Forest Adaptation Planning and Practices

~ Online Course ~

Session 4 Discussion: Identifying Adaptation Strategies, Approaches, and Tactics

Wednesday February 13, 2018

Discussion session: Please feel free to join the discussion on webcam or by phone – we w ant to hear from you!

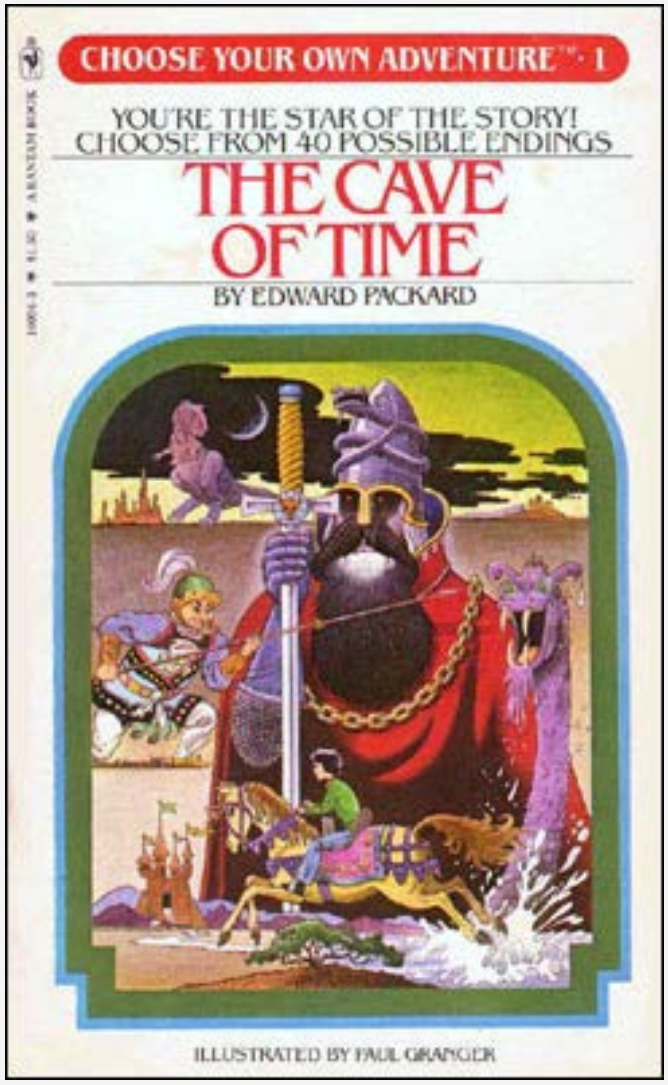
Welcome back!

Discussion: 1:00-1:45 pm

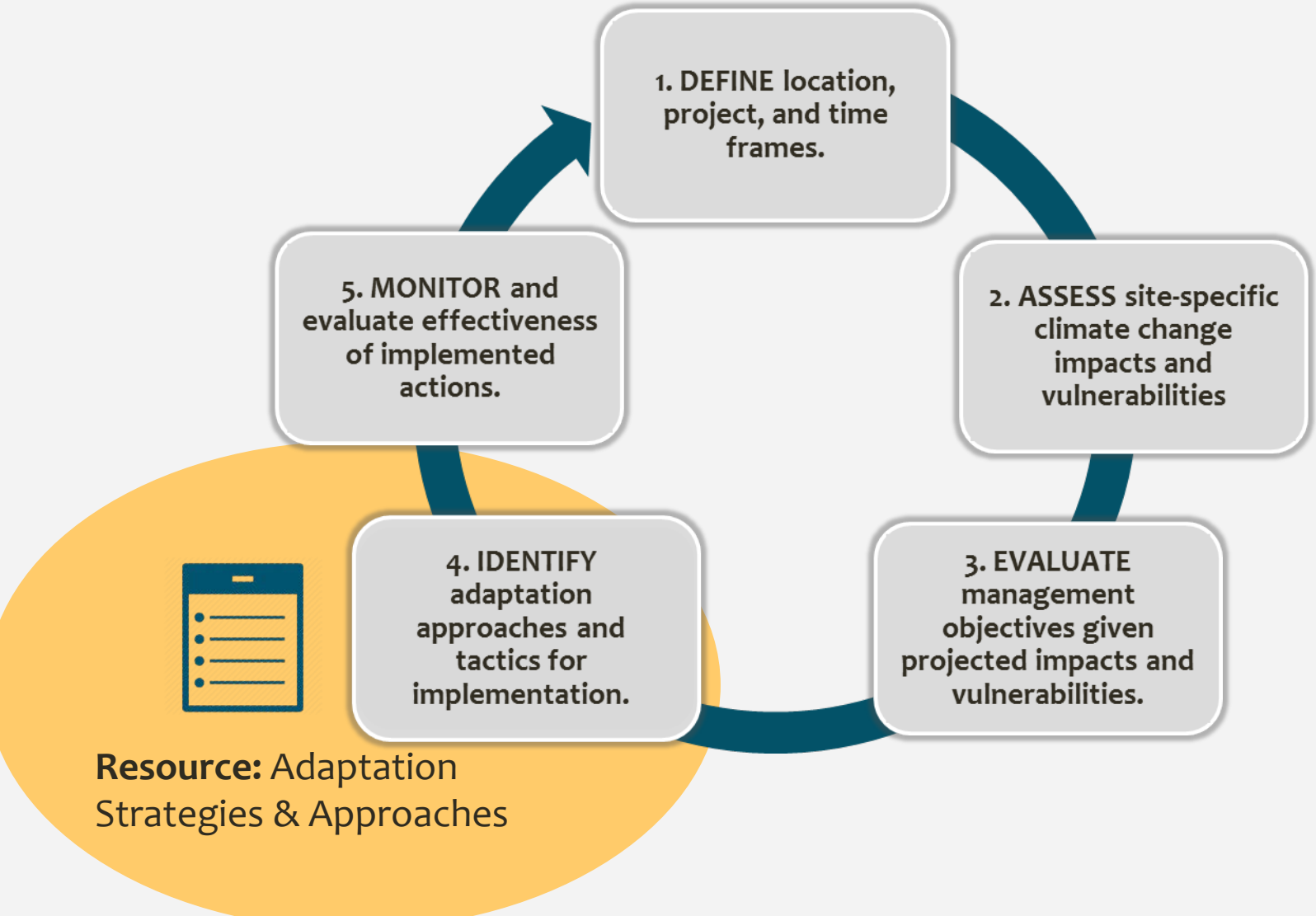
- Step 4 review
- What adaptation actions are you considering?

Lecture: 2:00-2:45 pm

- Step 5: Monitoring
- Assignment for Feb 20



Adaptation Workbook Process



Resource: Adaptation Strategies & Approaches

Step 4: IDENTIFY adaptation approaches and tactics for implementation.

