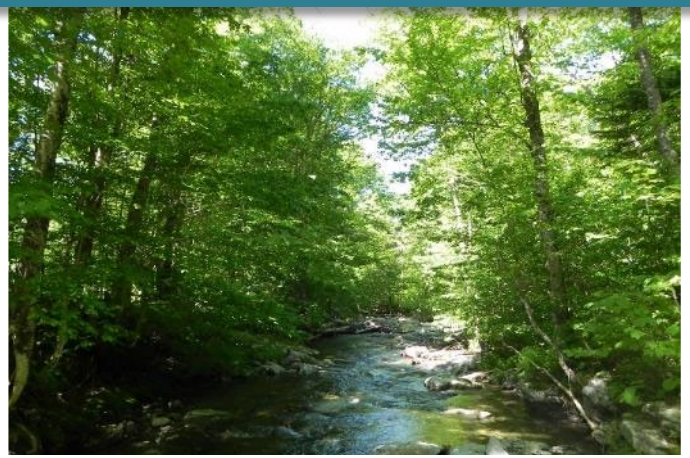
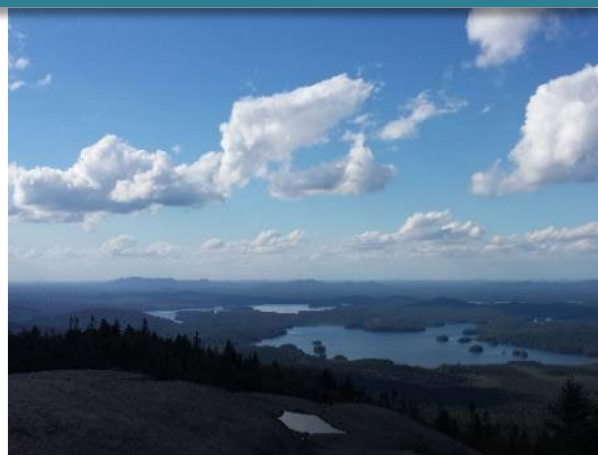
Tribal Forest Adaptation Planning and Practices

September 10-11, 2019

Saint Regis Mohawk Tribe

NIACS
Northern Institute of Applied Climate Science

USDA Northern Forests Climate Hub
U.S. DEPARTMENT OF AGRICULTURE

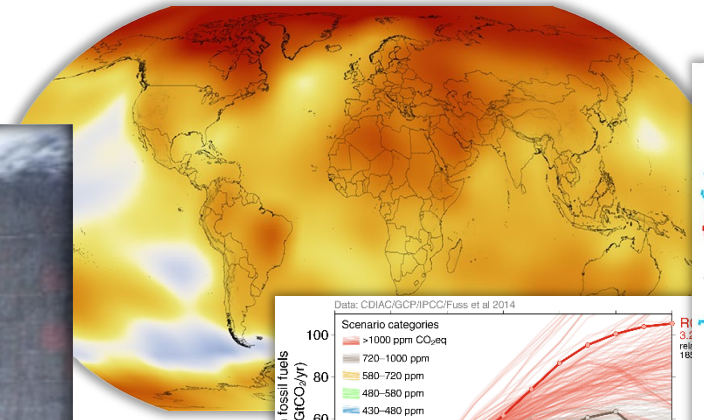
Great Lakes Indian Fish & Wildlife Commission

