

WILDLIFE MANAGEMENT AND CLIMATE ADAPTATION WORKSHOP



April 2019



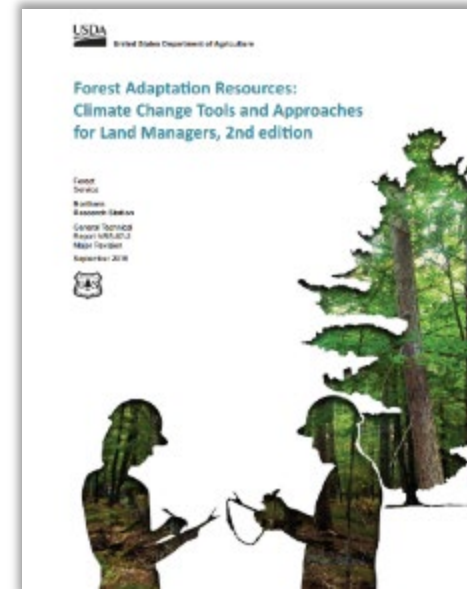
Two Key Questions

1. How might climate change affect the resources that I manage?
2. What management actions could help prepare for those effects?

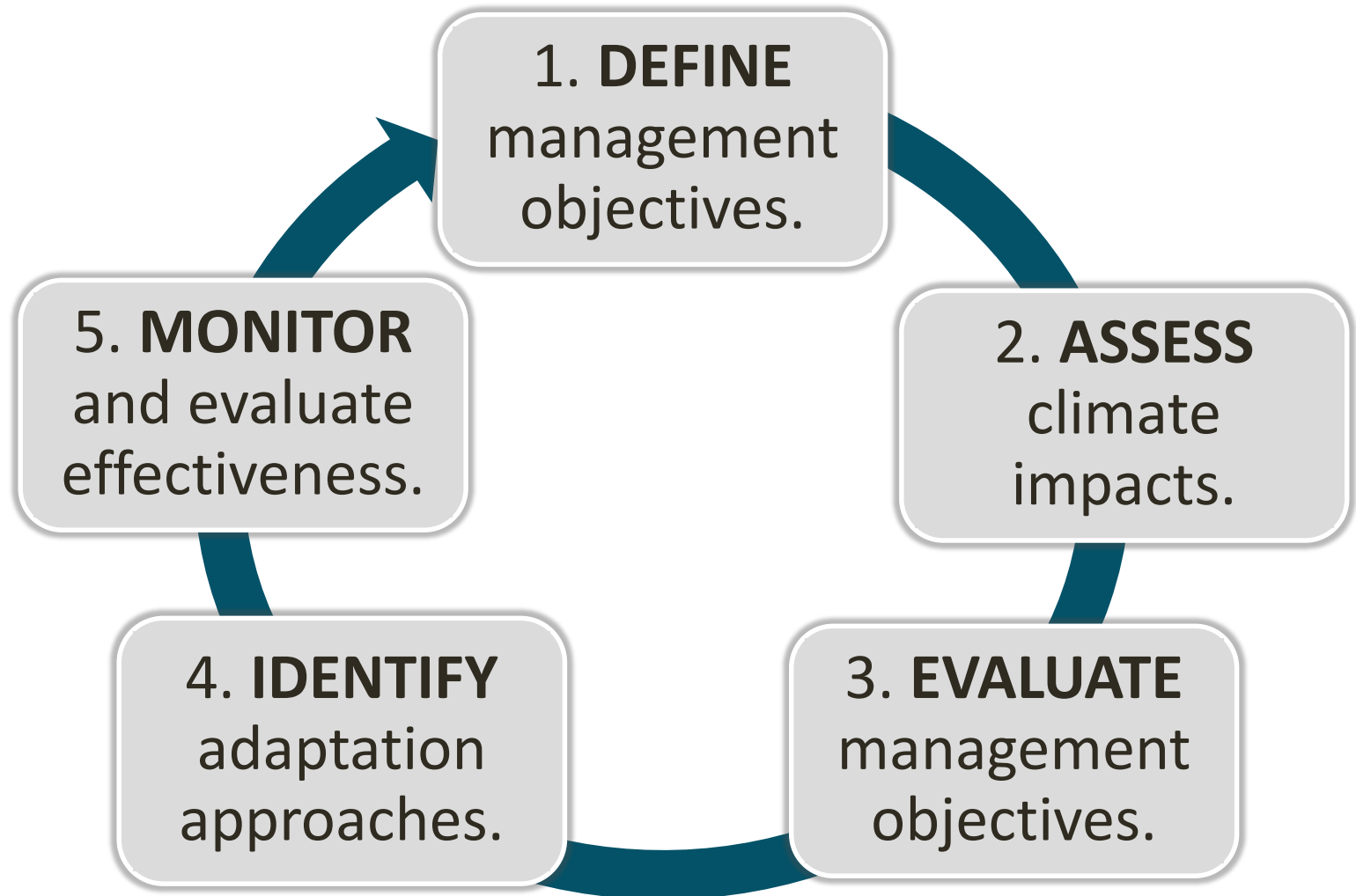
Adaptation Workbook

A flexible workbook and menu to address diverse needs

- Designed for a variety of land owners with diverse goals
- Does not make recommendations
- Menu of adaptation strategies and approaches for forest management
- New online version!



Adaptation Workbook



A systematic process...

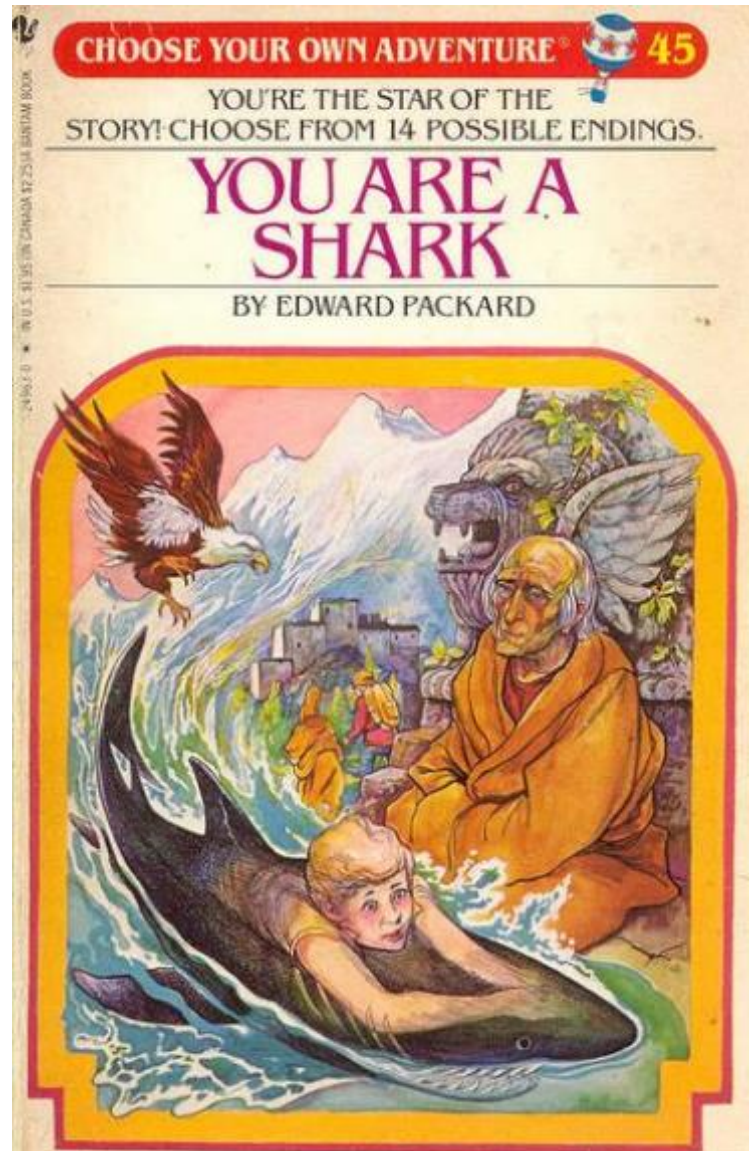
Management Objectives	Challenges	Opportunities	Feasibility	Other Considerations	
Adaptation Actions			Benefits	Drawbacks/ Barriers	Recommend Tactic?
Approach	Tactics	Time Frame			

Intentional

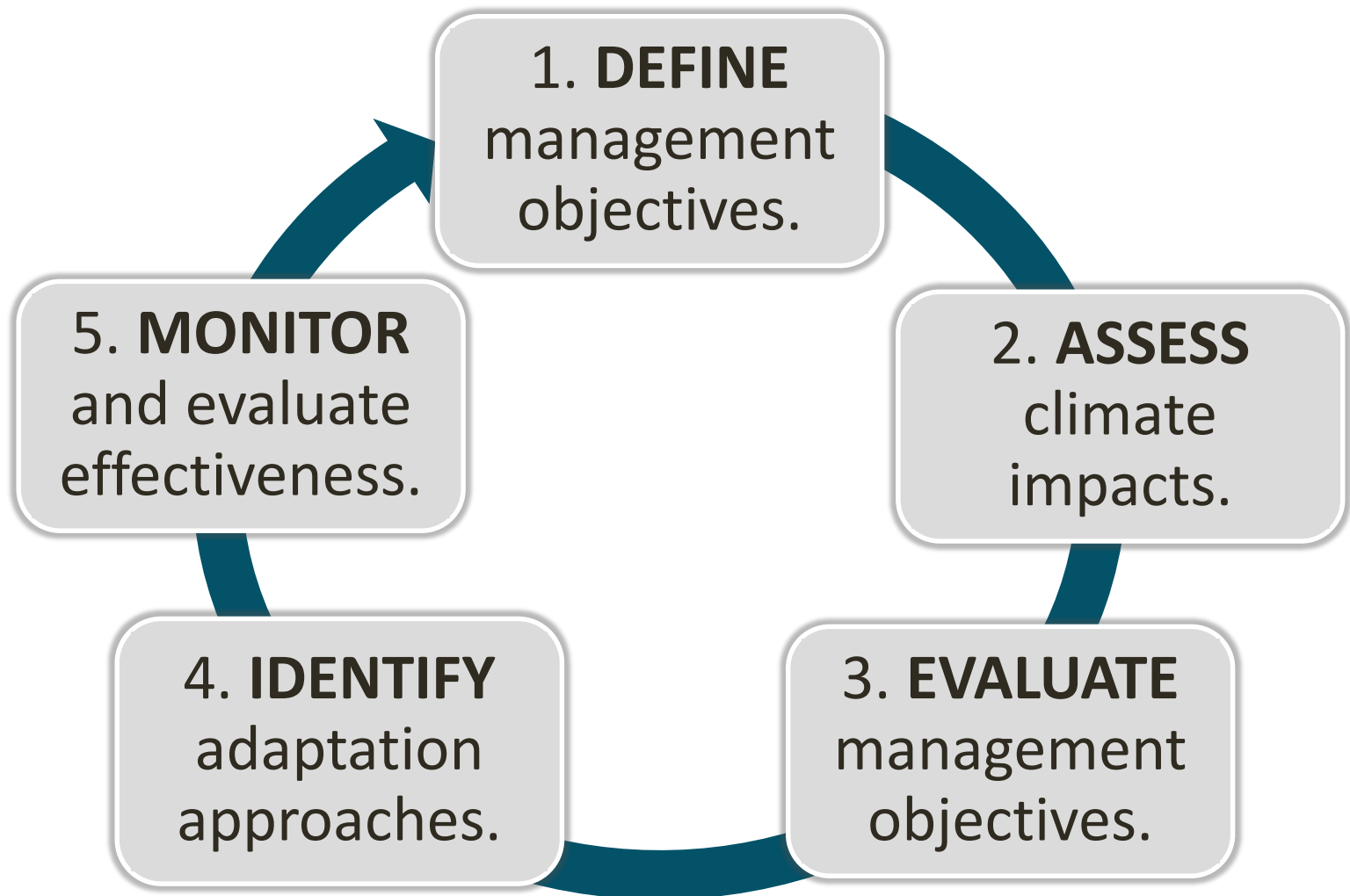
- Explicitly consider and address climate change
- Sure we might get lucky...
- Intentionally assessing risk and vulnerabilities **makes our plans more robust!**



Flexible

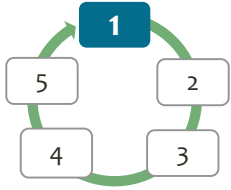


Agenda





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



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

Purpose:

- Define the scope of the project

Where are you working?