Key Question:

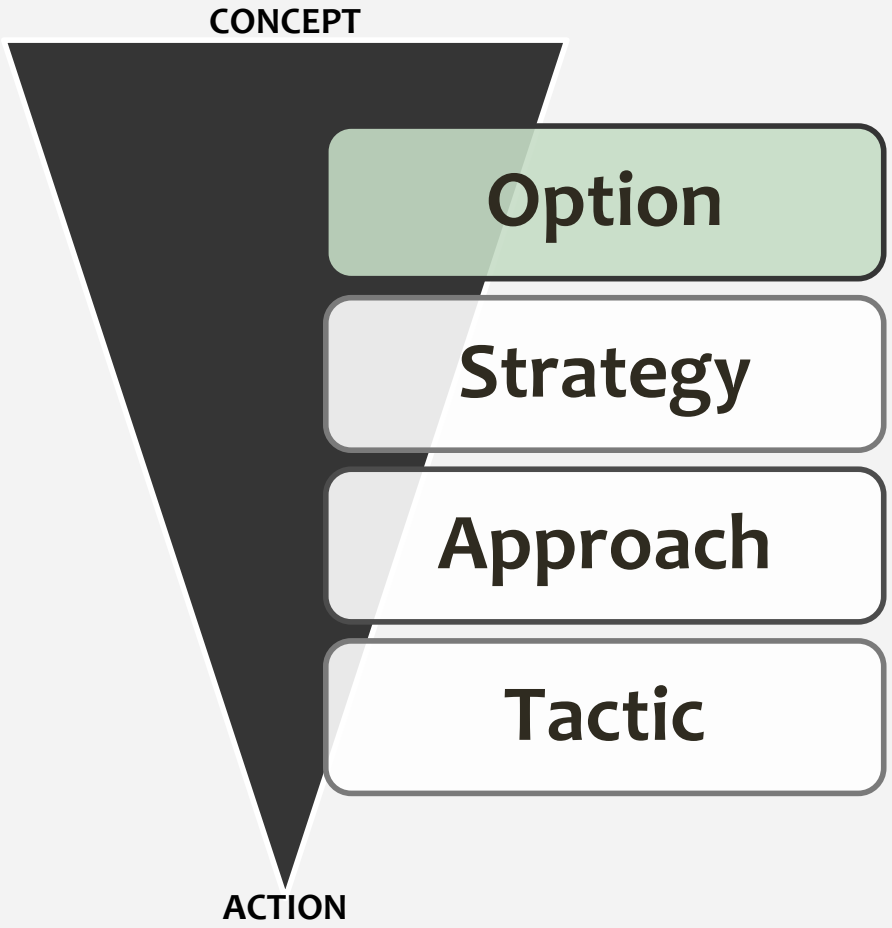
What actions can enhance the ability of the ecosystem to adapt to anticipate changes *and* meet management goals?

Adaptation Strategies & Approaches

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

Find in: Step 4 of online workbook, Chapter 3 of FAR , or
www.adaptationworkbook.org/niacs-strategies
www.adaptationworkbook.org/niacs-strategies/urban

Adaptation Strategies and Approaches

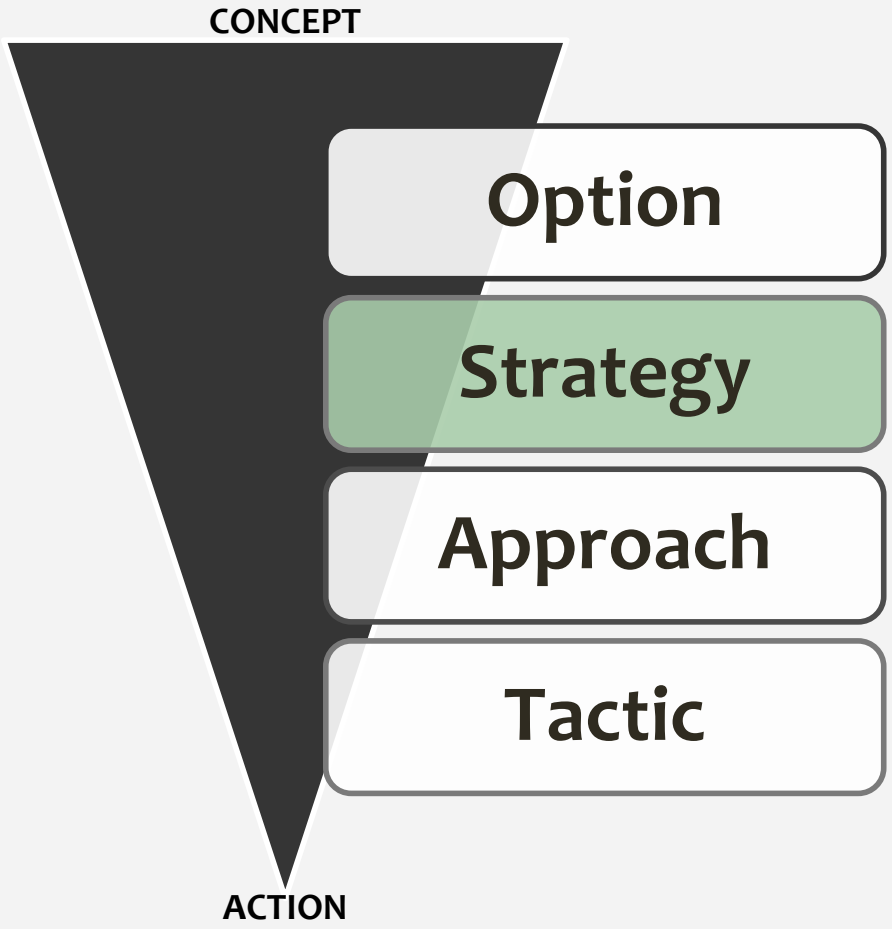


Big ideas

- Increase **resistance**
- Build **resilience**
- Facilitate **transition**

See Step 4 Course Materials for a recorded presentation that provides more details