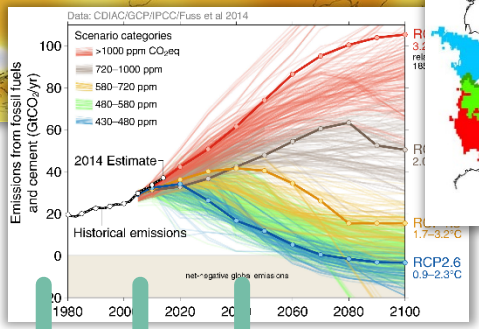
Introductions

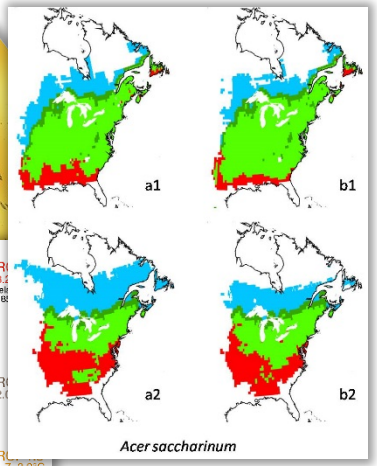
Climate Change Information

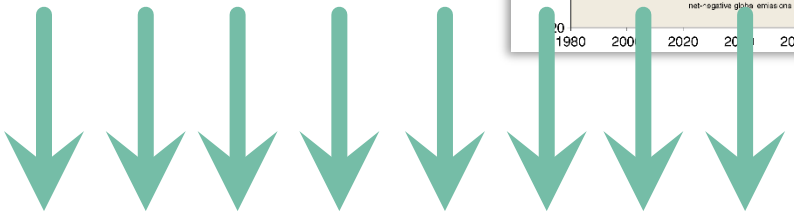
Image: www.ucciaconf.org

Climate Change Information







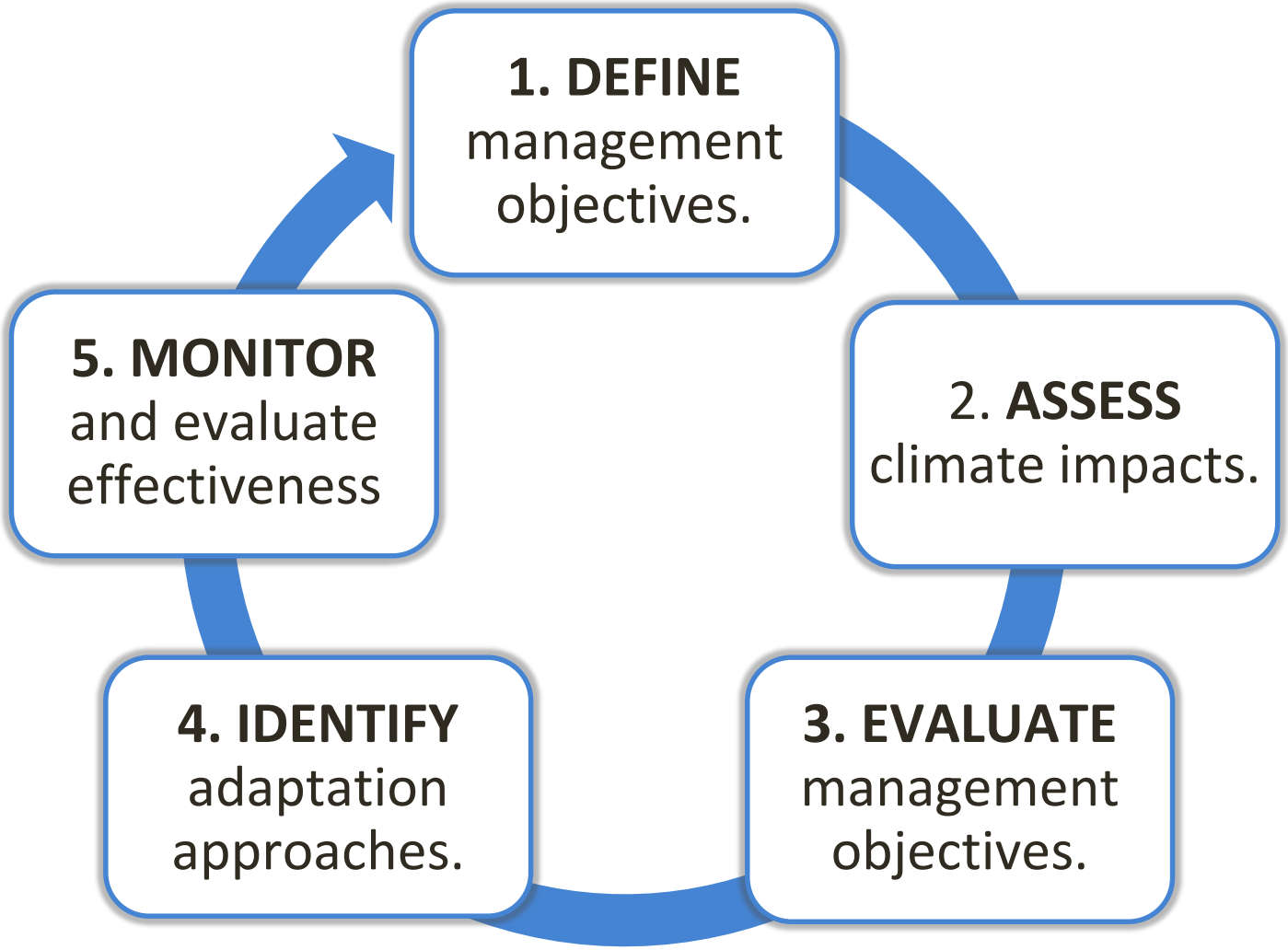


Training Objectives

You will be able to…

- Describe regional and local climate change effects on forests and related ecosystems
- Understand adaptation concepts and principles in the context of tribal natural resources management
- Use *Forest Adaptation Resources* in a real-world management project to:
  - Identify challenges and opportunities from climate change
  - Develop actionable steps to adapt to changing conditions
  - Create your own “climate-informed” project

Adaptation Process

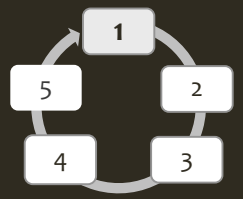


Adaptation Demonstration: Menominee Forest

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**

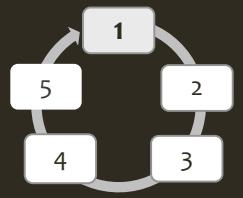
More information: www.forestadaptation.org/mte



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

General Management Goals across the Menominee Forest:

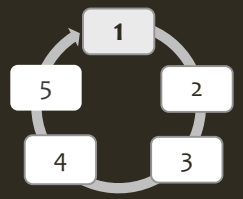
- Foster diversity
- Favor sawtimber species
- Provide for cultural uses



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

Goal: Reforest oak wilt pockets

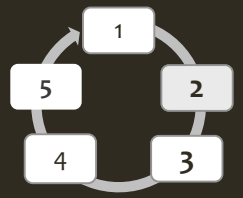
- More than 350 pockets found across forest during 2008-2013
- Identified 10 sites for climate-informed reforestation



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

Treatment on Oak Wilt Sites:

- Harvest affected & adjacent oaks
- Pull stumps to sever root connection
- Harvest other species in pocket



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

Climate Change & the Menominee Forest

- Menominee Forest has high species diversity compared to nearby forests
- Forest contains many northern species expected to decline
- Forest is located at transition zone with more southerly species present or relatively nearby
- Oak wilt sites are highly disturbed, with increased potential for invasion by nonnative or undesirable species

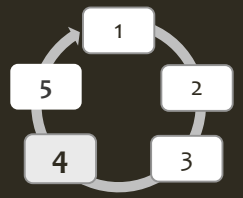
Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.

Challenges

- Oak wilt reduces the ability to maintain healthy, productive forests and meet other management goals
- Oak wilt treatment results in heavily disturbed sites

Opportunities

- Reforesting the oak wilt sites provides an opportunity to plant assemblages that may be better able to respond to future stressors.

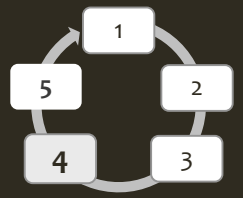


Step 4: IDENTIFY and adaptation approaches and tactics for implementation.

Adaptation Approaches

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

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

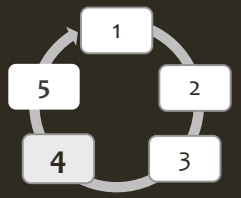


Step 4: IDENTIFY and adaptation approaches and tactics for implementation.

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

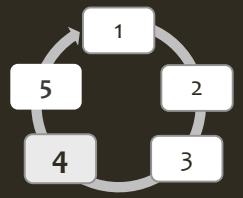


Step 4: IDENTIFY and adaptation approaches and tactics for implementation.

Plant selection: Traditional Ecological Knowledge

Example plant list for some sites

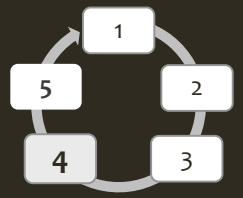
Tree Species	Notes	Menominee Name	Meaning	Menominee Use
White Oak	60% of site	Askeqtemaehnak	Good for the eyes	medicinal/food
Black Oak	30% of site	Anipahkahkuehtek	Black inside	medicinal/food
Bur Oak	8% of site	Mahkemenah maeqtekomen	Biggest acorn	medicinal/food
Swamp Oak	1% of site	Maskik-askeqtemaeh	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 2013 and 2014

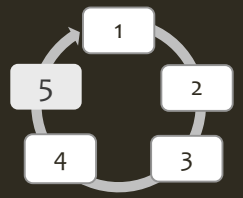
- Selected demonstration sites and prepared for planting
- Selected plant species and some oak trees planted



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

Summer 2015-2017

- Additional tree planting
- Seeding of understory plants



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!

