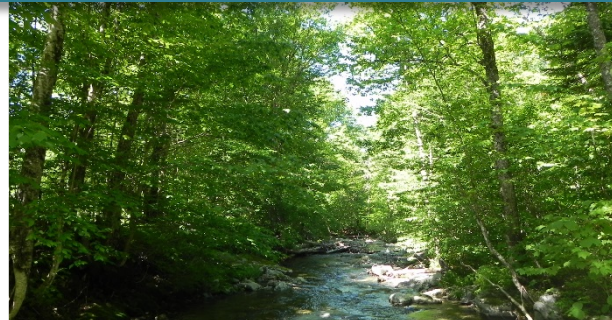




United States Department of Agriculture
Northern Forests Climate Hub

Culturally Relevant Climate Adaptation Planning for Tribes and Tribal Partners



Pre-workshop webinar:

Climate impacts and an introduction to adaptation

January 9, 2019

Welcome to the Pre-Workshop Webinar!

- Plan for ~ 90 minutes
- This will be recorded

Notes:

- There are some tasks to complete before the workshop.

Workshop:

Weds/Thurs Jan 23/24

9:00_{am} – 4:30_{pm}

Tansey Moore



Hannah Panci



Kristen Schmitt



Outline

1. Climate change impacts
2. Adaptation concepts
3. Guiding principles and Tribal Adaptation Menu
4. How to prepare for the workshop

Who we are -

Core Tribal Adaptation Menu team:

- GLIFWC (Kim Stone, Melonee Montano, Hannah Panci, Rob Croll)
- 1854 Treaty Authority (Tansey Moore)
- Lac du Flambeau (Patricia Moran)
- Michigan Tech (Jerry Jondreau)
- College of Menominee Nation (Chris Caldwell, Greg Gauthier)
- Red Cliff Band (Katy Bresette)
- Northeast Climate Adaptation Science Center (Sara Smith)
- Inter-Tribal Council of Michigan (Robin Clark)
- NIACS (Stephen Handler, Kristen, Chris Swanston)

Workshop:

- ITEP (Nikki Cooley, Karen Cozetto)



Travel funding:

- College of Menominee Nation
- Northeast Climate Adaptation Science Center



Who's on the phone?

Share your name, location, favorite winter activity

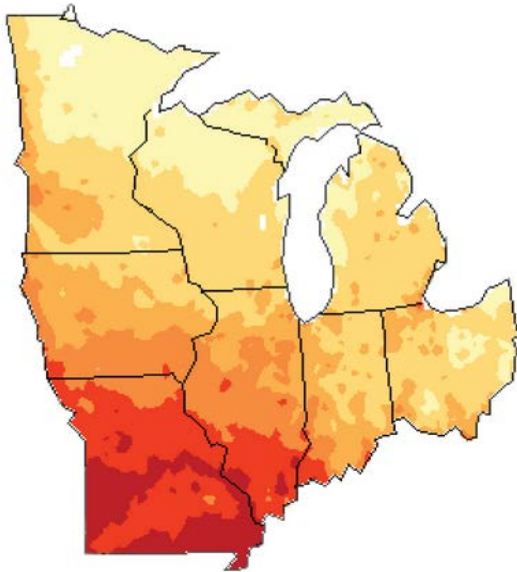


Climate impacts

Adaptation concepts

Tribal adaptation menu

Preparing for the workshop



Eight Key Impacts ...

- Longer growing season
- Less cold / more heat
- Less snow
- More rain in winter/spring
- More extreme rainfall
- More drought stress
- Shifting species
- Cumulative stressors

Climate impacts

Adaptation concepts

Tribal adaptation menu

Preparing for the workshop



Climate Trends and Projections:

Fourth National Climate Assessment
nca2018.globalchange.gov/

- **National Climate Assessment - Climate Science Special Report**
science2017.globalchange.gov

NOAA Climate at a Glance tool (data)
www.ncdc.noaa.gov/cag/

Climate impacts

Adaptation concepts

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Preparing for the workshop



Impacts on ecosystems

Forests (NIACS)

forestadaptation.org/vulnerability-assessment

Wetlands/natural communities (WICCI)

www.wicci.wisc.edu/plants-and-natural-communities-working-group.php

Culturally important species (GLIFWC)

data.glifwc.org/archive.bio/GLIFWC_Climate_Change_Vulnerability_Assessment_Version1_April2018.pdf

Various (1854 Treaty Authority)

[www.1854treatyauthority.org/images/ClimateAdaptationPlan_Final-July_2016-optimized\(1\).pdf](http://www.1854treatyauthority.org/images/ClimateAdaptationPlan_Final-July_2016-optimized(1).pdf)

Climate impacts

Adaptation concepts

Tribal adaptation menu

Preparing for the workshop

There are still a range of possible futures!

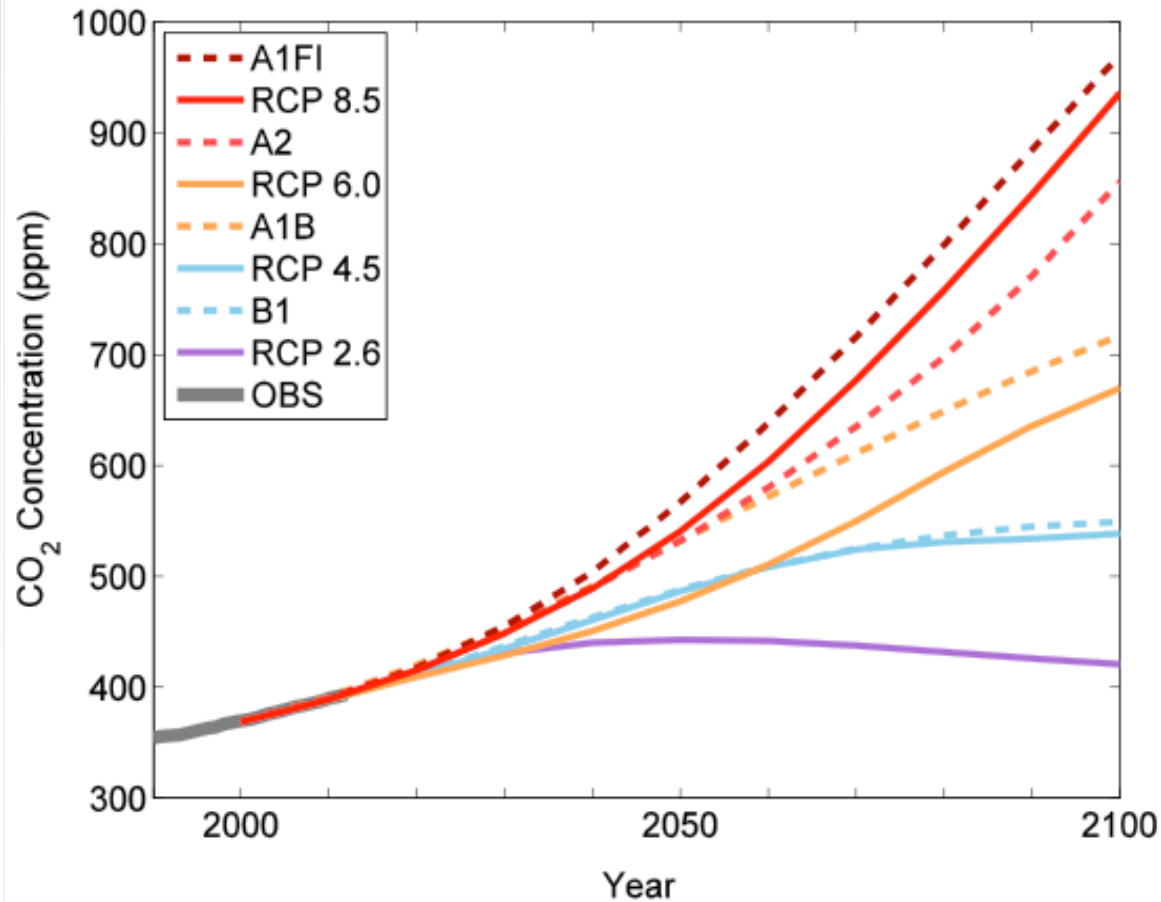


Figure Source: IPCC 2007, 2014

Climate impacts

Adaptation concepts

Tribal adaptation menu

Preparing for the workshop

Opportunity:

Longer period for plant growth

Challenge:

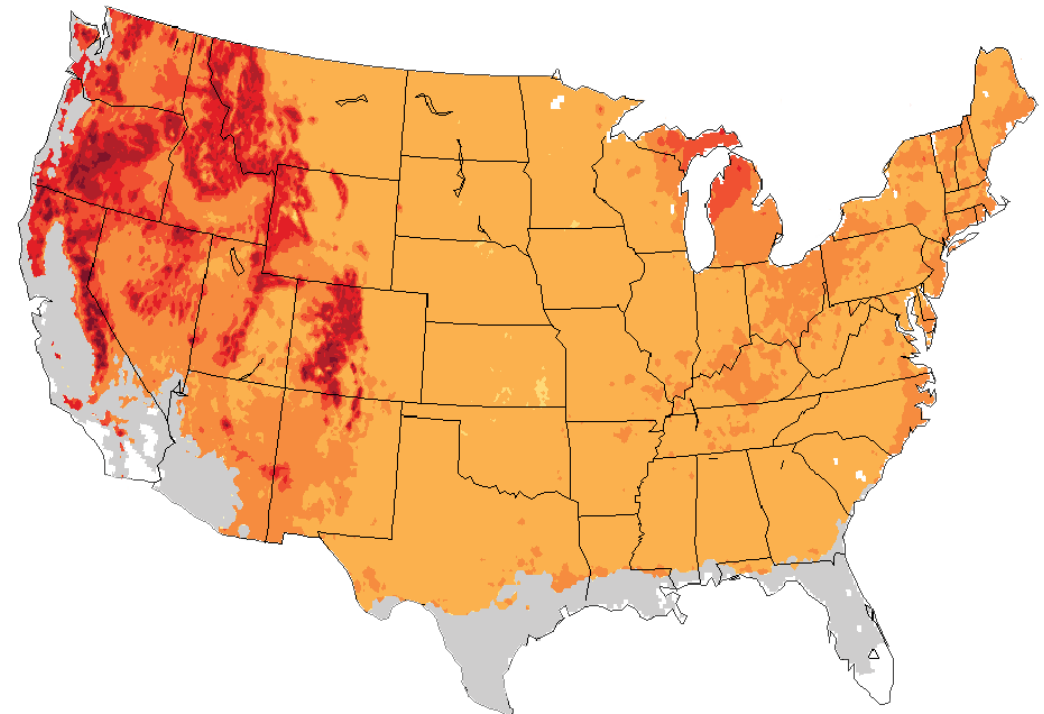
Potential risks from altered seasonality

- Early bud break/loss of cold hardening
- Frost damage during spring freezing
- May advantage some invasive plants

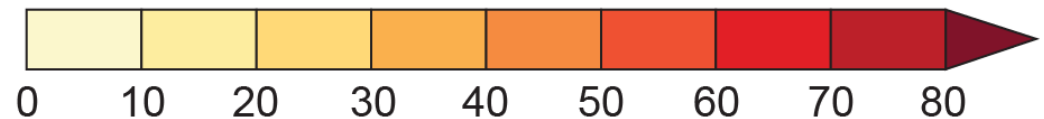
Longer Growing Seasons

Increase of **4-9 weeks** by 2100 (high emissions)

Change in Frost-free Season Length



Number of Days



Climate impacts

Adaptation concepts

Tribal adaptation menu

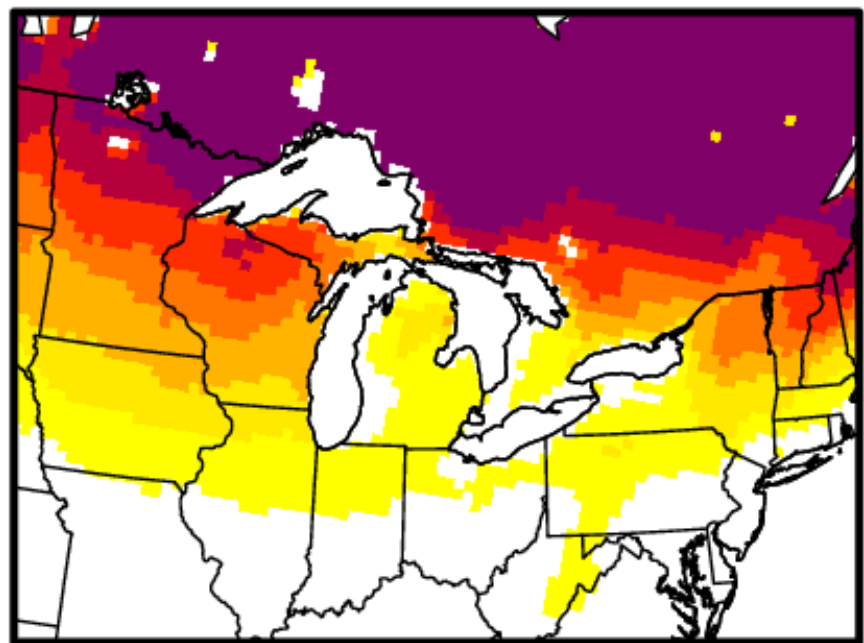
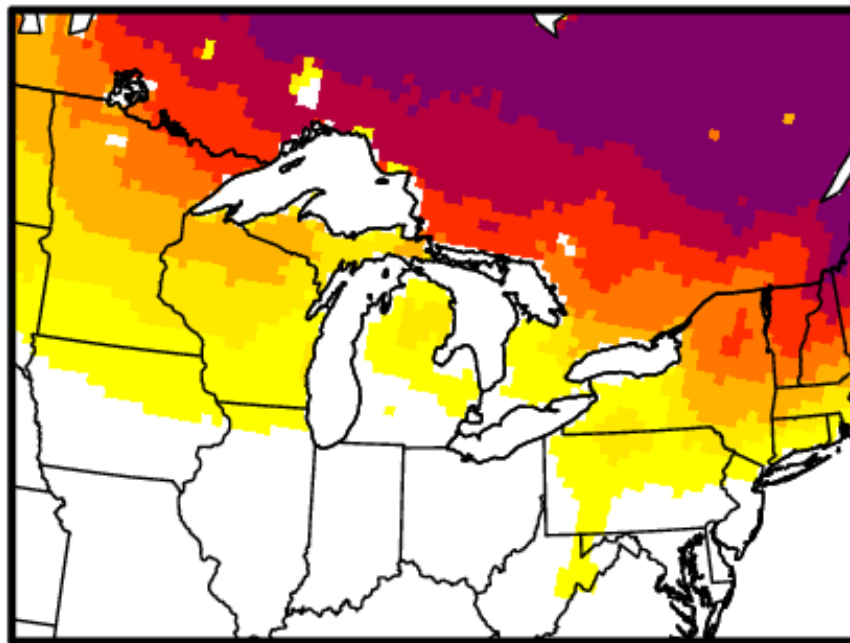
Preparing for the workshop

