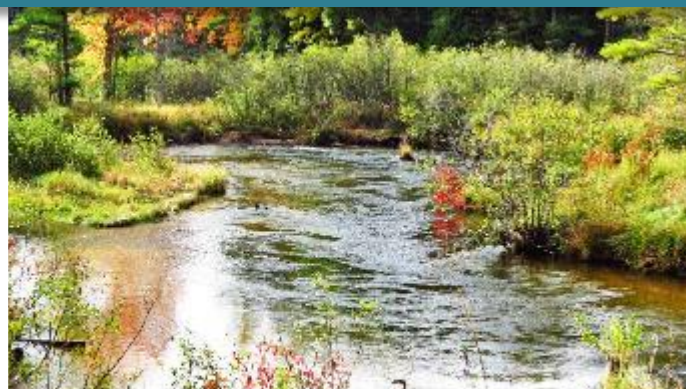
Culturally Relevant Climate Change Adaptation Planning

for Tribes and Tribal Partners





Jan. 23-24th, 2019

Cloquet, MN

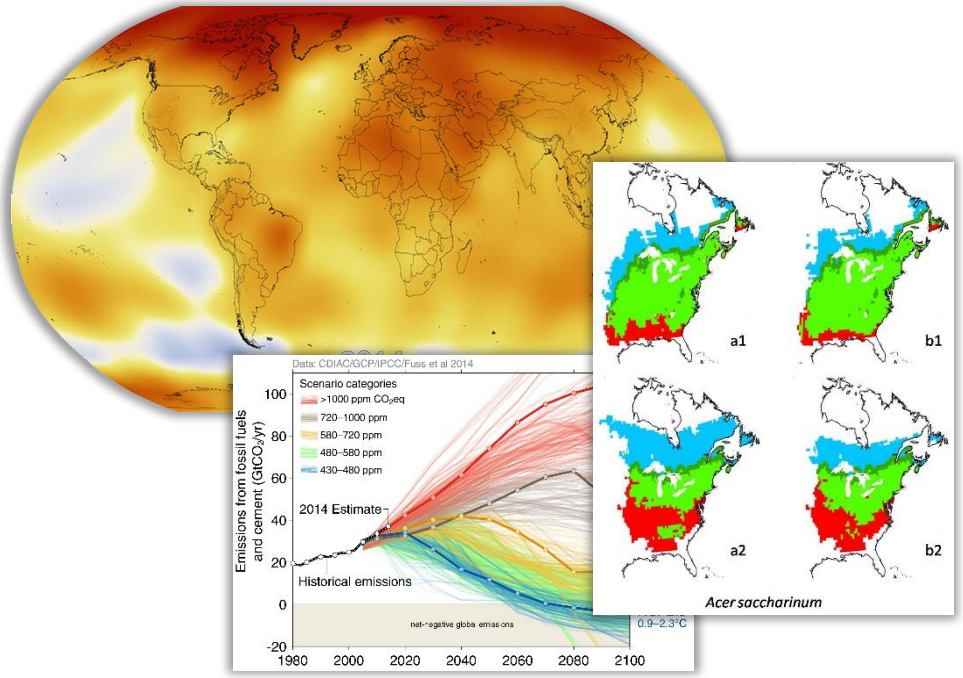
Questions you might be asking…

1. How might climate change affect the resources or relatives that I care about?

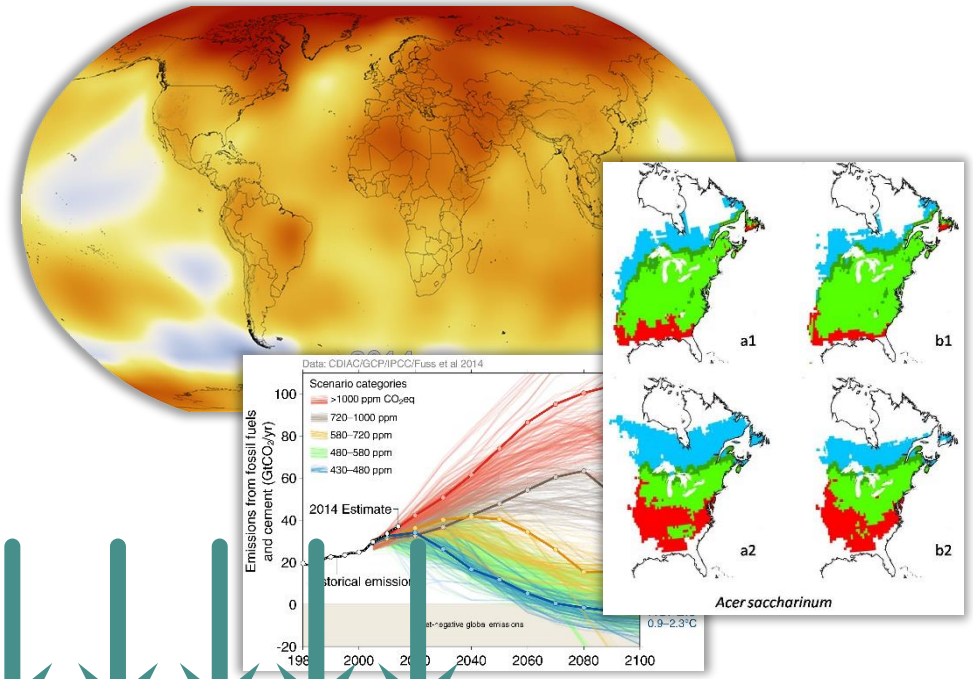
Focus of the workshop!

2. What management actions could help prepare for those effects?

Considering Climate Change

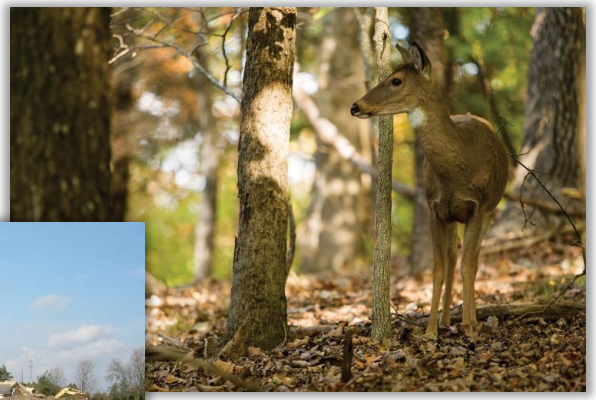


Considering Climate Change

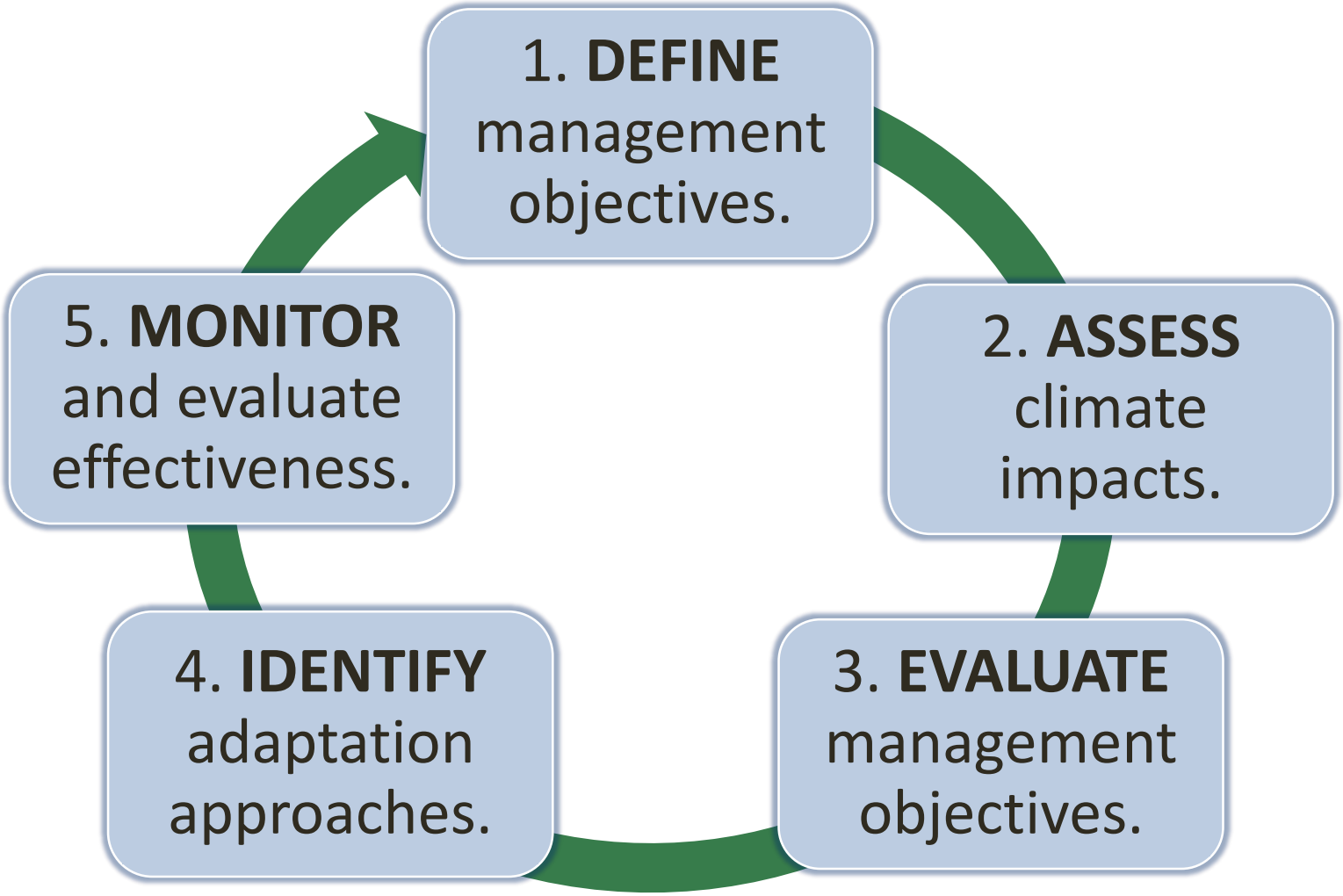


And Everything Else

Climate is not the complete story, but the story's not complete without it.



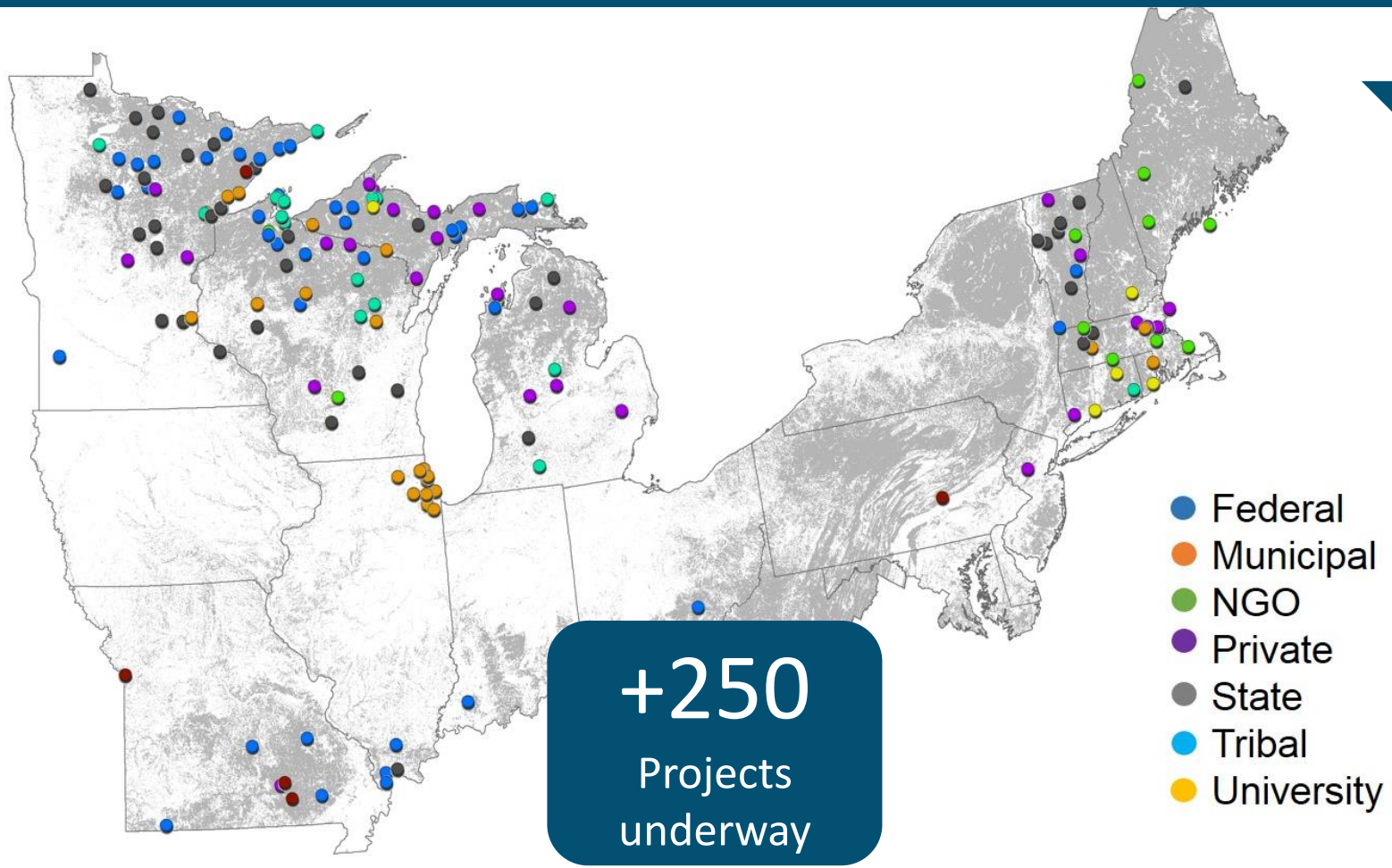
Adaptation Workbook Cycle



Swanston et al. 2016; www.nrs.fs.fed.us/pubs/52760

The Ultimate Goal

Feasible on-the-ground actions



Logistics & Safety information

- 9:00 a.m. – 4:30 p.m. each day
- Lunch served at noon
- Scheduled breaks, but take breaks as needed
- Please step out of room to take calls
- We welcome your feedback!
- Optional group dinner tonight – Pedro’s

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 Assistance:

- ITEP (Nikki Cooley, Karen Cozetto)

Travel funding:

- College of Menominee Nation
- Northeast Climate Adaptation Science Center

Introductions: Who's in the room?