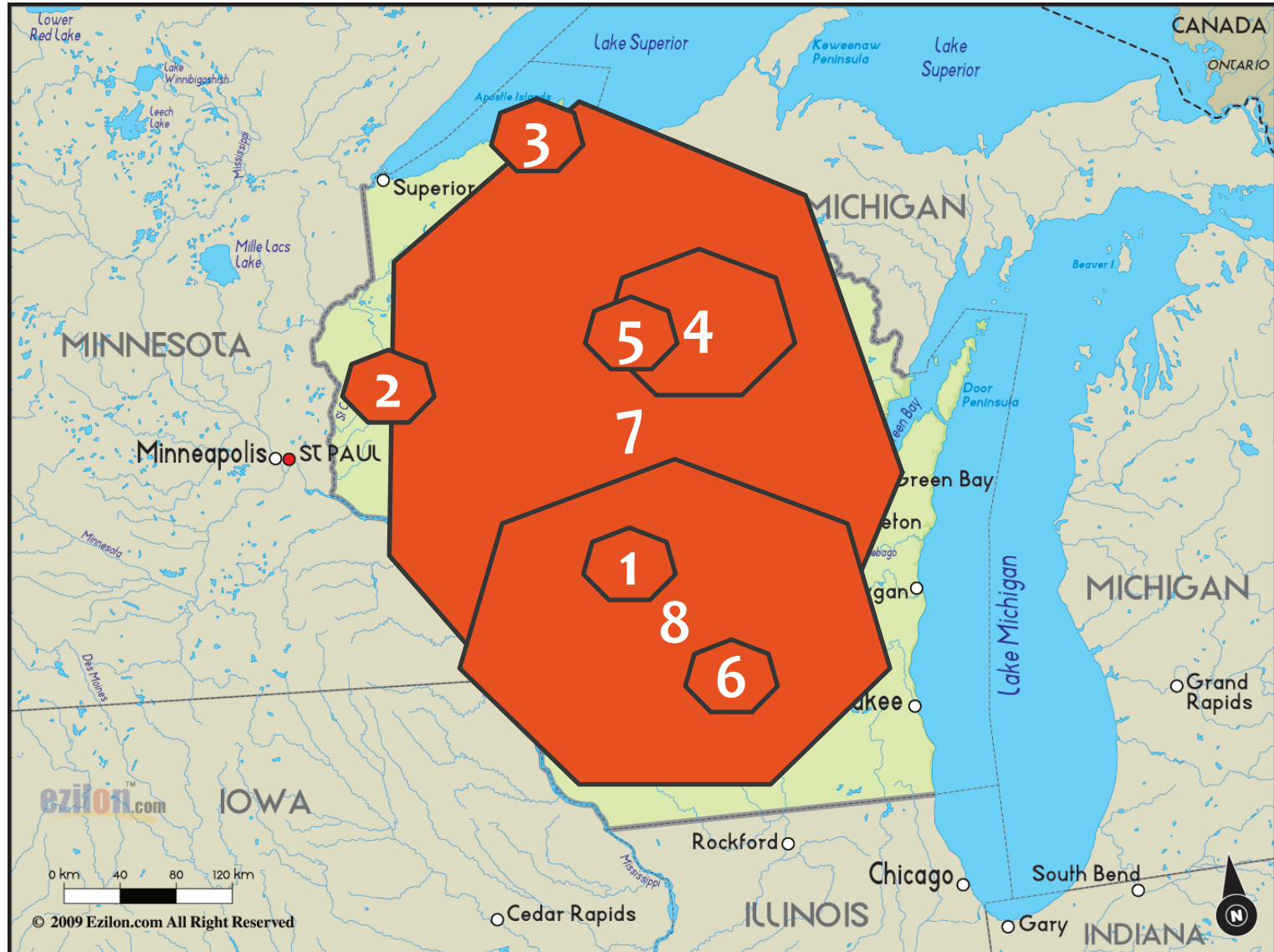
What are your current management goals and plans for this area?

Introductions

- Walk the rest of us through what your project is about (location, ecosystem types, key goals/objectives)
 - A few *brief* comments, please!



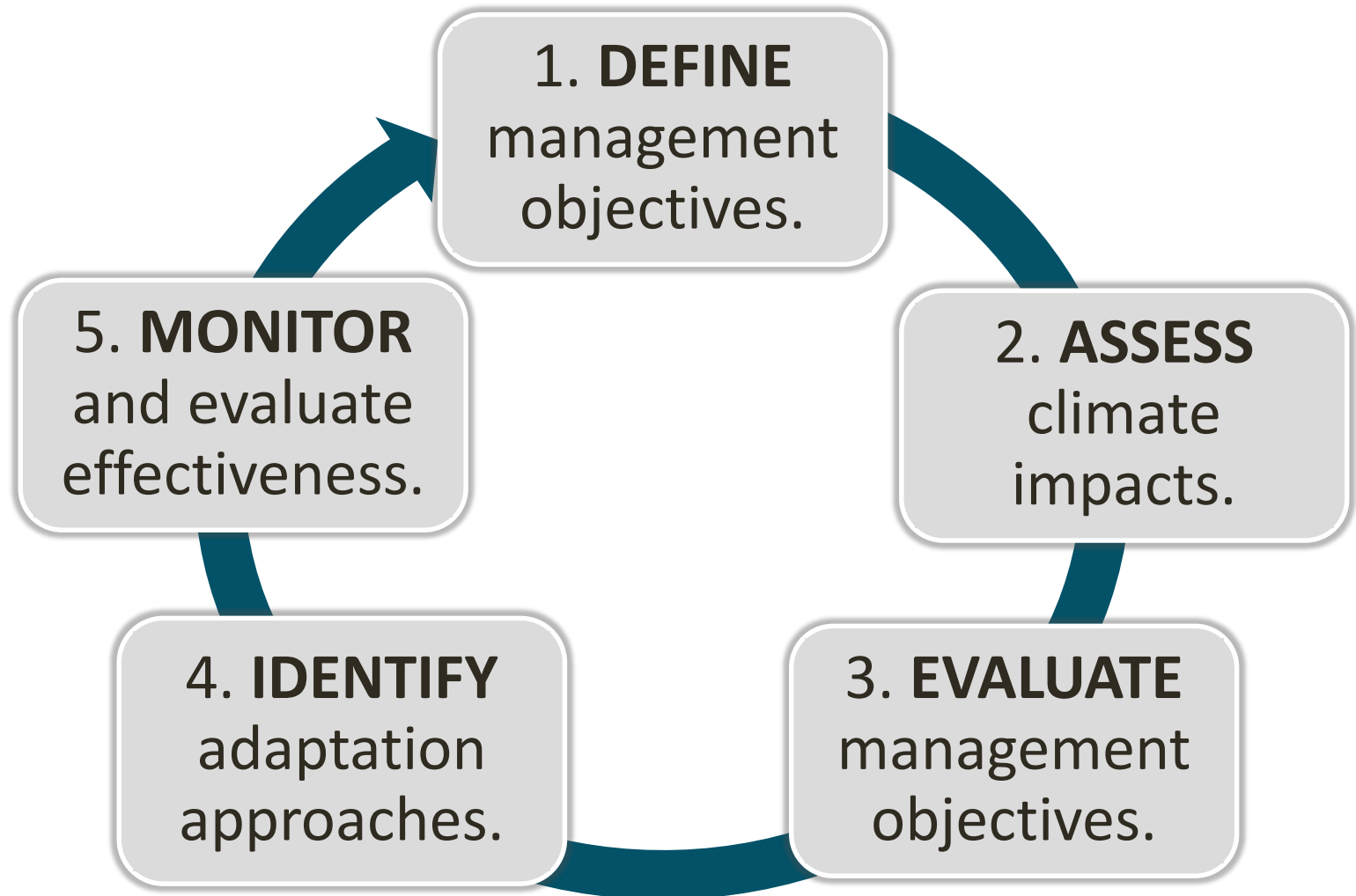
Introductions

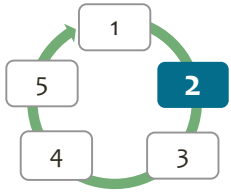




Step 2: Assess site-specific climate change impacts & vulnerabilities

Adaptation Workbook

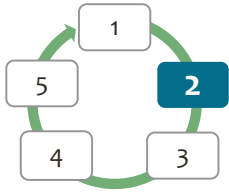




Step 2: ASSESS site-specific climate change impacts and vulnerabilities.

Purpose:

- Consider how climate change may specifically affect the project area
 - Climate Impacts and Vulnerability
 - Vulnerability Determination



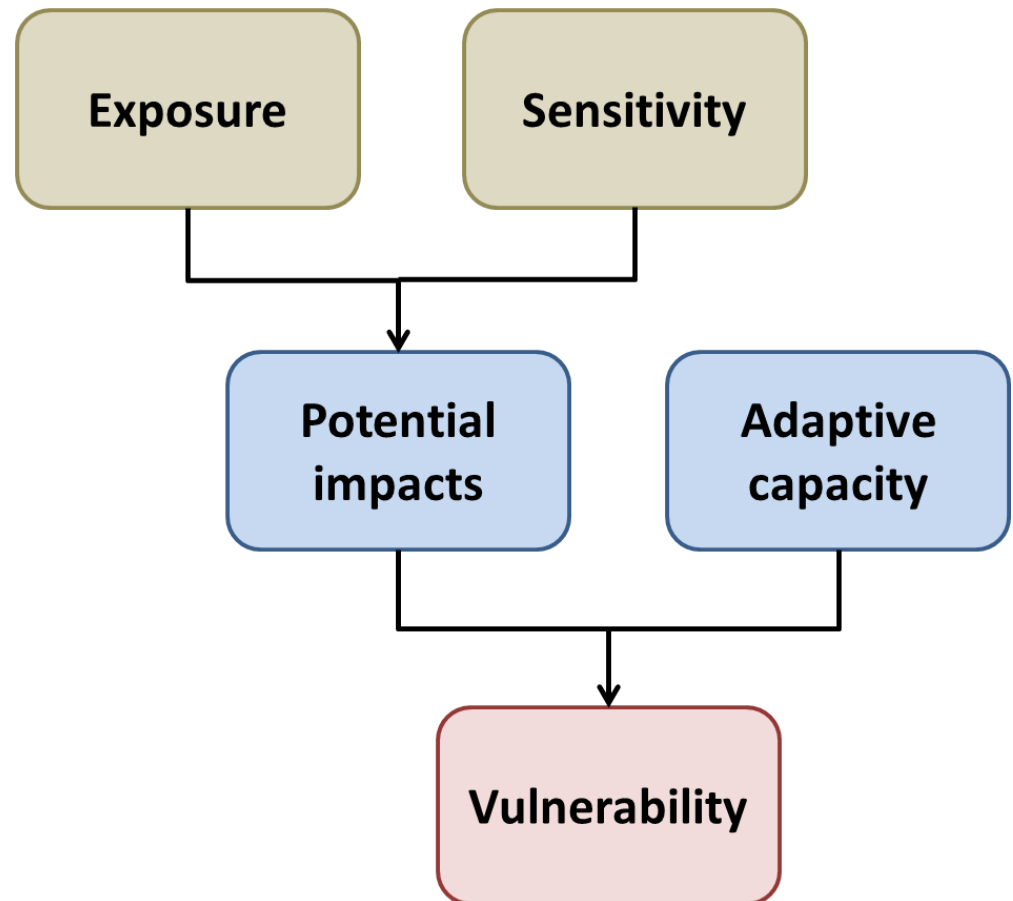
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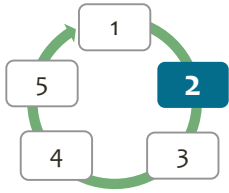
Vulnerability Determination

Exposure: character, magnitude, and rate of change

Sensitivity: whether and how a system is likely to be affected

Adaptive Capacity: ability of a system to accommodate change with minimal disruption





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

Climate Change Impacts – Notes and Prioritization

General Climate Change Impacts	Specific Considerations for the Project Area	Points* (20 Total)
<i>General climate change impacts across the Midwest and Northeast US:</i>	<i>How might broad-scale impacts and vulnerabilities be affected by conditions in your project area?</i>	
Warmer temperatures across the entire year, particularly warmer winters		
More days with extreme heat		
Fewer days with extreme cold		
Increased winter & spring precipitation		
Slight or large decrease in summer precipitation		
More frequent heavy precipitation events		
Less snow and more variable snowpack		
Shorter winters		

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



LUNCH BREAK!