Less Extreme Cold

Decrease in **4 - 28 days** below 0°F
by 2100 (high emissions)

0F- Nights RCP8.5 Late21-Late20

0F- Nights RCP8.5 Late21-Late20



MRI model

IPSL model

Climate impacts

Adaptation concepts

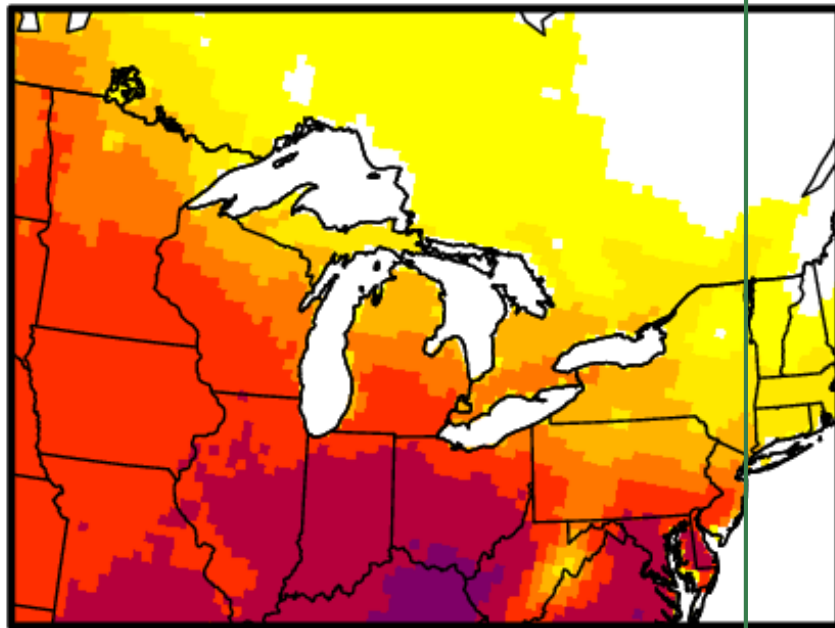
Tribal adaptation menu

Preparing for the workshop

More extreme heat

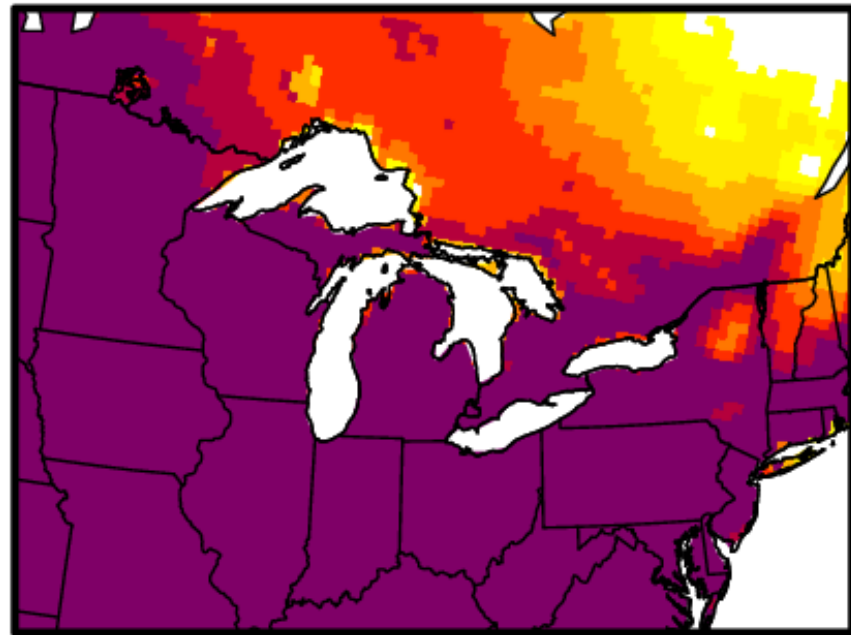
Increase in **12 - 42 days** above 90°F
by 2100 (high emissions)

90F+ Days RCP8.5 Late21-Late20

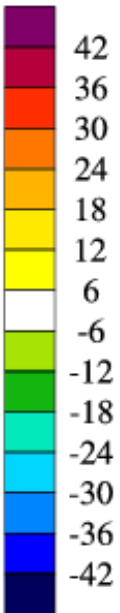


MRI model

90F+ Days RCP8.5 Late21-Late20



IPSL model



Climate impacts

Adaptation concepts

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Preparing for the workshop

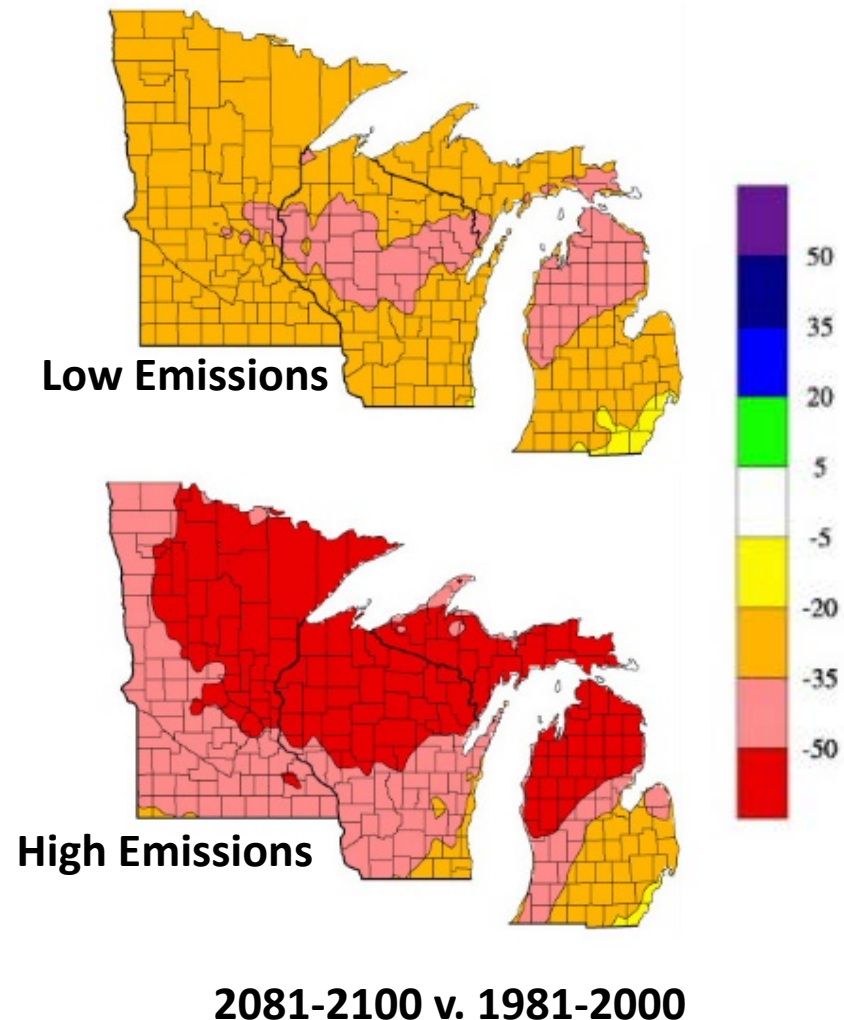
Challenge:

Decreased snowpack

- Increased soil frost and root damage in cold temps
- Warmer soil temperatures and altered processes
- Changing wildlife dynamics (e.g. deer)

Warmer Winters = Less Snow

30-50% decreases in snowfall (also decreases in snow cover & depth)



Climate impacts

Adaptation concepts

Tribal adaptation menu

Preparing for the workshop

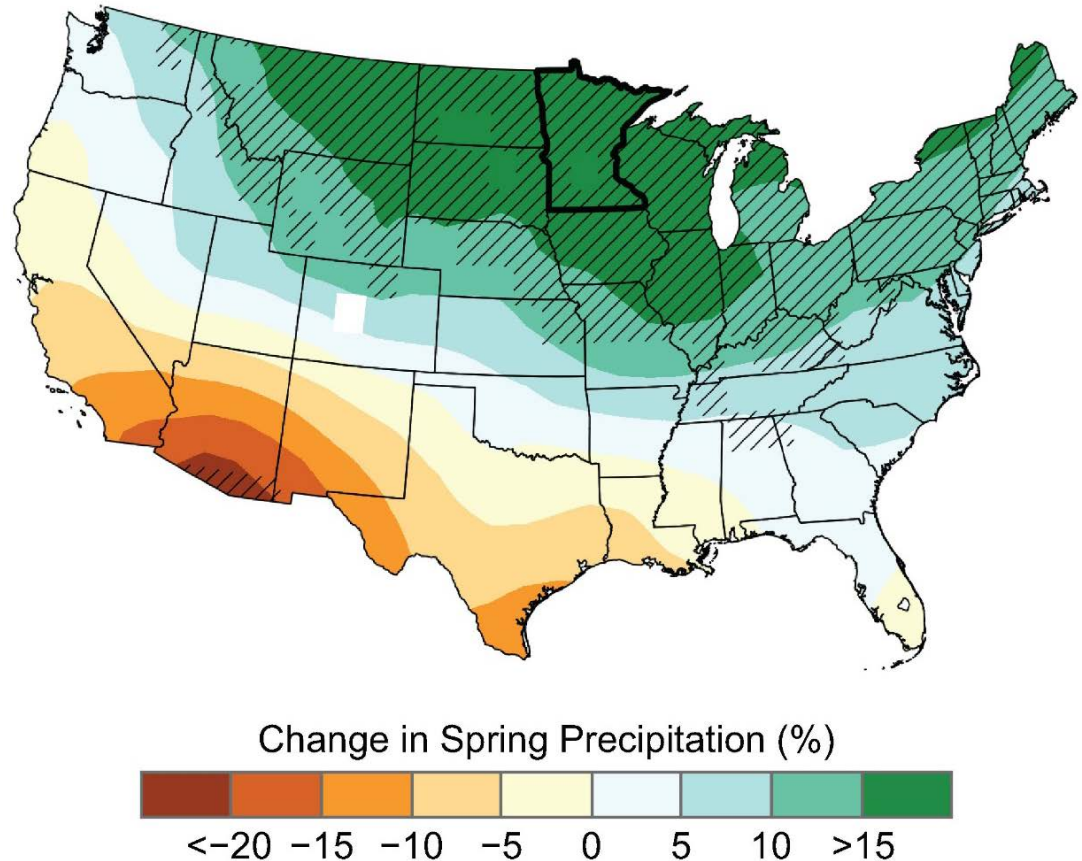
Opportunity:

Potentially more water available for humans and ecosystems

Challenge:

- Earlier spring peak streamflows
- Potential increases in flashiness – erosion & washouts
- Potential declines in summer stream flow

More rain in winter & spring



Climate impacts

Adaptation concepts

Tribal adaptation menu

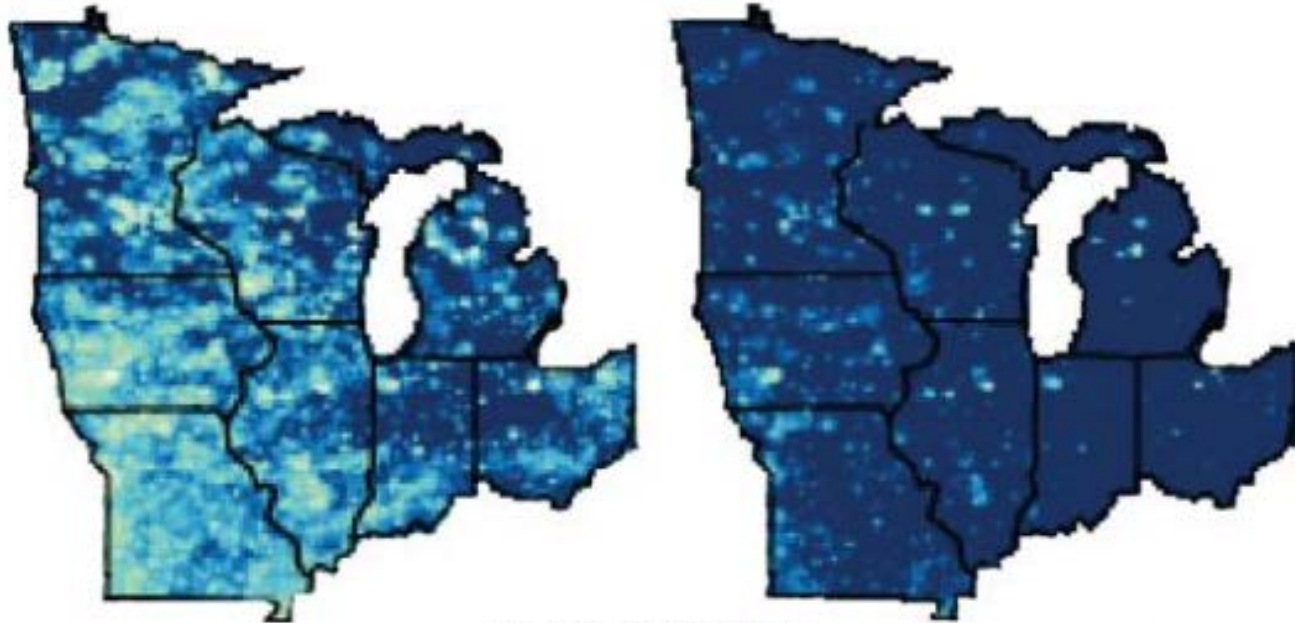
Preparing for the workshop

Increased extreme rainfall

30-80% more extreme precipitation days by 2100.