Comparing Values: An Introduction to the Guiding Principles

Ojibwe Values

- Nibwaakkaawin- Wisdom
- Zaagi'idiwin- Love
- Minaadendamowin- Respect
- Zoongide'ewin- Bravery
- Gwayakwaadiziwin- Honesty
- Dabaadedendiziwin- Humility
- Debwewin- Truth

Comparing Values: An Introduction to the Guiding Principles

Ojibwe Values

- Nibwaakkaawin- Wisdom
- Zaagi'idiwin- Love
- Minaadendamowin- Respect
- Zoongide'ewin- Bravery
- Gwayakwaadiziwin- Honesty
- Dabaadedendiziwin- Humility
- Debwewin- Truth

Comparing Values: An Introduction to the Guiding Principles

Reflecting on the values of an institution

BIA Mission Statement:

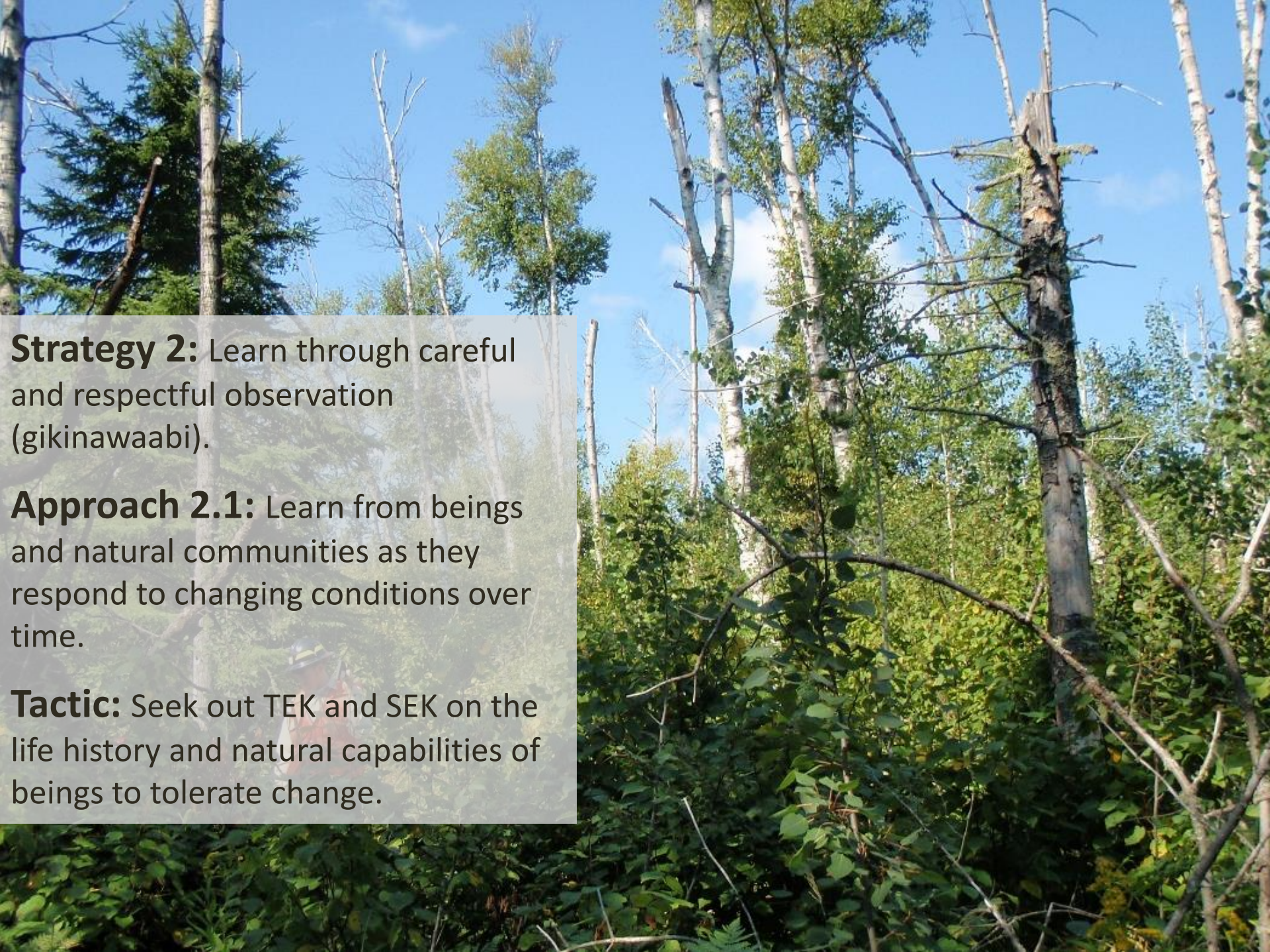
"The Bureau of Indian Affairs' mission is to enhance the quality of life, to promote economic opportunity, and to carry out the responsibility to protect and improve the trust assets of American Indians, Indian tribes and Alaska Natives."

Comparing Values: An Introduction to the Guiding Principles

Reflecting on the values of an institution

Guiding Principles:

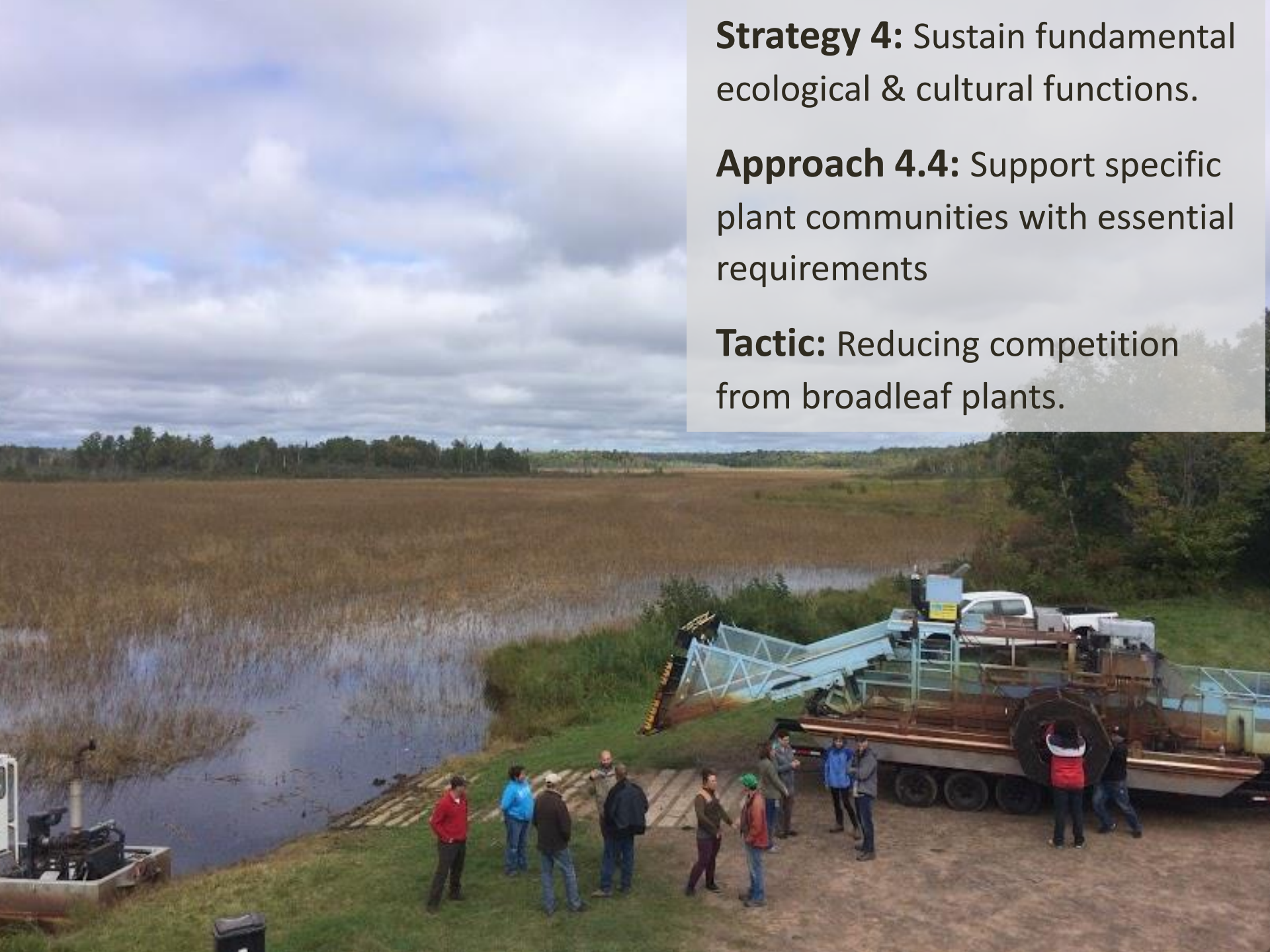
"Relationships are the interwoven bonds that form the framework of place within which we exist. Western societies value, and therefore emphasize, the importance of human interactions. These exchanges are often categorized into bonds of family, friendship, business, casual, intimate, and intellectual, to name a few. All of these ties create a roadmap that we utilize to guide our everyday actions. Indigenous cultures around the globe and throughout time have applied these relational values to recognizing and developing connections with their natural environment. We consider beings in the natural environment to be elders and teachers who can teach us valuable lessons. This has ensured an equitable, long-term, sustainable, and generational existence for many of these communities. These relationships have developed in a multiplicity of cultures that have passed down a knowledge of place through thousands of years of experience to subsequent generations. They provide the framework of relationships and the roadmap to a truly sustainable way of life, with respect and understanding for all aspects of creation."



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

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

Tactic: Seek out TEK and SEK on the life history and natural capabilities of beings to tolerate change.



Strategy 4: Sustain fundamental ecological & cultural functions.

Approach 4.4: Support specific plant communities with essential requirements

Tactic: Reducing competition from broadleaf plants.


Lunch!

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

Step 1: DEFINE location, project, and time frames.

