insect pests and diseases, and limited dispersal.
Sugar maple	Grows across a variety of sites and tolerates shade

SPECIES	ADDITIONAL CONSIDERATIONS
MIXED MODEL RESULTS	
Bigtooth aspen	Early-sucessional colonizer, but susceptible to drought
Eastern hemlock	Hemlock woolly adelgid causes mortality
Green ash	Emerald ash borer causes mortality
Red maple	Competitive colonizer tolerant of disturbance and diverse sites
NO CHANGE	
Northern red oak	Susceptible to some insect pests and oak wilt
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
Bur oak	Tolerates drought and fire
Ironwood	Grows across a variety of sites and tolerates shade
Northern pin oak	Tolerates drought and fire

CURRENT WORKPLAN

- **COMMUNICATE** RELEVANT CLIMATE CHANGE INFORMATION ACROSS THE FORESTRY COMMUNITY
- DEVELOP USEFUL **OUTREACH** MATERIALS
- LEAD ADAPTATION **TRAINING** AND DEVELOP REAL-WORLD ADAPTATION EXAMPLES
- INTEGRATE CLIMATE CHANGE ADAPTATION AND RESILIENCE INTO **DECISION-MAKING**
- INTEGRATE CLIMATE CHANGE ADAPTATION AND RESILIENCE INTO **DECISION-MAKING**

Did someone say storm?