Climate Change Adaptation Planning for Tribes and Tribal Partners

Bay Mills Community College
Brimley, MI
June 2019
Who we are -

Core Tribal Adaptation Menu team:

- GLIFWC (Melonee Montano, Hannah Panci, Rob Croll, Kim Stone)
- 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 (Zigwanikwe (Katy) Bresette)
- Northeast Climate Adaptation Science Center (Sara Smith)
- Inter-Tribal Council of Michigan (Robin Clark)
- NIACS (Stephen Handler, Kristen Schmitt, Chris Swanston)
Questions you might be asking...

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

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

- Be useful
- Think about climate change at a meaningful scale
- Get familiar with the Adaptation Workbook & Tribal Adaptation Menu
- Reflect indigenous perspectives in climate adaptation
- Learn from each other

Swanson et al. 2016; www.nrs.fs.fed.us/pubs/52760
1. DEFINE place and objectives.

2. ASSESS climate impacts.

3. EVALUATE management objectives.

4. IDENTIFY adaptation approaches.

5. MONITOR and evaluate effectiveness.

Swanson et al. 2016; www.nrs.fs.fed.us/pubs/52760
The Final Product

Real-world adaptation projects

+250 Projects underway
Workshop Logistics

• 9a.m. – 4:30p.m. today and tomorrow, 9-11:30 on Weds
• Lunch served around noon
• Scheduled breaks, but take breaks as needed
• Please step out of room to take calls
• We welcome your feedback!
• Optional group dinner tonight – Pickles!
Introductions: Who’s in the room?
Guiding Principles
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
Forest Adaptation Resources: Climate Change Tools and Approaches for Land Managers

- Practical process to intentionally consider climate
- Does not make recommendations – users customize actions
- Build from a “western” forest management mindset
As ecosystems continue to respond to the pressures of a changing climate, individuals and organizations tasked with managing these ecosystems will benefit from reexamining their priorities, objectives, and tactics. Some land managers may ultimately decide not to make any near-term changes in priorities or tactics, even after considering climate pressures on forests. Others may choose to accommodate forest change even as they attempt to ensure continued value from the ecosystem in question. In other words, as forests adapt naturally, organizations need to decide if they intend to play a role in adaptation through land management and how to play that role most effectively. This is easier said than done, of course, as land managers struggle to keep up with “traditional” challenges, not to mention the daunting complexities of climate change.
As ecosystems continue to respond to the pressures of a changing climate, individuals and organizations tasked with managing these ecosystems will benefit from reexamining their priorities, objectives, and tactics. Some land managers may ultimately decide not to make any near-term changes in priorities or tactics, even after considering climate pressures on forests. Others may choose to accommodate forest change even as they attempt to ensure continued value from the ecosystem in question. In other words, as forests adapt naturally, organizations need to decide if they intend to play a role in adaptation through land management and how to play that role most effectively. This is easier said than done, of course, as land managers struggle to keep up with “traditional” challenges, not to mention the daunting complexities of climate change.
Dibaginjigaadeg Anishinaabe Ezhitwaad: A Tribal Climate Adaptation Menu

No singular native, tribal or indigenous approach for caring of the land

• Suggestions to assist in addressing needs of a particular indigenous community
• Used by non-tribal people or organizations interested in indigenous approaches to adaptation
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 but 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 also 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 human and nonhuman 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.
Dibaginjigaaideg Anishinaabe Ezhitwaad: A Tribal Climate Adaptation Menu

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Three R’s: Respect, Reciprocity, and Relationships

- Decisions for use of our relatives were originally communal decisions made with recognition and acknowledgement throughout.
- 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.
Guiding Principles for Interacting with Tribes

How to Develop Culturally Appropriate Climate Adaptation Actions

This document is intended to empower tribal governments, federal and state agencies, non-governmental organizations (NGOs), individual landowners and others to incorporate Anishinaabeg perspectives, specifically from the Great Lakes region, into a climate adaptation framework. We recognize the shortcomings of this document in our attempt to incorporate indigenous concepts, language, and cultural practices; a single document written in English can't fully capture what we intend to express. We hope that the perspectives given here offer users an additional lens with which to view the environment and facilitate a more culturally appropriate approach to working with tribal nations.