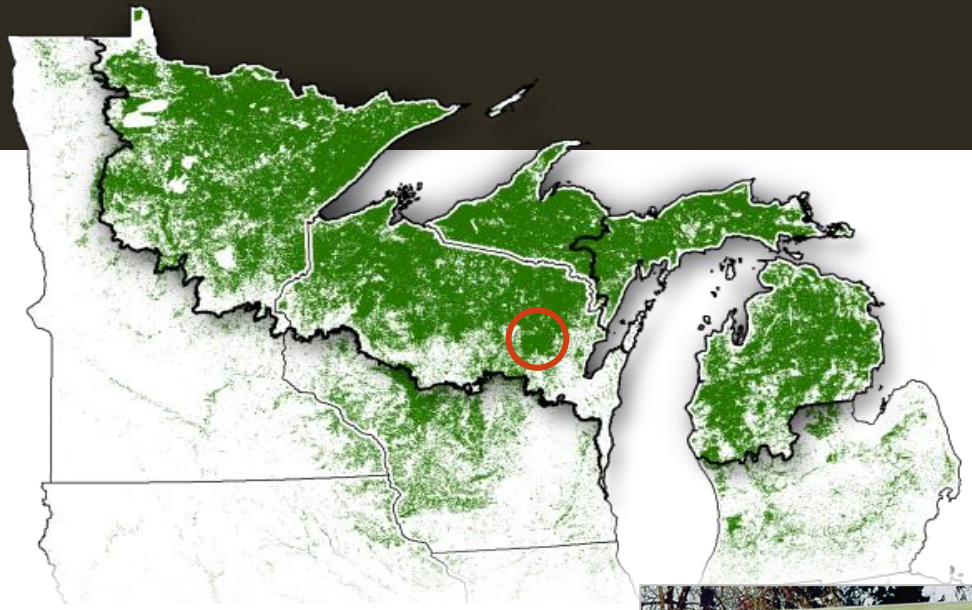
Key Question:

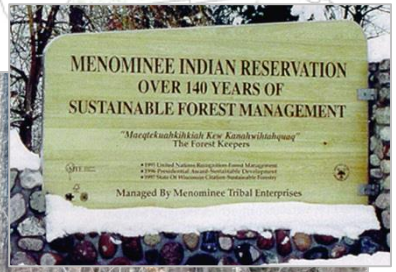
- Where are you working?
- What are your management goals and objectives for this area?

Adaptation Demonstration: Menominee Forest

The Menominee Forest

- 220,000 acres of forest
- Managed by Menominee Tribal Enterprises for Menominee Indian Tribe
- Long history of sustainable management
- Current management issue: **Oak wilt disease**





More information: www.forestadaptation.org/mte

Step 1: DEFINE location, project, and management goals.

Project Area:	The Menominee Forest		
Location:	350 sites affected by oak wilt (project focuses on 10 initial pockets)		
Forest Type	**Management Goals**	**Management Objectives**	**Time Frames**
Hardwoods, north-eastern Wisconsin	▪ Maintain diversity of species and habitats for cultural and environmental values ▪ Maximize sustainable production of forest products. ▪ Treat 10 affected oak-wilt pockets.	▪ Harvest affected and adjacent oaks in oak-wilt pockets. ▪ Pull stumps to sever root connection. ▪ Allow regeneration of trees, shrubs, and understory plants.	▪ Next 10 years (initial actions)

Introductions

- Walk us through your project (location, ecosystem types, key goals/objectives)
  - A few *brief* comments, please!

Step 2: Assess site-specific climate change impacts & vulnerabilities

Workbook Cycle: Step 2

1. DEFINE area of interest, management objectives, and time frames.

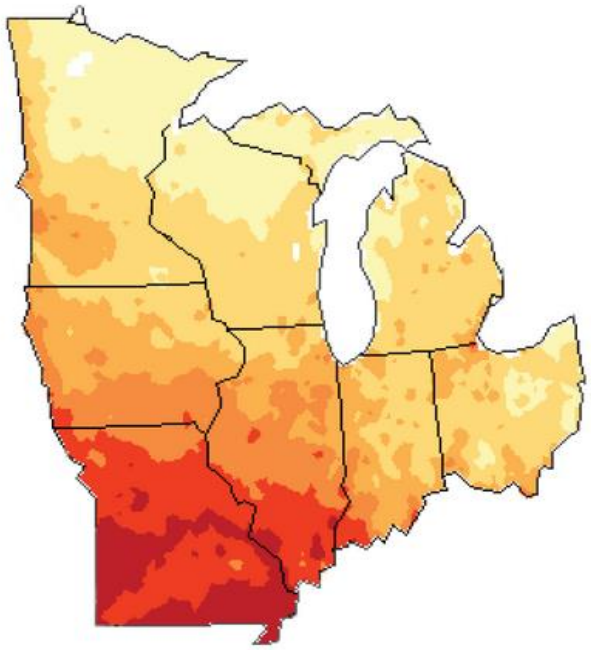
2. ASSESS climate change impacts and vulnerabilities for the area of interest.

3. EVALUATE management objectives given projected impacts and vulnerabilities.

4. IDENTIFY and implement adaptation approaches and tactics.

5. MONITOR and evaluate effectiveness of implemented actions.

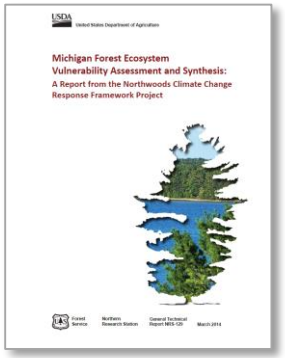
Resource: Climate Change Assessments

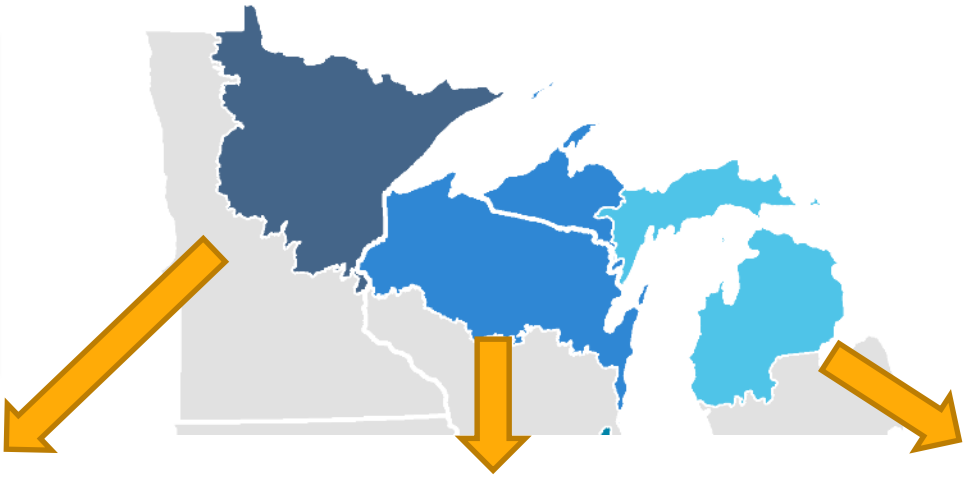


Eight Key Impacts …

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

Forest Type Vulnerability (NIACS)





High
High-moderate
Moderate
Low-moderate

Acid peatland
Forested rich peatland
Wet forest
Managed aspen
Managed red pine
Fire-dependent forest
Mesic hardwood forest
Floodplain forest

Lowland conifer
Upland spruce-fir
Aspen-birch
Lowland/riparian hardwoods
Red pine
Northern hardwoods
Jack pine
Oak
White pine

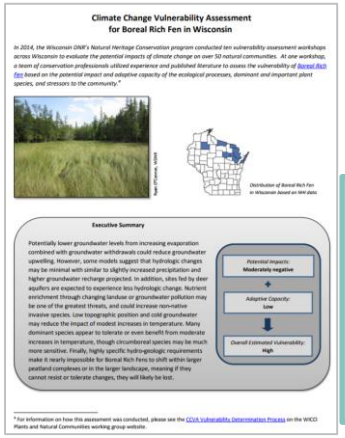
Upland spruce-fir
Lowland conifer
Red pine/ white pine
Jack pine
Aspen-birch
Northern hardwoods
Lowland/riparian hardwoods
Oak associations
Barrens

Download: **www.forestadaptation.org**

Non-forested Wetland vulnerability

Potential Impacts:

- Reduced snowpack
- Altered timing/ magnitude of streamflow
- Invasive species
- Increased temperatures
- Flooding & sediment deposition
- Land use change/ water table drawdown


Climate Change Vulnerability Assessment
for Boreal Rich Fen in Wisconsin

In 2014, the Wisconsin DNR's Natural Heritage Conservation program conducted ten vulnerability assessment workshops across Wisconsin to evaluate the potential impacts of climate change on over 50 natural communities. At one workshop, a team of conservation professionals utilized experience and published literature to assess the vulnerability of Boreal Rich Fen based on the potential impact and adaptive capacity of the ecological processes, dominant and important plant species, and stressors to the community.*

Executive Summary

Potentially lower groundwater levels from increasing evaporation combined with groundwater withdrawals could reduce groundwater upwelling. However, some models suggest that hydrologic changes may be minimal with similar to slightly increased precipitation and higher groundwater recharge projected. In addition, sites fed by deer aquifers are expected to experience less hydrologic change. Nutrient enrichment through changing landuse or groundwater pollution may be one of the greatest threats, and could increase non-native invasive species. Low topographic position and cold groundwater may reduce the impact of modest increases in temperature. Many dominant species appear to tolerate or even benefit from moderate increases in temperature, though circumboreal species may be much more sensitive. Finally, highly specific hydro-geologic requirements make it nearly impossible for Boreal Rich Fens to shift within larger peatland complexes or in the larger landscape, meaning if they cannot resist or tolerate changes, they will likely be lost.

Potential Impacts: Moderately negative

Adaptive Capacity: Low

Overall Estimated Vulnerability: High

* For information on how this assessment was conducted, please see the CCVA Vulnerability Determination Process on the WICCI Plants and Natural Communities working group website.

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

High vulnerability

- Boreal rich fen
- Calcareous fen
- Central poor fen
- Coastal plain marsh
- Sandy moist meadow
- Shore fen

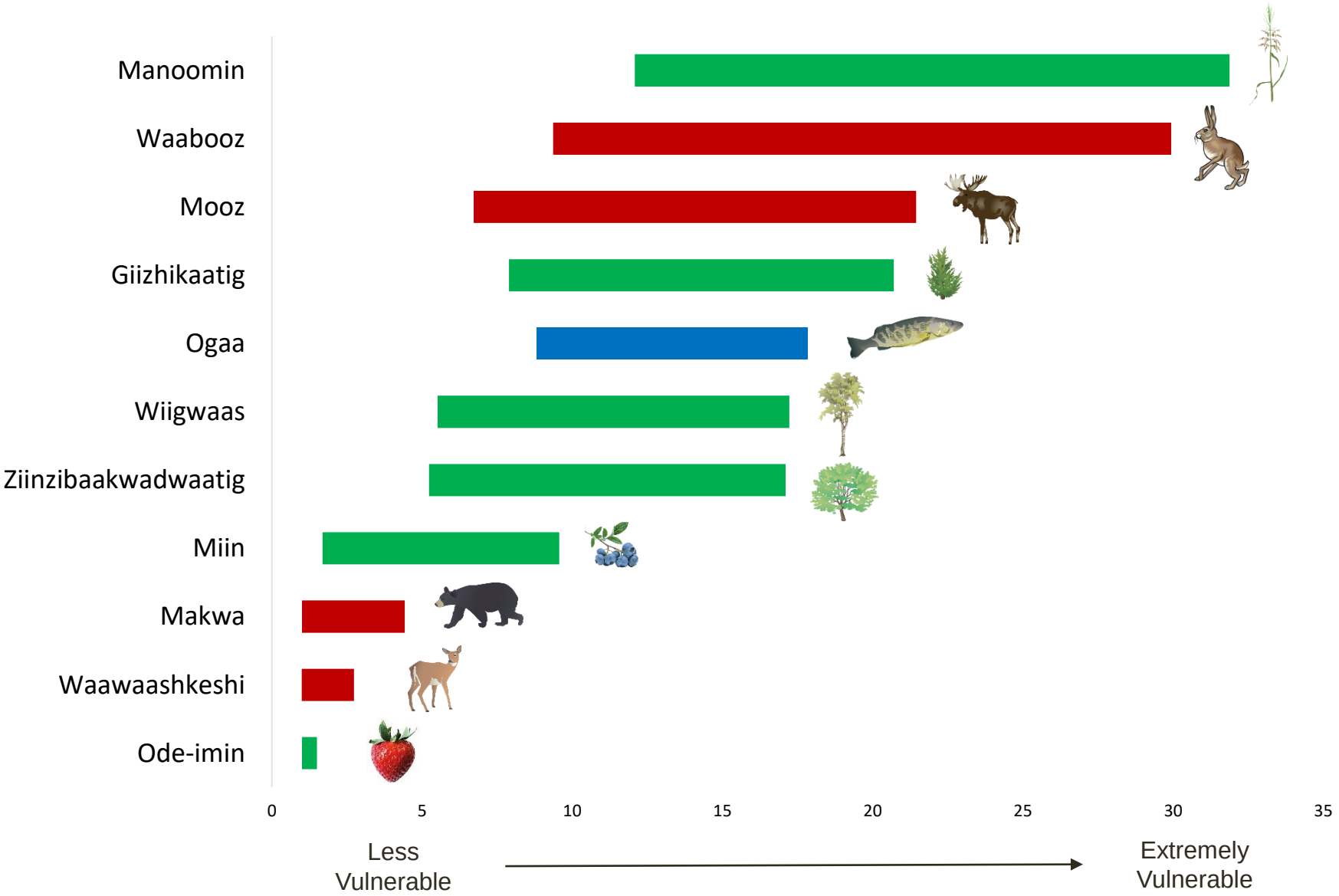
Moderate-High vulnerability

- Bog relict
- Ephemeral pond
- Muskeg
- Poor Fen
- N. sedge meadow
- S. sedge meadow
- Open bog
- Pattered Peatland

Low-Moderate vulnerability

- Alder thicket
- Emergent marsh
- Shrub-carr

Beings from GLIFWC Vulnerability Assessment



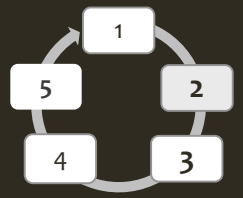
Local Considerations

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

Step 2: ASSESS site-specific climate change impacts and vulnerabilities.