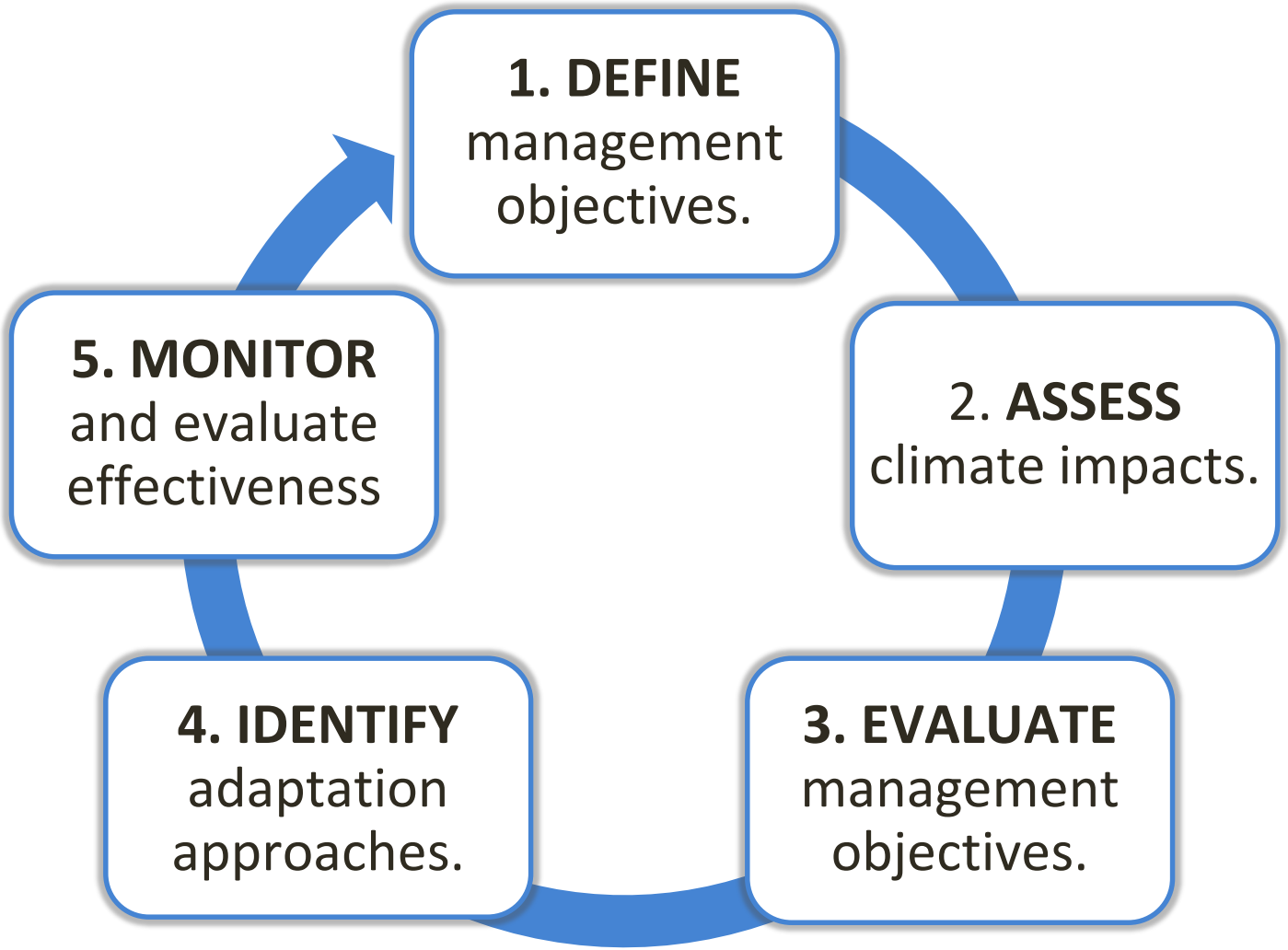
- Tony Waupochick
- Dave Mausel
- Jeff Grignon
- Marshall Pecore

Read more!

Adaptation Demonstration summary:
www.forestadaptation.org/mte

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

Adaptation Workbook



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

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

Key Questions:

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

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

Ecosystem Type or Management Topic – Different aspects of your project

Management Goals – Desired outcomes

Management Objectives – Specific targets for meeting your desired outcomes

Time Frame – for each objective

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

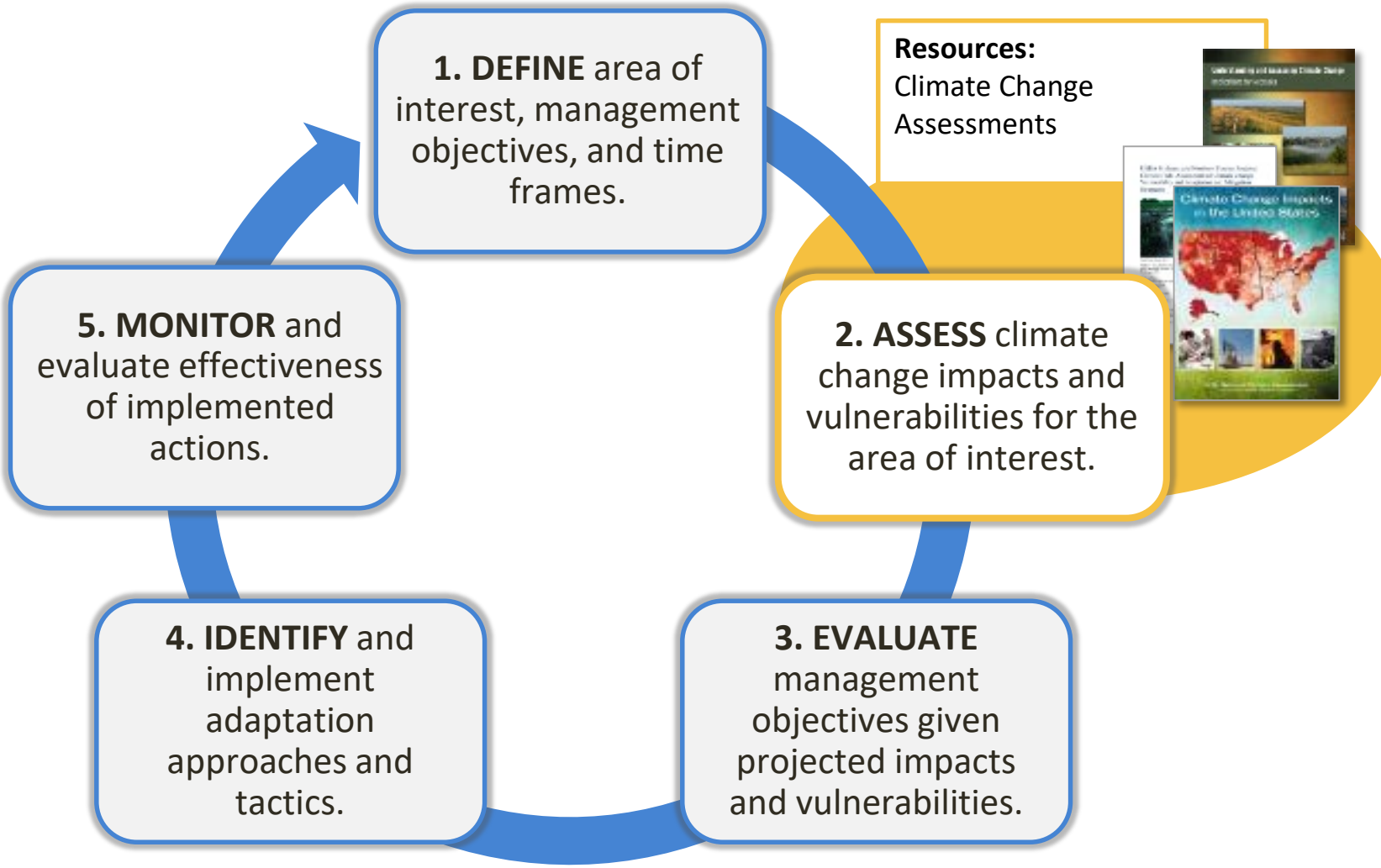
Step 2: ASSESS site-specific climate change impacts and vulnerabilities.