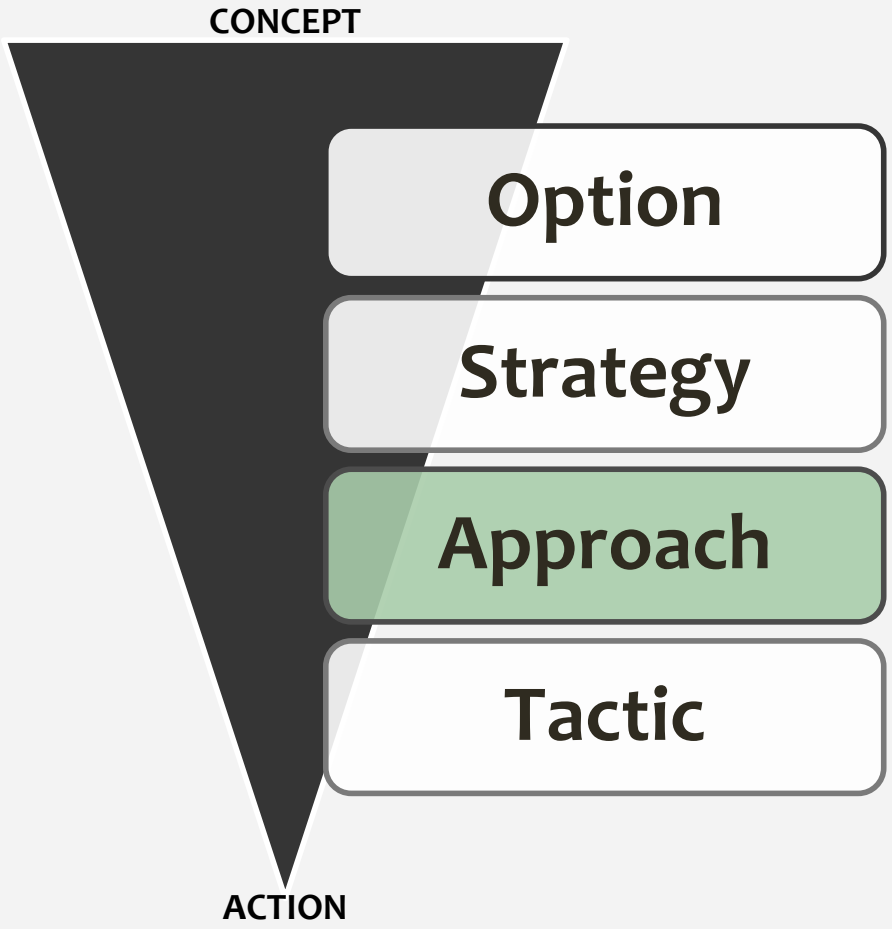
Adaptation Strategies and Approaches



Broad adaptation responses

- Sustain fundamental ecological functions
- Reduce the impact of existing biological stressors
- Maintain and enhance species and structural diversity
- Facilitate community adjustments through species transitions

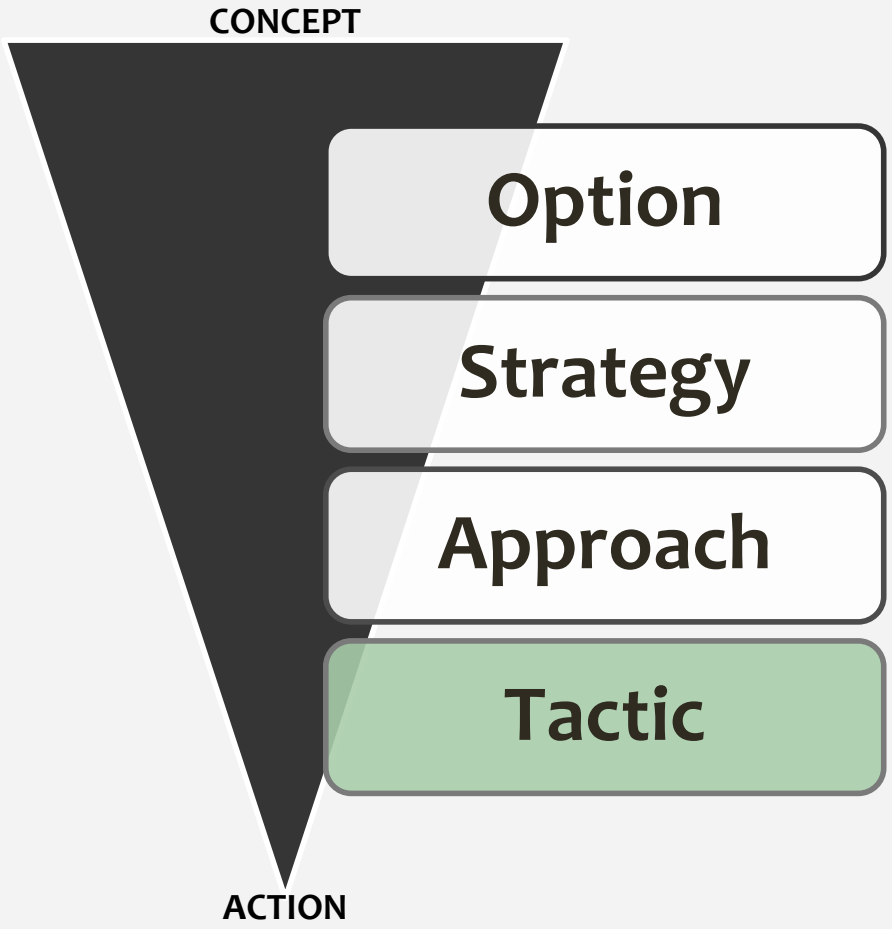
Adaptation Strategies and Approaches



More specific actions

- Promote diverse age classes
- Maintain and restore diversity of native tree species
- Identify and move species to sites that are likely to provide future habitat