Key Questions:

- How might the area be uniquely affected by climate change and subsequent impacts?
- How might regional impacts be different in the project area?

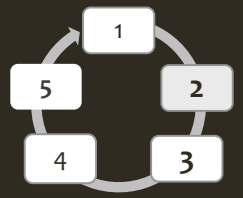


Step 2: ASSESS climate change impacts and vulnerabilities for the area of interest.

Climate Change & the Menominee Forest

Broad-scale Impacts & Vulnerabilities

- Increasing pests and diseases
- More drought stress
- Declines in many northern species
- Increases in temperate species



Step 2: ASSESS climate change impacts and vulnerabilities for the area of interest.

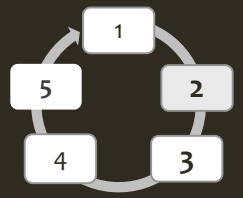
Climate Change & the Menominee Forest

Broad-scale Impacts & Vulnerabilities

- Increasing pests and diseases
- More drought stress
- Declines in many northern species
- Increases in temperate species

How might broad impacts be different in the area of interest?

- Current disease problems
- Oak-wilt areas have high risk of invasion



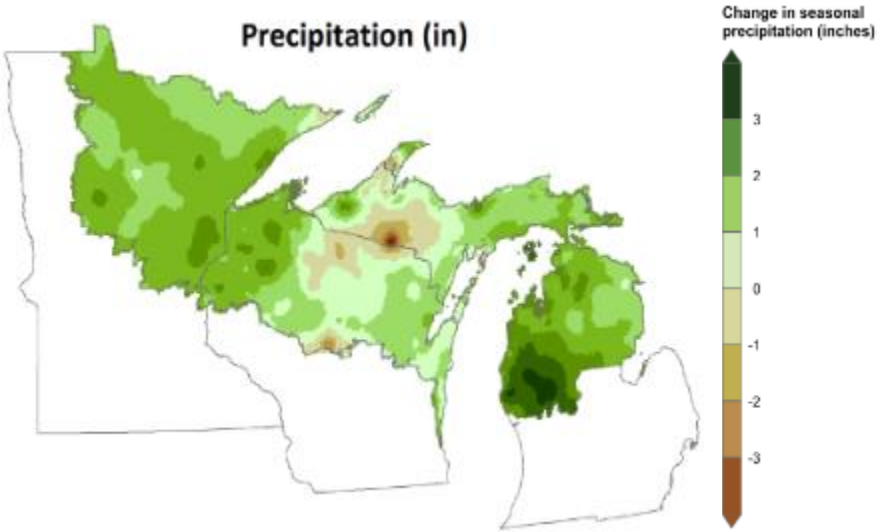
Step 2: ASSESS climate change impacts and vulnerabilities for the area of interest.

Climate Change & the Menominee Forest

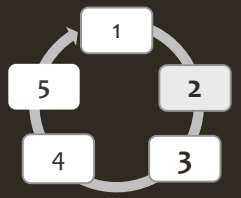
Broad-scale Impacts & Vulnerabilities

- Increasing pests and diseases
- More drought stress
- Declines in many northern species
- Increases in temperate species

How might broad impacts be different in the area of interest?



- Potential for dry conditions/moisture stress



Step 2: ASSESS climate change impacts and vulnerabilities for the area of interest.

Climate Change & the Menominee Forest

Broad-scale Impacts & Vulnerabilities

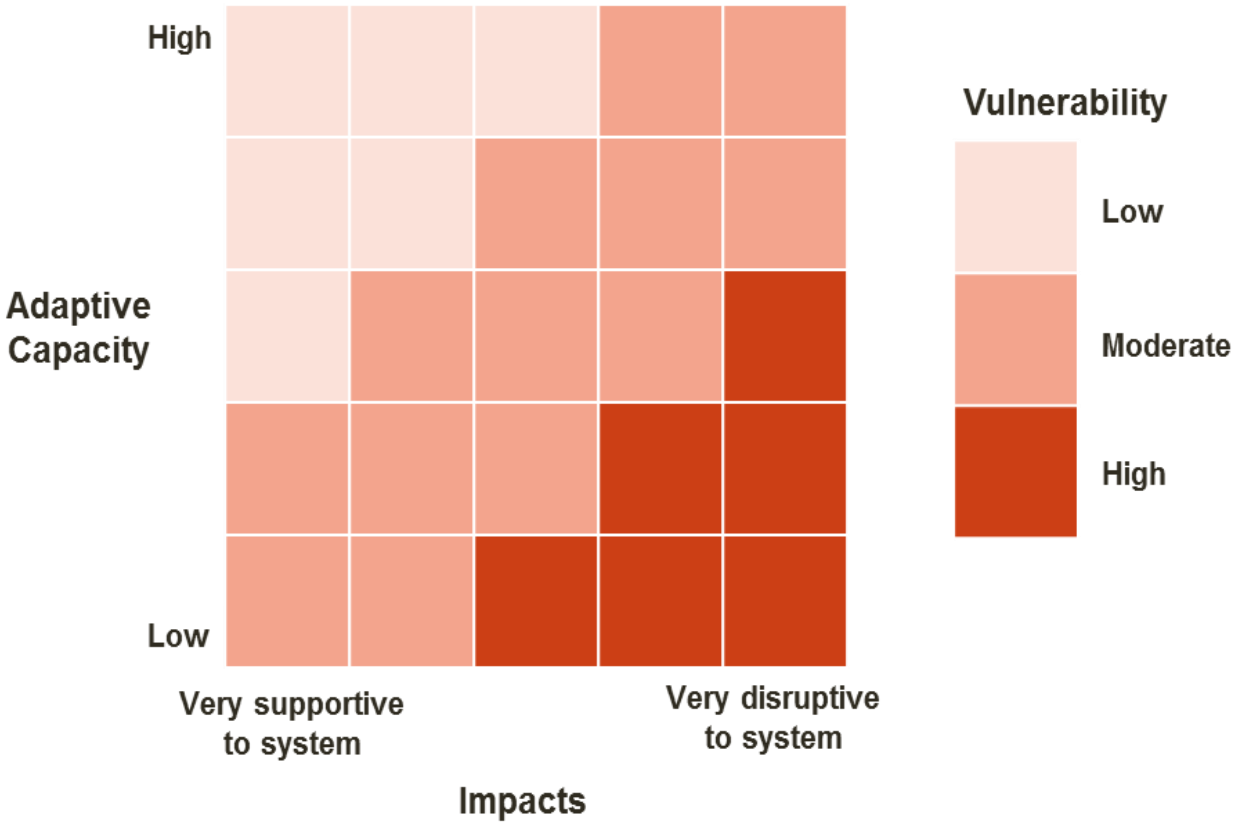
- Increasing pests and diseases
- More drought stress
- Declines in many northern species
- Increases in temperate species

How might broad impacts be different in the area of interest?

- Many northern species
- Relatively High diversity
- At ‘transition zone’

Step 2: ASSESS site-specific climate change impacts and vulnerabilities.

Vulnerability Determination



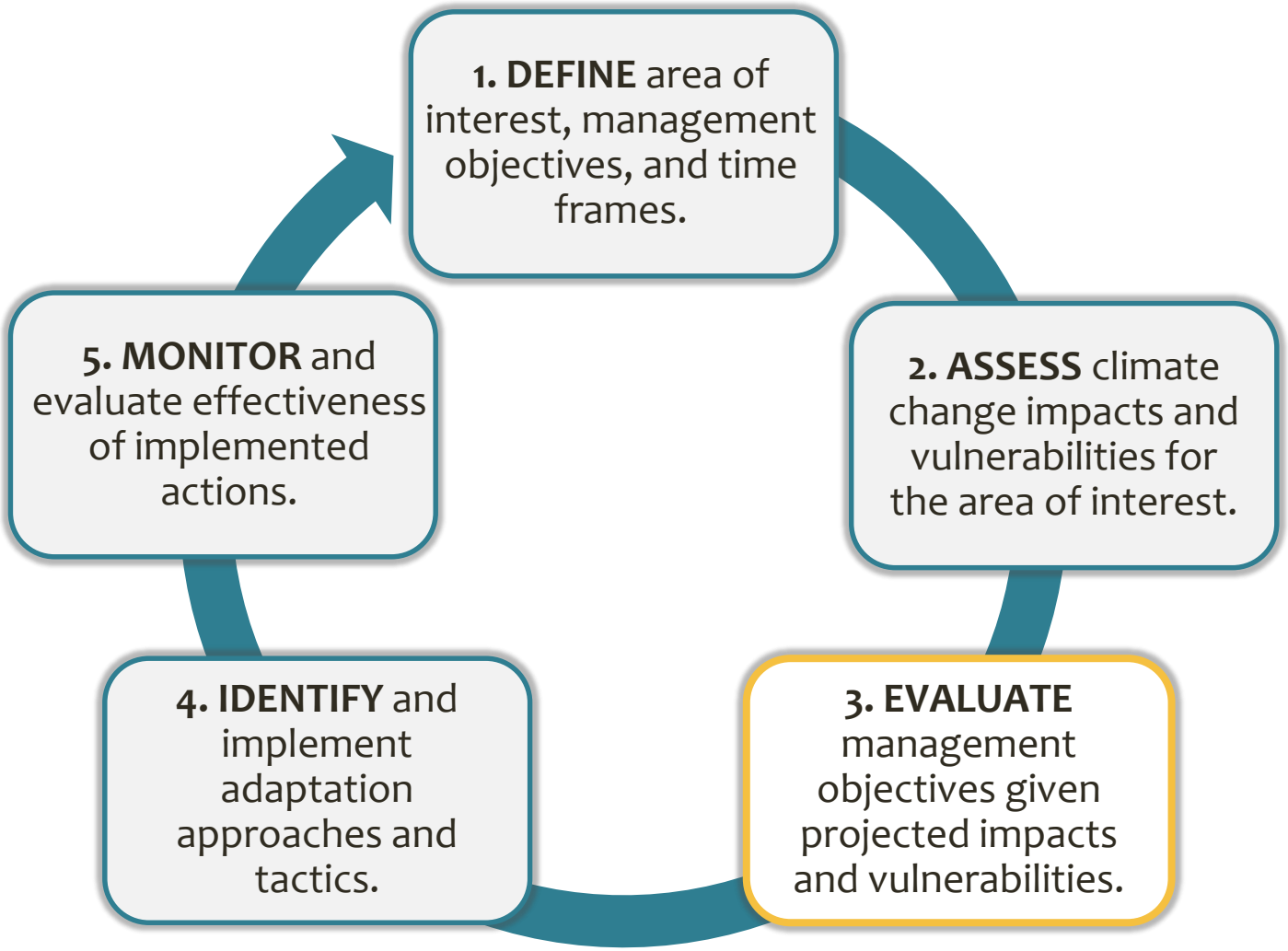
Step 2: ASSESS site-specific climate change impacts and vulnerabilities.

General Climate Change Impacts and Vulnerabilities	**Climate Change Impacts and Vulnerabilities for the Project Area**	**Points** (20 Total)
*General climate change impacts across **The Midwest and Northeast**:*	*How might broad-scale impacts and vulnerabilities be affected by conditions in the **project area**?*	
Warmer temperatures (annual and seasonal)		
More days with extreme heat		
Fewer days with extreme cold		
Increased annual precipitation		
Altered seasonal changes in precipitation		
More frequent heavy precipitation events		
Less snow/shorter winter season		

- You have 20 points (as a group) to distribute as you see fit.

Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.

Workbook Cycle: Step 3



Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.

Key Questions:

- How will climate change challenge or assist my ability to meet my management objectives?
- Do my goals and objectives need to change?

Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.

Ecosystem Type or Management Topic – From Step 1

Management Objectives – From Step 1

Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.

Challenges to Meeting Management Objective with Climate Change – Things that will make it harder to achieve the management objective due to climate change.

**Focus on challenges related to your management (not global markets, policies, etc.)

Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.

Opportunities to Meeting Management Objective with Climate Change – Things that will make it easier to achieve the management objective due to climate change.

**Focus on challenges related to your management (not global markets, policies, etc.)

Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.

Feasibility – Can you meet your management objectives using current (business-as-usual) management actions?

- **High:** We can do it!