Lower Emissions (RCP4.5)

Higher Emissions (RCP8.5)



Percent Change



Climate impacts

Adaptation concepts

Tribal adaptation menu

Preparing for the workshop

Challenge:

- Heavy precipitation
- Flooding
- Ice storms
- Heat waves/droughts
- Wind storms

“Events” are very difficult to predict

Increased extreme rainfall (and other events)



Climate impacts

Adaptation concepts

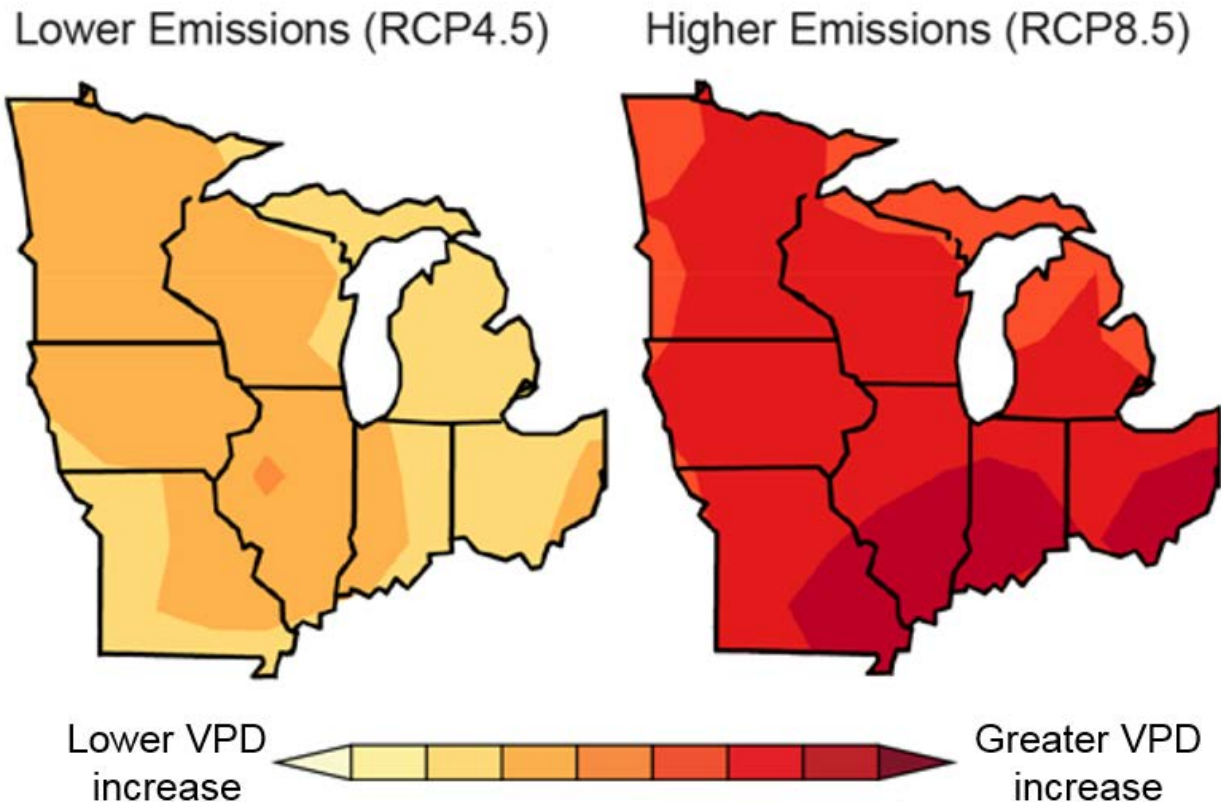
Tribal adaptation menu

Preparing for the workshop

Moisture Stress

Warmer temperatures = vapor pressure deficit (VPD)

- More evaporation from soils & open water
- More transpiration from plants



Climate impacts

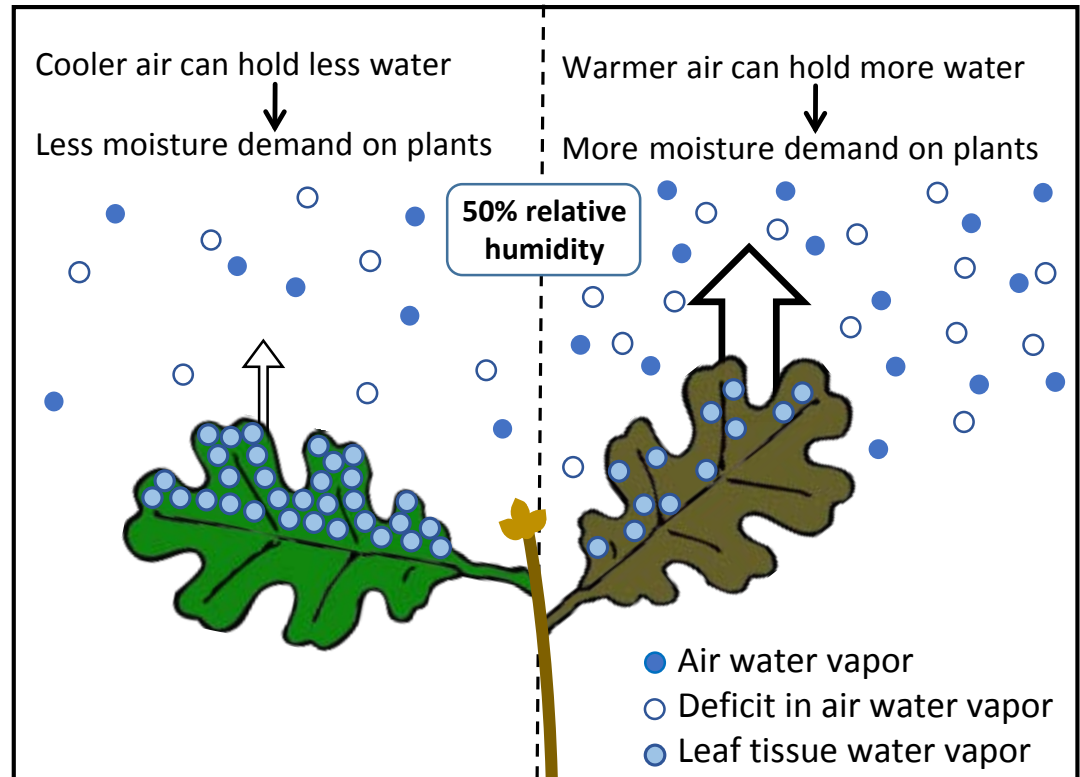
Adaptation concepts

Tribal adaptation menu

Preparing for the workshop

Moisture Stress

Warmer temperatures = vapor pressure deficit (VPD)



Climate impacts

Adaptation concepts

Tribal adaptation menu

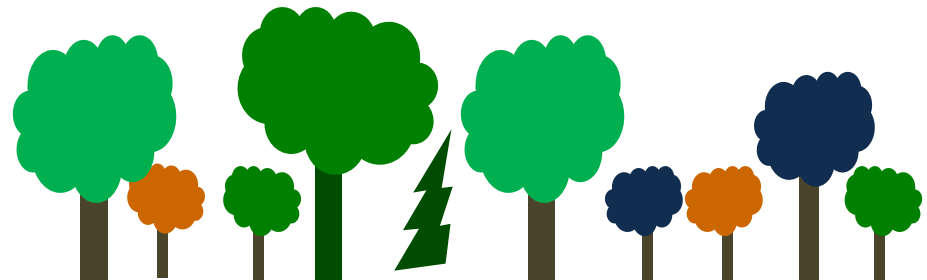
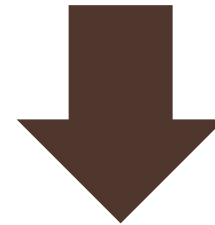
Preparing for the workshop

Plant and animal species will respond to changes in climate.

Opportunity: Increased habitat for some species

Challenge: Decline of northern/boreal species

Species Changes



Climate impacts

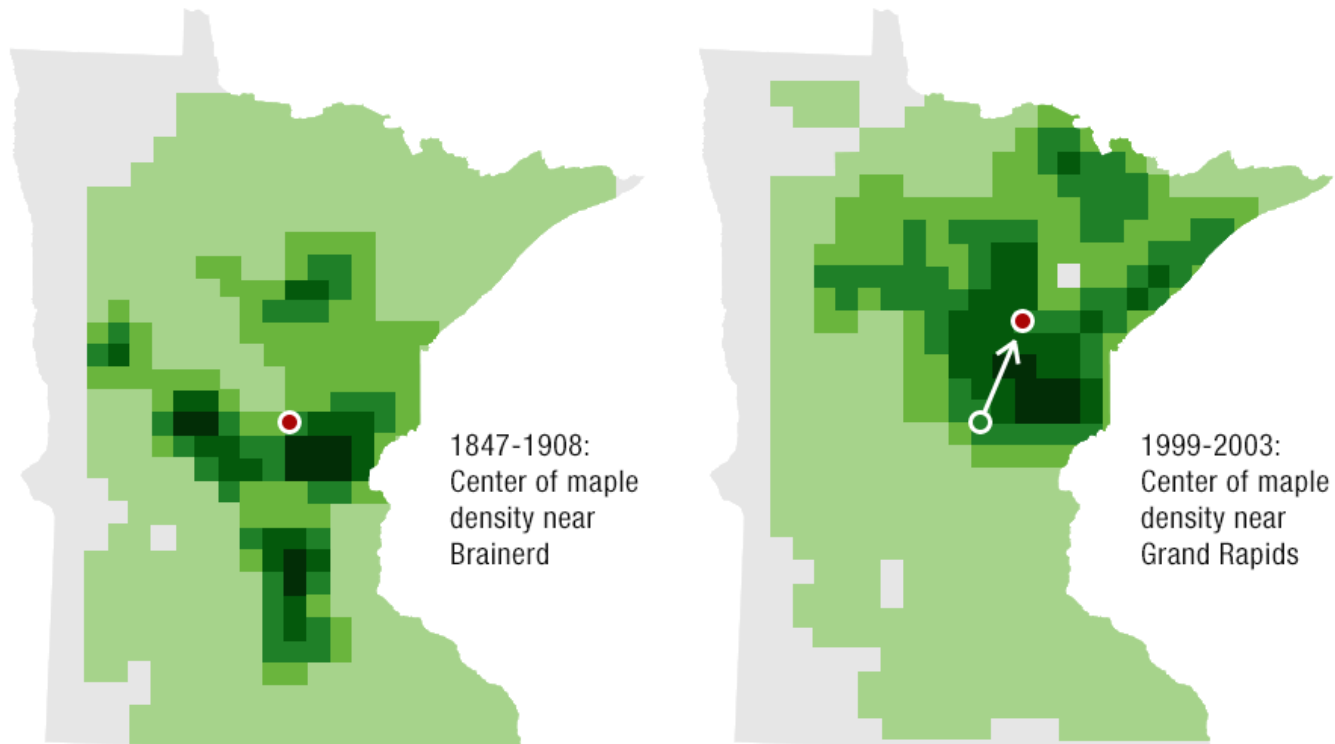
Adaptation concepts

Tribal adaptation menu

Preparing for the workshop

Species Changes – Sugar maple

Density of Minnesota's maples moving north and east



Proportion of trees that are maples

0	0-20%	20-40%	40-60%	60-80%	80-100%
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Climate impacts

Adaptation concepts

Tribal adaptation menu

Preparing for the workshop

Interactions make all the difference.