While the intent of this document is to give specific examples from one group of people, we encourage other tribes to edit these according to the needs of their individual community by adding language, words, and concepts unique to that community. We should stress that the editing process be undertaken first, before initiating any project, as the intent behind this document is to ground climate change adaptation planning in knowledge that is unique to the perspective of each indigenous community.

Offering asemacín‘egnēmaw (tobacco). (Photo by Charlie Rasmussen, GLIFWC.)
Questions ?
No singular native, tribal or indigenous approach for caring of the land

- Suggestions to assist in addressing needs of a particular indigenous community
- Used by non-tribal people or organizations interested in indigenous approaches to adaptation
A quick tour of the TAM
LUNCH BREAK!
**Step 1**: DEFINE area of interest, goals and objectives, and time frames.
Step 1: DEFINE location, project, and time frames.

Key Question:
- Where are you working?
- What are your goals and objectives for this place or this ecosystem?
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
1. **DEFINE**
   place and objectives.

2. **ASSESS**
   climate impacts.

3. **EVALUATE**
   management objectives.

4. **IDENTIFY**
   adaptation approaches.

5. **MONITOR**
   and evaluate effectiveness.

Swanson et al. 2016; [www.nrs.fs.fed.us/pubs/52760](http://www.nrs.fs.fed.us/pubs/52760)
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
Beings from GLIFWC Vulnerability Assessment

- Manoomin
- Waabooz
- Mooz
- Giizhikaatig
- Ogaa
- Wiigwaas
- Ziinzibaakwadwaatig
- Miin
- Makwa
- Waawaashkeshi
- Ode-imin

Vulnerability Levels:
- Less Vulnerable
- Extremely Vulnerable
**Inter-Tribal Forest Understory Adaptation**

How might Mashkiigobag respond to climate-driven change in Michigan?

<table>
<thead>
<tr>
<th>Climate-driven changes</th>
<th>Possible impacts on Mashkiigobag</th>
<th>What to watch for</th>
</tr>
</thead>
</table>
| **Increasing temperatures**  
The average temperature increased by 2°F over the past century and may increase 4-6°F by 2050. | Mashkiigobag are at their southern limit in Michigan and grows in cooler areas of the forest, which may become too warm for Mashkiigobag to grow. | Have you noticed changes in how or where Mashkiigobag grows? Are they limited to the coolest areas of the forest? |
| **Drier soils**  
Increased air temperatures may lead to warmer and drier soils, especially in mid- to late-summer. | Mashkiigobag may be out-competed by other plants as soils warm, dry out, and become more nutrient-rich. | Have there been changes in how wet or dry the places are where Mashkiigobag grows? |
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 general climate trends be affected or modified by local conditions?
- How might tribal communities and lands be affected?
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](http://www.forestadaptation.org/mte)
**Step 1: DEFINE location, project, and goals.**

**Project Area:** The Menominee Forest

**Location:** 350 sites affected by oak wilt (project focuses on 10 initial pockets)

<table>
<thead>
<tr>
<th>Forest Type</th>
<th>Management Goals</th>
<th>Management Objectives</th>
<th>Time Frames</th>
</tr>
</thead>
</table>
| 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) |
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.

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

- You have 20 points (as a group) to distribute as you see fit.
Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.
1. **DEFINE** place and objectives.

2. **ASSESS** climate impacts.

3. **EVALUATE** management objectives.

4. **IDENTIFY** adaptation approaches.

5. **MONITOR** and evaluate effectiveness.

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

**Key Questions:**
- How will climate change challenge or assist the ability to meet my objectives?
- Do my goals and objectives need to change?
**Step 3:** EVALUATE objectives given projected impacts and vulnerabilities.

- **Ecosystem Type or Topic** – From Step 1
- **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 business-as-usual management (not global markets, policies, etc.)**
**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.
**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.
- Harvest affected oaks in pockets.
- Allow regen. of trees and plants.

Challenges
- Oak wilt treatment results in heavily disturbed sites.
- Potential for more, invasives, drought.
- Allowing natural regen. (business as usual) may not be sufficient.