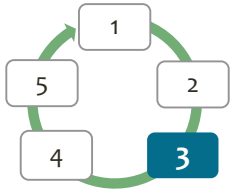
  Opportunities > Challenges

- **Low:** We'll need more resources or effort.

  Challenges > Opportunities

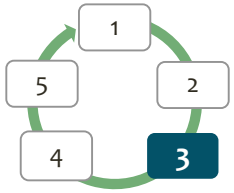
Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.

Other Considerations – Social, financial, or other factors that also affect your ability to meet objectives.



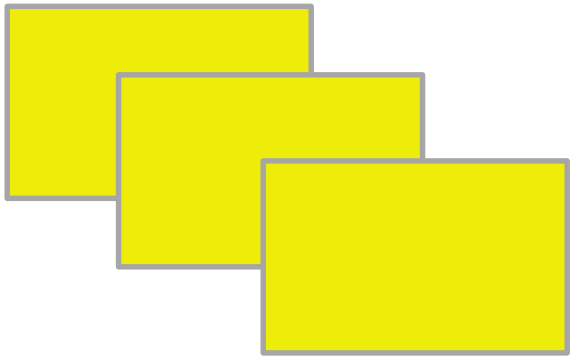
Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.

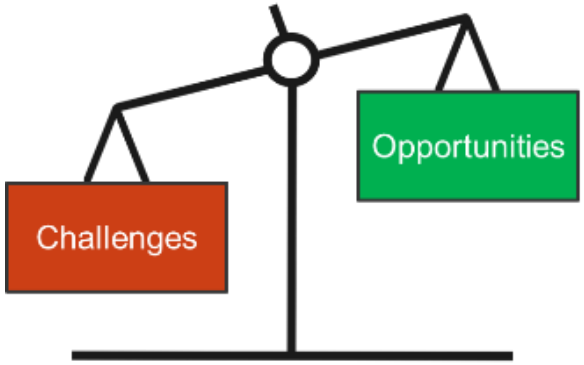
Mgmt. Obj.	Challenges	Opportunities	Feasibility of Meeting Obj. (Current Mgmt)
▪ Harvest affected oaks in pockets. ▪ Allow regen. of trees and plants.	• Oak wilt treatment results in heavily disturbed sites. • Potential for more, invasives, drought. • Allowing natural regen. (business as usual) may not be sufficient.	• Disturbed sites allow planting of species that could be tolerant of future stressors. • 'Transition zone' - potential increasers on or near the site.	• Moderate



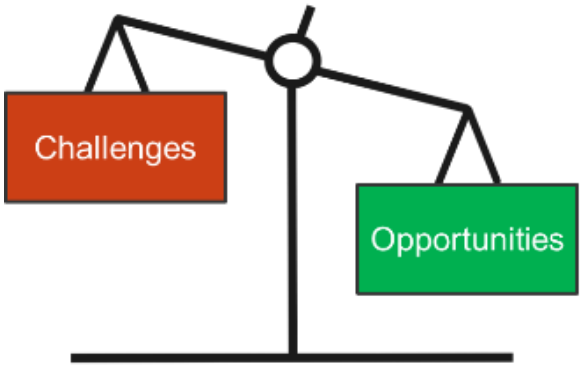
Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.

Feasibility Discussion





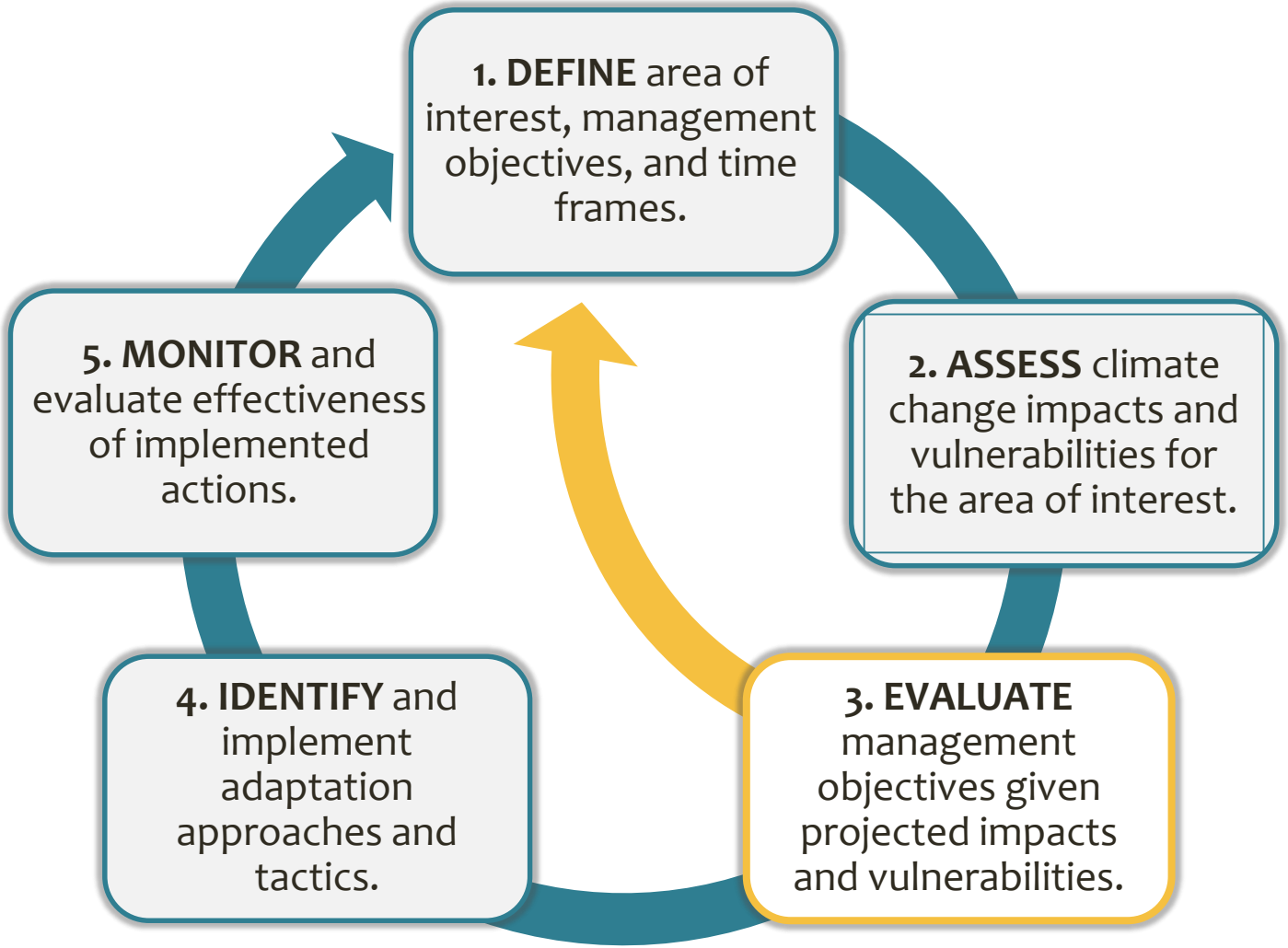
- Select 3 objectives
- One per sticky note



Low: Current management can't overcome challenges, or few opportunities exist.

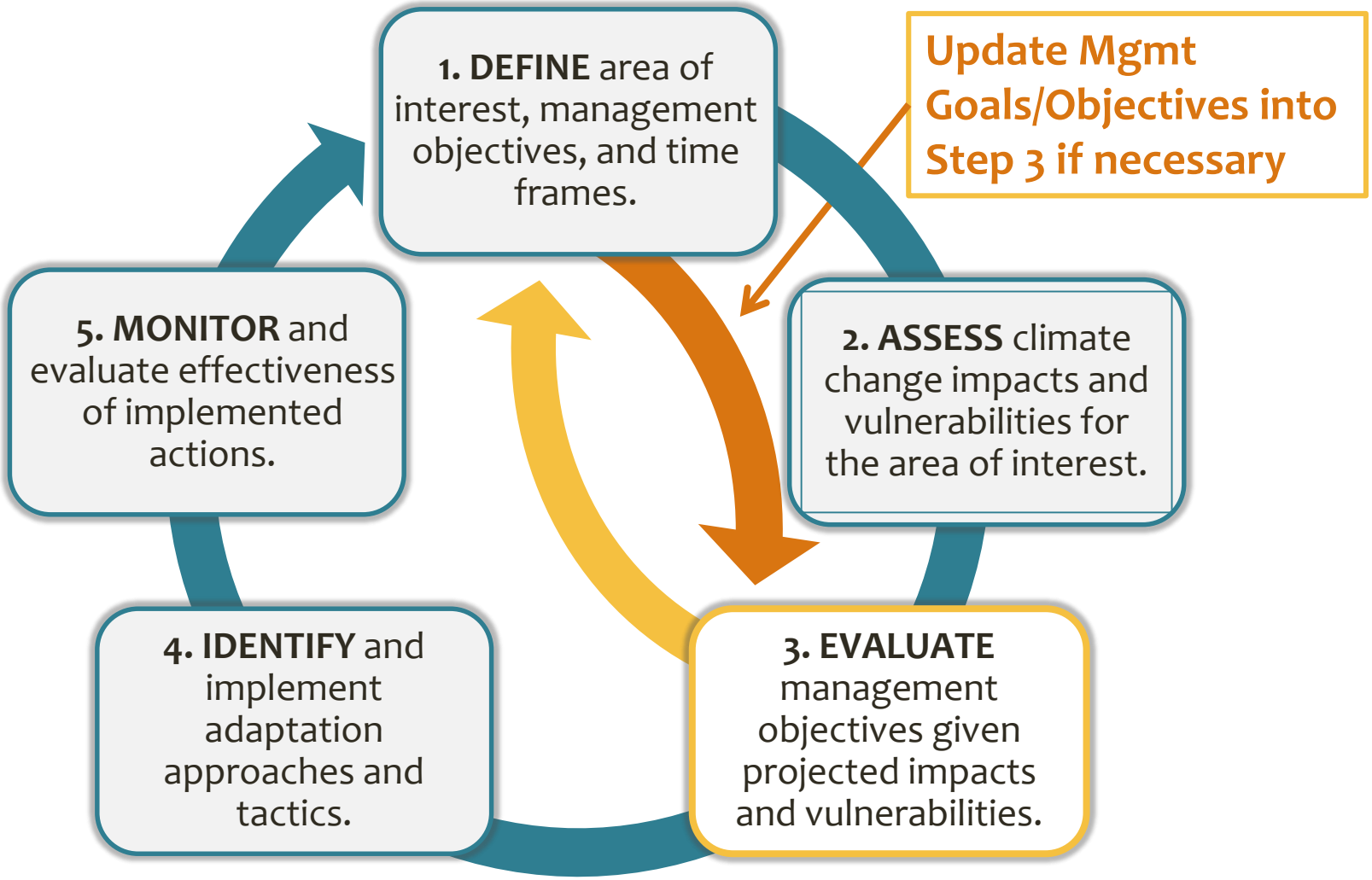
High: Current management can overcome challenges, or opportunities outweigh challenges

Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.