- Chronic stress
- Disturbances
- Invasive species
- Insect pests
- Forest diseases

Cumulative stressors

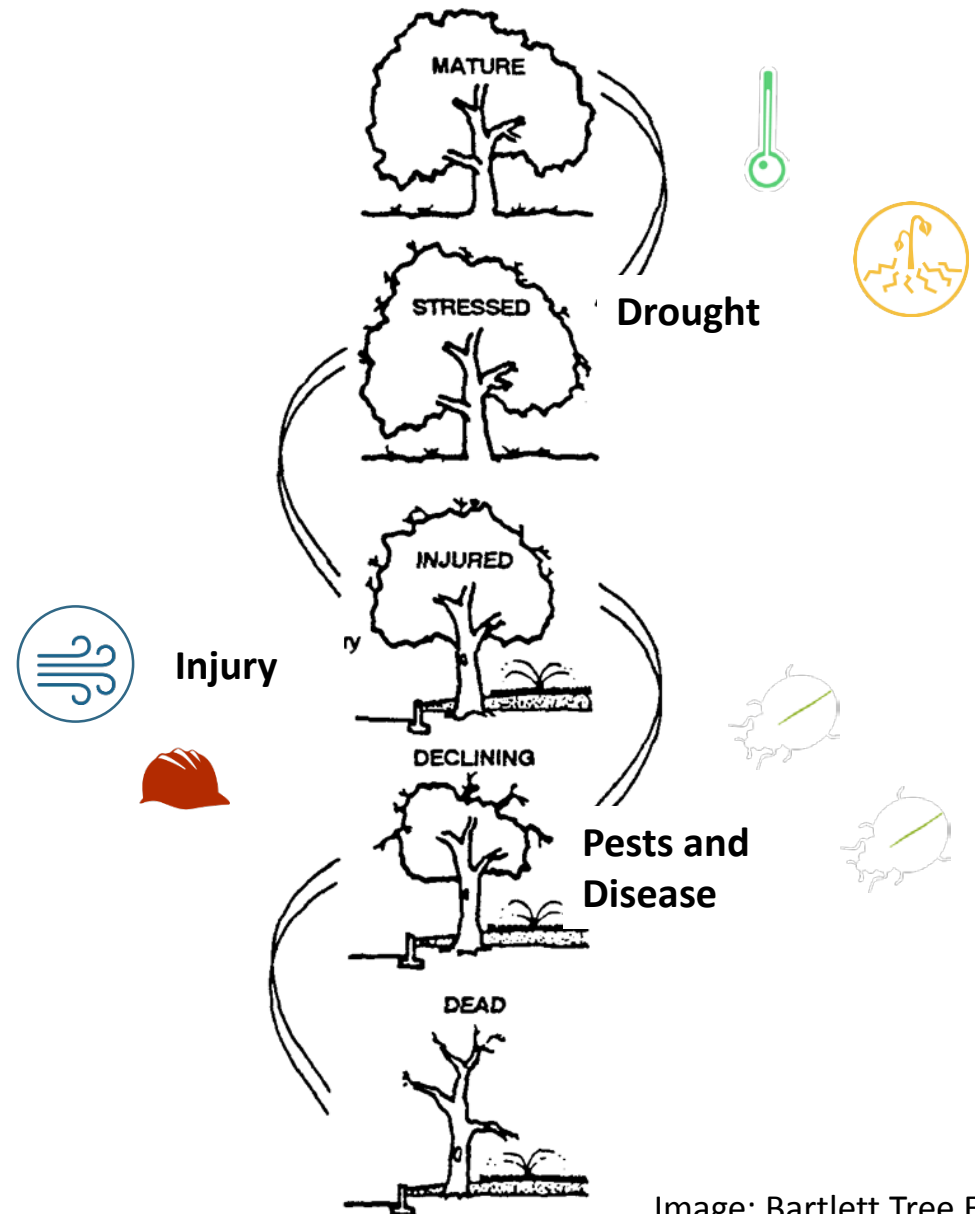
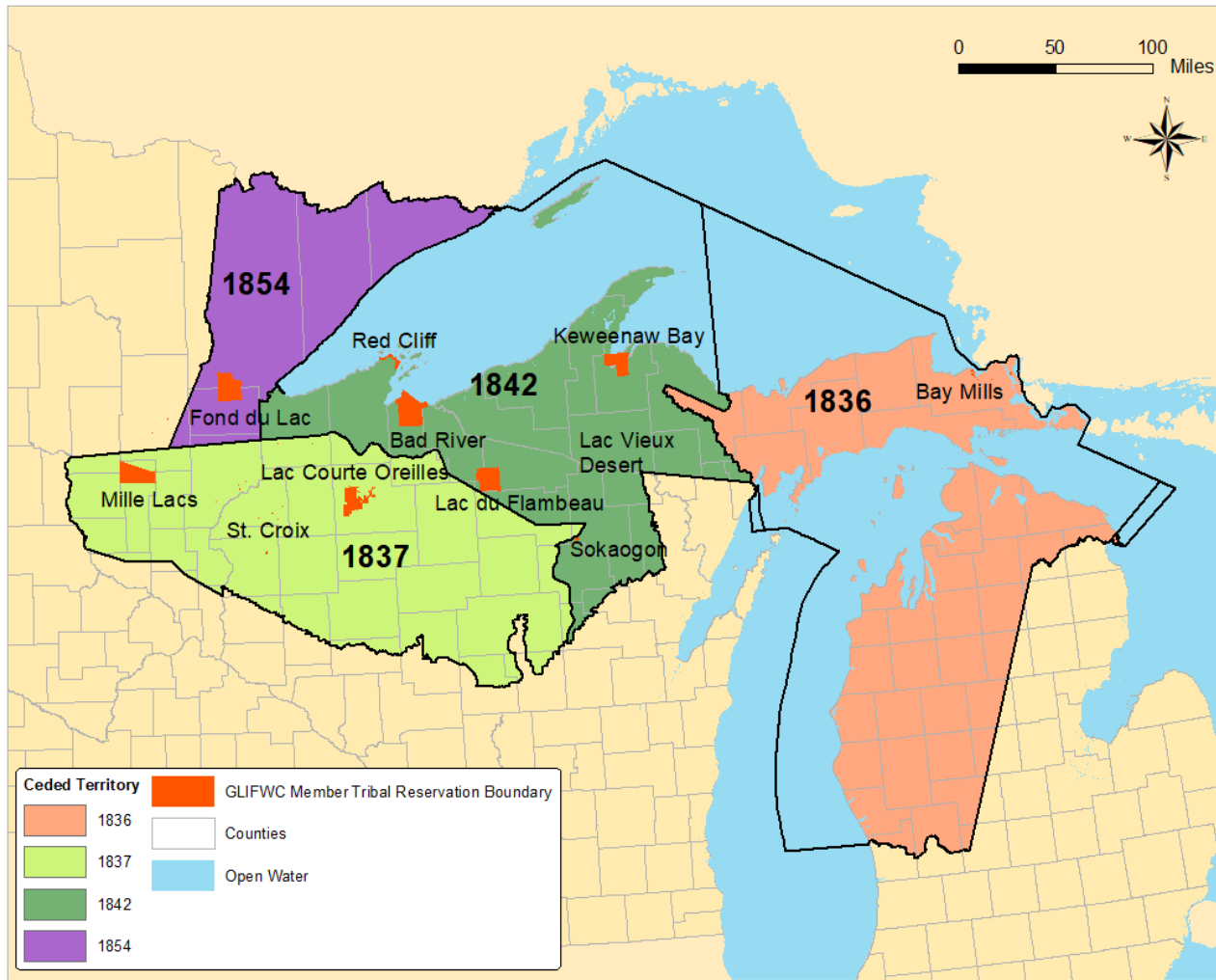


Image: Bartlett Tree Experts



Impacts on
Culturally
Important Species

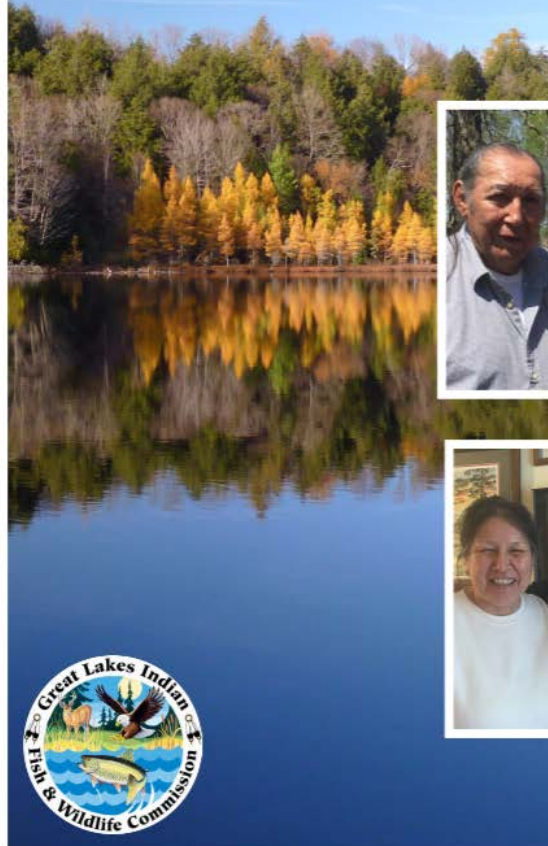
Great Lakes Indian Fish Wildlife Commission



Climate Change Vulnerability Assessment

Version 1 • April 2018

Integrating Scientific and Traditional Ecological Knowledge



Available at
glifwc.org/ClimateChange

Climate Change Vulnerability Assessment

Scientific Ecological Knowledge

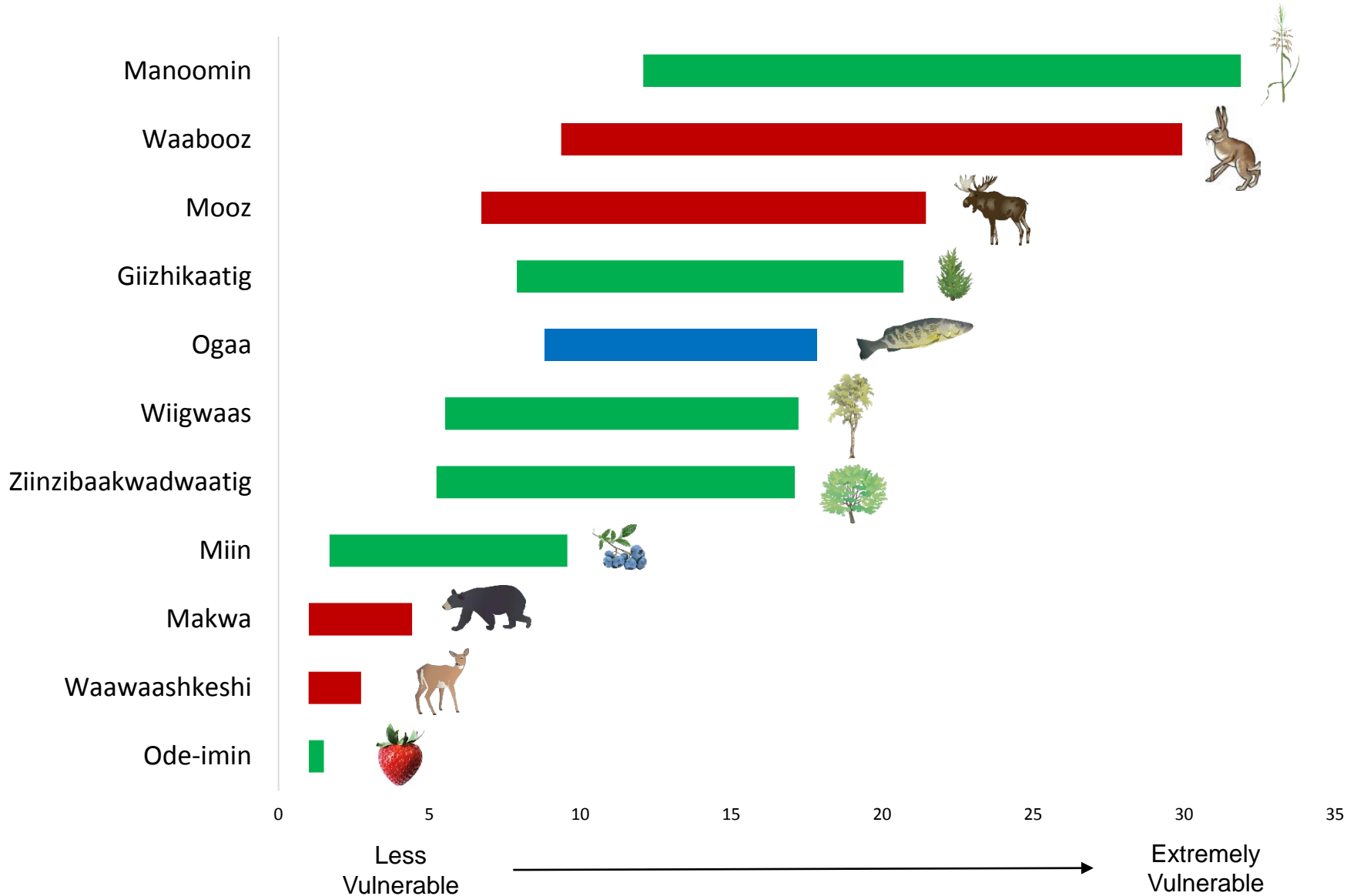
- NatureServe's Climate Change Vulnerability Index tool incorporates climate projections and literature on natural history
- Expert reviews of each being's assessment