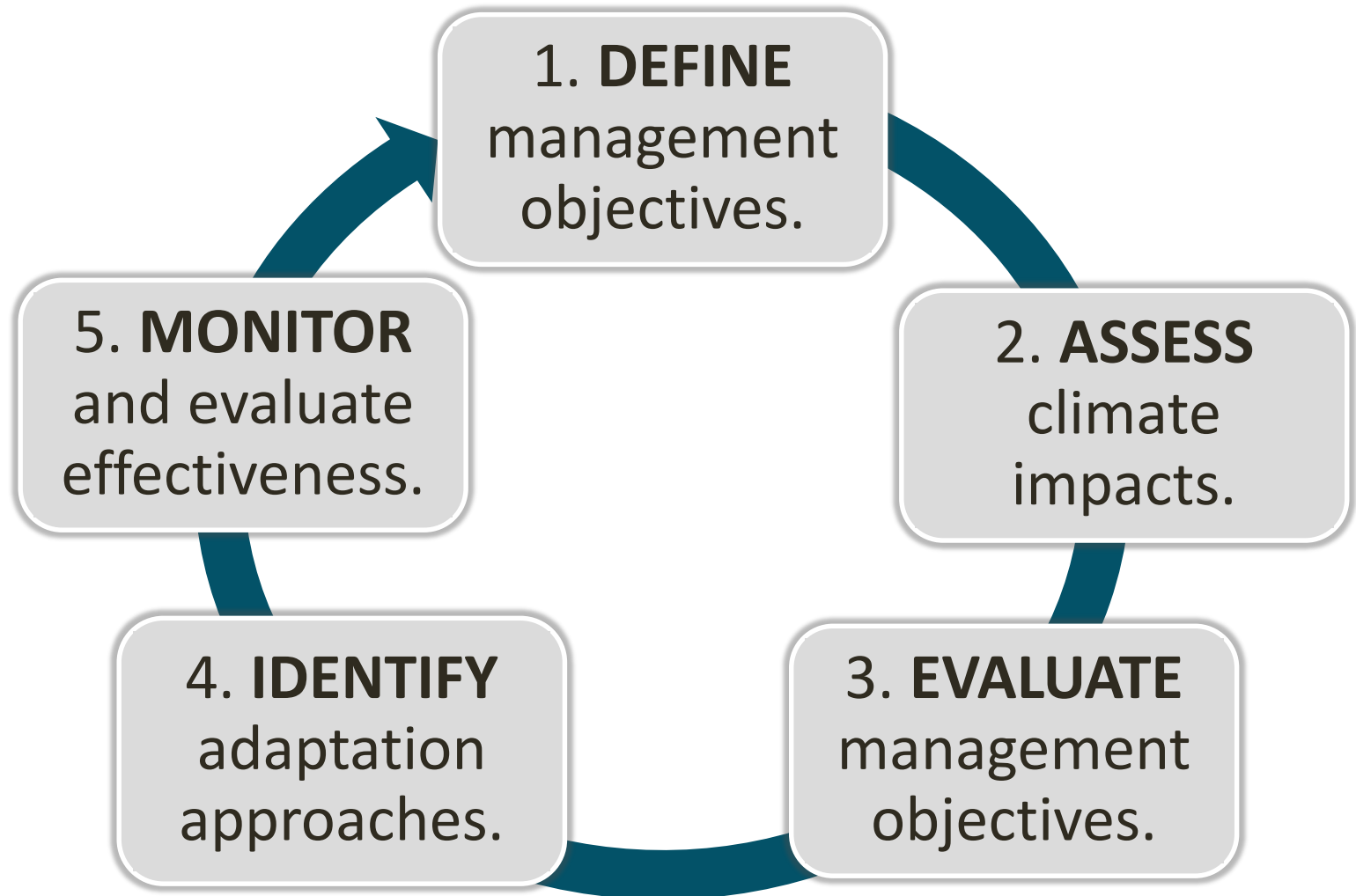


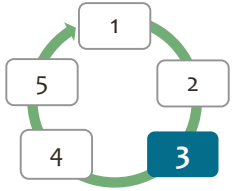
Step 2: Assess site-specific climate change impacts & vulnerabilities



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

Adaptation Workbook



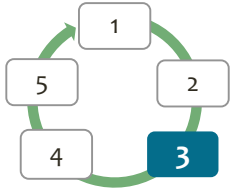


Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.

Purpose:

- Realistically assess the ability to meet goals and objectives under current management.

Can current management achieve goals?



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

Management Objective

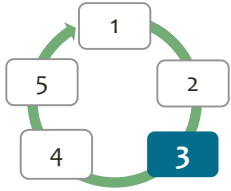
Challenges

Opportunities

Feasibility under
Current Management

Other Considerations

From Step 1



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

Management Objective

Challenges

Opportunities

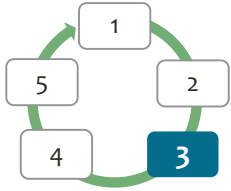
Feasibility under
Current Management

Other Considerations

How climate change impacts and vulnerabilities may make it more difficult to achieve the objective.

For example:

- Reduced suitable habitat for target species*
- Reduced winter access*



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

Management Objective
Challenges

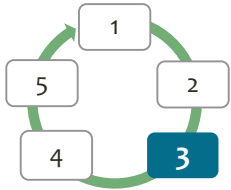
Opportunities

Feasibility under
Current Management
Other Considerations

How climate change impacts and vulnerabilities may make it easier to achieve the objective.

For example:

- *Reduced competition*
- *Increased growth*



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

Management Objective

Challenges

Opportunities

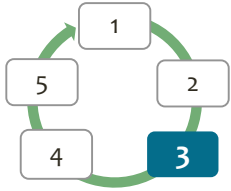
**Feasibility under
Current Management**

Other Considerations

Is current management adequate for meeting the objectives given climate change?

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.

Management Objective

Challenges

Opportunities

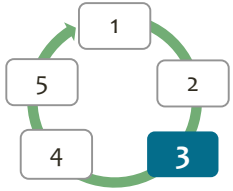
Feasibility under
Current Management

Other Considerations

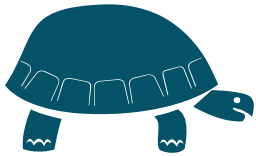
Social, administrative, financial, or other factors that also affect the ability to meet the objectives.

For example:

- Rare species or high social value—we'll manage for it regardless*
- Best chance of success—go for the long shot*



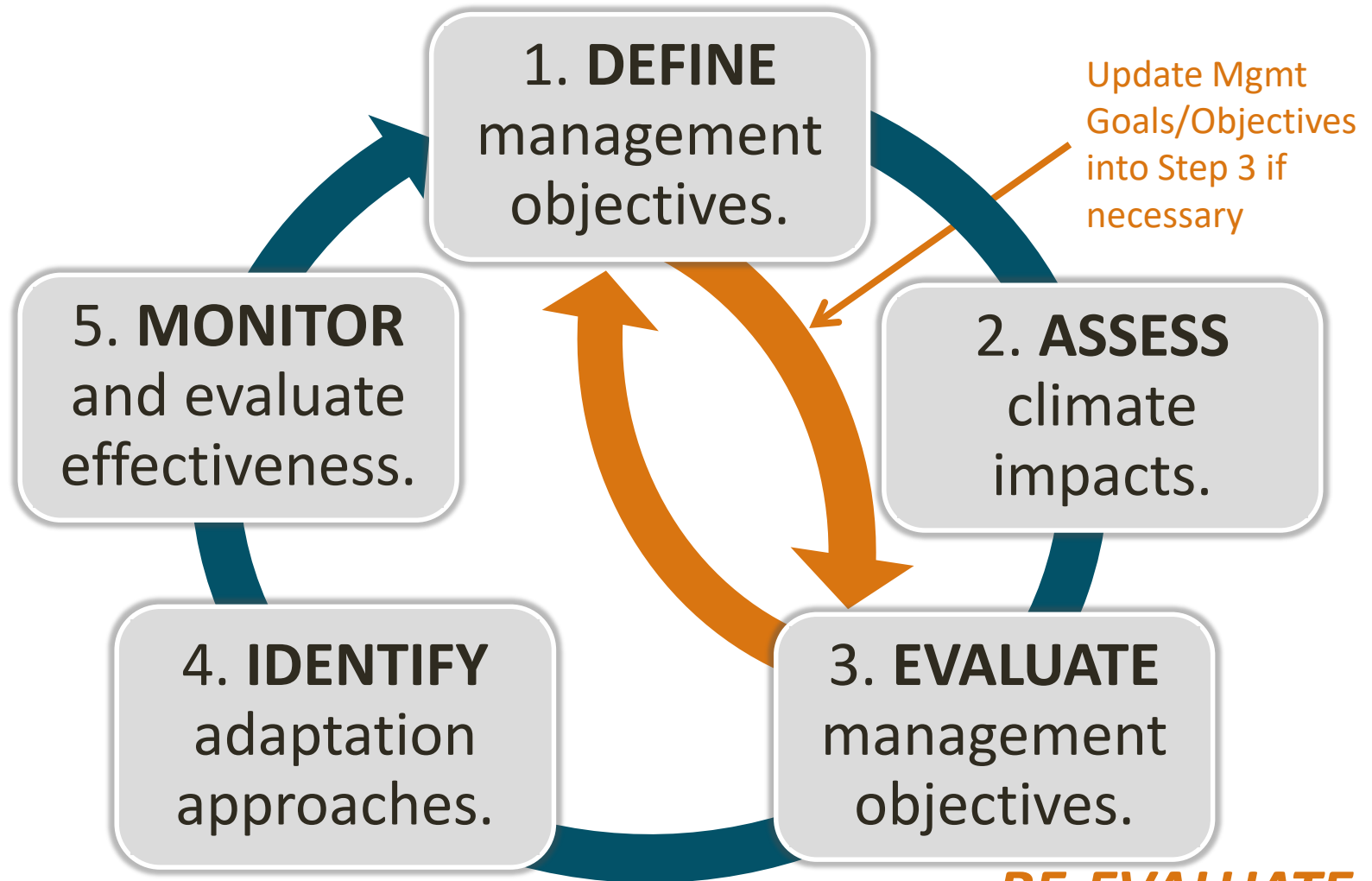
Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.



Slow down!

Are you going to continue with the management objectives that you have identified?

Adaptation Workbook



...or, RE-EVALUATE

MI DNR : Allegan State Game Area

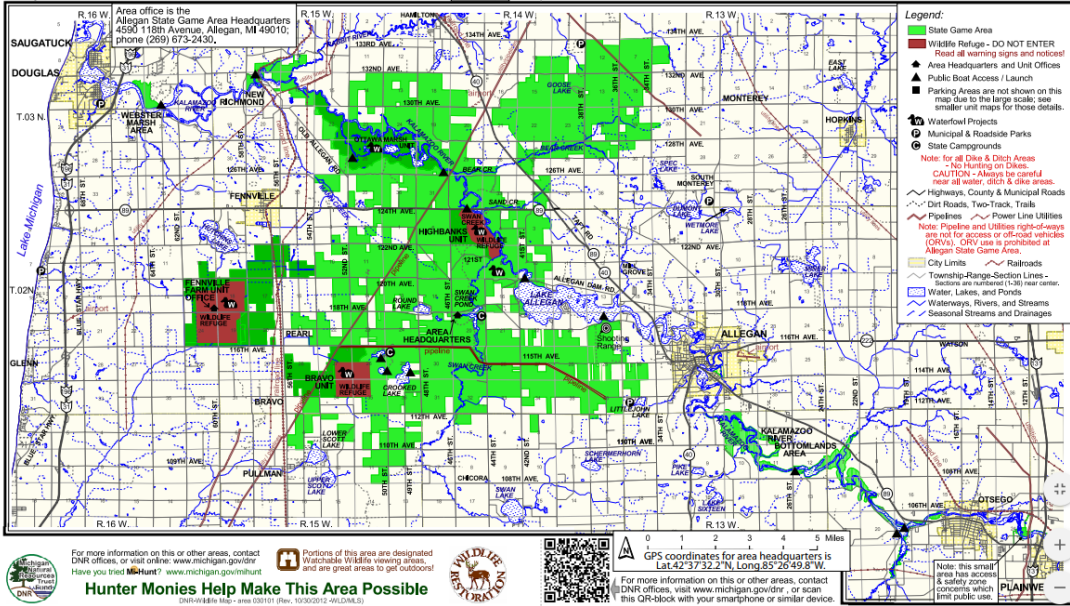


STATE OF MICHIGAN - DEPARTMENT OF NATURAL RESOURCES
ALLEGAN STATE GAME AREA
 OVERVIEW OF GAME AREA (11"x17" MAP)
 - General Map -
 ALLEGAN COUNTY



Important Information: This area has several unit maps with additional details.