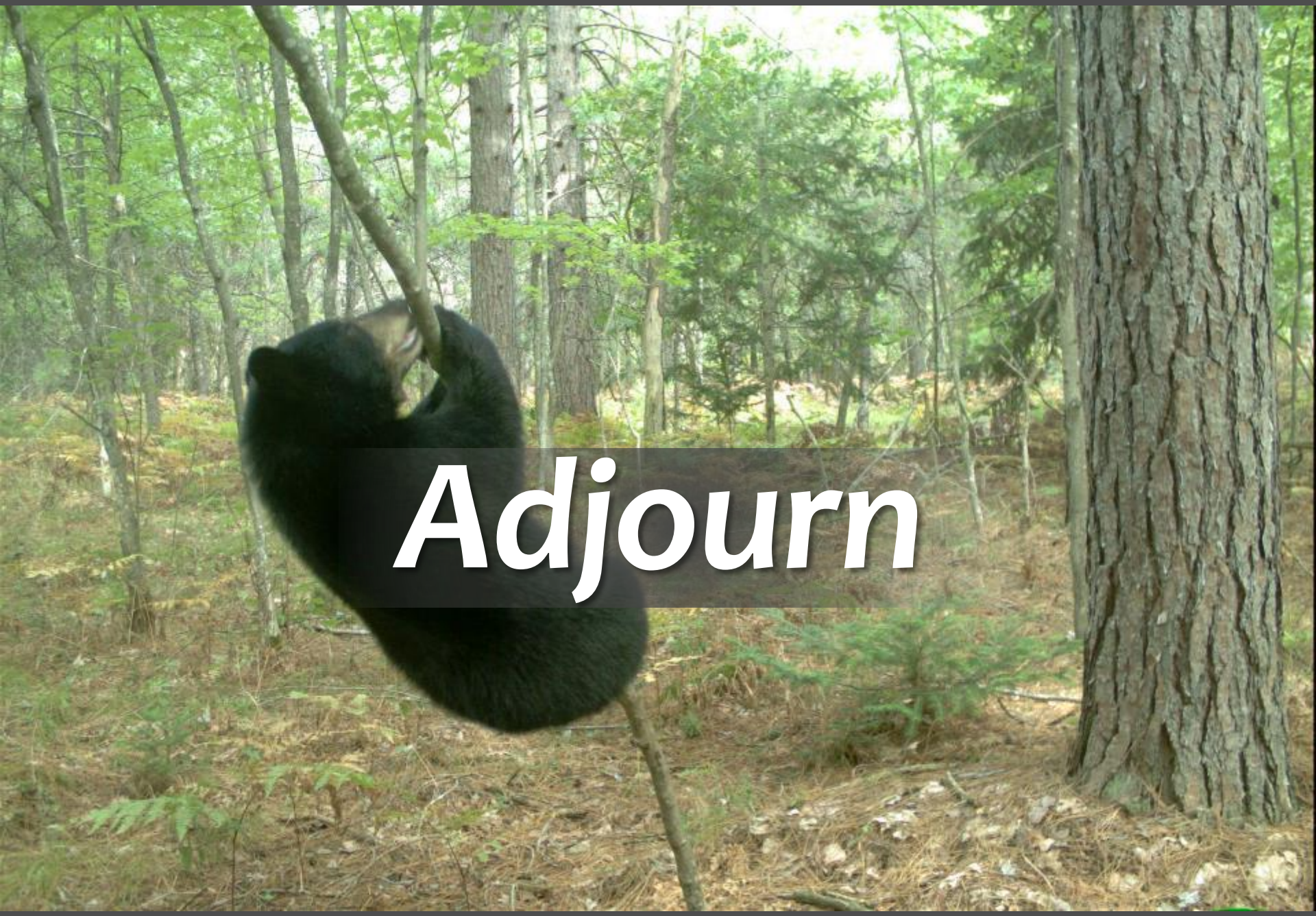
…or, RE-EVALUATE

Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.



… or, RE-EVALUATE

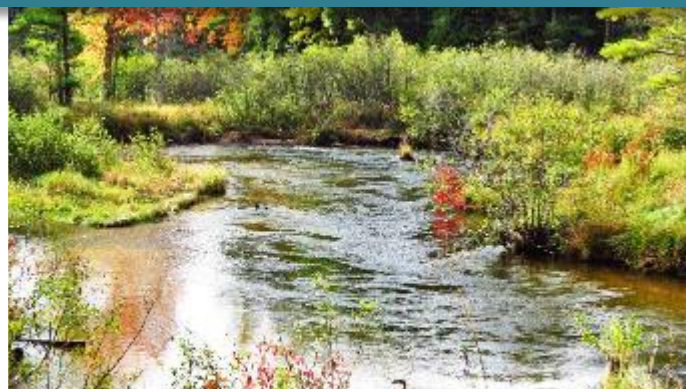
Thoughts/takeaways from the day?


Adjourn

Culturally Relevant Climate Change Adaptation Planning

for Tribes and Tribal Partners





Jan. 23-24th, 2019

Cloquet, MN

Adaptation Concepts

What can we do, how do we respond?

Adaptation Workbook Cycle

1. DEFINE area of interest, management objectives, and time frames.

2. ASSESS climate change impacts and vulnerabilities for the area of interest.

3. EVALUATE management objectives given projected impacts and vulnerabilities.

4. IDENTIFY and implement adaptation approaches and tactics.

5. MONITOR and evaluate effectiveness of implemented actions.

Resource:
Climate Change Assessments

Resource:
Menus of strategies and approaches

Adaptation is preparing ecosystems for climate change.



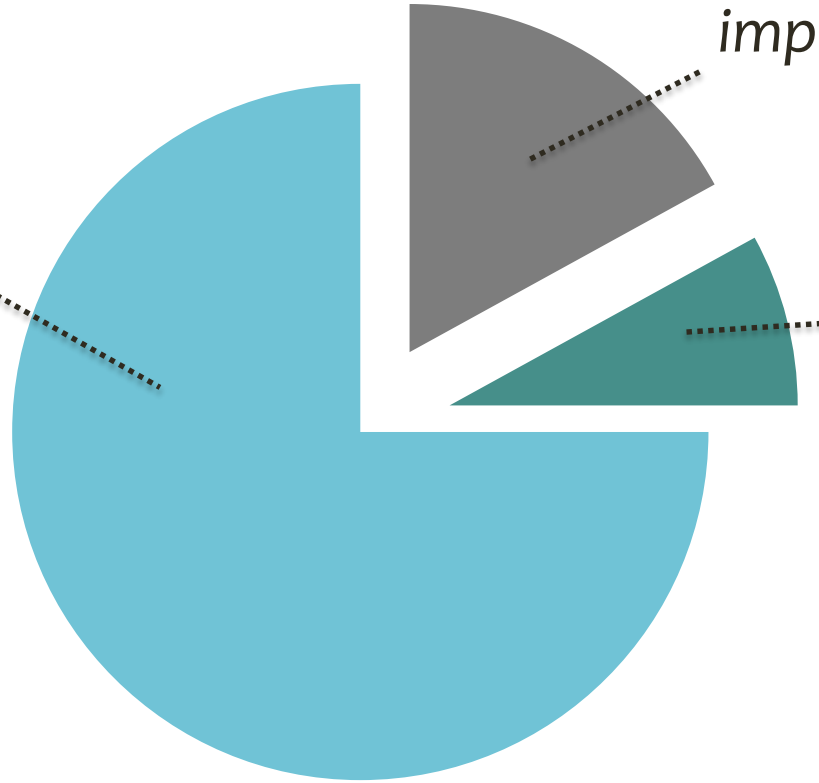

Actions may build upon sustainable management, conservation, and restoration techniques.

BUT it is necessary to explore potential modification to address climate change

Adaptation actions may not look that different from current actions, especially in the near term.

Small "tweaks" *that improve effectiveness*

Same actions– *climate change just makes them that much more important*



New & different *actions to consider, even some that may seem* ***wild & crazy***

**individual results will vary*

Adaptation Strategies and Approaches

A "menu" of possible actions that allows you to decide what is most relevant for a particular location, set of conditions and values.

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.

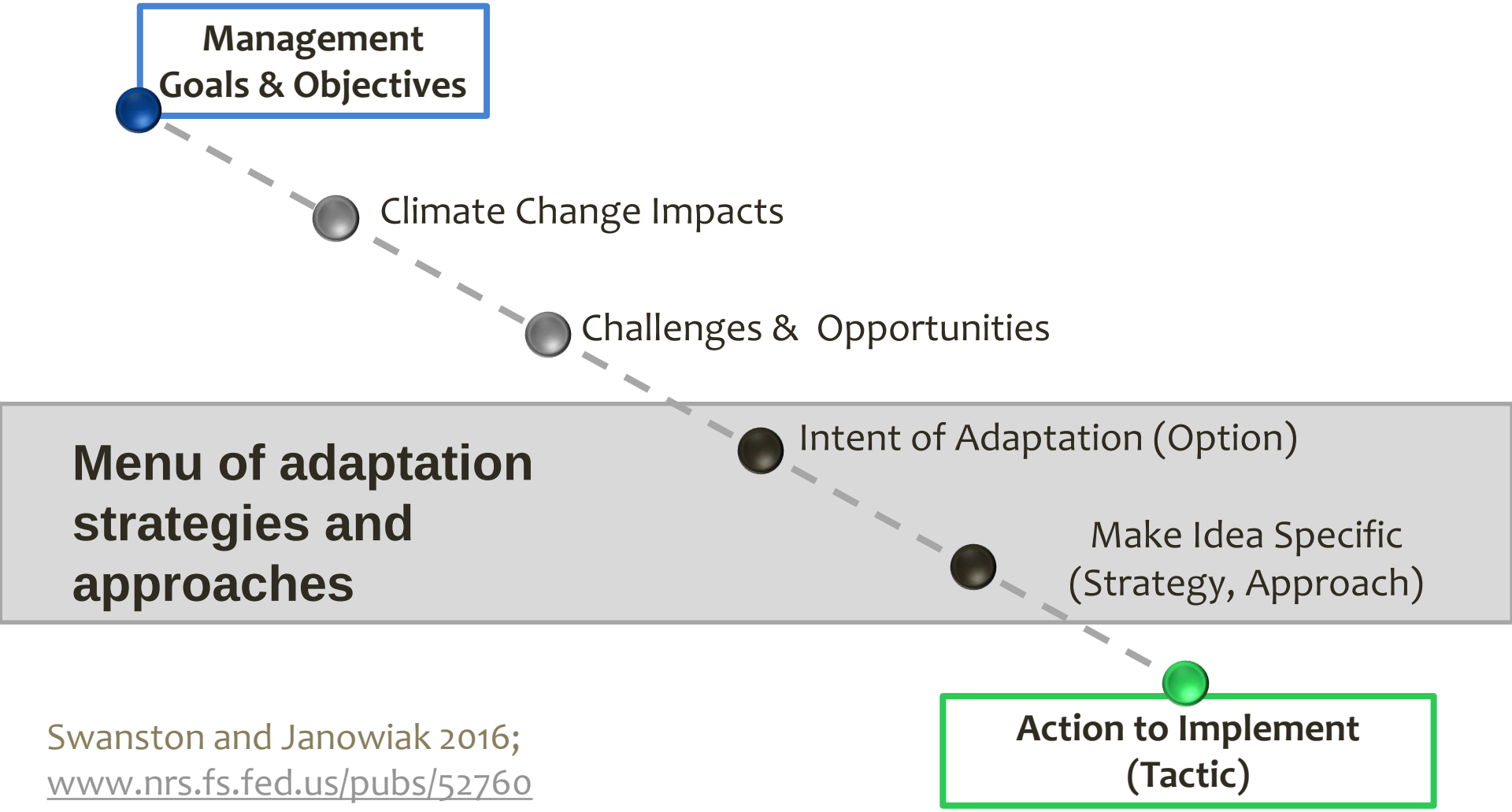
Example tactics:

- 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

Other menus at www.adaptationworkbook.org/niacs-strategies

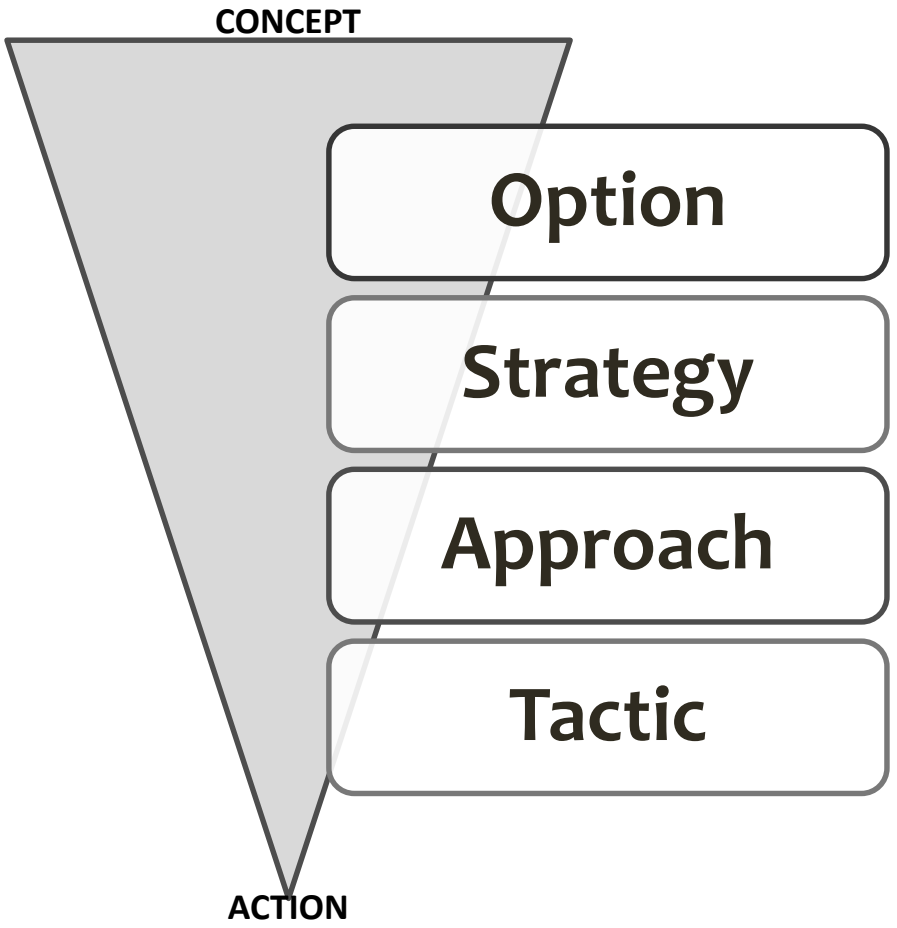
Connecting the Dots

A clear train of thought shows ***intentionality***



Swanston and Janowiak 2016;
www.nrs.fs.fed.us/pubs/52760

Adaptation Strategies and Approaches



Responding to climate change

- Sets context
- General direction

Adaptation Options

Manage for Persistence:
Ecosystems are still recognizable as being the same system (character)

Manage for Change:
Ecosystems have fundamentally changed to something different

Resistance (persistence)

Required, or otherwise worth the risk

Improve the defenses of the system against anticipated changes or directly defending against disturbance in order to maintain relatively unchanged conditions.