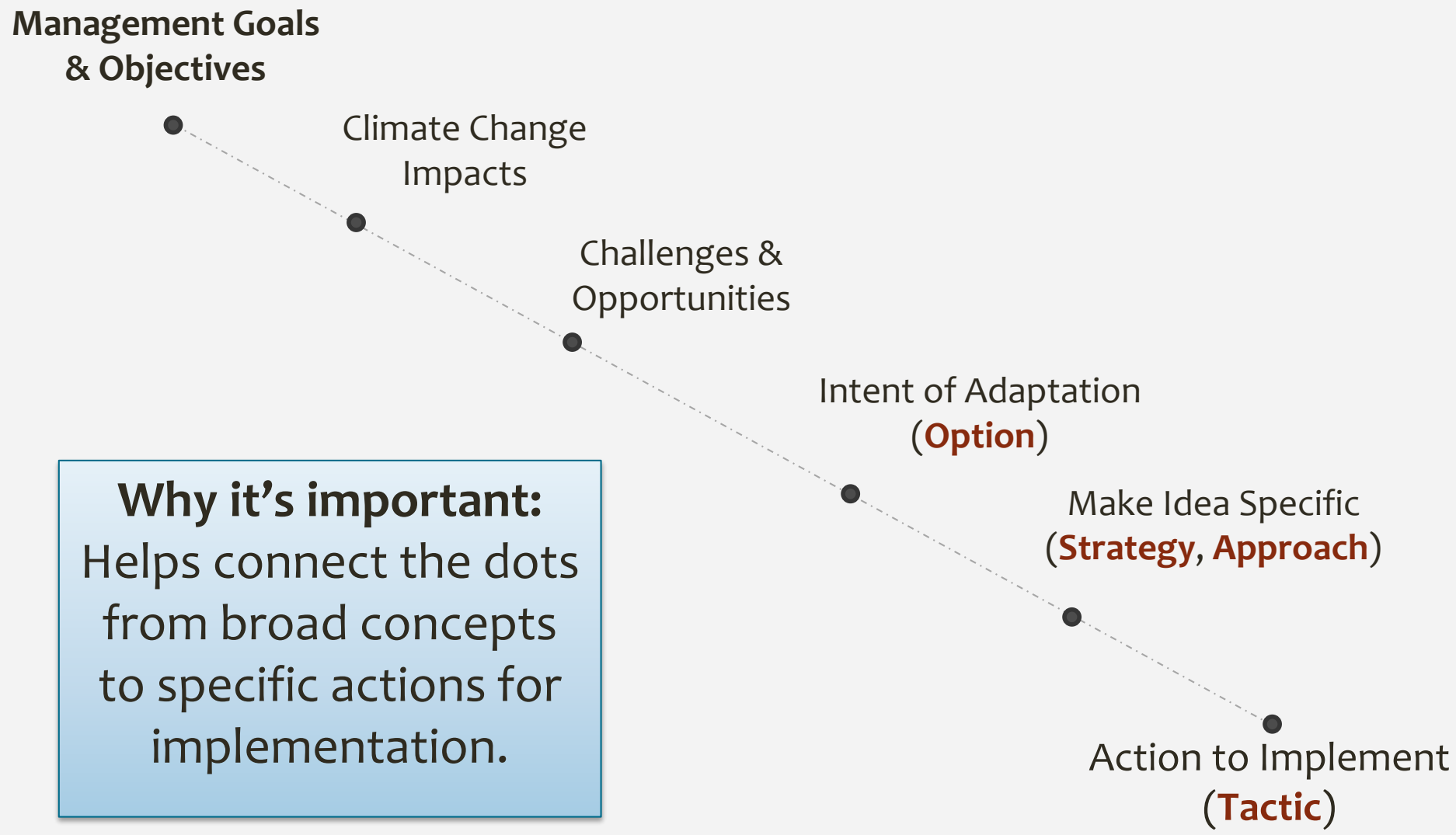
Adaptation Strategies and Approaches



Prescriptive actions selected by producer that are designed for individual site conditions and management objectives

→ **YOU DECIDE!**

Adaptation Strategies and Approaches



Why it's important:
Helps connect the dots from broad concepts to specific actions for implementation.

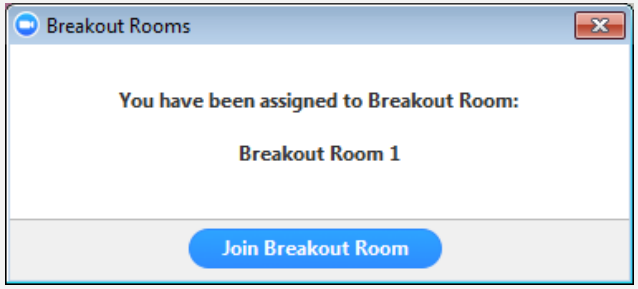
Breakout Discussions

Consider:

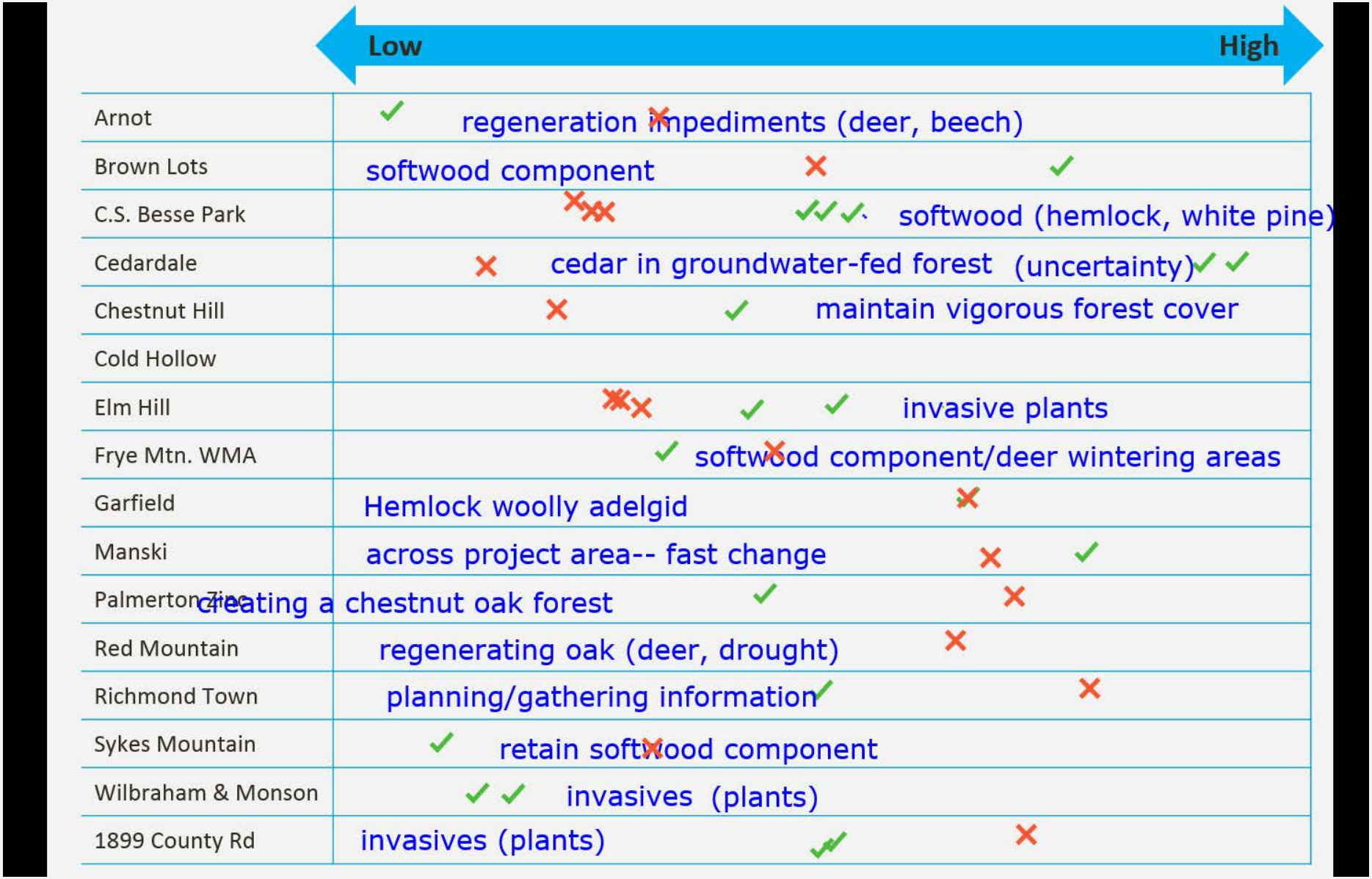
- What adaptation actions are you considering?
- Do they address your major impacts or challenges?
- Would you consider these actions to be resistance, resilience, transition, or a mix?

Breakout Discussions

We'll split into two groups. Click **"Join breakout room."**



From Step 3…


Low
High
Arnot
regeneration impediments (deer, beech)
Brown Lots
softwood component
C.S. Besse Park
softwood (hemlock, white pine)
Cedardale
cedar in groundwater-fed forest (uncertainty)
Chestnut Hill
maintain vigorous forest cover
Cold Hollow
Elm Hill
invasive plants
Frye Mtn. WMA
softwood component/deer wintering areas
Garfield
Hemlock woolly adelgid
Manski
across project area-- fast change
Palmerton Zinc
creating a chestnut oak forest
Red Mountain
regenerating oak (deer, drought)
Richmond Town
planning/gathering information
Sykes Mountain
retain softwood component
Wilbraham & Monson
invasives (plants)
1899 County Rd
invasives (plants)