- Off-road vehicle use is unlawful at Allegan State Game Area
- Always use care when near all water areas - water levels can vary with season & rainfall.
- Horses are prohibited off of marked equestrian trail system. See equestrian trail system map for details or contact the Allegan State Game Area Headquarters.

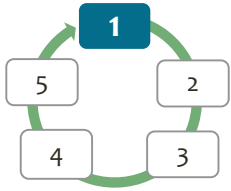


For more information on this or other areas, contact DNR offices, or visit online: www.michigan.gov/dnr. Have you tried **Michigan Hunt?** www.michigan.gov/mhunt

Hunter Monies Help Make This Area Possible

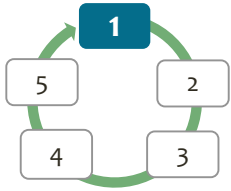
06/15/2016 10:00 AM - area 03101 (dhw, 10/30/2012 - WLD/MS)





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

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

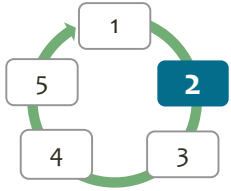


Step 1: DEFINE area of interest, management goals and objectives, and time frames.



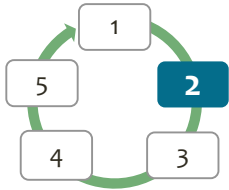
Mgmt. Goals

1. Maintain existing cool season and warm season grasslands (pheasant, Canada goose, etc.)
2. Maintain row crop production and expand grassland nesting habitat for migratory and winter resident waterfowl
3. Provide riparian habitat in Black River drain



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

How might the area be uniquely affected by climatic change and subsequent impacts?

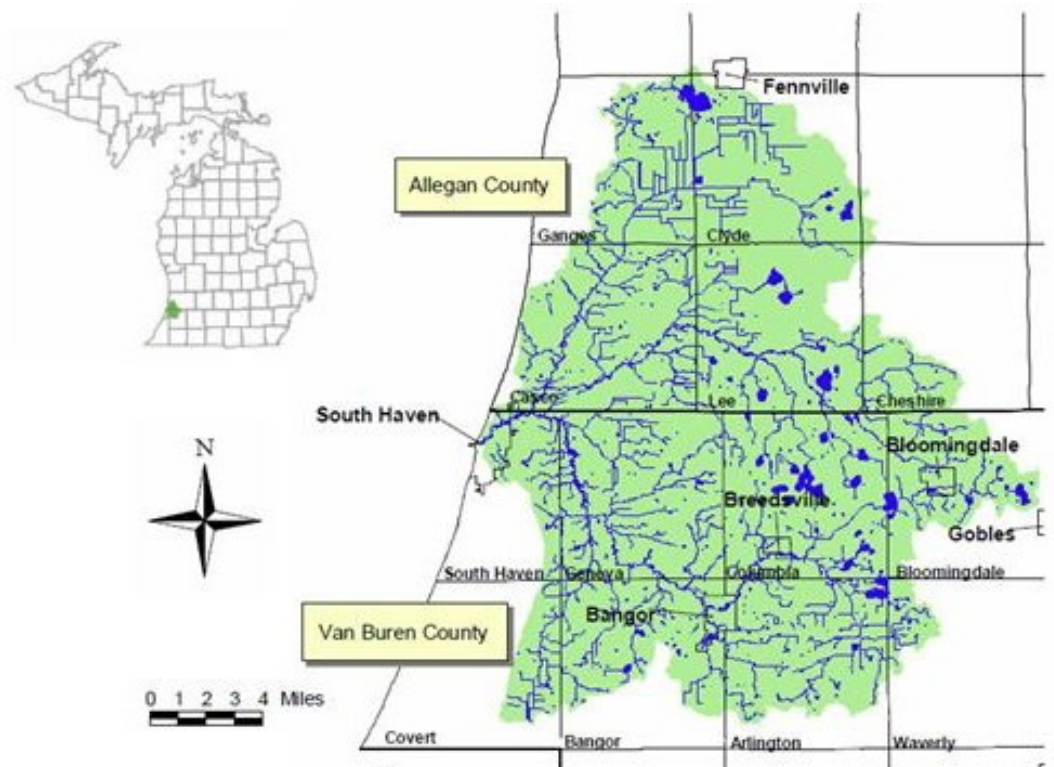


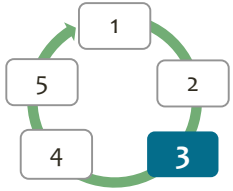
Step 2: ASSESS climate change impacts and vulnerabilities for the area of interest.

Broad-scale Impacts & Vulnerabilities

- Warmer temps
- Longer growing season
- Early snowmelt
- More extreme precip

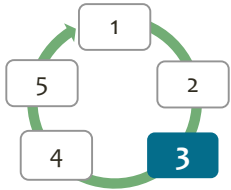
How might broad impacts be different in the area of interest?





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

- **What management challenges or opportunities might occur?**
- **Can current management meet management goals?**
- **Do goals need to change?**



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

Mgmt. Obj.

Challenges

Opportunities

Feasibility of Meeting Obj. (Current Mgmt)

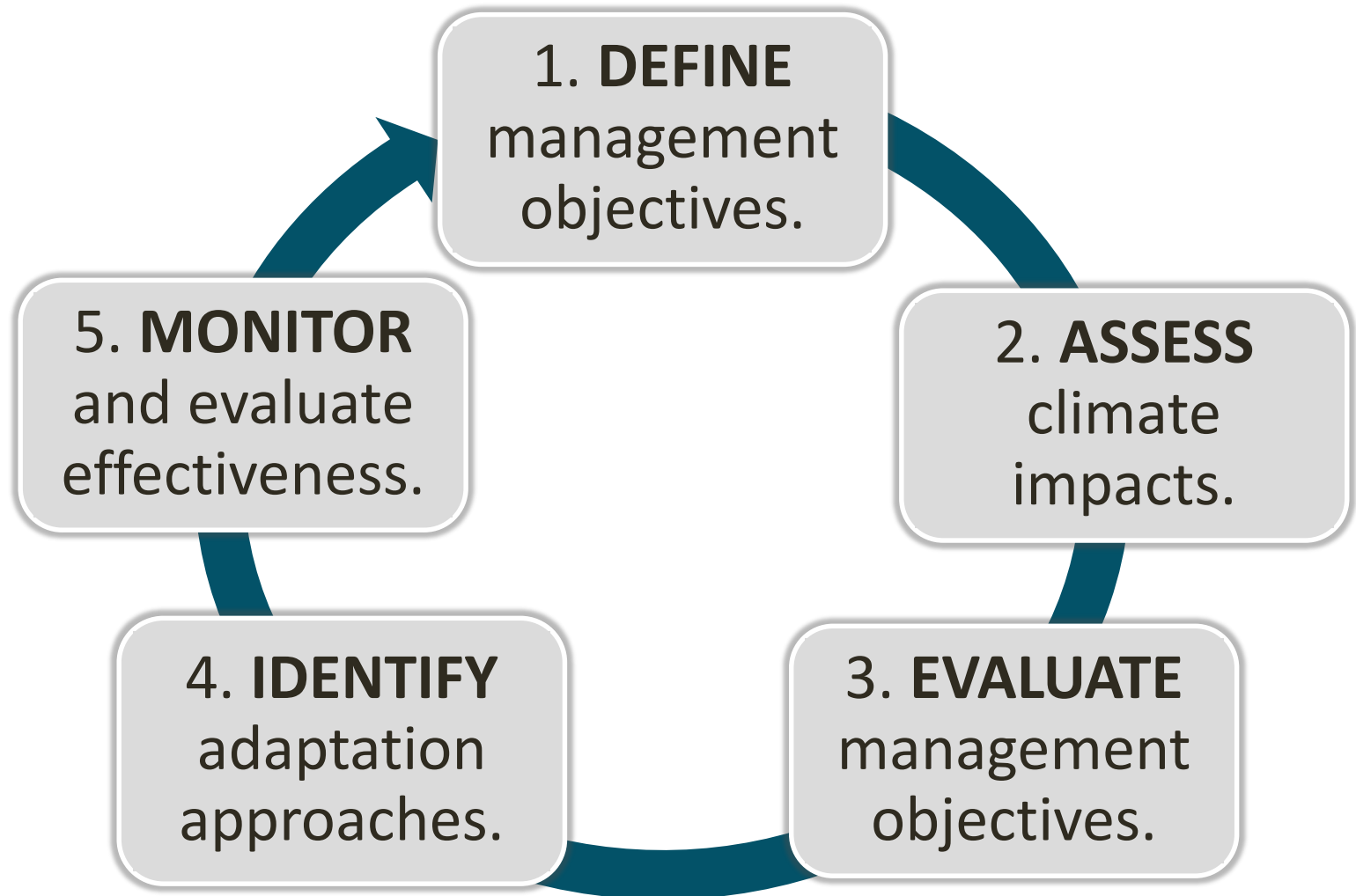
#2 Maintain row crop production for migratory and resident waterfowl

- Flooding
- Difficulty timing planting
- More drought stress
- Row crop pests and diseases

- Longer growing season

- Short term: Medium

Adaptation Workbook





BREAK!

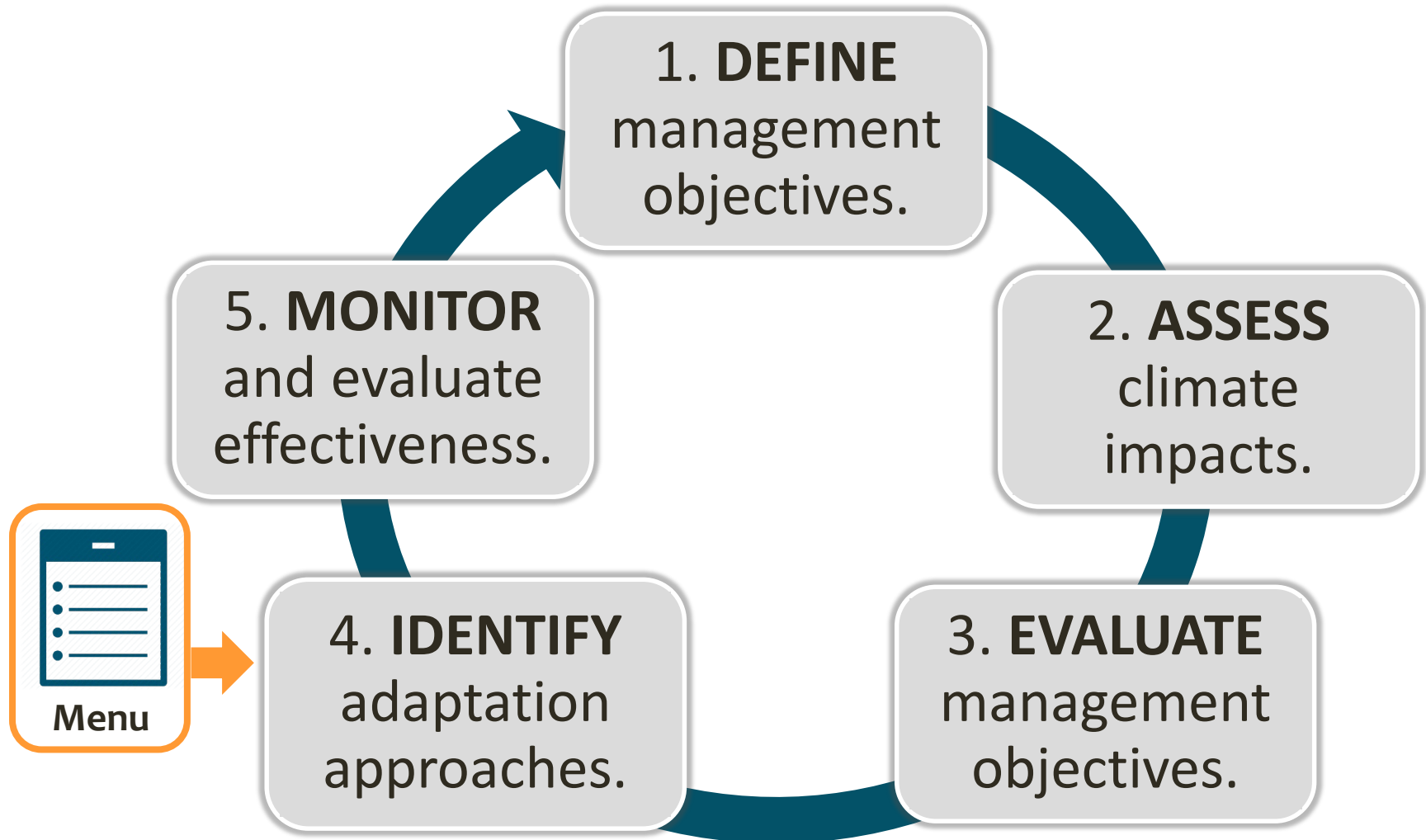


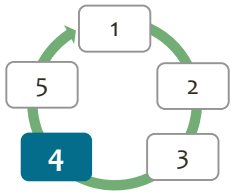
Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.