Opportunities
- Disturbed sites allow planting of species that could be tolerant of future stressors.
- ‘Transition zone’ - potential increasers on or near the site.

Feasibility of Meeting Obj. (Current Mgmt)
- Moderate
**Step 3:** EVALUATE objectives given projected impacts and vulnerabilities.

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.

*…or, RE-EVALUATE*
Step 3: EVALUATE objectives given projected impacts and vulnerabilities.

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.

... or, RE-EVALUATE

Update Goals/Objectives into Step 3 if necessary
Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.

Challenges & Opportunities Discussion

- Select 3 challenges (pink)
- Select 3 opportunities (green)
- One idea per sticky note
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
Thoughts/takeaways from the day?
Climate Change Adaptation Planning for Tribes and Tribal Partners

Bay Mills Community College
Brimley, MI
June 2019
Recap of Day 1
Adaptation Concepts

What can we do, how do we respond?
Adaptation is helping ecosystems and communities prepare for climate change.

Actions may build upon conservation, restoration, sustainable harvest, and other 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.

Same actions—climate change just makes them that much more important

Small “tweaks” that improve effectiveness

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

*individual results will vary
**Adaptation Concepts**

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

- resistance
- resilience

**Manage for Change:**
Ecosystems have fundamentally changed to something different

- transition

**Reduce impacts / Maintain current conditions**

*Intentionally promote change*

Millar et al. 2007, Stein et al. 2014
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.

Poleward-facing slopes and aspects result in shaded areas that buffer solar heating, particularly during the low solar angles of winter and early spring.

Cold groundwater inputs produce local cold-water refuges in which stream temperature is decoupled from air temperature.
Adaptation Concepts

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

Manage for Change:
Ecosystems have fundamentally changed to something different

Reduce impacts / Maintain current conditions

Resilience

Transition

Intentionally promote change

Millar et al. 2007, Stein et al. 2014
When you might emphasize...

**Persistence (Same/Similar)**

- High cultural or social or value associated with current condition. (Or legal requirement to maintain current condition!)
- Inherent ability to buffer changes.
- Highly vulnerable, but your place represents best chance of success.

**Change (Future-adapted)**

- High likelihood that current conditions will fail, making change more necessary.
- Changes are already occurring, and can be enhanced.
- Good opportunity to try something new.
There isn’t a single answer

Every community is different

Each decision is unique and will vary based upon:

**Place:** Location & Site Conditions

**Purpose:** Goals & Objectives

**People:** Values, Culture, & Mission

**Practices:** Equipment, Procedures, & Methods
Tribal Adaptation Menu

No singular native, tribal or indigenous approach for caring of the land

• Suggestions to assist in addressing needs of a particular indigenous community

• Used by non-tribal people or organizations interested in indigenous approaches to adaptation
Adaptation Menu Benefits

Address challenges in implementing adaptation:

1. Connecting broad ideas to specific actions
2. Making actions intentional
3. Communicating your ideas
4. Boosting creativity
1. Connecting Broad Ideas to Specific Actions

Option: Resistance (forestall change)
Adaptation Menus

1. Connecting Broad Ideas to Specific Actions

Strategy 4. Sustain fundamental ecological and cultural functions
Approach 4.5. Revitalize and maintain Anishinaabe/cultural use of ishkode (fire) as a stewardship tool.
1. Connecting Broad Ideas to Specific Actions

**Tactic:** Use prescribed burns in marsh habitats to encourage young plant communities.
2. Making Actions Intentional

My intent is to .... (Options and Strategies)

So I will .... (Approaches and Tactics)
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**
- American beech
- **American elm**
- American hornbeam
- Bitternut hickory
- **Black cherry**
- Black locust
- Black oak
- Boxelder
- **Bur oak**
- Eastern cottonwood
- Silver maple
- Slippery elm
- White ash
- **White oak**

**Projected New Habitat**
- Black hickory
- **Black walnut**
- Blackjack oak
- **Chinkapin oak**
- Eastern red cedar
- Eastern redbud
- Flowering dogwood
- **Hackberry**
- Honeylocust
- Mockernut hickory
- Ohio buckeye
- Osage-orange
- Post 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