Traditional Ecological Knowledge

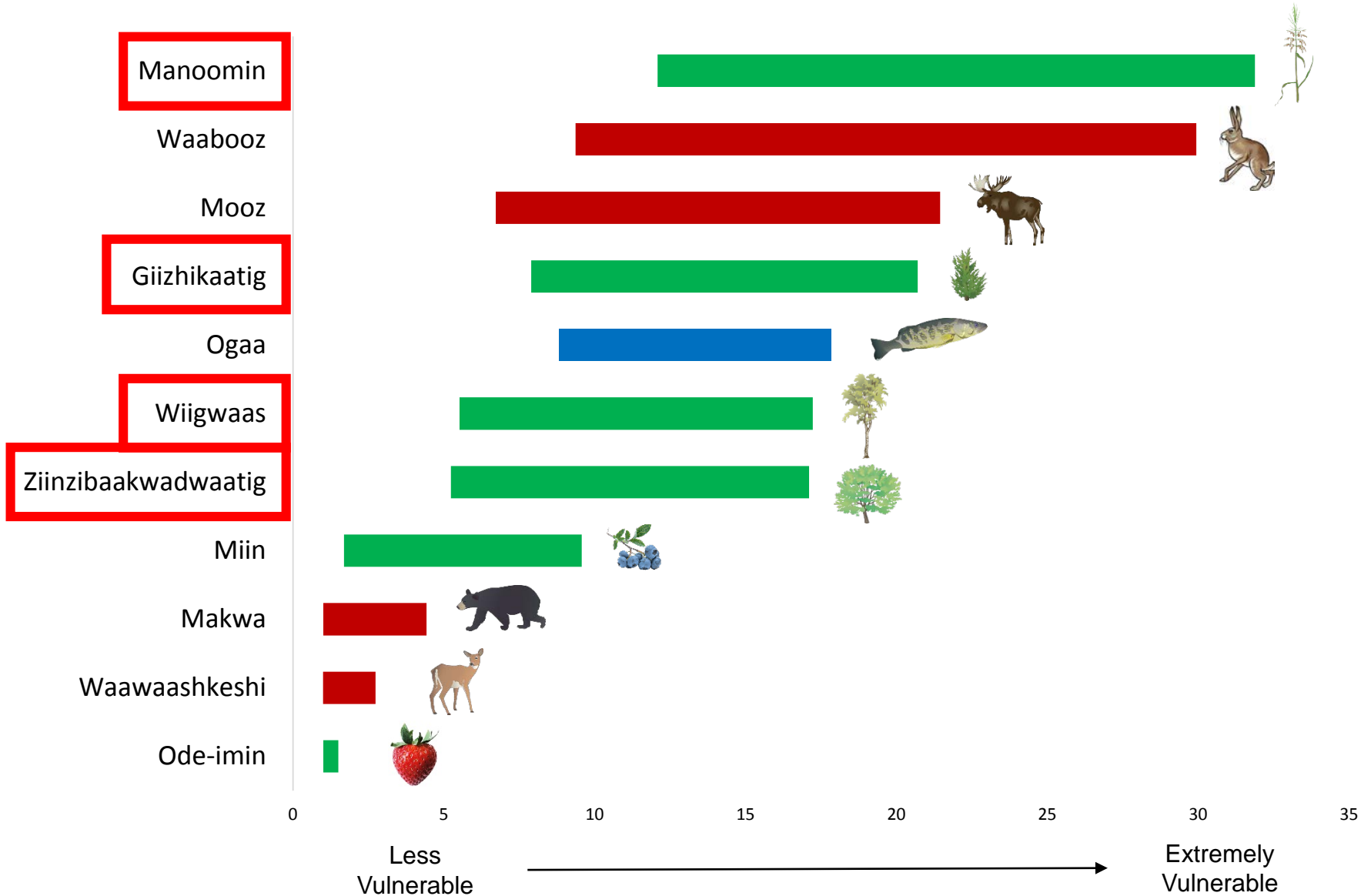
- At least 3 interviews in each community
- Elders, harvesters, other community members
- Interviewees provide stories, teachings, knowledge about changes

Results
Incorporate both

Results from top-mentioned beings



Results from top-mentioned beings



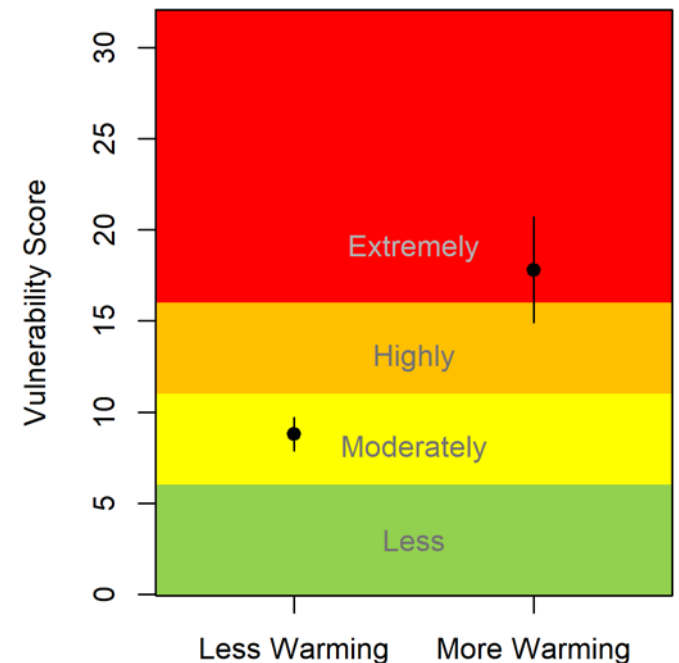
Giizhikaatig (Northern White Cedar)

- Adapted to cool environments
- Susceptible to drought
- Requires particular hydrological conditions
- Dependent on snow
- Susceptible to deer browse
- Suitable habitat projected to decrease

- Used as medicine
- Cedar swamps are drying
- Cedar abundance is decreasing



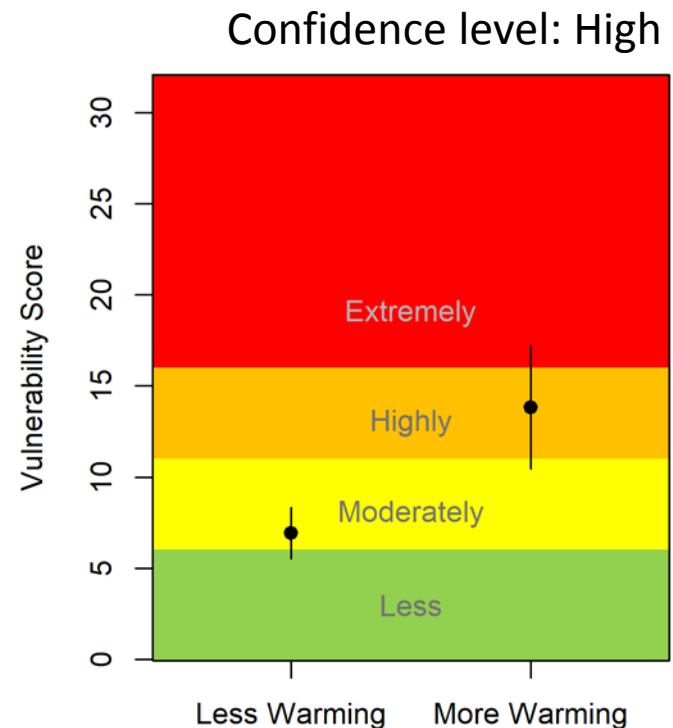
Confidence level: Moderate



Wiigwaas (Paper Birch)

- Adapted to cool environments
- Susceptible to drought
- Dependent on snow
- Susceptible to insects and deer browse
- Susceptible to competition
- Suitable habitat projected to decrease

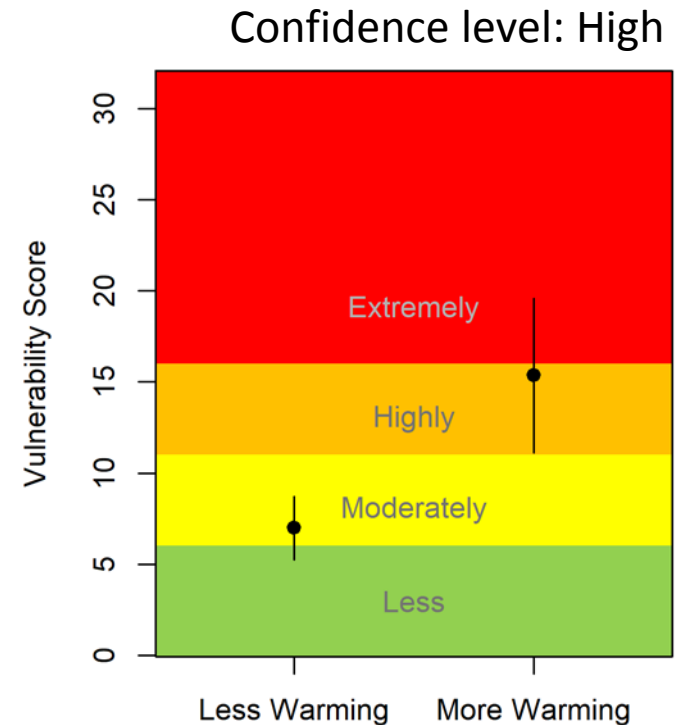
- Used to fight cancer
- Gather bark after mosquitoes and deer flies are out – but that timing is changing



Ziinzibaakwadwaatig (Sugar Maple)

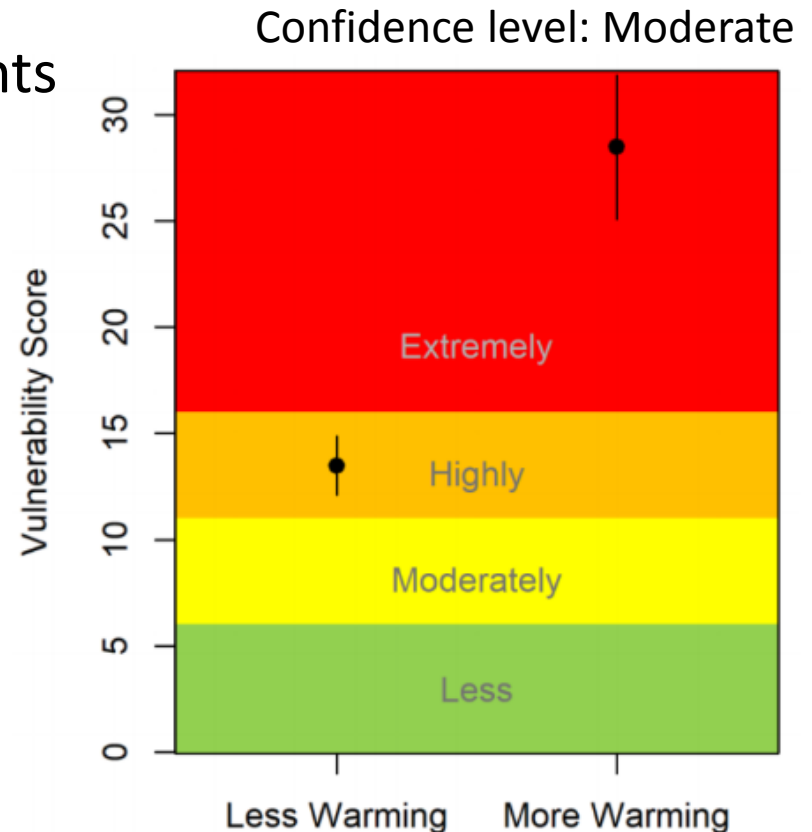
- Adapted to cool environments
- Susceptible to disturbance
- Susceptible to drought
- Dependent on snow
- Susceptible to insects, deer browse
- Susceptible to competition
- Suitable habitat projected to decrease

- Depended on by thousands of generations
- Recent years have rarely had a season to harvest sap



Manoomin (Wild rice)

- Limited by natural barriers
- Affected by human land use changes
- Limited dispersal
- Adapted to cool environments
- Particular hydrological requirements
- Susceptible to disturbance
- Dependent on ice/snow
- Susceptible to competition
- Susceptible to pathogens
- Lack of genetic variation
- Documented response to climate change



Manoomin (Wild rice)



“According to the little bit I know about wild rice, you have to have the water, it’s gotta be just right in order for, otherwise you're gonna drown it.”

– *Tom Maulson Sr., Lac du Flambeau*

“You know what I was worried about this mornin’? That rain knocking my rice over.”

- *Fred Ackley, Mole Lake*

Final thoughts

- Many resources of tribal interest are vulnerable to climate change
- TEK and SEK complement each other and strengthen our overall knowledge of climate change vulnerability
- We need to use both knowledge systems to move forward in adapting to climate change



Jim & Pat Northrup
Fond du Lac Reservation
Photo by Melonee Montano



Adaptation Concepts

Climate impacts

Adaptation concepts

Tribal adaptation menu

Preparing for the workshop

Responding to climate change

Mitigation = actions that reduce the human contribution to the greenhouse gas effect.