Step 4: Identify adaptation approaches and tactics for implementation

Adaptation Workbook





Step 4: IDENTIFY adaptation approaches and tactics for implementation.

Key Questions:

What actions can enhance the ability of the ecosystem to adapt to anticipated changes *and* meet management goals?

Will future managers know what we were trying to do?

Intentionality

- Explicitly consider and address climate change
- Sure we might get lucky...
- Intentionally assessing risk and vulnerabilities **makes our plans more robust!**



Adaptation Options

Resistance

Resilience

Transition



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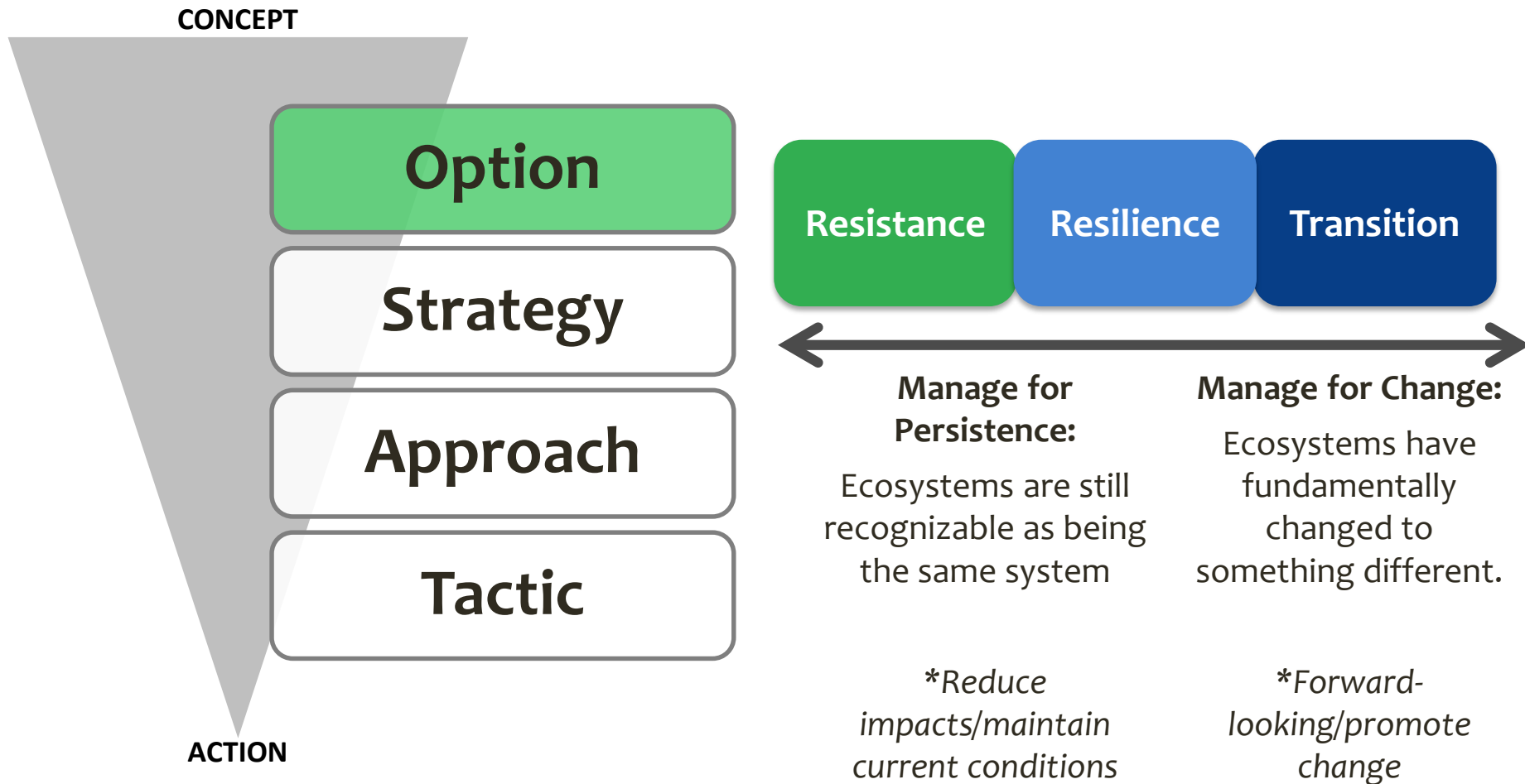


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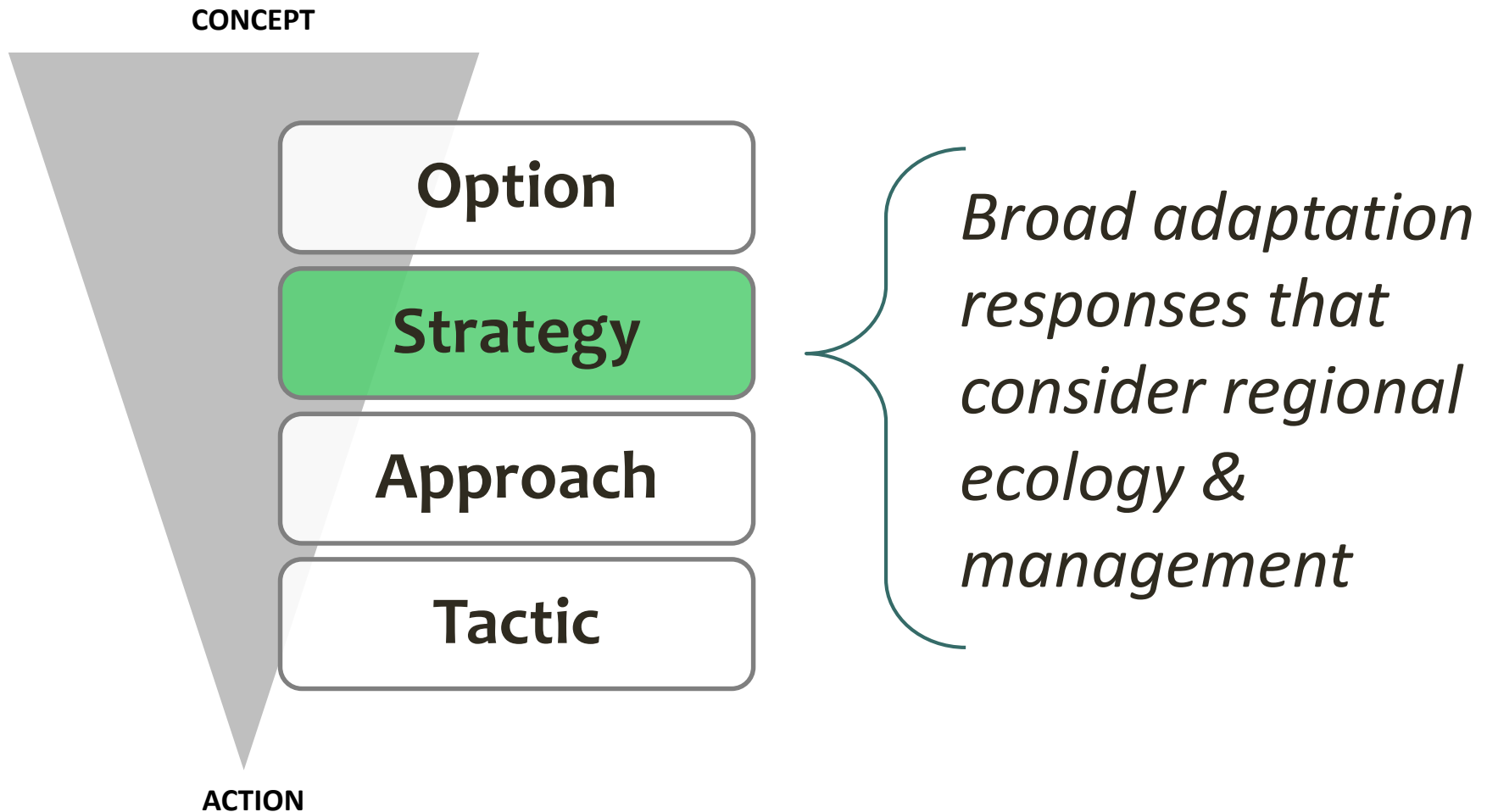


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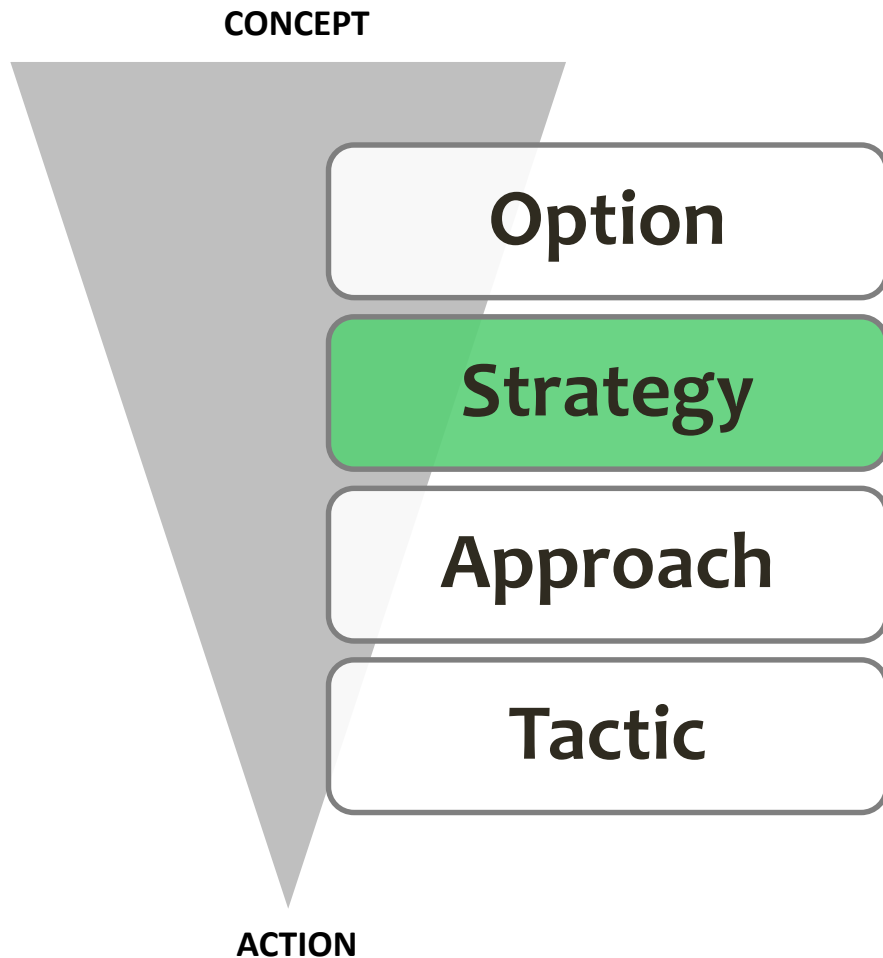
Adaptation Strategies and Approaches