Forest Adaptation Planning and Practices

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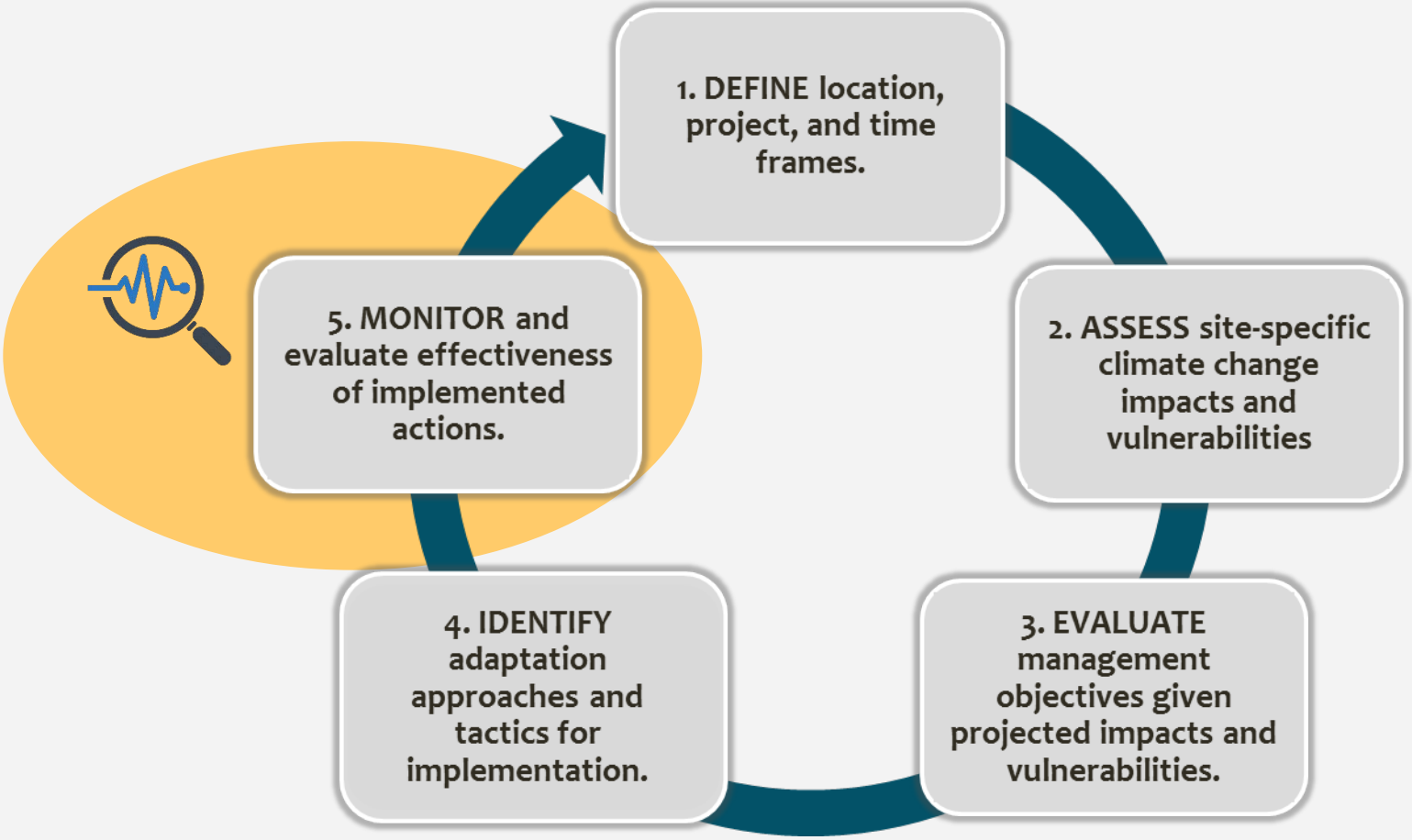
Session 5 Lecture:
Monitoring and Evaluating Effectiveness

Wednesday February 13, 2018

Web session etiquette:

- Mute your phone/microphone unless you are speaking to the group.
- If using the phone, turn off your computer speakers to avoid feedback and terrible noises.

Adaptation Workbook Process



A Few Thoughts About Monitoring…

Be VERY CLEAR about your objectives! What question you are asking guides 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.

Adaptation Monitoring Variable – What you will measure

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

If possible, use an item that also helps evaluate a particular tactic.

For example:

- *Planted seedling survival*

Step 5: MONITOR and evaluate effectiveness of implemented actions.

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

What is success?

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

For example:

- *60% survival of non-local genotypes.*

Step 5: MONITOR and evaluate effectiveness of implemented actions.

Monitoring Implementation– How you will gather the information

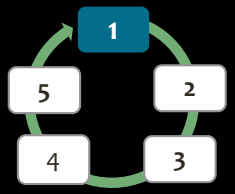
How the monitoring will actually get done.

Take advantage of existing monitoring when possible!

For example:

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

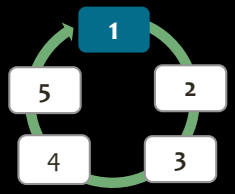
An example: Responding to Oak Wilt on the Menominee Forest



DEFINE management goals and objectives

General goals across the Menominee Forest

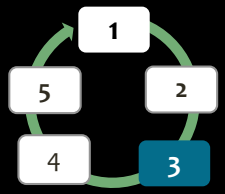
- **Foster diversity**
- **Favor sawtimber species**
- **Provide for cultural resources**



DEFINE management goals and objectives

Project objective: Reforest oak wilt pockets

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



EVALUATE management objectives given projected impacts and vulnerabilities

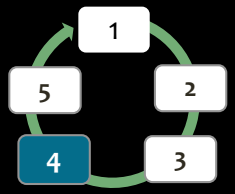
Climate Change & the Menominee Forest

CHALLENGES

- Forest contains many northern species **expected to decline.**
- Oak wilt sites are highly disturbed, with increased potential for **establishment of invasion species.**

OPPORTUNITIES

- Forest is located at the transition zone with more **southerly species present** or relatively nearby.
- Menominee Forest has **high species diversity** compared to nearby forests.



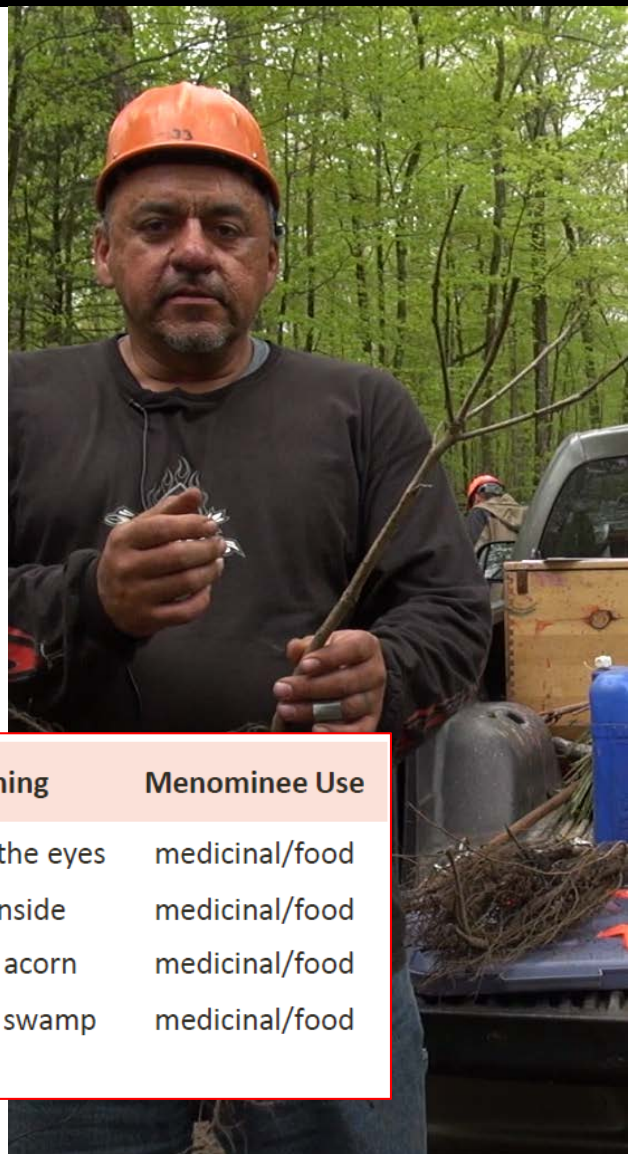
IDENTIFY adaptation approaches and tactics for implementation.