Adaptation = actions to prepare for and adjust to new conditions.



Climate impacts

Adaptation concepts

Tribal adaptation menu

Preparing for the workshop

An Uncertain Future

Don't wait for the crystal ball...



Climate impacts

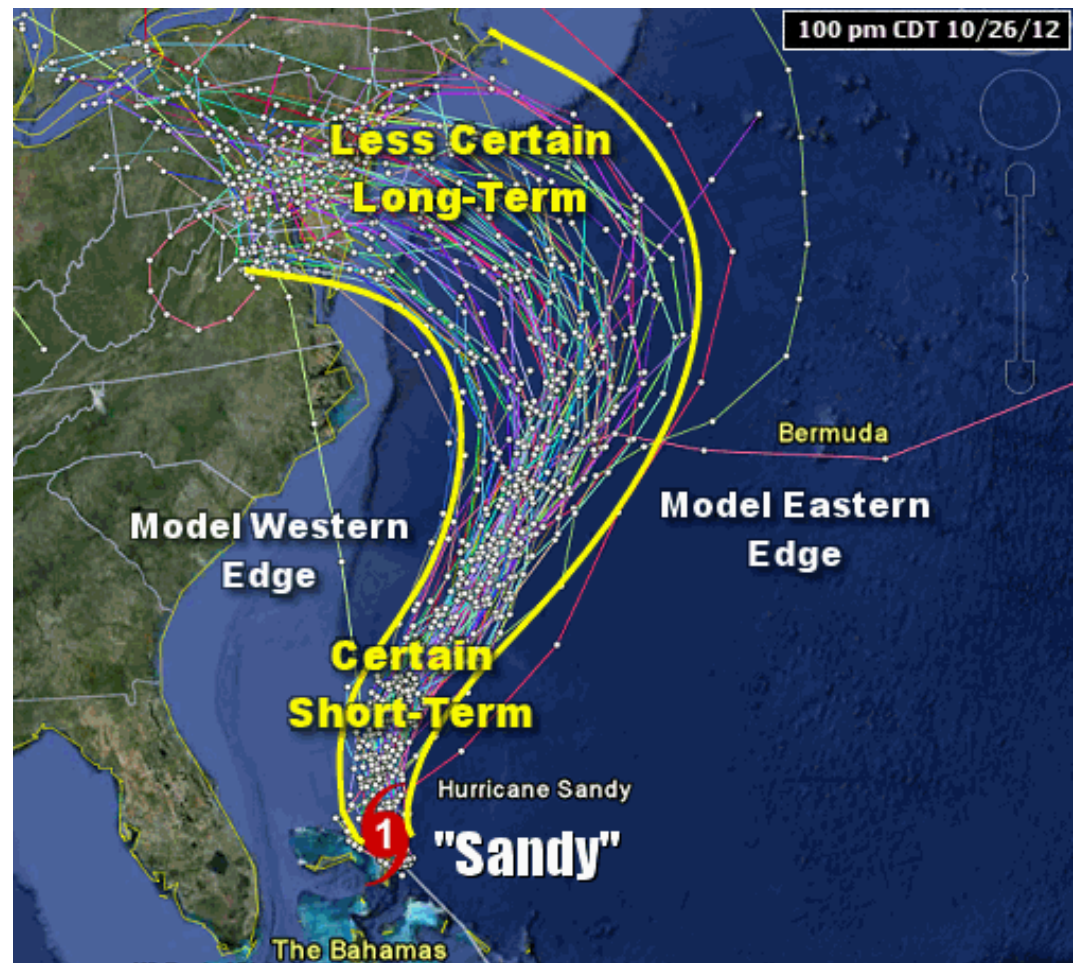
Adaptation concepts

Tribal adaptation menu

Preparing for the workshop

An Uncertain Future

We don't need certainty to act



Climate impacts

Adaptation concepts

Tribal adaptation menu

Preparing for the workshop

Plan for a Range

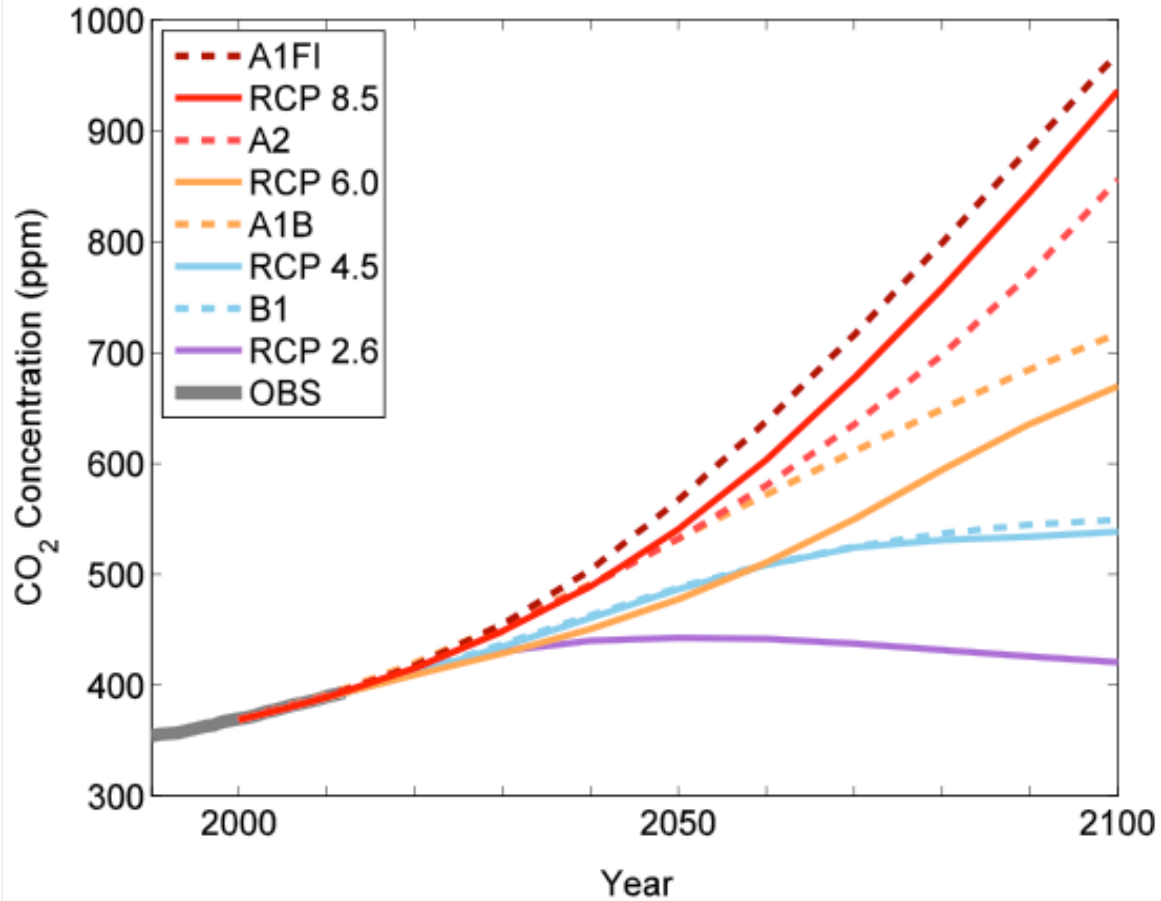


Figure Source: IPCC 2007, 2014

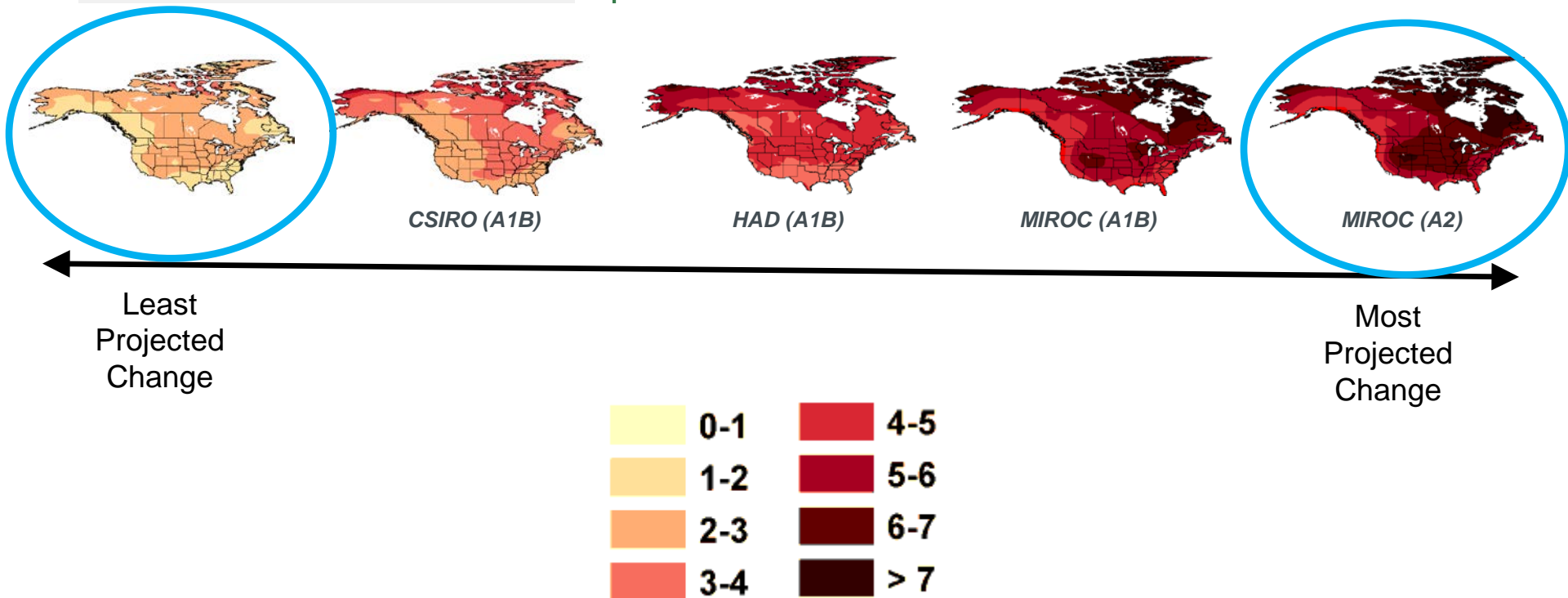
Climate impacts

Adaptation concepts

Tribal adaptation menu

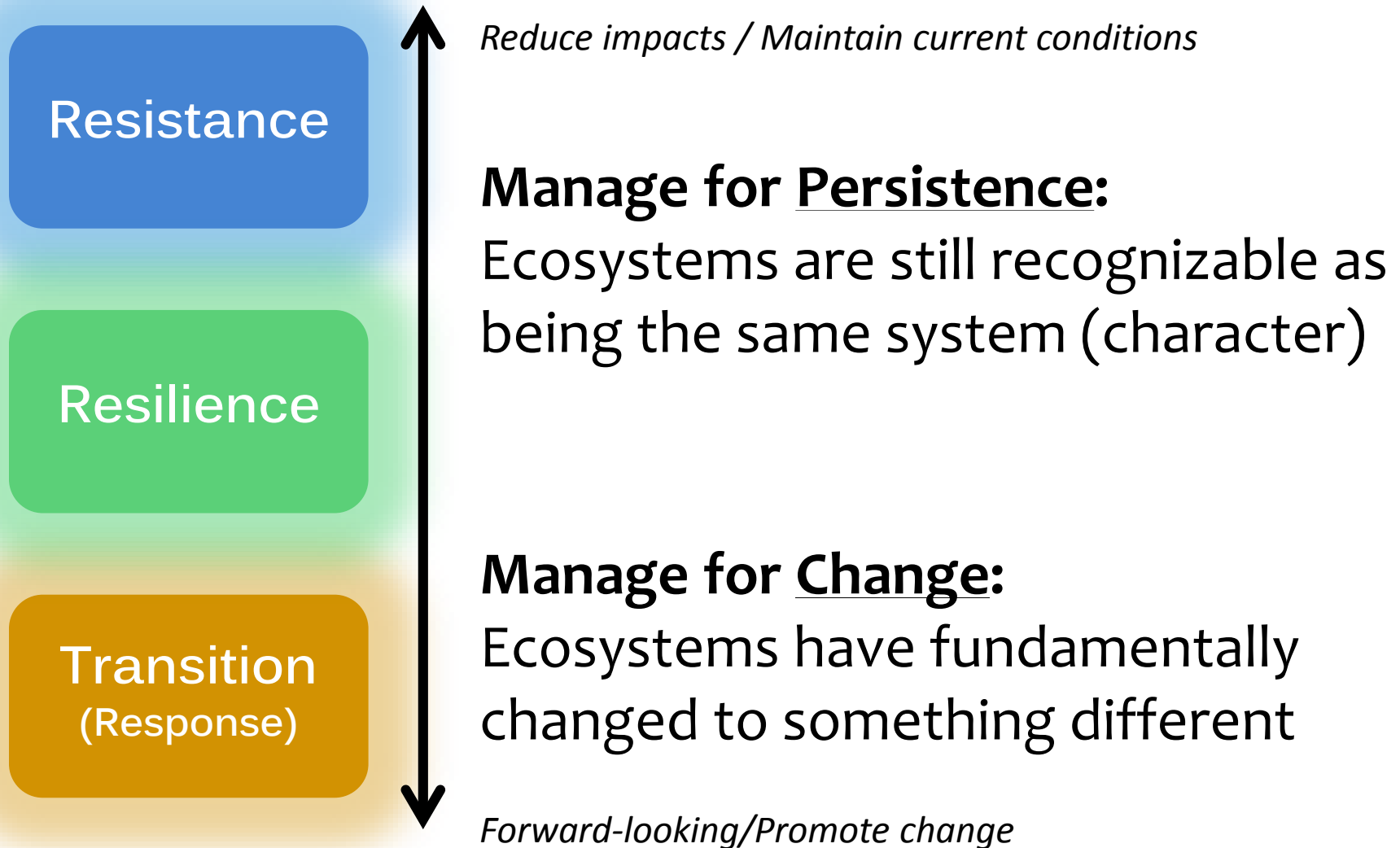
Preparing for the workshop

Plan for a Range



**Change in Mean Monthly Temperature (°C)
2070-2099 vs 1961-1990**

Adaptation Concepts



There isn't a single answer

Every landowner is different



Management
goal



Timber



Wildlife



Food

Each decision is unique and will vary based upon:

Place: Location & Site Conditions

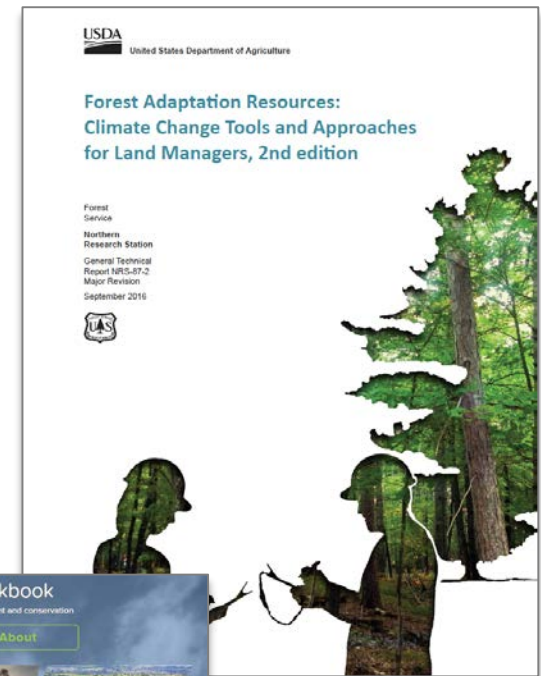
Purpose: Goals & Objectives

People: Values, Culture, & Mission

Practices: Equipment, Procedures, & Methods

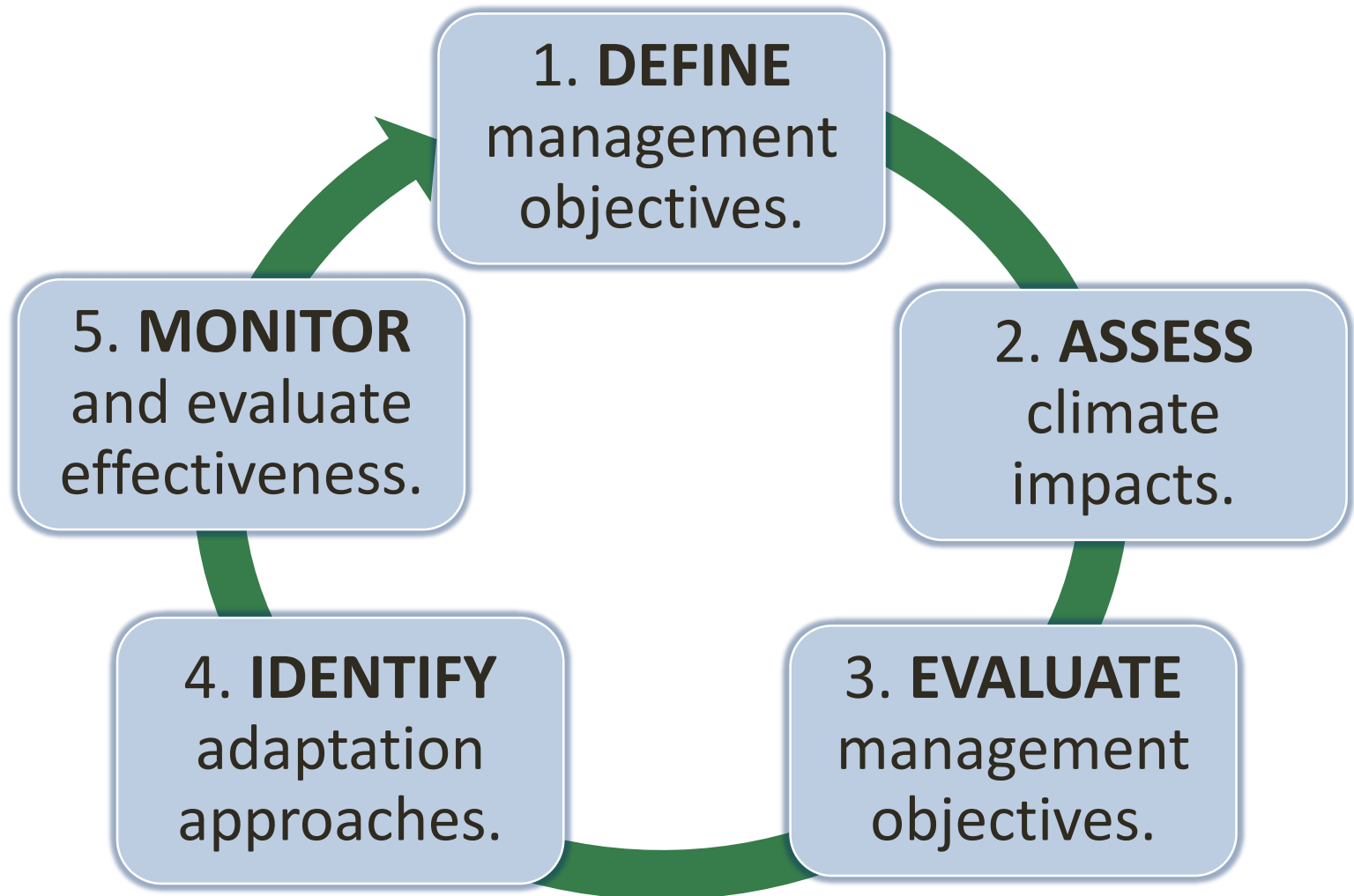
Adaptation Resources + workbook

- Practical process to intentionally consider climate
- Designed to be flexible – for diverse goals, and values
- Does not make recommendations – users customize actions



AdaptationWorkbook.org

Preview to the workshop process



A 'Menu' for adaptation actions

Translating concepts to actions

Options (concepts):

- Resistance, Resilience, Transition

Strategies:

- Consider ecological conditions and management goals.

Approaches:

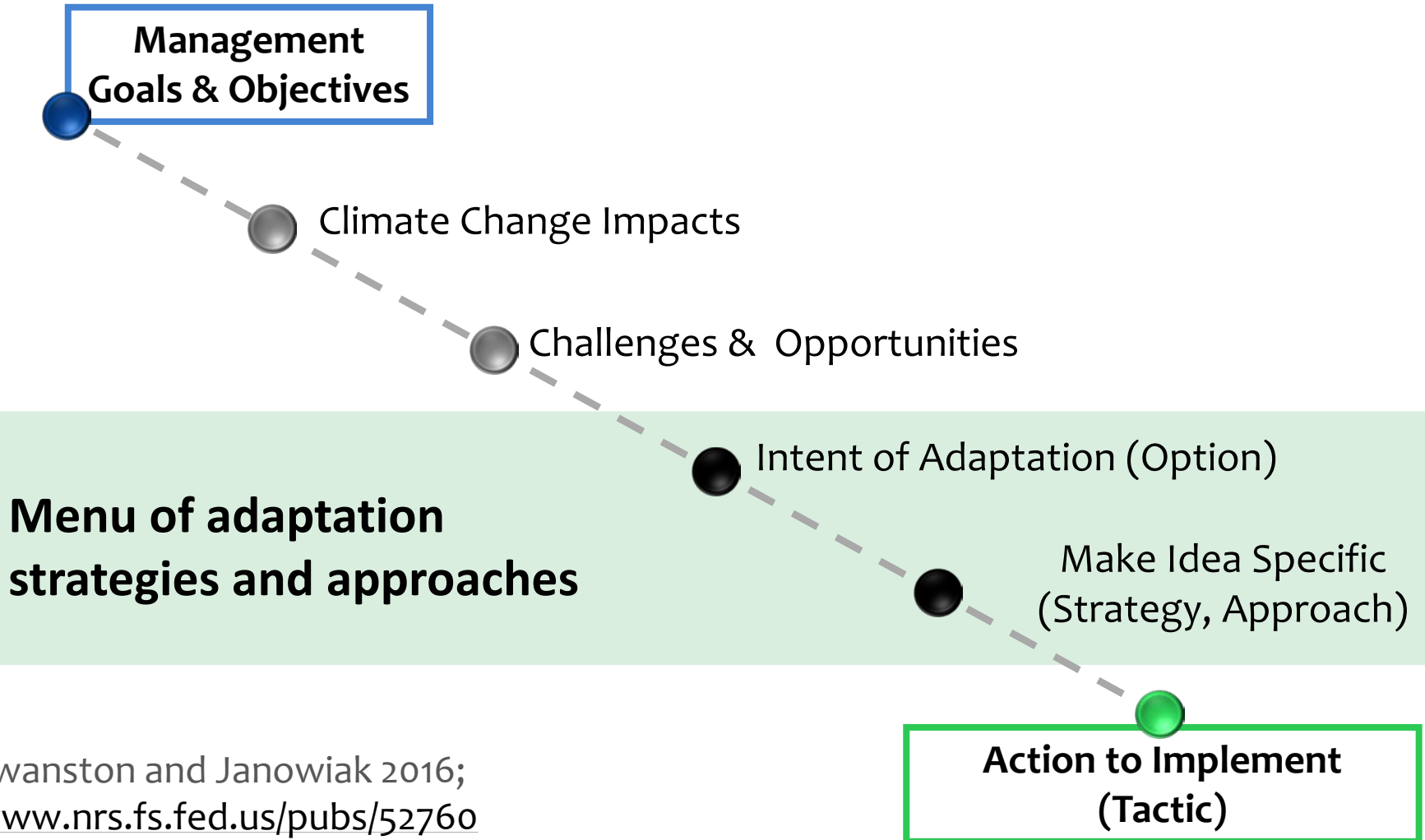
- Consider site conditions and management objectives

Tactics:

- Prescriptions for local conditions and management objectives



Connecting the Dots



The need for additional perspectives

- Adaptation menus have been reflective of western science and a resource-centric perspective
- Needed to create a menu reflective of Traditional and Indigenous knowledge and perspectives



Comparing Values

Forest Adaptation Menu:

Strategy 9: Facilitate community adjustments through species transitions.

Approach 9.7: Introduce species that are expected to be adapted to future conditions.

Tribal Adaptation Menu:


Strategy 11: Encourage community adjustments and transition while maintaining reciprocity and balance.

Approach 11.4: Seek out and share traditional and cultural knowledge of potential new beings from tribal communities where these beings are native.

Local knowledge and experience is crucial

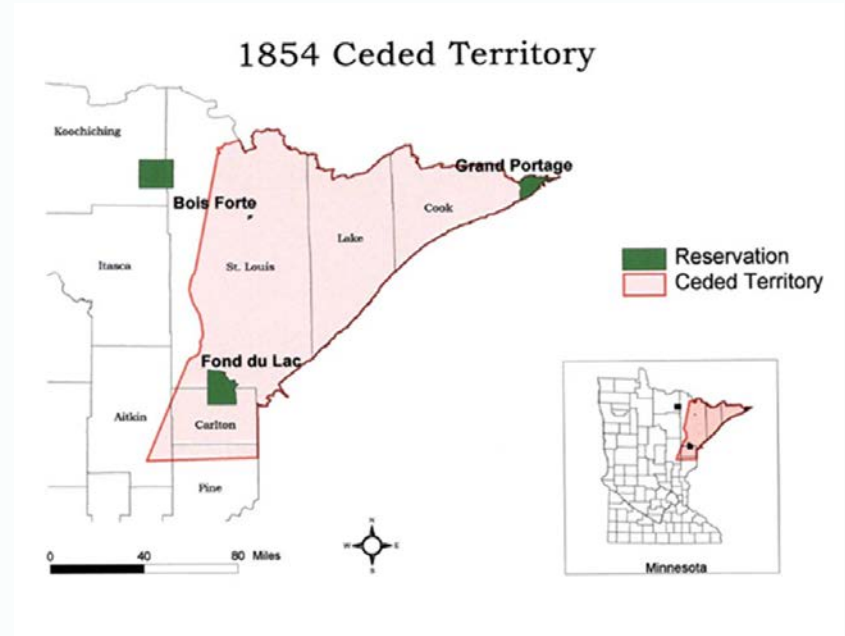
Research and assessments describe broad trends but local conditions and management make the difference.