Adaptation Strategies and Approaches



Adaptation Strategies and Approaches

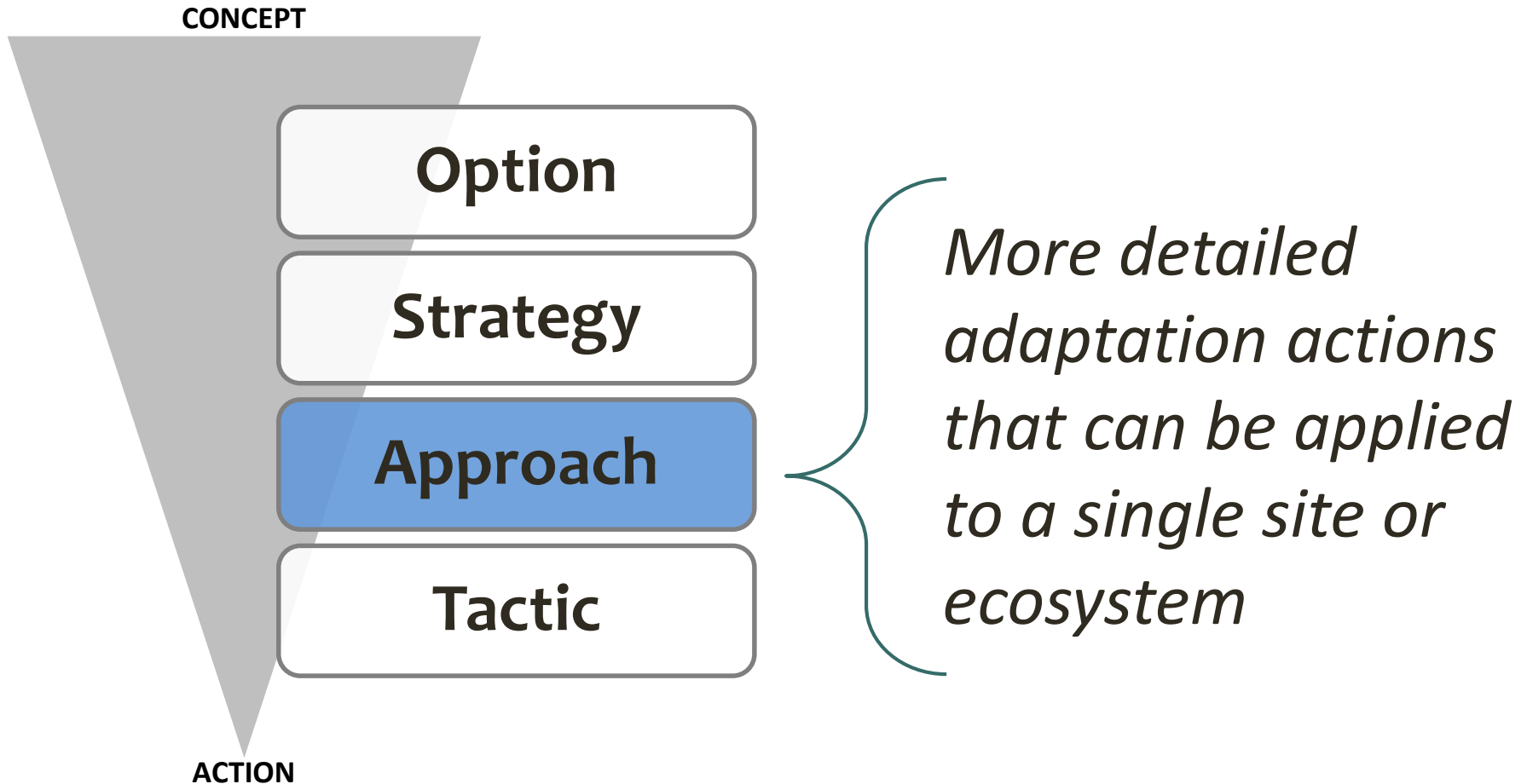


Broad adaptation responses:

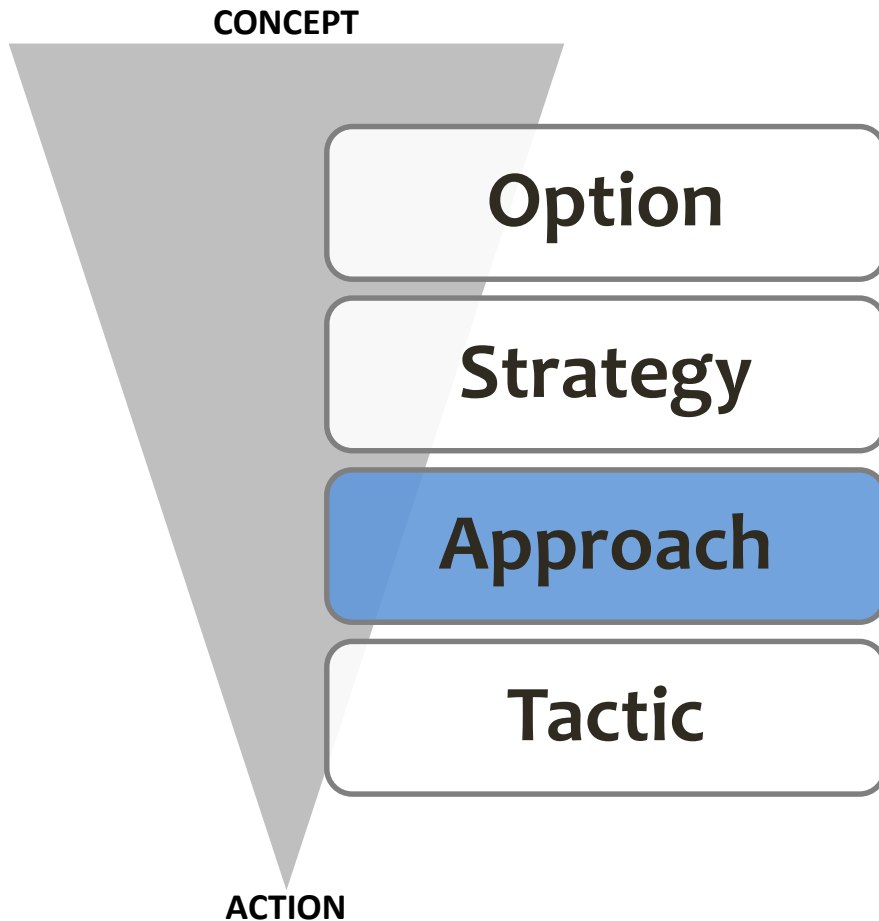
1. Maintain and enhance genetic diversity

9. Adjust management of food, water, and cover to align with expected future conditions.

Adaptation Strategies and Approaches



Adaptation Strategies and Approaches

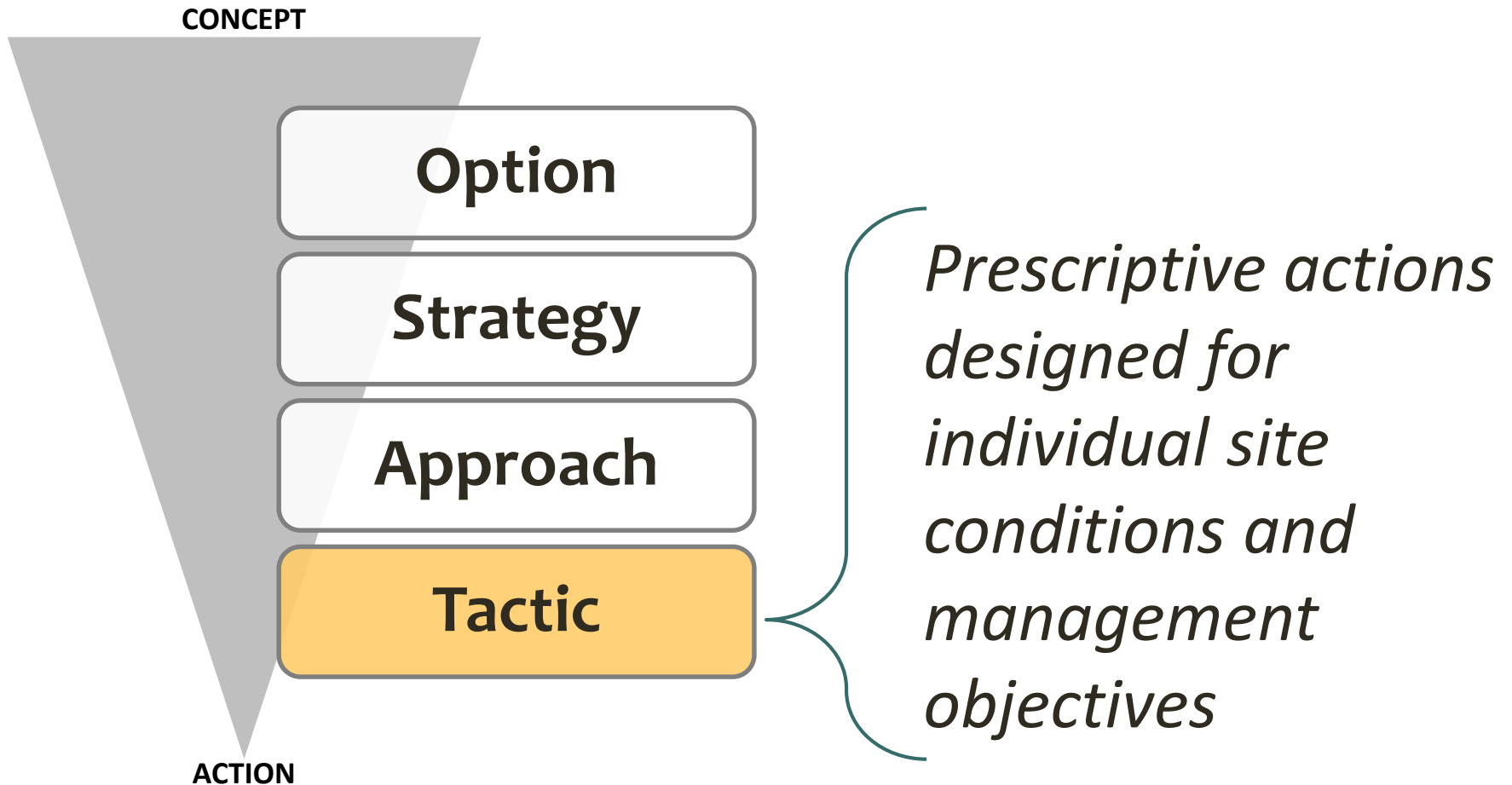


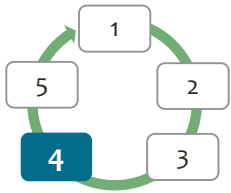
More detailed actions:

1.6. Protect areas of high phylogenetic diversity or endemism

9.4. Create new sources of food, water, and cover in anticipation of future conditions

Adaptation Strategies and Approaches



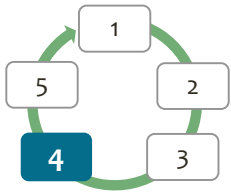


Step 4: IDENTIFY adaptation approaches and tactics for implementation.

Key Questions:

What actions can enhance the ability of the ecosystem to adapt to anticipated changes *and* meet management goals?

Will future managers know what we were trying to do?

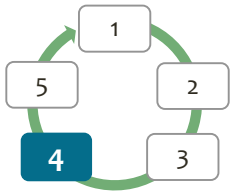


Step 4: IDENTIFY adaptation approaches and tactics for implementation.

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

Tactic – Describe a specific action you can take.

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

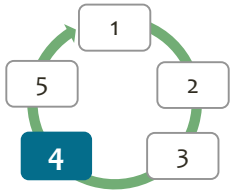


Step 4: IDENTIFY adaptation approaches and tactics for implementation.

Timeframe – Specify when you will implement the tactic.

For example:

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

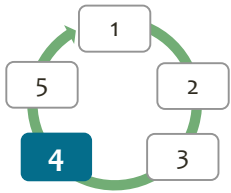


Step 4: IDENTIFY adaptation approaches and tactics for implementation.

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

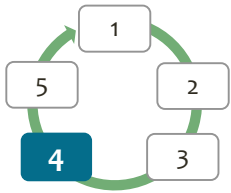


Step 4: IDENTIFY adaptation approaches and tactics for implementation.

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.