Good for

- Short-term
- High-value

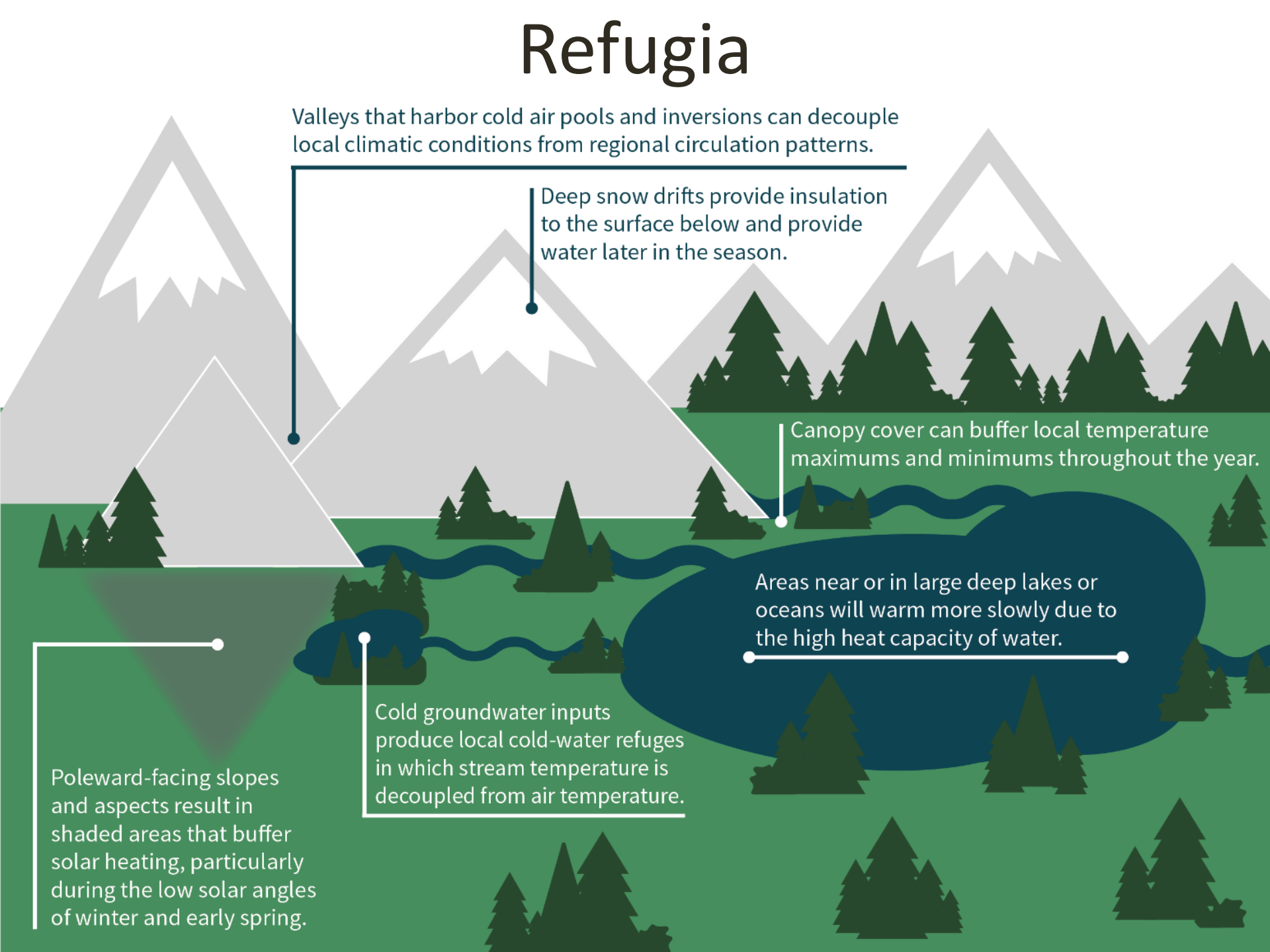
- May require more resources over time

Photo: FWS, Dwarf iris

Photo: USFS

Millar et al. 2007

Refugia


Valleys that harbor cold air pools and inversions can decouple local climatic conditions from regional circulation patterns.
Deep snow drifts provide insulation to the surface below and provide water later in the season.
Canopy cover can buffer local temperature maximums and minimums throughout the year.
Areas near or in large deep lakes or oceans will warm more slowly due to the high heat capacity of water.
Cold groundwater inputs produce local cold-water refuges in which stream temperature is decoupled from air temperature.
Poleward-facing slopes and aspects result in shaded areas that buffer solar heating, particularly during the low solar angles of winter and early spring.

Resilience (persistence)

BAU, but risk may increase over time

Accommodate some degree of change or disruption, but be able to return to a similar condition after disturbance (composition and function).

- Good for: High adaptive capacity systems
- Risk of disturbance that exceeds the ability of the system to cope

The Nature Conservancy
Lulu Lake Preserve, WI

MN DNR

freshwaternetwork.org

Millar et al. 2007, Holling 1973

Transition (change)

Mixed risk. Challenges values and precautionary principle.

Intentionally encourage change, help ecosystems respond in a targeted fashion

- Good for: Highly vulnerable systems
- Can be phased into broader management
- Less risk = getting ahead of change
- Upfront risk = accepting failures

Millar et al. 2007

When you might emphasize…

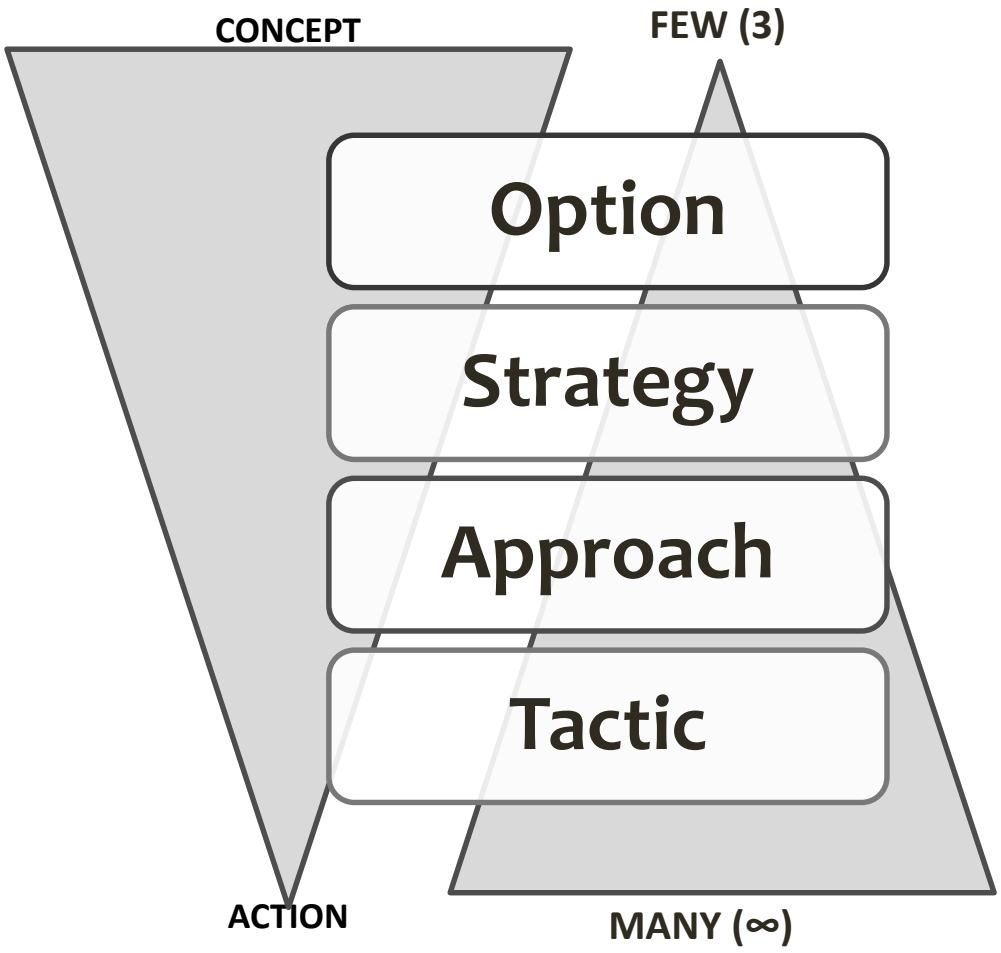
Persistence (Same/Similar)

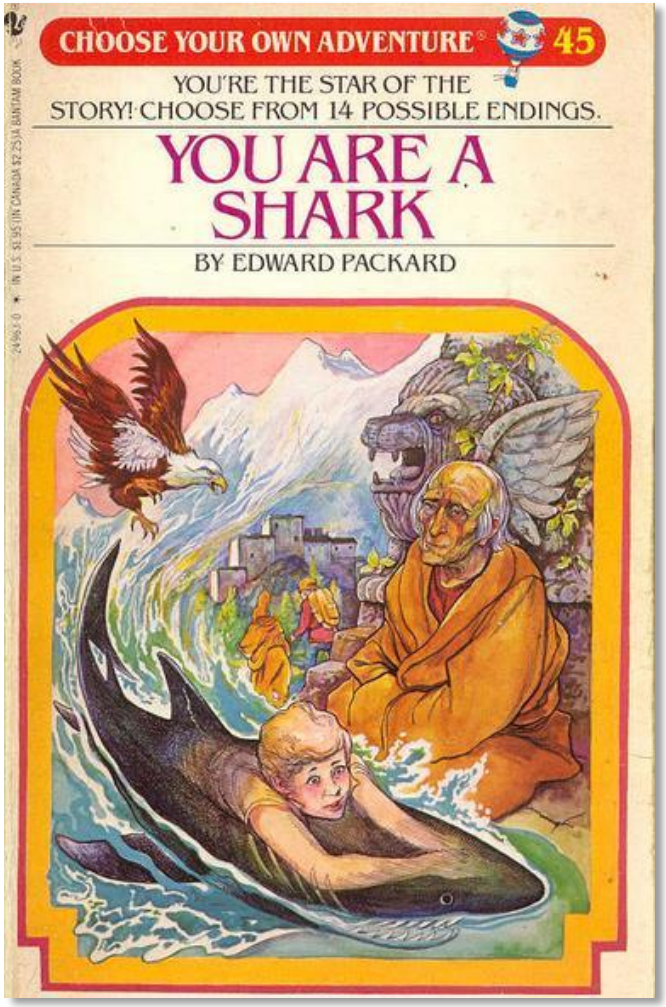
- High economic, social or cultural value associated with current condition.
- Inherent ability to buffer changes.
- Highly vulnerable, but place represents best chance of success.

Change (Future-adapted)

- High likelihood that current conditions will fail, making change is necessary.
- Changes are already occurring, and can be enhanced.
- Good opportunity to try something new.

Adaptation Strategies and Approaches





Adaptation Menu

Strategy 4: Sustain fundamental ecological & cultural functions

Approach 4.5: Revitalize & maintain Anishinaabe/cultural use of ishkode/fire as a stewardship tool

Tactic: Restore ishkode (fire) and miinagaawanzh (blueberry) relations with prescribed burns.

Photo courtesy of Vern Northrup:
Akinomaage
www.duluthartinstitute.org/Current-Exhibitions

Adaptation Menu

<u>Strategy 5:</u> Reduce the impact from biological & anthropogenic stressors.

<u>Approach 5.3:</u> Manage herbivory to promote regeneration of impacted beings.

<u>Tactic</u>: Protect cedar seedlings with a deer exclosure.

forestadaptation.org/node/657

Step 4: Identify adaptation approaches and tactics for implementation

Step 4: IDENTIFY adaptation approaches and tactics for implementation.

Key Questions:

- What actions can help the project area to adapt to anticipated changes ***and*** meet your goals?
- Will future managers know what we were trying to do?

Step 4: IDENTIFY adaptation approaches and tactics for implementation.

Approach – Select from the menu. Pick any that seem to make sense and help address your challenges.

Tactic – Describe a specific action you can take.

These details should ideally answer what, where, and how you will implement the actions.

Focus on Strategies/Approaches 4 – 14 to start!

Step 4: IDENTIFY adaptation approaches and tactics for implementation.