Adaptation approaches:

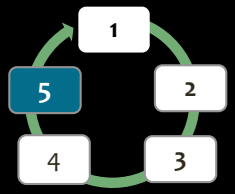
- Reduce biological stressors
- Maintain and enhance diversity
- Promote future adapted species
- Enhance genetic diversity

ADAPTATION ACTION: Restore sites with future-adapted species

- Seed understory species
- Tree species selection based on projected habitat increases/ new habitat



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			

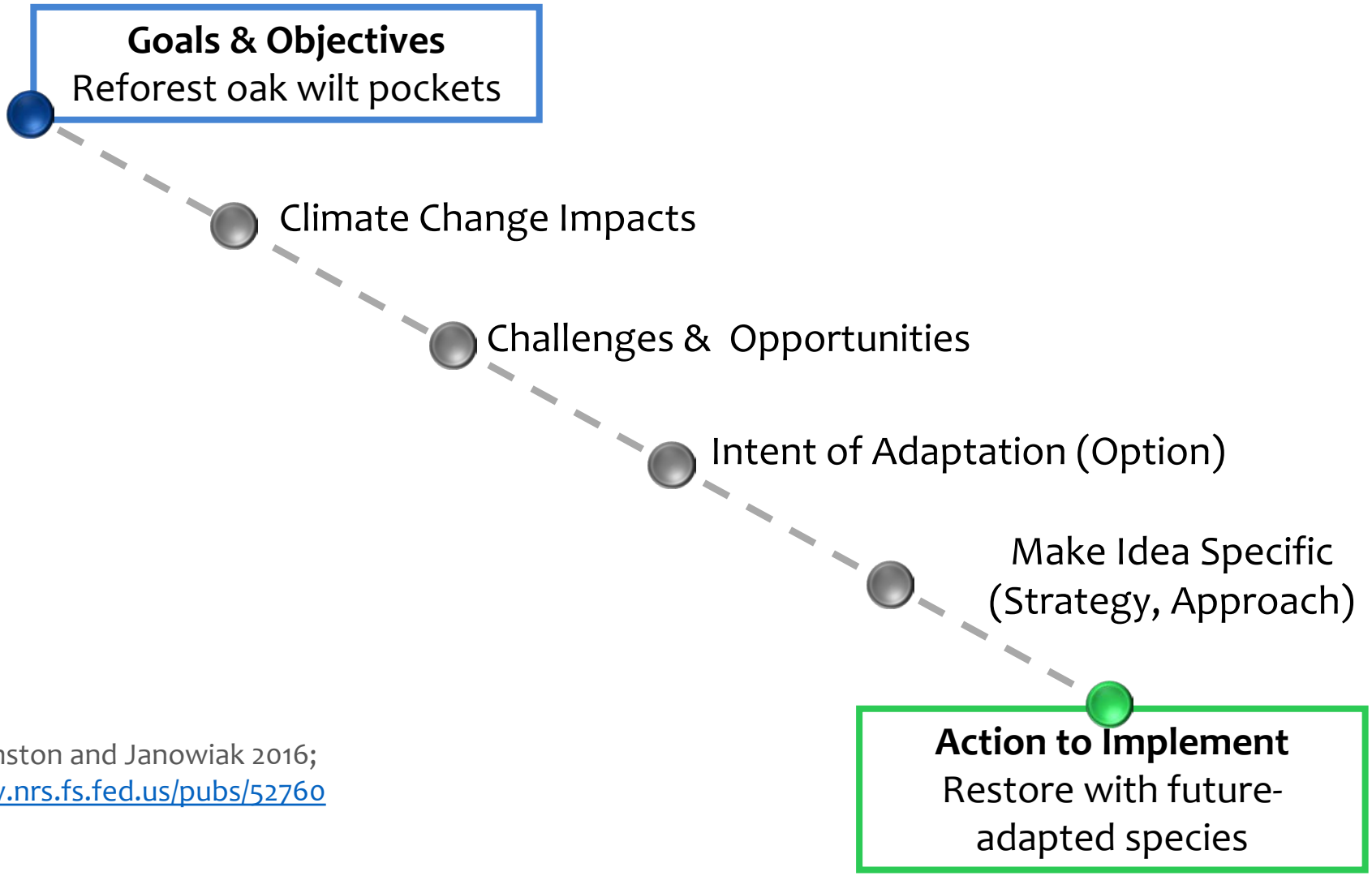


MONITOR and evaluate effectiveness of implemented actions

Monitoring Item	Metric	Criteria	Implementation
Oak wilt control	>95% control	Halt spread	Surveys 5 yrs post-treatment
Invasive spp.	Presence/ absence	Eradication	Ongoing
Planting	% survivorship	?	Surveys
TSI	Trees/acre	Desired species	Regeneration surveys