Purpose:

- Consider how climate change may specifically affect the project area

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

Workbook Cycle: Step 2



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

Regional Climate Change Impacts and Vulnerabilities – From regional vulnerability assessments

Site Specific Impacts – How regional climate impacts are likely to play out locally, based on your knowledge of the site.

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

Regional Climate Impacts

- Based on regional info

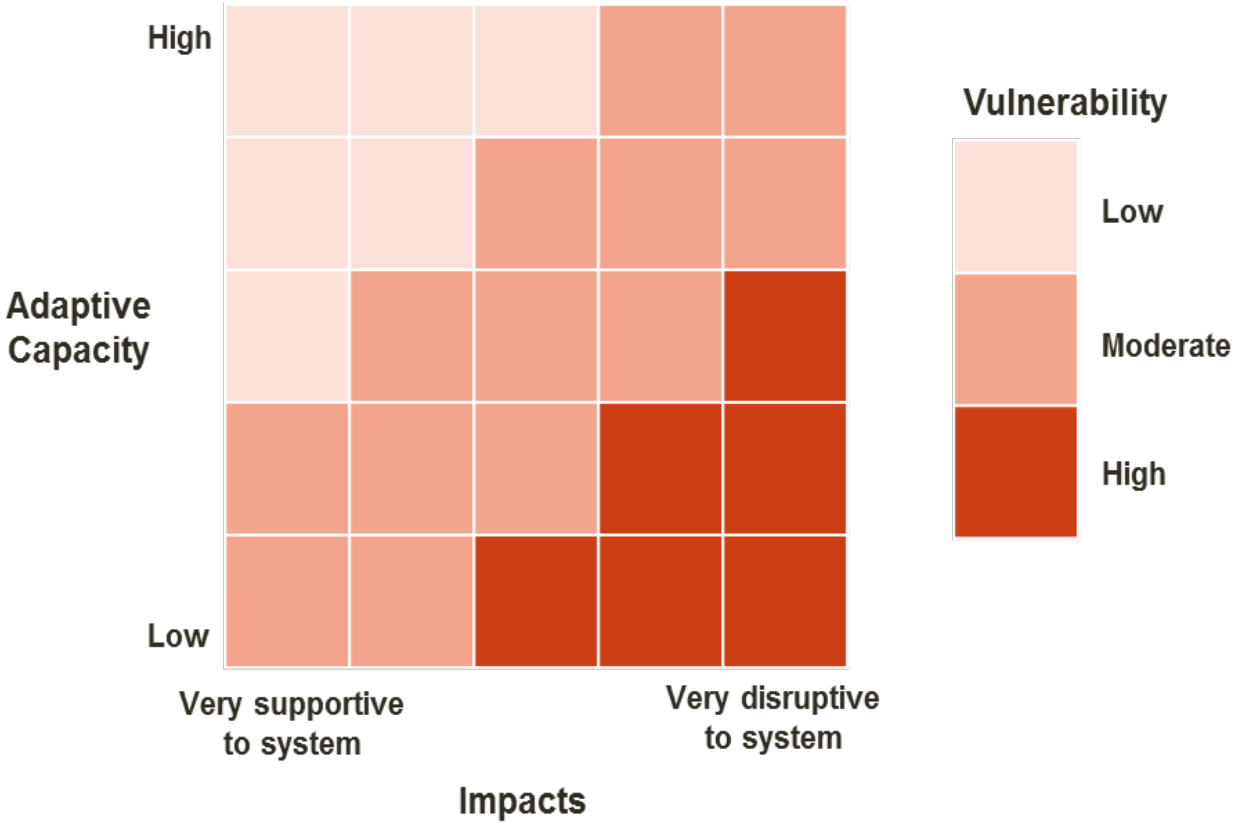
Site-specific Impacts

- Based on your expertise

Mgmt. Unit/ Topic	Climate Change Impacts and Vulnerabilities	
	Regional	For the Property or Project Area
Upland forest	More extreme precipitation events	Low position and clayey soils on east side of property makes it vulnerable to flooding and ponding
	Increased potential for summer drought	Ridges and hilltops are especially vulnerable to growing season moisture stress