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

MI DNR : Allegan State Game Area



STATE OF MICHIGAN - DEPARTMENT OF NATURAL RESOURCES
ALLEGAN STATE GAME AREA
 OVERVIEW OF GAME AREA (11"x17" MAP)
 - General Map -
 ALLEGAN COUNTY

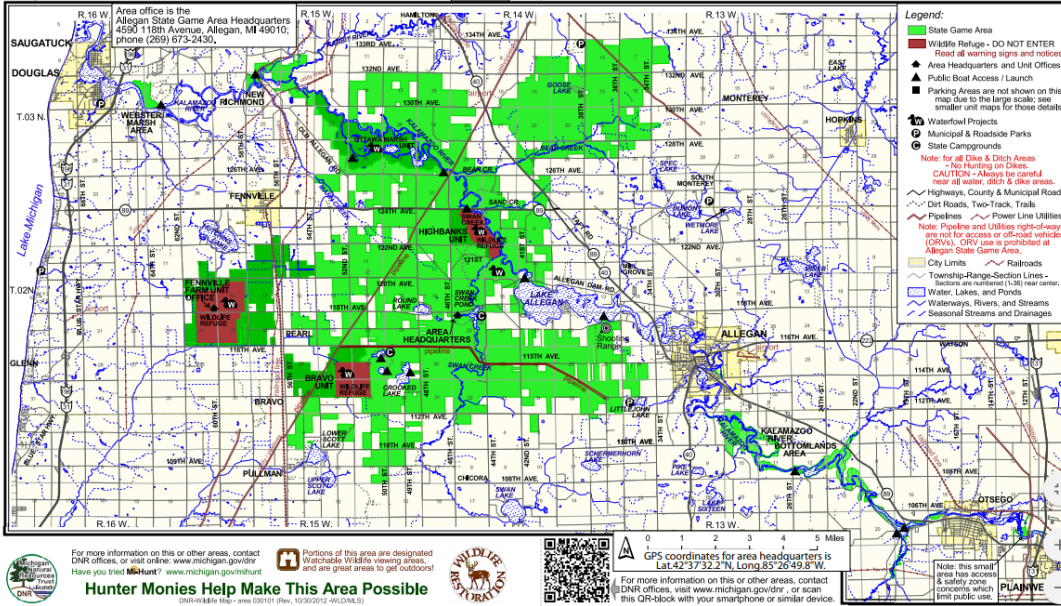


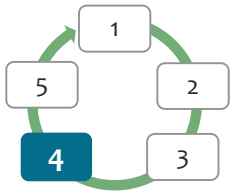
Important Information: This area has several unit maps with additional details.

Off-road vehicle use is unlawful at Allegan State Game Area

Always use care when near all water areas - water levels can vary with season & rainfall.

Horses are prohibited of marked equestrian trail system. See equestrian trail system map for details or contact the Allegan State Game Area Headquarters.





Step 4: IDENTIFY adaptation approaches and tactics for implementation.

Goal #2: Maintain row crop production for migratory and resident waterfowl

Adaptation Actions

- 9.2: Convert some areas to wet/moist soil vegetation
- 9.4: Plant other grains – buckwheat, millet, sorghum
- 9.5: Install filter strips and cover crops

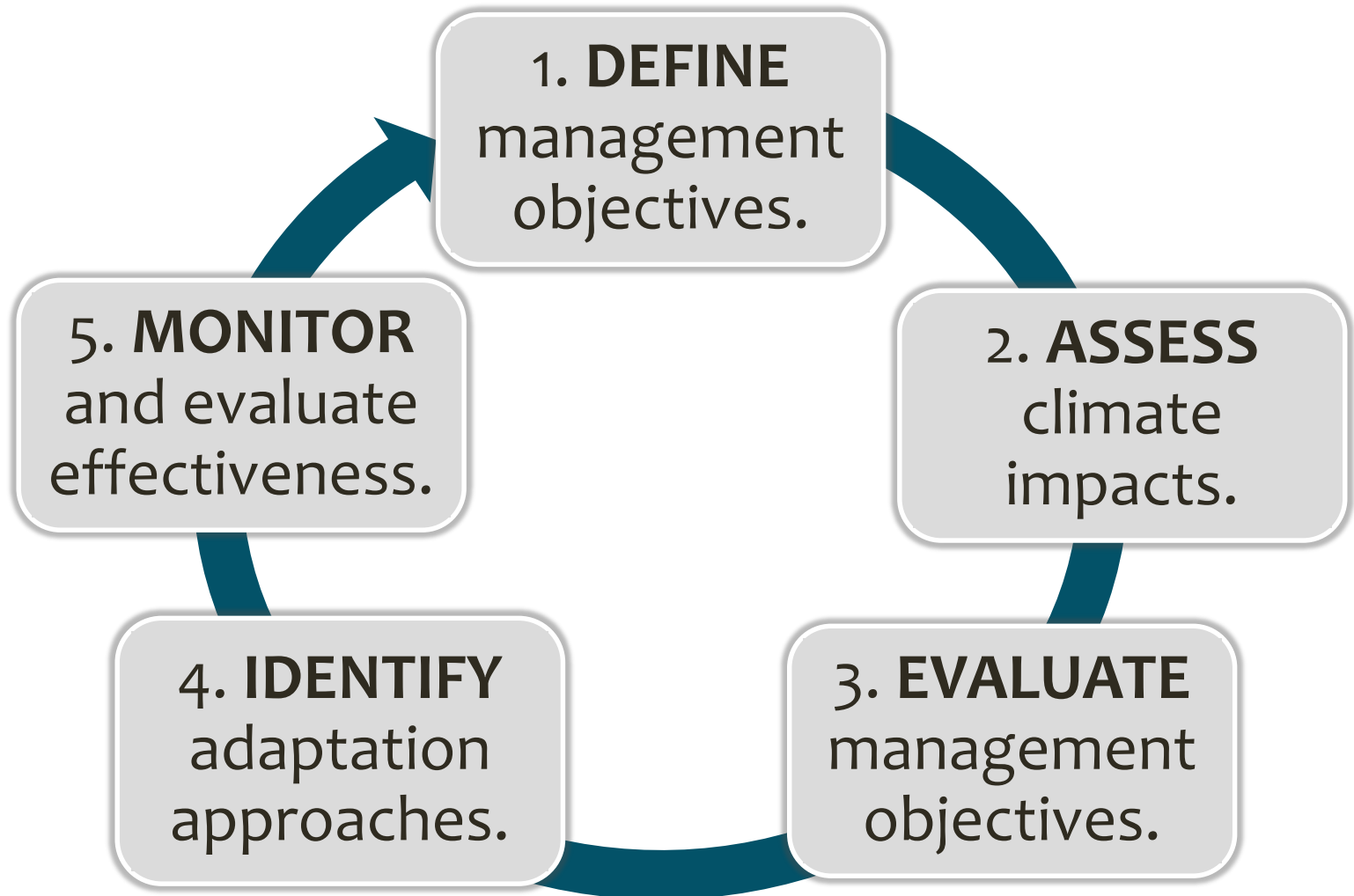
Benefits

- Beneficial to chicks
- More diverse timing of food sources
- Reduced erosion and sedimentation

Drawbacks

- Social acceptance
- Requires creative agreements with sharecropper

Adaptation Workbook





© Patty Bauchman / www.comedywildlifephotography.com

BREAK!

WILDLIFE MANAGEMENT AND CLIMATE ADAPTATION WORKSHOP

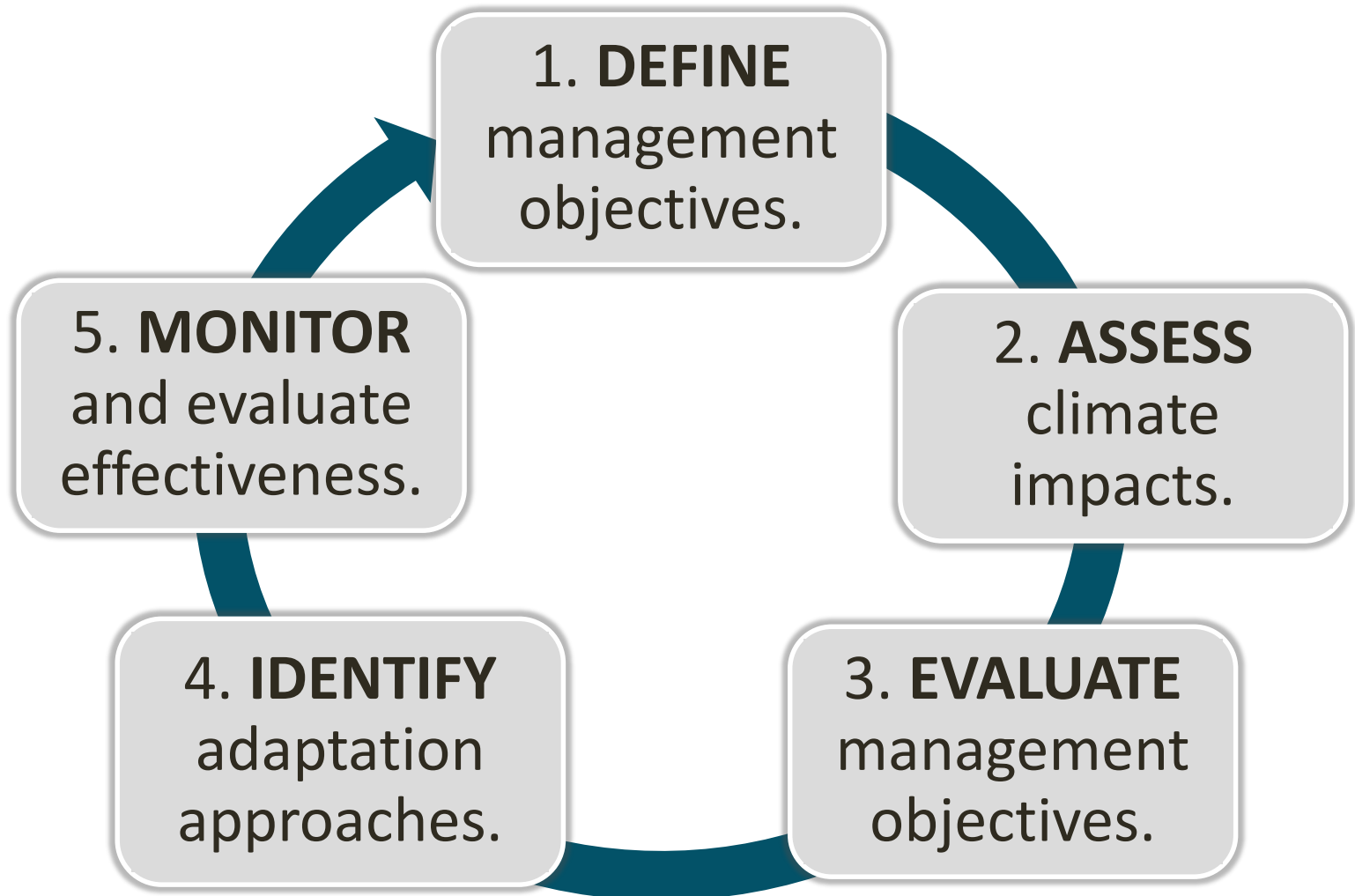
Welcome Back - Day 2



April 2019



Review of Day 1



Adaptation Critical Thinking

Do your adaptation actions:

1. Connect to your fundamental management goals?
(WILDLIFE)
2. Address climate change impacts you identified in Step 2?
3. Address the key challenges and opportunities you identified in Step 3?
4. Hold up across a range of future conditions?
5. Consider a range of Strategies from the menu?

Poster Time!

Project Name

Objective

Site-level Impacts

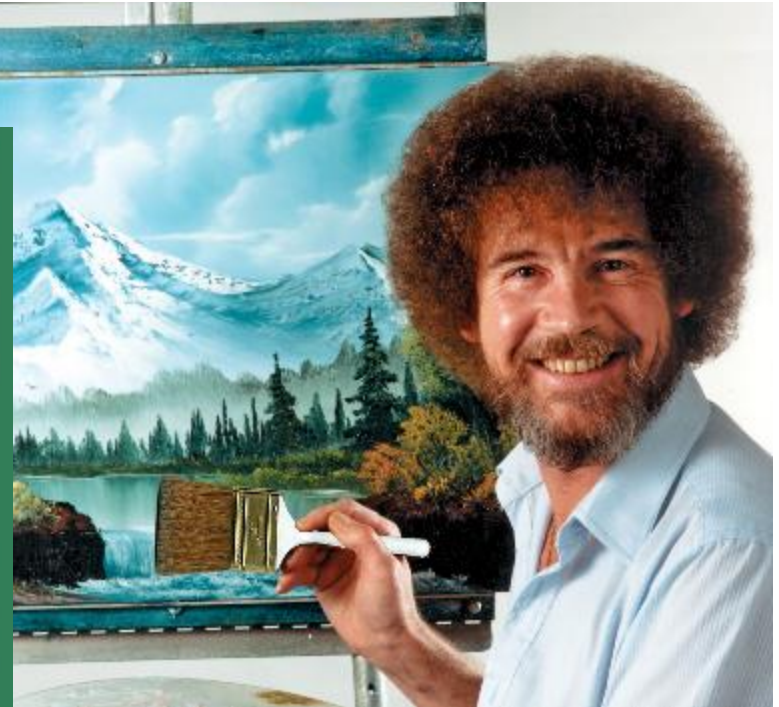
Challenge/ Opportunity

Adaptation Tactics

(label with Strategy/ Approach #)

Be creative! What's your future vision, and how will adaptation help you get there?