Connecting the Dots

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



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

Connecting the Dots

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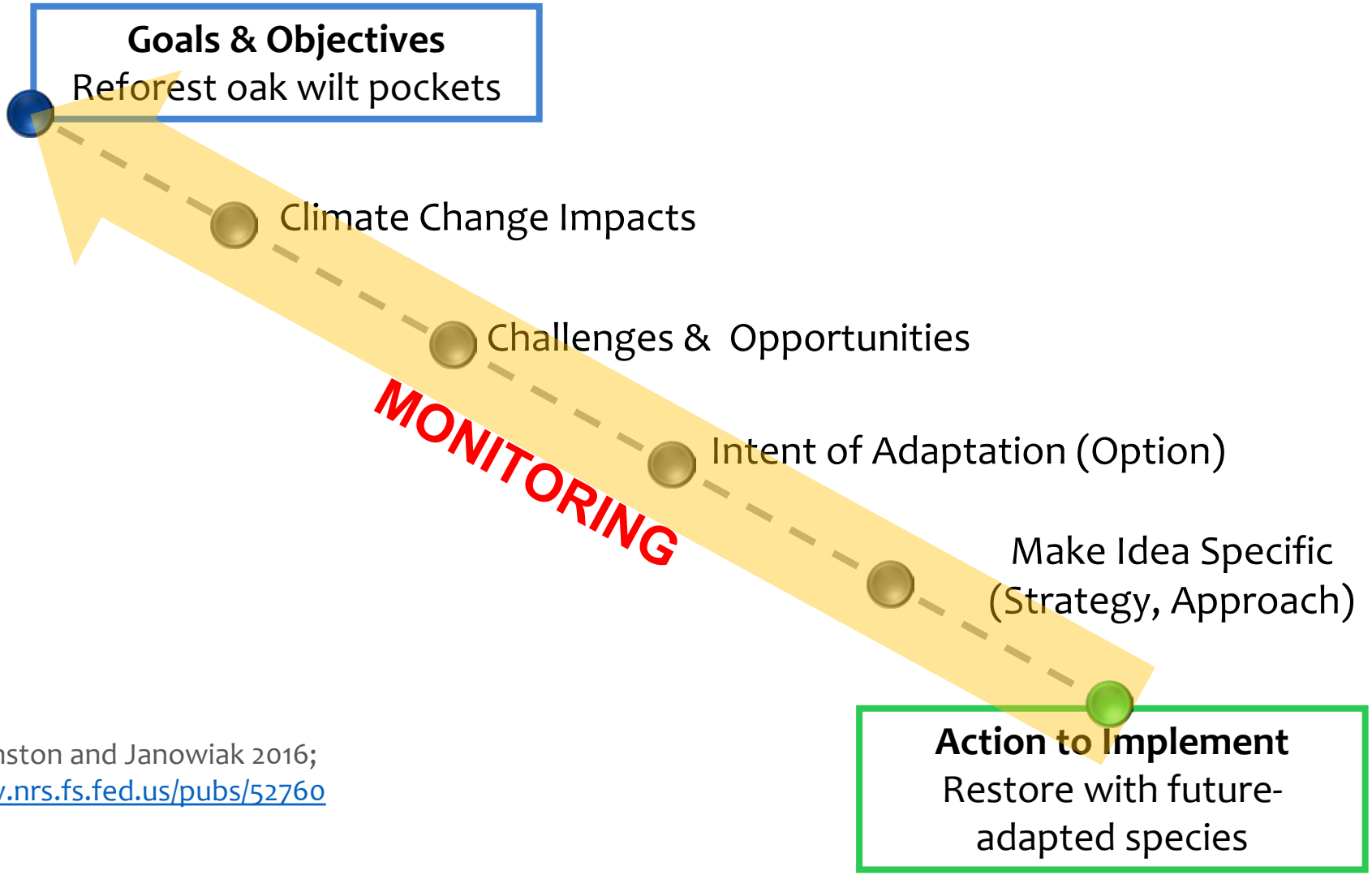