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

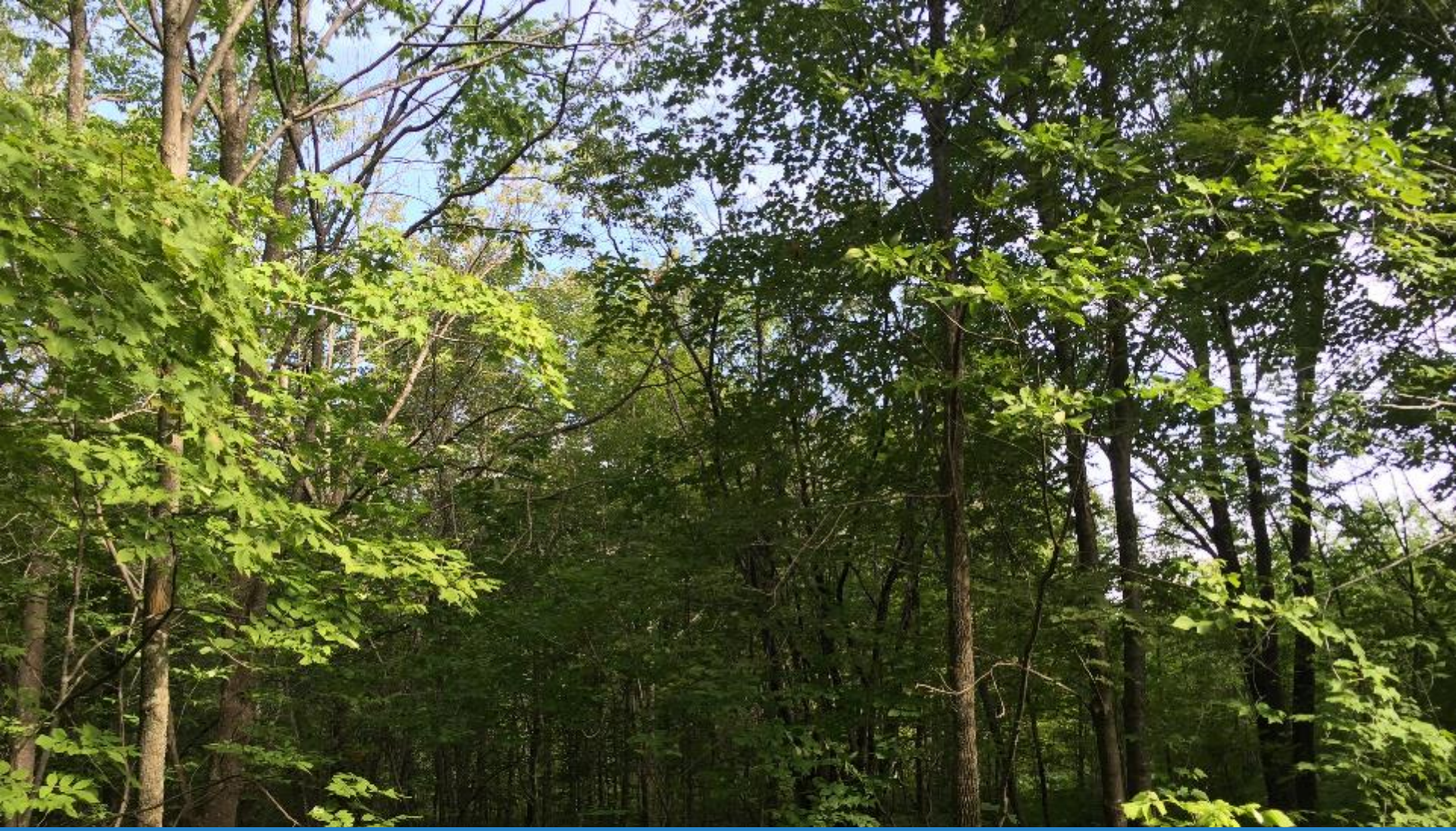
Vulnerability Determination



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

Example – Jerktail Mountain

Mgmt. Unit or Topic	Climate Change Impacts and Vulnerabilities	
	Regional	For the Property or Project Area
Woodland	Mean annual temperature increases from 2 °F to 7 °F.	Common species, such as black, red, and scarlet oak are expected to be affected by drier summers. Some tree species are better adapted to warm and dry conditions, such as shortleaf pine and post oak.
	Increased precipitation in winter and spring and potential declines in summer.	
	Increased frequency and severity of wildfire	Woodlands adapted to frequent, low-intensity fire, but not severe fire



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

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.

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 within control of 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 within control of your management (not global markets, policies, etc.)

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

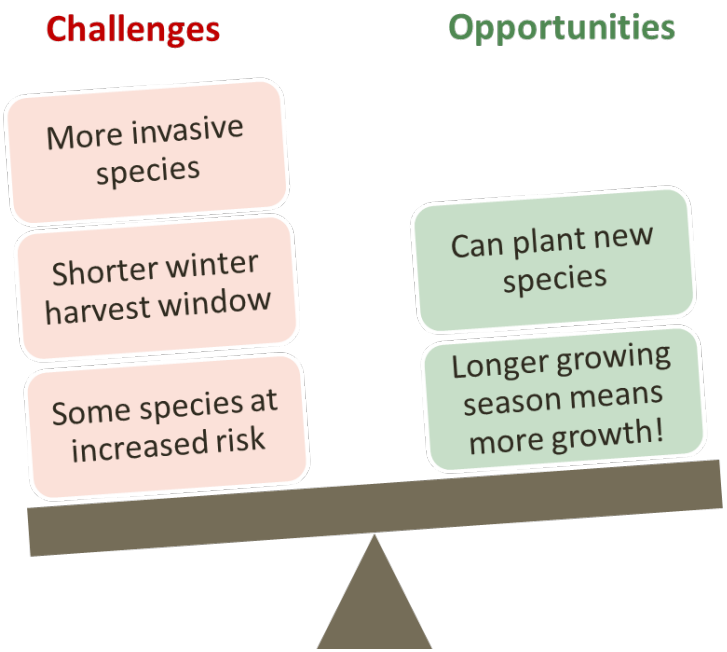
Feasibility – Can you meet your management objectives using current (business-as-usual) management actions?

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

  Opportunities > Challenges

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

  Challenges > Opportunities



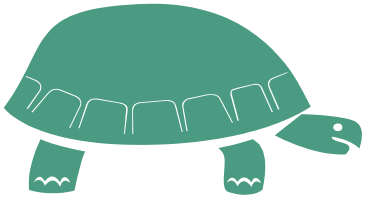
Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.

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

Feasibility & Other considerations

Objective	Challenge from Climate Change	Opportunity from Climate Change	Feasibility	Other considerations
Provide sufficient protection and habitat for the Eastern box turtle.	May be harder to maintain habitats given drier conditions, fluctuating water levels, or reduced winter snow pack	May be able to improve habitat during management, such as through retaining woody residues on site.	Medium	High uncertainty about how habitats will be affected. If turtle is present, need to maintain habitats for as long as possible.
Improve breeding habitat for forest-interior birds by providing a variety of forest structures.	Projected declines in conifer species reduce that component.	Active management can improve structure. Active management can increase course woody material.	High	
Maintain existing and develop new walking trails.	Extreme precipitation may increase erosion or flooding. Extreme storms may increase windthrow and hazard trees.	New trails can be designed to reduce impacts from extreme weather.	Low	Additional funding would be needed to make improvements.