Tribal Adaptation
Menu & Guiding
Principles

1854 Treaty Authority





Origins: Tribal Adaptation Menu & Guiding Principles

- Tribes/Indigenous people have been adapting to the environment and changing climate conditions since our existence
- Sense of urgency that we have to strategize a plan forward to conserve the resources or relatives that we still have
 - Especially with fixed boundaries such as Treaty Ceded Territories



Origins: Tribal Adaptation Menu & Guiding Principles

- In the Spring of 2017, NIACS held an *Adapting Forested Watersheds to Climate Change Workshop* in Minocqua, WI
- Case Study Wild Rice Restoration project that was to be used with the NIACS Adaptation Workbook and Adaptation Menu

A decorative vertical panel on the left side of the slide. It features a dark blue background with a repeating pattern of stylized green leaves and flowers. The pattern is partially obscured by a white curved border that separates it from the main text area.

Purpose

- Climate adaptation approach menu revision
 - Decision making and conduct must be rooted in an indigenous way
- As indigenous people, we believe our truths are still relevant and it is only now that Western facts have begun to verify knowledge that has been the foundations of our existence for millennia.



Indigenous vs. Western perspectives

- Indigenous perspectives call for observation, deliberation, recognition and adaptation
- Western perspectives more closely reflect exploration, exploitation and extraction



Natural World

- Instead of waiting for systems to naturally establish themselves, people assume authority and choose who they believe should be there.
 - *These are all rooted in a Western perspective of control and dominance over the natural world.*
- Development of documents such as the Tribal Adaptation Menu, perhaps can lend to the Western perspective to view the natural world in a different way.



Respect, Reciprocity & Relationships (3 R's)

- Decisions for use of our relatives were originally communal decisions made with recognition and acknowledgement through
- Today management and decision-making for land and the natural environment is made less as a communal decision and more as an individual or institutionalized.

A decorative vertical panel on the left side of the slide. It features a dark blue background with a repeating pattern of stylized green leaves and flowers. The pattern is partially obscured by a white curved border that separates it from the main text area.

Tribal Adaptation Menu

- Not intended to prescribe a singular native, tribal or indigenous approach for caring of the land and resources
- The “Menu” provides suggestions to assist in addressing needs of a particular indigenous community
- The menu may also be used by non-tribal people or organizations interested in indigenous approaches to adaptation and management

Menu of Adaptation Strategies and Approaches



Strategy 1: Consider cultural practices and seek spiritual guidance.

Indigenous knowledges and ways may provide the backbone for successful climate adaptation. Seeking guidance from the community on adaptation needs and actions, respecting and building on dynamic relationships, and honoring cultural responsibilities and histories may benefit both short- and long-term adaptation efforts.

1.1. Consult cultural leaders, key community members, and elders.

Cultural leaders, community members, harvesters, elders, and other key individuals have important knowledges and perspectives that can inform climate adaptation activities. Taking time to build relationships and properly consult with the broader community will result in better decisions and more support for adaptation actions.

Example tactics:

- Conduct community engagement workshops to learn about past changes using specific examples or important resources as discussion points.
- Interview wild rice gatherers to discuss observed impacts on wild rice from storm events or changing lake levels.
- Work with tribal leaders and members to identify knowledgeable individuals in the community, such as

What are our take-aways?

- Understanding the underlying values and principles will guide your efforts and transform the dominant paradigm to one that is cultural, ethical, and effective.

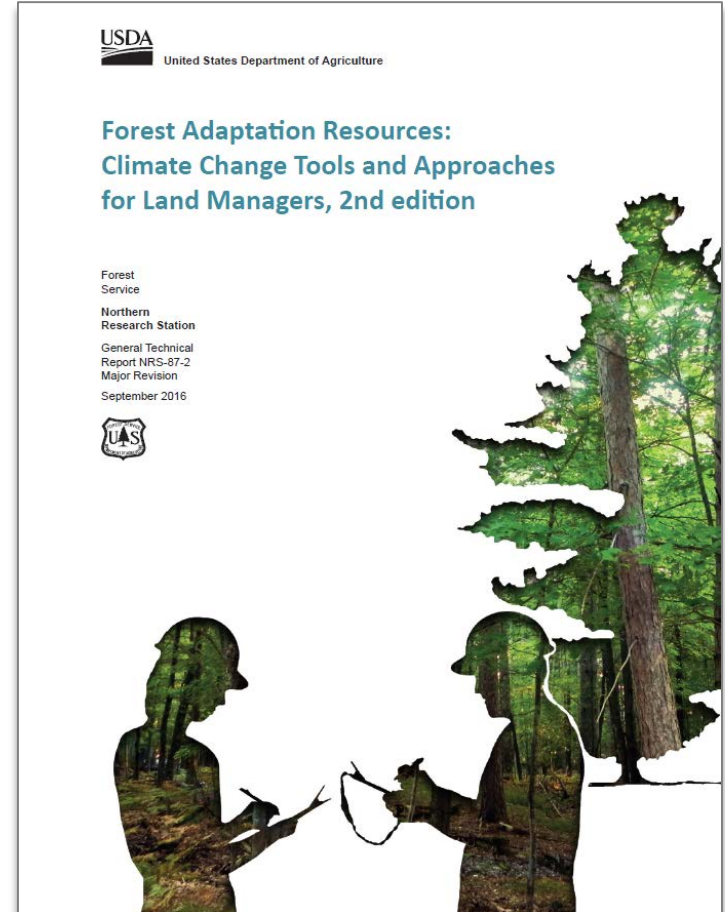




Preparing for the Workshop

Before the Workshop

- Read through the Guiding Principles and Tribal Adaptation Menu
- Complete “Step 1” of the adaptation workbook, for a project of your choice, using the worksheet.



forestadaptation.org/far

By January 23rd

- Read the Guiding Principles
- Read through the Tribal Adaptation Menu



Outline of the Menu's Strategies and Approaches

Strategy 1: Consider cultural practices and seek spiritual guidance.

- 1.1. Consult cultural leaders, key community members, and elders.
- 1.2. Consider mindful practices of reciprocity.
- 1.3. Understand the human and landscape history of the community.
- 1.4. Hold respect for all of our relations, both tangible and intangible
- 1.5. Maintain dynamic relationships in a changing landscape.

Strategy 2: Learn through careful and respectful observation (gikinawaabi).

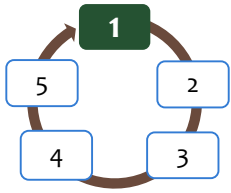
- 2.1. Learn from beings and natural communities as they respond to changing conditions over time.

Strategy 3: Support tribal engagement in the environment.

- 3.1. Maintain and revitalize traditional relationships and uses.
- 3.2. Establish and support language revitalization programs.
- 3.3. Establish, maintain, and identify existing inventory and monitoring programs.
- 3.4. Establish and maintain cultural, environmental education, and youth programs.
- 3.5. Communicate opportunities for use of tribal and public lands.
- 3.6. Participate in local- and landscape-level management decisions with partner agencies.

Strategy 4: Sustain fundamental ecological and cultural functions.

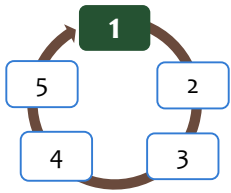
- 4.1. Maintain or restore hydrology and soils.
- 4.2. Maintain or restore riparian areas.
- 4.3. Maintain or restore nibi (water) quality
- 4.4. Support specific plants or plant communities with essential requirements.
- 4.5. Revitalize and maintain Anishinaabe/cultural use of ishkode/fire as a stewardship tool.
- 4.6. Maintain and revitalize cultural approaches to harvesting and caretaking.



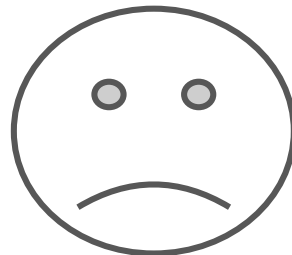
Step 1: DEFINE area of interest, program goals and objectives, and time frames.

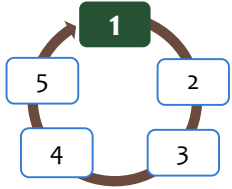
What project should I choose?

- Something you're working on now!
- Something from your IRMP
- Something you want to spend time discussing.
- You're encouraged to submit a project as a group – just let us know.



Step 1: DEFINE area of interest, program goals and objectives, and time frames.

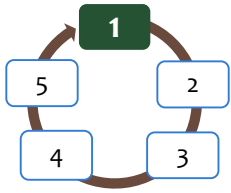




Step 1: DEFINE area of interest, project or program goals and objectives, and time frames.

Send to Kristen Schmitt (kmschmit@mtu.edu).

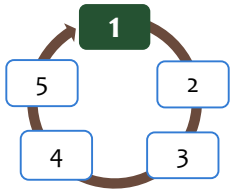
Project Area:			
Location:			
Ecosystem	Management Goals	Management Objectives	Time Frames



Step 1: DEFINE area of interest, program goals and objectives, and time frames.

Goals: What are your desired outcomes?

Objectives: How do you plan to achieve these outcomes?



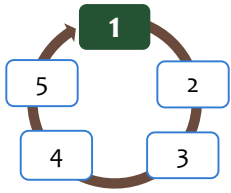
Step 1: DEFINE area of interest, program goals and objectives, and time frames.

Example Goal:

- *Improve wildlife habitat for game species in a tribally owned hunting area.*

Example Objective:

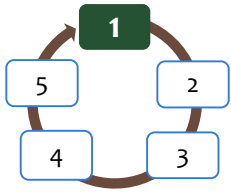
- *Implement prescribed burns across 100 acres of property to encourage growth of mast species like northern red oak.*



Step 1: DEFINE area of interest, program goals and objectives, and time frames.

Think about how you're already considering the community:

- ***Strategy 1:*** Consider cultural practices and seek spiritual guidance.
- ***Strategy 2:*** Learn through careful and respectful observation (*gikinawaabi*).
- ***Strategy 3:*** Support tribal engagement in the environment.



Step 1: DEFINE area of interest, program goals and objectives, and time frames.

Please send your worksheet to
kmschmit@mtu.edu

Sooner is better!

For more background ...

Look over some information on ecosystem vulnerabilities:

Forest Assessments:

<https://forestadaptation.org/vulnerability-assessment>

Culturally important species (GLIFWC):

[data.glifwc.org/archive.bio/GLIFWC Climate Change Vulnerability Assessment Version1 April2018.pdf](https://data.glifwc.org/archive.bio/GLIFWC%20Climate%20Change%20Vulnerability%20Assessment%20Version1%20April2018.pdf)

Various (1854 Treaty Authority):

www.1854treatyauthority.org/inslan
lan Final-July 2011

Wisconsin Vulnerability Assessments:

<https://www.wicci.wisc.edu/plants-and-natural-communities-working-group.php>



Your own Vulnerability Assessments!



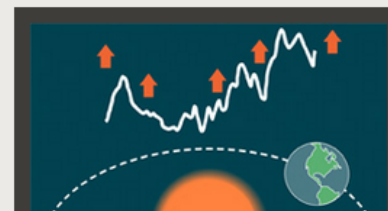
For more background ...

Climate Change Resource Center

1. Climate Science
2. Effects on Forests and Grasslands

Education Modules

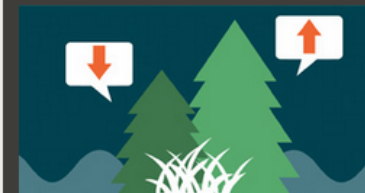
These comprehensive education modules were created using curriculum developed by the Forest Service Climate Change Advisor's Office, Climate Change Education and Training Team. They give an in-depth introduction to basic climate change science, the effects of climate change on forest and grassland ecosystems, and how we can respond to climate change with management.



Climate Change Science and Modeling

Learn about the climate system, greenhouse gases, climate models, current climate impacts, and future projections.

[Read More >](#)



Climate Change Effects on Forests and Grasslands

Explore current and projected climate effects on water resources, vegetation, wildlife, and disturbances for forest and grassland ecosystems.

[Read More >](#)



Responses to Climate Change

Review the adaptation options, resistance, resilience, and transition, and learn how to incorporate them into natural resource planning.

[Read More >](#)

www.fs.usda.gov/ccrc/education

Questions?

Kristen Schmitt

kmschmit@mtu.edu

Climate Change Adaptation Specialist

Northern Institute of Applied Climate Science

USDA Northern Forest Climate Hub



Questions ?

Extra Slides

Climate impacts

Adaptation concepts

Tribal adaptation menu

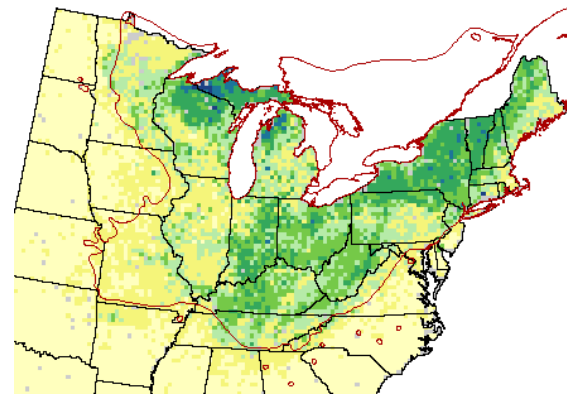
Preparing for the workshop

Opportunity: Increased habitat for some species

Challenge: Decline of northern/boreal species

Species Changes – sugar maple

Current Distribution



Importance Value
Low

High

2070-2100 Low

2070-2100 High