<table>
<thead>
<tr>
<th>Tree Species</th>
<th>Notes</th>
<th>Menominee Name</th>
<th>Meaning</th>
<th>Menominee Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>White Oak</td>
<td>60% of site</td>
<td>Askeqtemaehnak</td>
<td>Good for the eyes</td>
<td>medicinal/food</td>
</tr>
<tr>
<td>Black Oak</td>
<td>30% of site</td>
<td>Anipahkahkuehtek</td>
<td>Black inside</td>
<td>medicinal/food</td>
</tr>
<tr>
<td>Bur Oak</td>
<td>8% of site</td>
<td>Mahkemenah maeqtekomen</td>
<td>Biggest acorn</td>
<td>medicinal/food</td>
</tr>
<tr>
<td>Swamp Oak</td>
<td>1% of site</td>
<td>Maskik-askeqtemaeh</td>
<td>Found in swamp</td>
<td>medicinal/food</td>
</tr>
<tr>
<td>Post oak</td>
<td>1% of site</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Additional Tree Species

<table>
<thead>
<tr>
<th>Tree Species</th>
<th>Notes</th>
<th>Menominee Name</th>
<th>Meaning</th>
<th>Menominee Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Walnut</td>
<td>Kentucky Bluegrass along side</td>
<td>Paskanaweh</td>
<td>Good tasting nut</td>
<td>medicinal/food</td>
</tr>
<tr>
<td>American Elm</td>
<td>Variety with higher resistance</td>
<td>Keckiwahtek</td>
<td>Elder Tree</td>
<td>medicinal</td>
</tr>
<tr>
<td>Shingle Oak</td>
<td>Hoping for shrublike effect</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black Cherry</td>
<td>Earlier successional stage</td>
<td>Awaehsehsaekahtek</td>
<td>Little Bear tree</td>
<td>medicinal</td>
</tr>
<tr>
<td>Northern White-cedar</td>
<td>Medicine tree within stand</td>
<td>Kesaehkahtek</td>
<td>Medicine tree</td>
<td>medicinal/ceremonial</td>
</tr>
</tbody>
</table>
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!
BREAK!
**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 BREAK!
Poster

Project Name

Objective(s)

Climate Challenges/Opportunities

Cover these up with another flip-chart page!
Be creative! What’s your future vision, and how will adaptation help you get there?
Report out:

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

15 min per group for feedback!
Moving Forward: How do we start?
Thoughts/takeaways from the day?
Thoughts/takeaways from the past two days?
Step 5: MONITOR and evaluate effectiveness of implemented actions.
Adaptation Workbook Cycle

1. **DEFINE** place and objectives.

2. **ASSESS** climate impacts.

3. **EVALUATE** management objectives.

4. **IDENTIFY** adaptation approaches.

5. **MONITOR** and evaluate effectiveness.

Swanson et al. 2016; [www.nrs.fs.fed.us/pubs/52760](http://www.nrs.fs.fed.us/pubs/52760)
Step 5: MONITOR and evaluate effectiveness of implemented actions.

Purpose: Practice adaptive management

How do we know if the adaptation actions are effective?

What can we learn from the other beings in the system?

What can we learn from our community members or other communities?
Step 5: MONITOR and evaluate effectiveness of implemented actions.

Different categories of scientific/western knowledge gathering:

- **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.

Different ways of gathering TEK:
**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.

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
YOU MADE IT!
(Congrats!)

But you’re not done yet ...
Discussion & Next Steps
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?
Next Steps:

- Let’s keep moving these ideas forward! We’d like to share your examples of culturally relevant adaptation projects:
  - [www.ForestAdaptation.org](http://www.ForestAdaptation.org) as Adaptation Demonstration Projects.
  - Will you share your workbook sheets?

- Tribal Adaptation Cohort Calls!
  - Next call is Friday June 28 @ 10am Eastern.
  - Will send out call details.
To-do list:

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

**US:**
- Share contact list & presentations from the workshop
- Schedule a follow-up call
- Check in soon!

Thanks everyone!