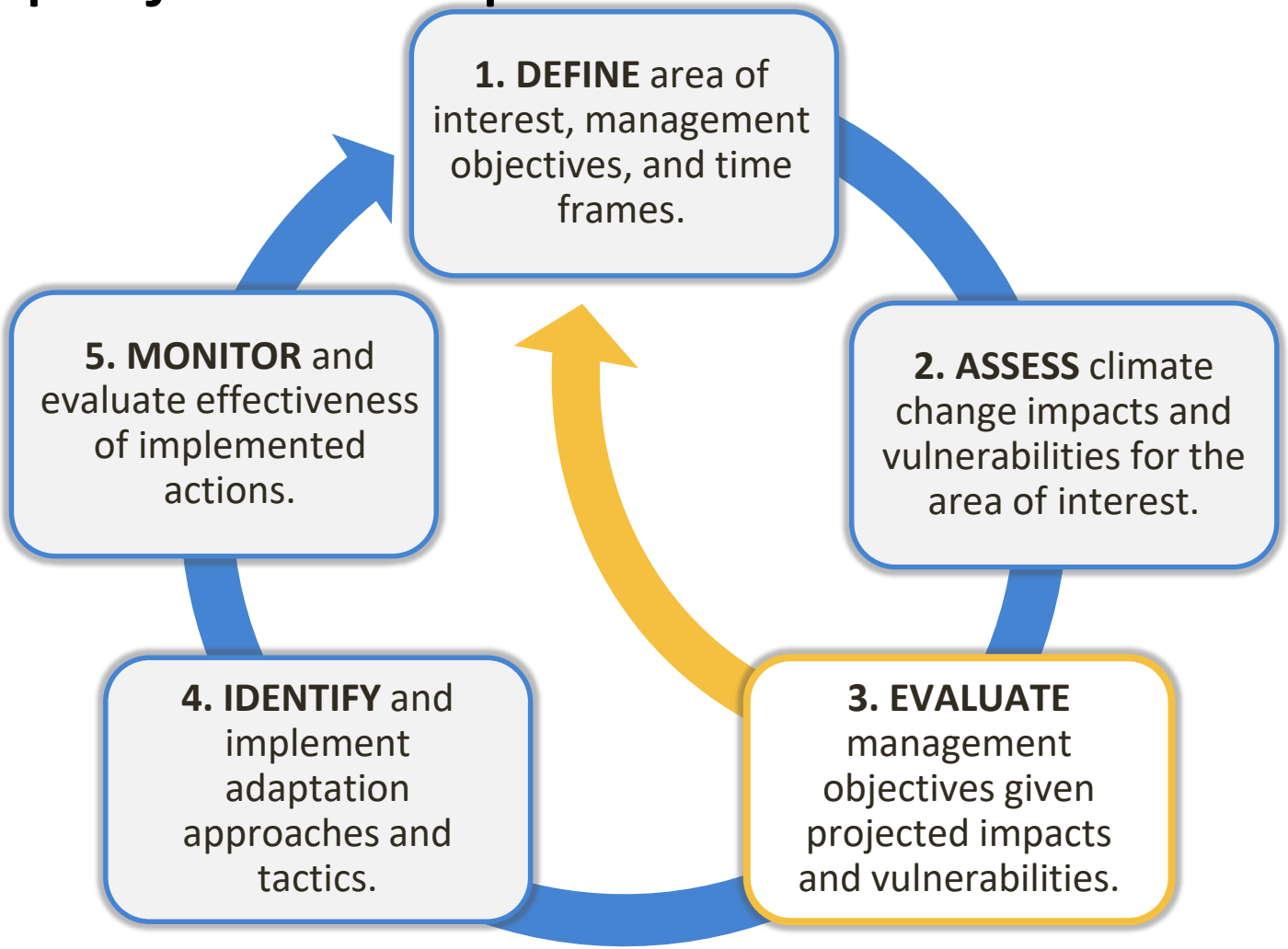
Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.



Slow down!

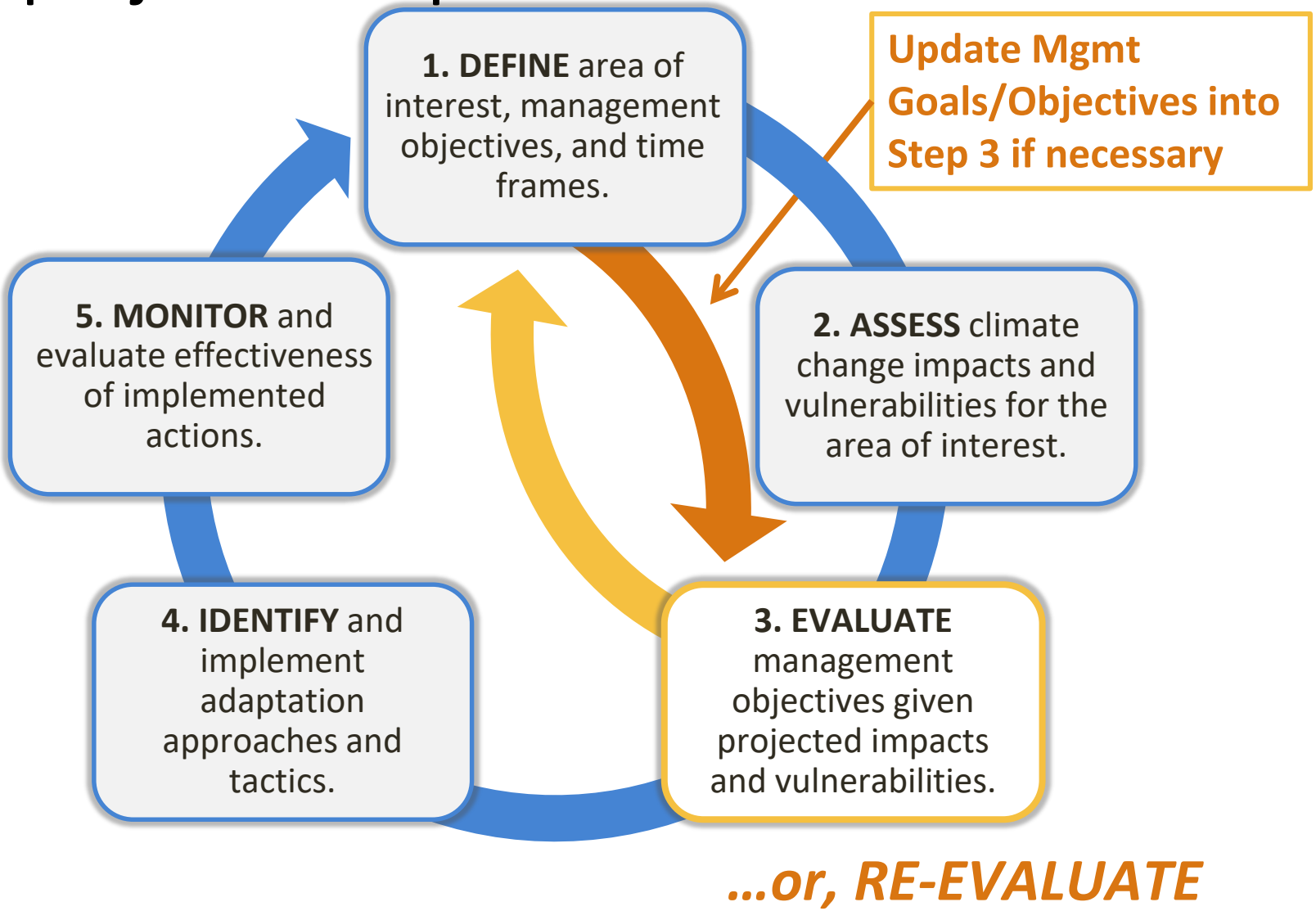
Are you going to continue with these management objectives?

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



…or, RE-EVALUATE

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



Step 4: Identify adaptation approaches and tactics for implementation

Adaptation Workbook Cycle

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

Resources:
Climate Change Assessments

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.

Resource:
Menus of strategies and approaches

- **Forests**
- **Tribal**
- **Agriculture**

5. MONITOR and evaluate effectiveness of implemented actions.

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.