Timeframe – Specify when you will implement the tactic.

For example:

- Summer 2016
- Winter 2016-7
- Within 3 years of…
- After…

Step 4: IDENTIFY adaptation approaches and tactics for implementation.

Benefits – Describe why the tactic is good.

For example:

- addresses biggest or multiple challenges
- is cheap and easy
- has co-benefits
- is likely to succeed

Step 4: IDENTIFY adaptation approaches and tactics for implementation.

Drawbacks and Barriers – Describe why it's not so good.

For example:

- it may have negative side effects,
- Requires high cost or effort
- may not be successful
- has social, financial, or other barriers

Step 4: IDENTIFY adaptation approaches and tactics for implementation.

Practicability – Is it both ***effective*** (will meet desired intent) and ***feasible*** (capable of being implemented)?

- **High:** Yes to both!
- **Moderate:** Yeah, but it will take some additional effort or planning…
- **Low:** No, the barriers/drawbacks seem too big or the benefits too small.

Step 4: IDENTIFY adaptation approaches and tactics for implementation.

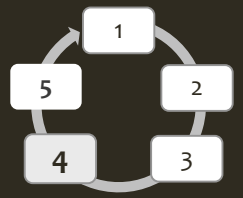
Recommend Tactic– Given all this, is this tactic likely to be helpful?

Also consider: trade-offs, urgency, likelihood of success, cost, and effort…

Yes: look to integrate into plan, prescription, or other activities

No: not useful at this time

Adaptation Demonstration: Menominee Forest

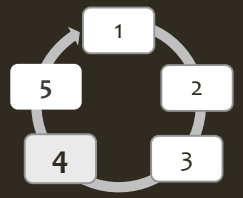


Step 4: IDENTIFY and adaptation approaches and tactics for implementation.

Adaptation Approaches

- Reduce biological stressors
- Maintain and enhance diversity
- Promote future-adapted species
- Enhance genetic diversity

→ **Adaptation Action:**
Restore sites with future-adapted species

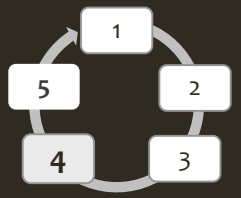


Step 4: IDENTIFY and adaptation approaches and tactics for implementation.

Plant selection: Climate Change Tree Atlas

Projected Habitat Increases	Projected New Habitat
American beech	Black hickory
American elm	**Black walnut**
American hornbeam	Blackjack oak
Bitternut hickory	**Chinkapin oak**
Black cherry	Eastern red cedar
Black locust	Eastern redbud
Black oak	Flowering dogwood
Boxelder	**Hackberry**
Bur oak	Honeylocust
Eastern cottonwood	Mockernut hickory
Silver maple	Ohio buckeye
Slippery elm	Osage-orange
White ash	Post oak
White oak	Shingle oak

Janowiak et al. 2014



Step 4: IDENTIFY and adaptation approaches and tactics for implementation.

Plant selection: Traditional Ecological Knowledge

Example plant list for some sites

Tree Species	Notes	Menominee Name	Meaning	Menominee Use
White Oak	60% of site	Askeqtemaehnak	Good for the eyes	medicinal/food
Black Oak	30% of site	Anipahkahkuehtek	Black inside	medicinal/food
Bur Oak	8% of site	Mahkemenah maeqtekomen	Biggest acorn	medicinal/food
Swamp Oak	1% of site	Maskik-askeqtemaeh	Found in swamp	medicinal/food
Post oak	1% of site			
Additional Tree Species				
Black Walnut	Kentucky Bluegrass along side	Paskanaweh	Good tasting nut	medicinal/food
American Elm	Variety with higher resistance	Keckiwahtek	Elder Tree	medicinal
Shingle Oak	Hoping for shrublike effect			
Black Cherry	Earlier successional stage	Awaehsehsaekahtek	Little Bear tree	medicinal
Northern White-cedar	Medicine tree within stand	Kesaehkahtek	Medicine tree	medicinal/ ceremonial

Step 4: IDENTIFY and adaptation approaches and tactics for implementation.

Summer 2014 - 2016

- Tree planting
- Seeding of understory plants

Step 4: IDENTIFY adaptation approaches and tactics for implementation.

Approach – Select from the menu. Pick any that seem to make sense and help address your challenges.

Tactic – Describe a specific action you can take.

These details should ideally answer what, where, and how you will implement the actions.

Focus on Strategies/Approaches 4 – 14 to start!

Activity

Adaptation Speed Dating

Step 4 Continued: IDENTIFY adaptation approaches and tactics for implementation.

Using your Step 4 worksheet:

Put a star * next to tactics that you'd like to implement after you get more input or engagement from the community.

Step 4 Continued: IDENTIFY adaptation approaches and tactics for implementation.

Approach – Select from the menu.

Tactic – Describe a specific action you can take.

Think about strategies 1-3:

- What are you already doing that will help you meet your project goals?
- What information do you need from the community before moving forward on "starred" tactics?
- These details should include the who and when.


Lunch!

Poster

Project Name

Objective (s)

Climate Challenges/
Opportunities

3-4 Adaptation Tactics
(include one tactic from
strategies 1-3)

Be as creative as you like!

Report out:

- Share your poster/Action Plan for your project area:

3 min max!

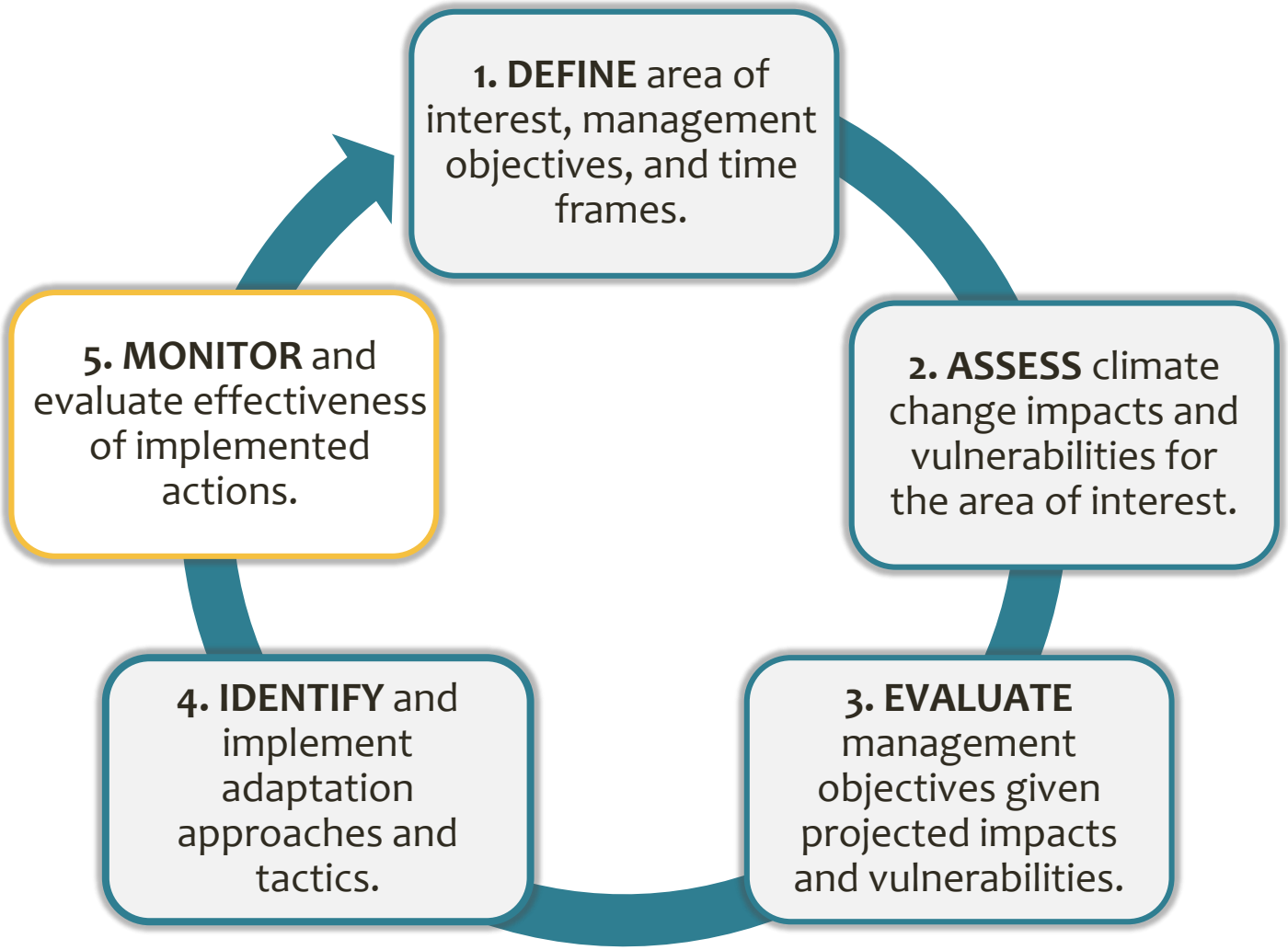
(But you'll have time to view posters and leave feedback)

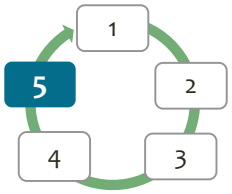
Discussion

Prioritization

Step 5: MONITOR and evaluate effectiveness of implemented actions.

Workbook Cycle: Step 5





Step 5: MONITOR and evaluate effectiveness of implemented actions.

Purpose: Practice adaptive management

How do we know if the selected actions were effective?

- *What are we (or others) already doing that can help us answer that?*

What can we learn from these actions to inform future management?

Step 5: MONITOR and evaluate effectiveness of implemented actions.

What question are you are asking? This will guide your monitoring approach:

- Scientific research = Is this outcome statistically significant compared to a control? Could we expect similar results elsewhere?
- Impact/ response monitoring = What changes are occurring?
- Implementation monitoring = Did we do the action?
- **Effectiveness monitoring** = Did our actions actually have the desired effect?

Step 5: MONITOR and evaluate effectiveness of implemented actions.

Monitoring Variable

Evaluation Criteria

Monitoring Implementation

Items that can tell you whether you have achieved your management goals & objectives.

Use an item that also helps evaluate a particular tactic (e.g. what was the strategy/ approach?)

For example:

- *Diversity of species composition*

Step 5: MONITOR and evaluate effectiveness of implemented actions.

Monitoring variable

Evaluation Criteria

Monitoring Implementation

What is success?

What you're monitoring or measuring. What are the units on your data?

For example:

- *25% of stems are of future-adapted species*

Step 5: MONITOR and evaluate effectiveness of implemented actions.

Monitoring variable

Evaluation Criteria

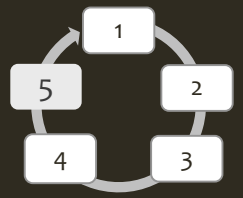
Monitoring Implementation

How the monitoring will actually get done.

Use existing monitoring when possible!

For example:

- *Regular post-planting stocking surveys.*



Step 5: MONITOR and evaluate effectiveness of implemented actions.

Monitor

- Seedling success
- Forest health and stressors
- Forest composition
- Cost of treatment

Thanks to Menominee Tribal Enterprises!

- Tony Waupochick
- Dave Mausel
- Jeff Grignon
- Marshall Pecore

Read more!

Adaptation Demonstration summary:
www.forestadaptation.org/mte

Journal of Forestry article:
www.nrs.fs.fed.us/pubs/46417

Step 5: MONITOR and evaluate effectiveness of implemented actions.

Monitoring Discussion Groups:

- Topic 1:
- Topic 2:
- Topic 3:
- Topic 4:

Step 5: MONITOR and evaluate effectiveness of implemented actions.

Adaptation Monitoring Variable – What you will measure

Criteria for Evaluation – a value or threshold that is meaningful for assessing effectiveness or informing future decisions

Monitoring Implementation– How you will gather the information

But you're not done yet …

Discussion & Next Steps

Next Steps:

- Let's keep moving these ideas forward! We'd like to share your examples of culturally relevant adaptation projects:
  - www.ForestAdaptation.org as Adaptation Demonstration Projects.
  - National Adaptation Forum, April 2019
  - Will you share your workbook sheets?

- Let's schedule a follow up call to check in – April/May?

To-do list:

Participants:

- Complete Tribal Adaptation Menu feedback
- Evaluations (please!)
- Follow up with questions or ideas
- Complete necessary reimbursement information

NIACS/GLIFWC/1854:

- Share contact list & presentations from the workshop on forestadaptation.org/Tribal-adaptation-2019
- Schedule a follow-up call
- Check in soon!

Thanks everyone!

Discussion:

Menu Feedback

- Please add your thoughts to the feedback form!
- What resonated? What would you change?
- How can we help you facilitate this or bring it to audiences that may be more resistant?