Poster Time!



Be creative! What's your future vision, and how will adaptation help you get there?

Group Reports:

- Give a short summary of your adaptation actions for one of your Management Objectives.

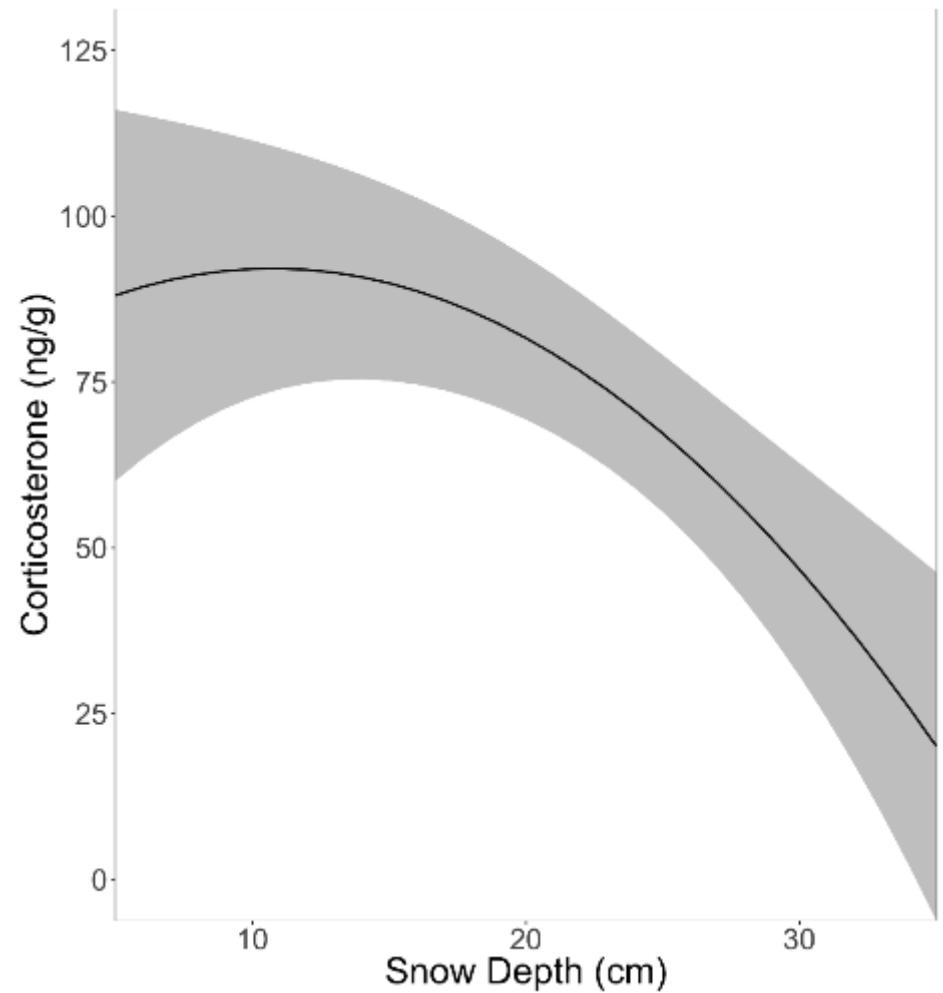
2 min max!

A few *brief* comments, please!



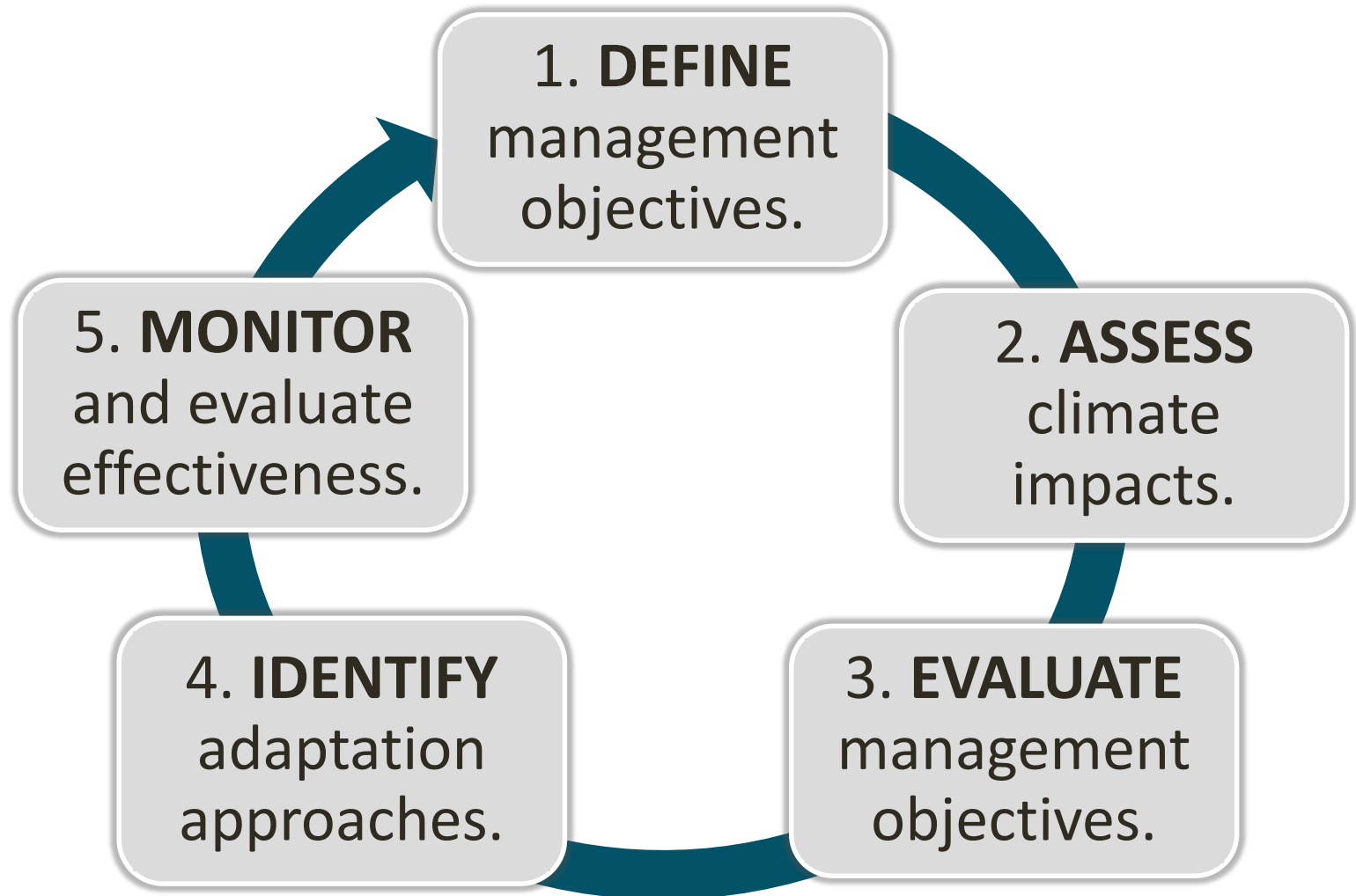


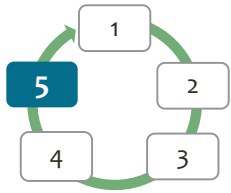
BREAK!



Step 5: MONITOR and evaluate effectiveness of implemented actions.

Adaptation Workbook





Step 5: MONITOR and evaluate effectiveness of implemented actions.

Purpose:

- Practice adaptive management

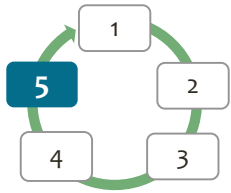
How do we know if the selected actions were effective?

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

A Few Thoughts About Monitoring...

What question you are asking guides your monitoring approach:

- **Impact/ response monitoring** = What changes are occurring? (surveillance)
- **Implementation monitoring** = Did we do the action?
- **Effectiveness monitoring** = Did our actions actually have the desired effect?
- **Scientific research** = Are responses to treatments statistically significant, compared to a control? Can we replicate and standardize the design?



Step 5: MONITOR and evaluate effectiveness of implemented actions.

Monitoring Variable

Criteria for Evaluation

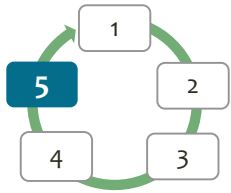
Monitoring
Implementation

Item that can tell you whether management goals/objectives were achieved .

If possible, use an item that also helps evaluate the effectiveness of the tactics.

For example:

- Planted seedling survival at 1, 2, 5, and 10 years after planting*



Step 5: MONITOR and evaluate effectiveness of implemented actions.

Monitoring Item

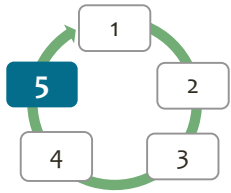
Criteria for Evaluation

Monitoring Implementation

Evaluation of success

For example:

- *60% survival of non-local genotypes*



Step 5: MONITOR and evaluate effectiveness of implemented actions.

Monitoring Item

Criteria for Evaluation

Monitoring Implementation

How the monitoring will actually get done?

Note: use existing monitoring when possible

For example:

- *Regular post-planting stocking surveys.*
- *Supplemental surveys at 10 years.*

Chequamegon-Nicolet National Forest

Twentymile Creek and Marengo River Priority Watershed project



28,445 acres within CNNF

High-priority watershed for restoration

Adaptation workbook used to guide the development of climate-informed restoration activities



Chequamegon-Nicolet National Forest

Twentymile Creek and Marengo River Priority Watershed project



Management Goals

CNNF Forest Plan Goal: Aquatic Ecosystems

Provide for ecologically healthy **streams, riparian areas, lakes, and wetlands** including a decline in the occurrence of exotics.

CNNF Forest Plan Goal: Wildlife and Fish Habitat

Conserve habitat capable of supporting **viable populations of existing native and desired non-native species**, and retain the integrity and function of key habitat areas.



Chequamegon-Nicolet National Forest

Twentymile Creek and Marengo River Priority Watershed project



Broad-scale impacts	AOI Impacts & Vulnerabilities
Extreme precipitation	Increased runoff, sedimentation; infrastructure damage
Warmer temperatures	Impacts to cold-water fish species
Alter precipitation regimes	Increased low-flow days
Soil moisture stress, wind	Increased riparian tree mortality



Chequamegon-Nicolet National Forest

Twentymile Creek and Marengo River Priority Watershed project



Adaptation tactics

Replace culverts to increase flow capacity and connectivity

Underplant pine to diversify & increase shade in riparian zones

Convert aspen stands to diverse long-lived species

Maintain older, larger trees to discourage beaver activity & increase cold-water habitat for trout



Chequamegon-Nicolet National Forest

Twentymile Creek and Marengo River Priority Watershed project



Monitoring item	Metric	Criteria for evaluation
Brook trout pop. (+ other spp.)	# fish (size, pop, catch/effort)	Maintaining or increasing populations
Channel stability	Bankfull channel width, depth, and area over time	Maintaining stable channels: no change in width:depth ratio
Water temperature	Summer max, max weekly mean	Cold: <23 C for annual max Cool: <26 C for annual max



Key Monitoring Considerations

- What is going to give you a clear vision of success?
- What data will help you engage in adaptive management?
- What is sustainable with minimal funding?
- What existing programs or resources can be leveraged?



YOU MADE IT!

(Congrats!)

To-do list:

You folks:

- Let us take a photo of your Workbook (or else!)
- Complete Next Steps sheets (and let us get a photo)
- Evaluations (please!)
- Keep moving these ideas forward!
- Follow up with questions or ideas

NIACS:

- Share contact list & presentations from today
- Check in soon!
- Other ideas?

Thanks everyone!