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…

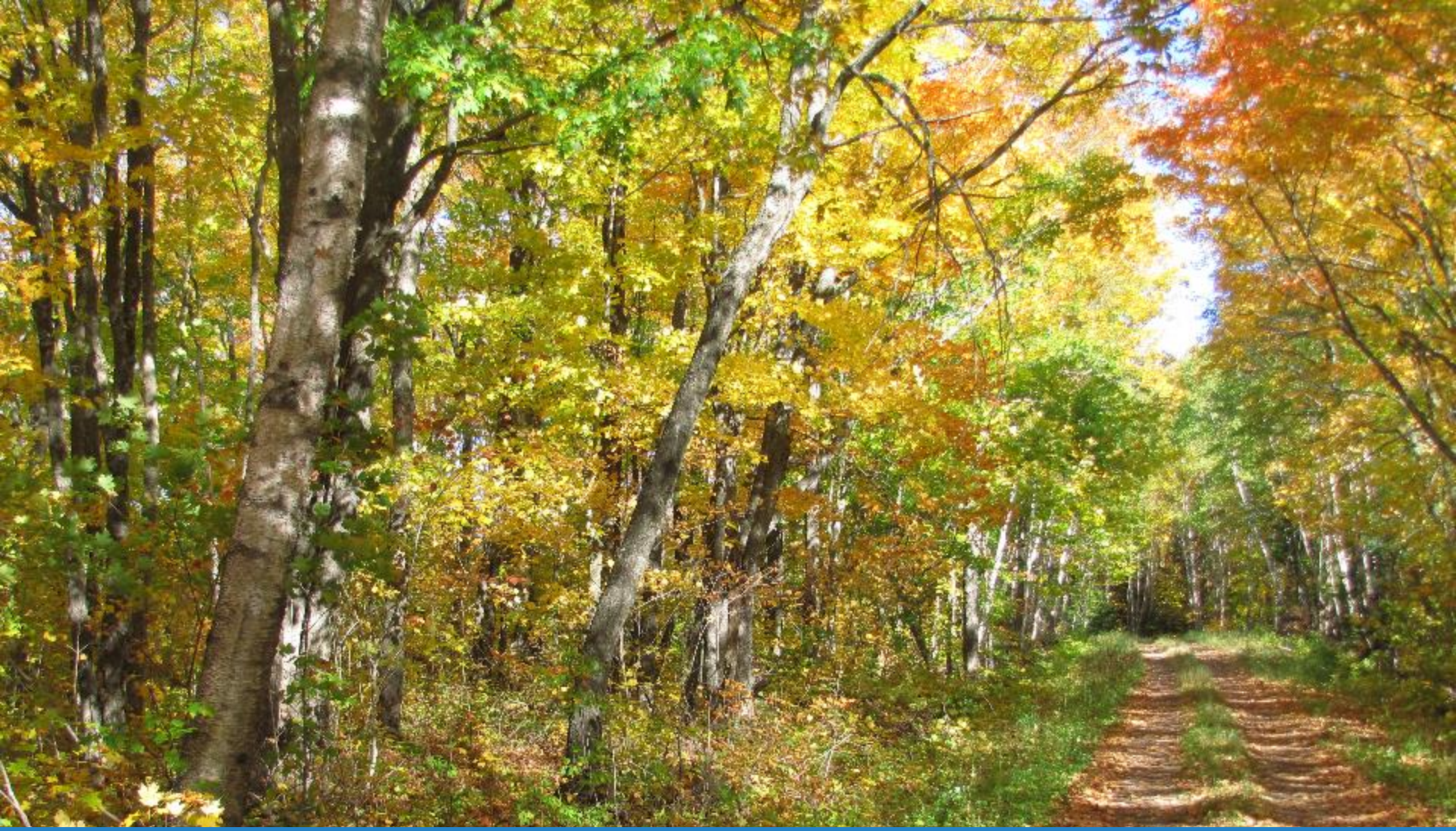
Yes: look to integrate into plan, prescription, or other activities

No: not useful at this time

Step 4: IDENTIFY adaptation approaches and tactics for implementation.

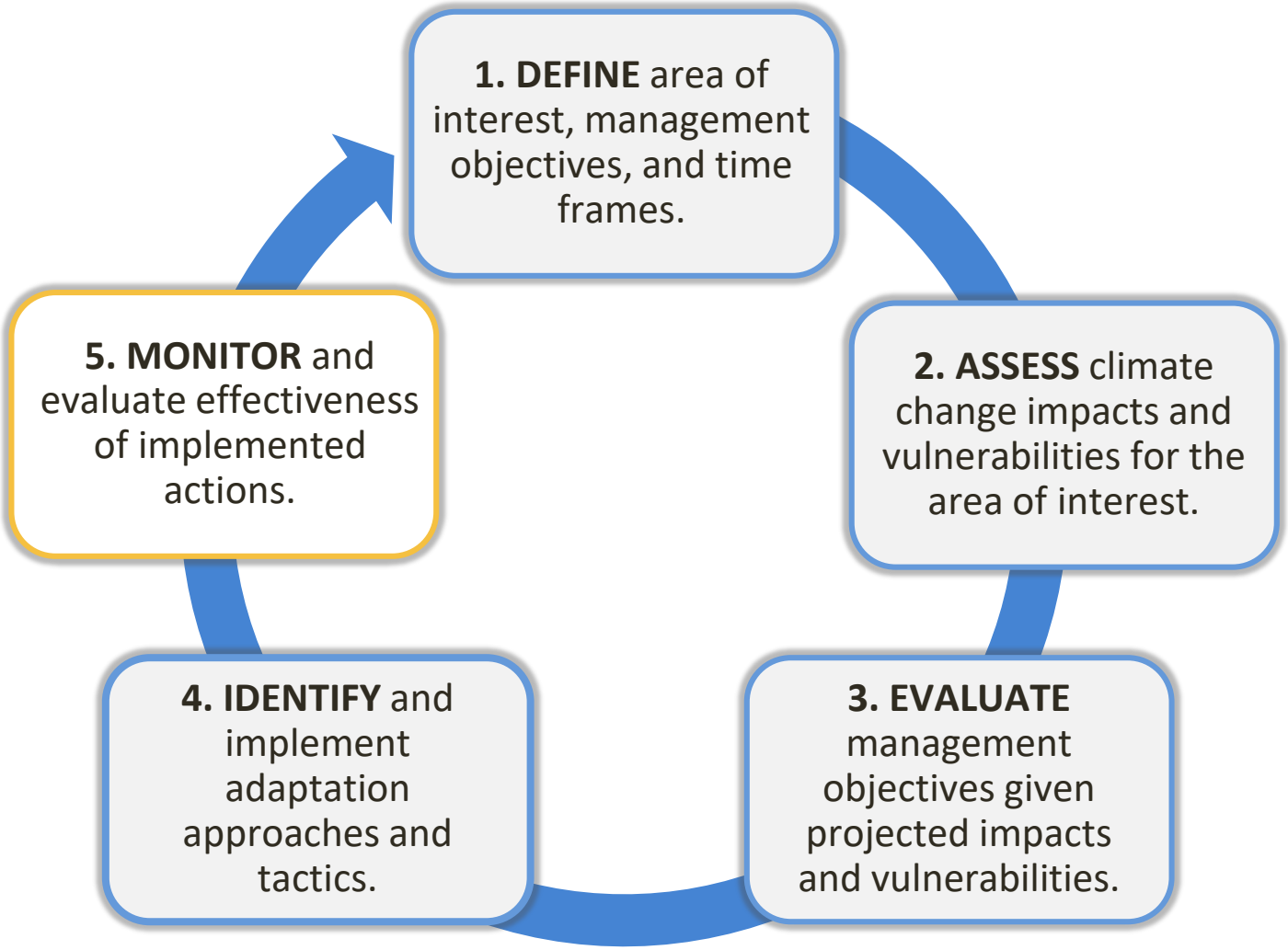
Example – Jerktail Mountain Woodland

Adaptation Actions		Time Frames	Benefits	Drawbacks & Barriers	Practicability of Tactic	Recommend Tactic?
Approach	**Tactic**					
▪ 2.1. Maintain or improve the ability of forests to resist pests & pathogens. ▪ 5.2. Maintain and restore diversity of native species. ▪ 5.3. Retain biological legacies. ▪ 9.1. Favor or restore	Tree thinning.	Every 20-30 years	▪ Providing timber (economic benefit). Increases light on the ground to promote an herbaceous layer. ▪ Helps reduce the risk of pest/pathogen outbreaks by reducing density.	▪ This area has low accessibility for logging operations. ▪ Topography limits where logging can occur. ▪ Opens up the stand for adverse human use. ▪ Too much light can shock some of the timber and cause epicormic sprouting in oaks. ▪ Adds fuel-loading in short term.	High	Yes



Step 4: Identify adaptation approaches and tactics for implementation

Workbook Cycle: Step 5



Step 5: MONITOR and evaluate effectiveness of implemented actions.

Purpose:

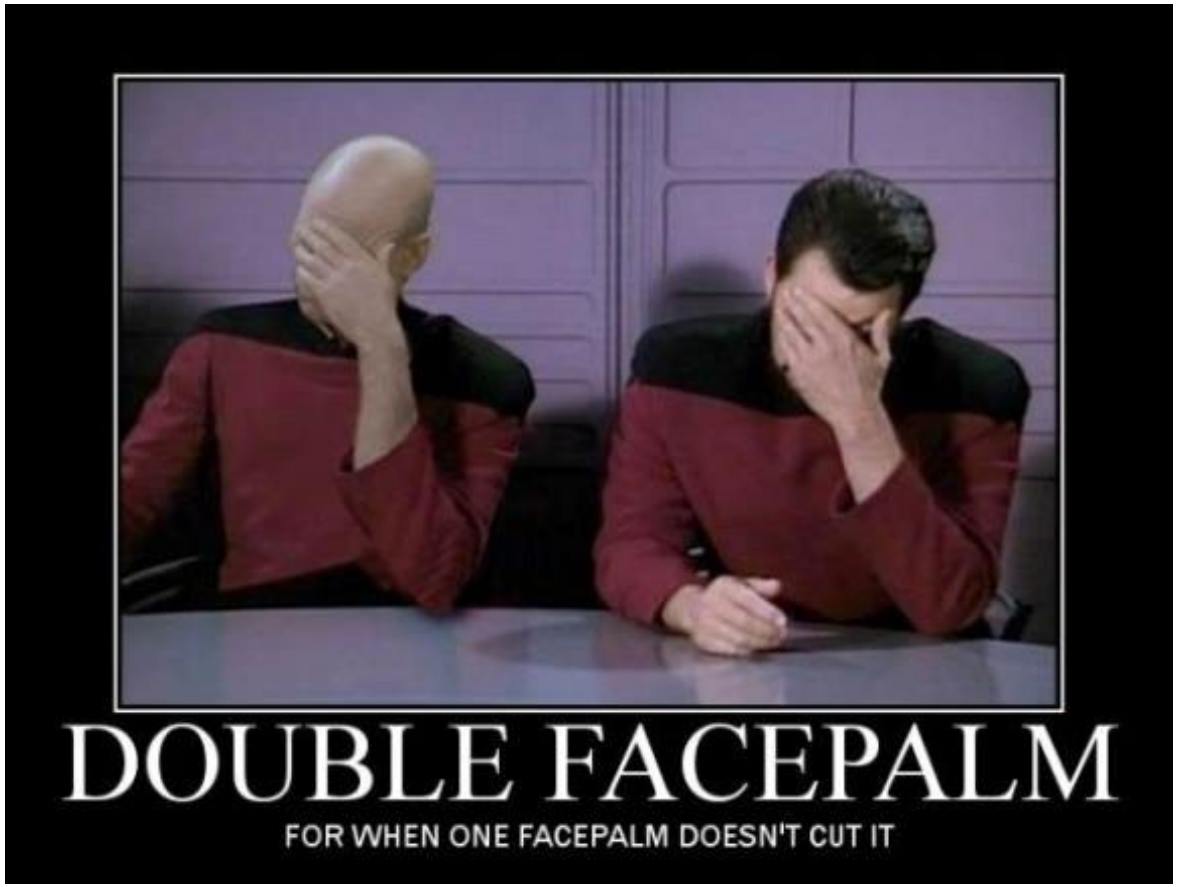
- Practice adaptive management

How do we know if the selected actions were effective?

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

A Few Thoughts About Monitoring…

- Learning about our actions is useful
- Our track record is not very good



A Few Thoughts About Monitoring…

- Be VERY CLEAR about your information needs and the kind of monitoring that might help you get that information:
  - **Implementation monitoring** = Did we do the action?
  - **Surveillance/impact monitoring** = What change is occurring over time?
  - **Effectiveness/adaptation monitoring** = Did our action actually have the desired effect?

A Few Thoughts About Monitoring…

- Be VERY CLEAR about your information needs and the kind of monitoring that might help you get that information:
  - **Implementation monitoring** = Did we do the action?
  - **Surveillance/impact monitoring** = What change is occurring over time?
  - **Effectiveness/adaptation monitoring** = Did our action actually have the desired effect?
  - **Scientific research** = Is this outcome statistically significant compared to a control? Could we expect similar results elsewhere?

“Climate change monitoring”

- Are you going to monitor climate change?
  - Nope.
- Are you going to monitor climate change impacts?
  - Not necessarily.
- Are you going to monitor the success of your management?
  - That’s the ticket!
  - You’re already doing that (or trying).
- “Climate change monitoring” is not climate science

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

Step 5: MONITOR and evaluate effectiveness of implemented actions.

Examples

Adaptation Monitoring Variable	Criteria for Evaluation	Monitoring Implementation
Invasive species control	Areas identified for control have <20% cover from invasive species	Annual invasive species surveys (late-fall)
Regeneration success	More than 200 trees per acre of acceptable/desirable species in 0.5-2” class	Regeneration survey 2-4 years after harvest
Forest canopy cover	Forested conditions (at least 60% canopy cover is maintained across all forested areas)	Forest inventory every 5 years