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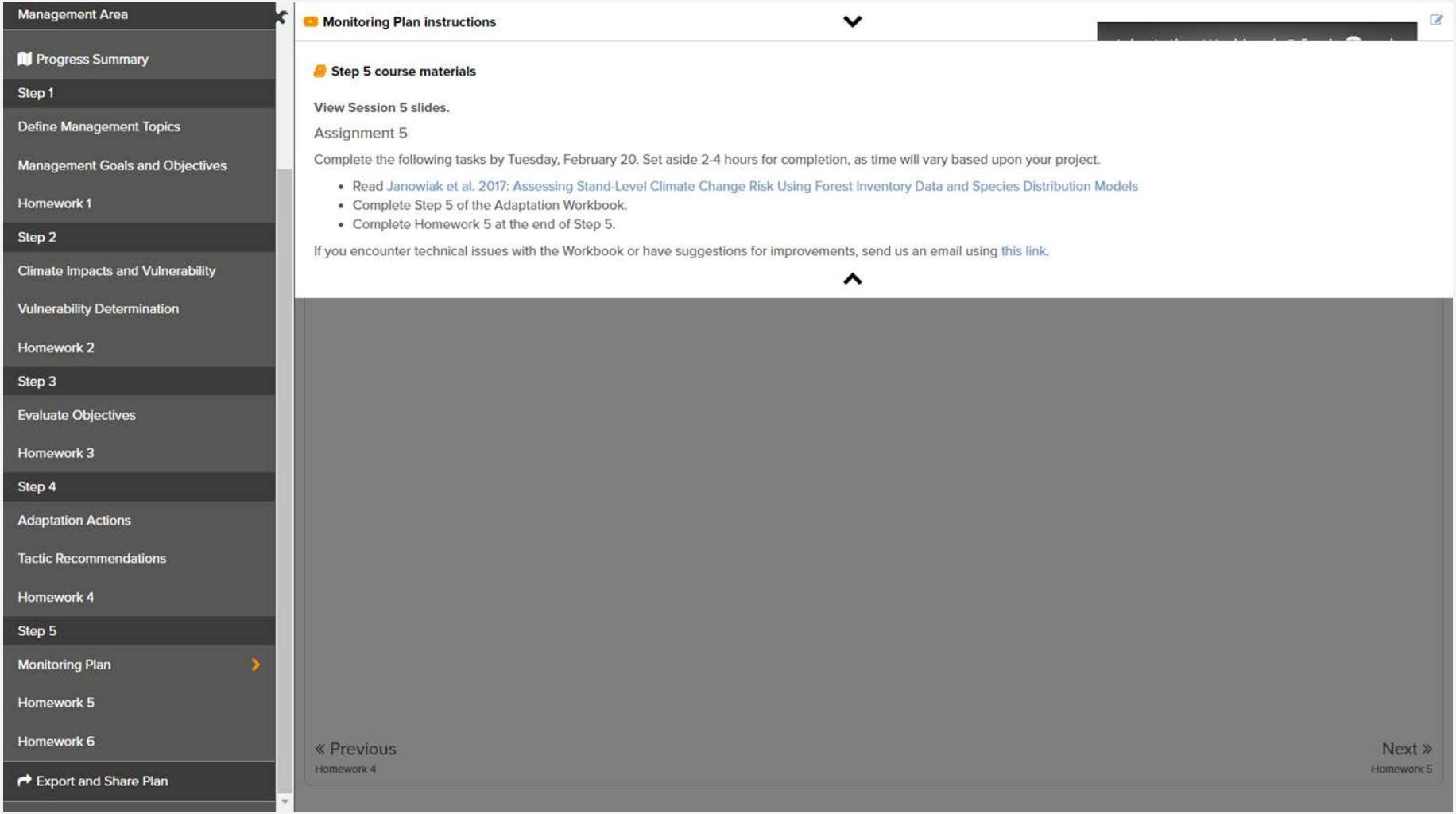
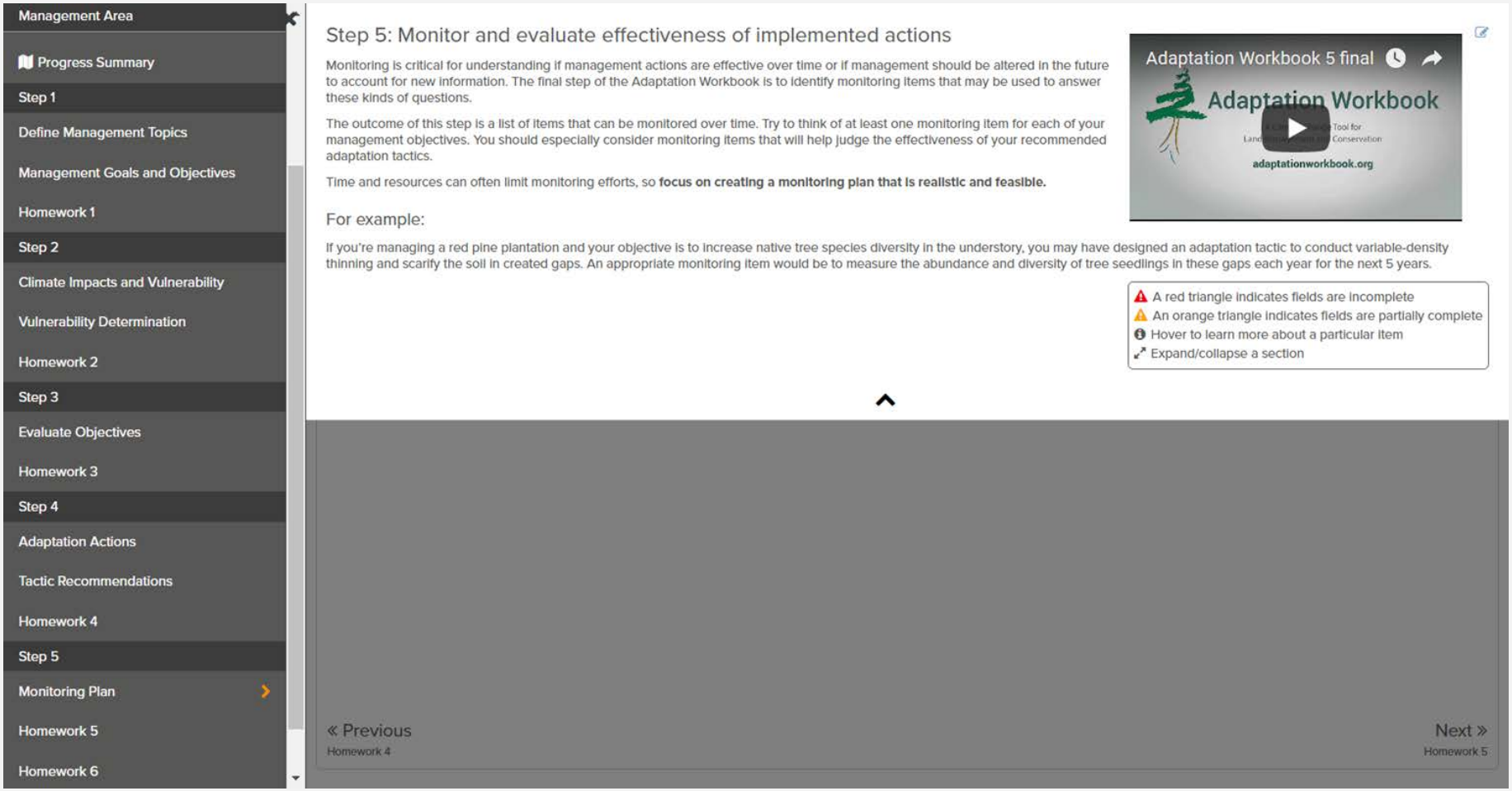
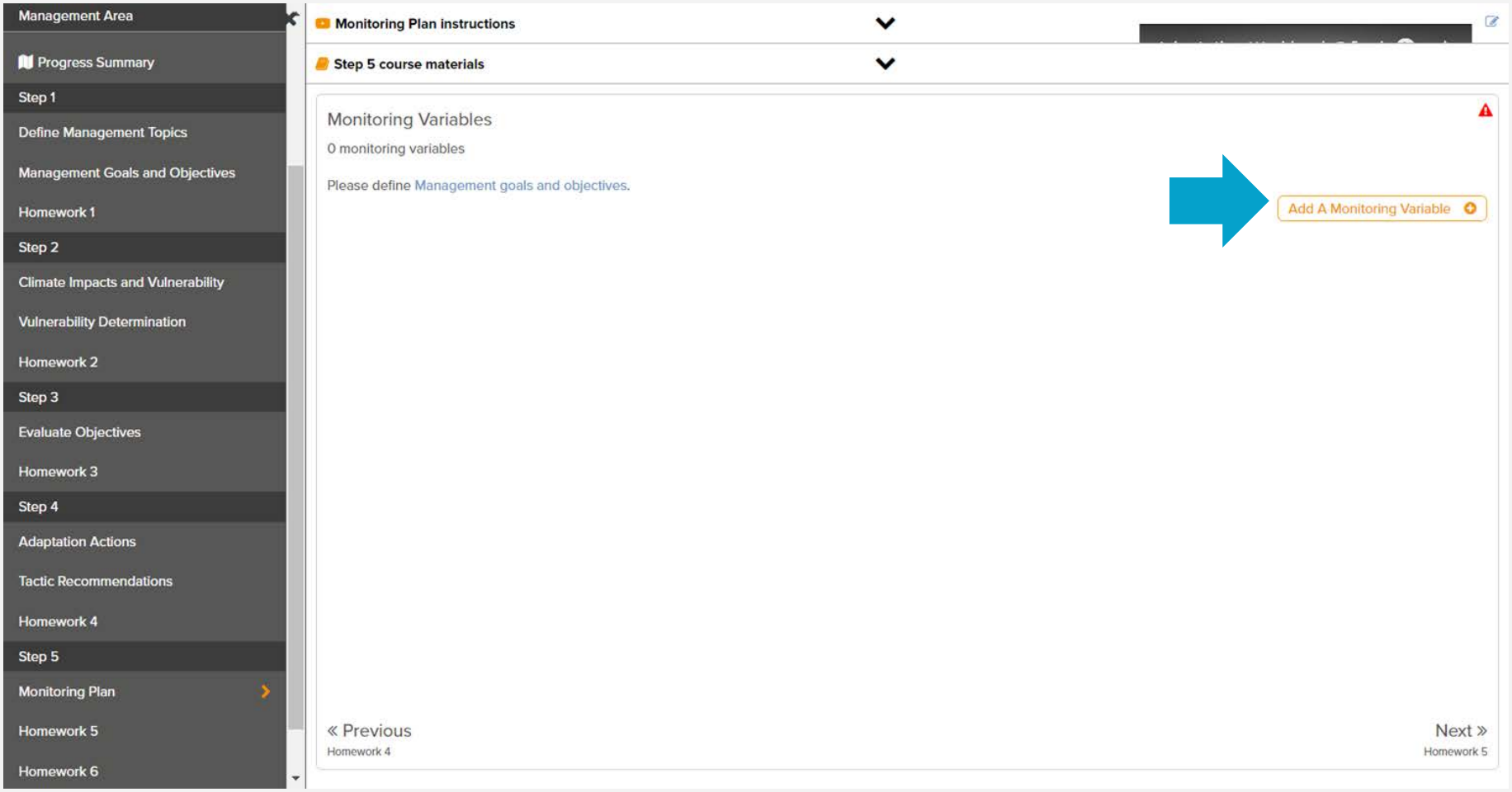
Course Material Landing Page



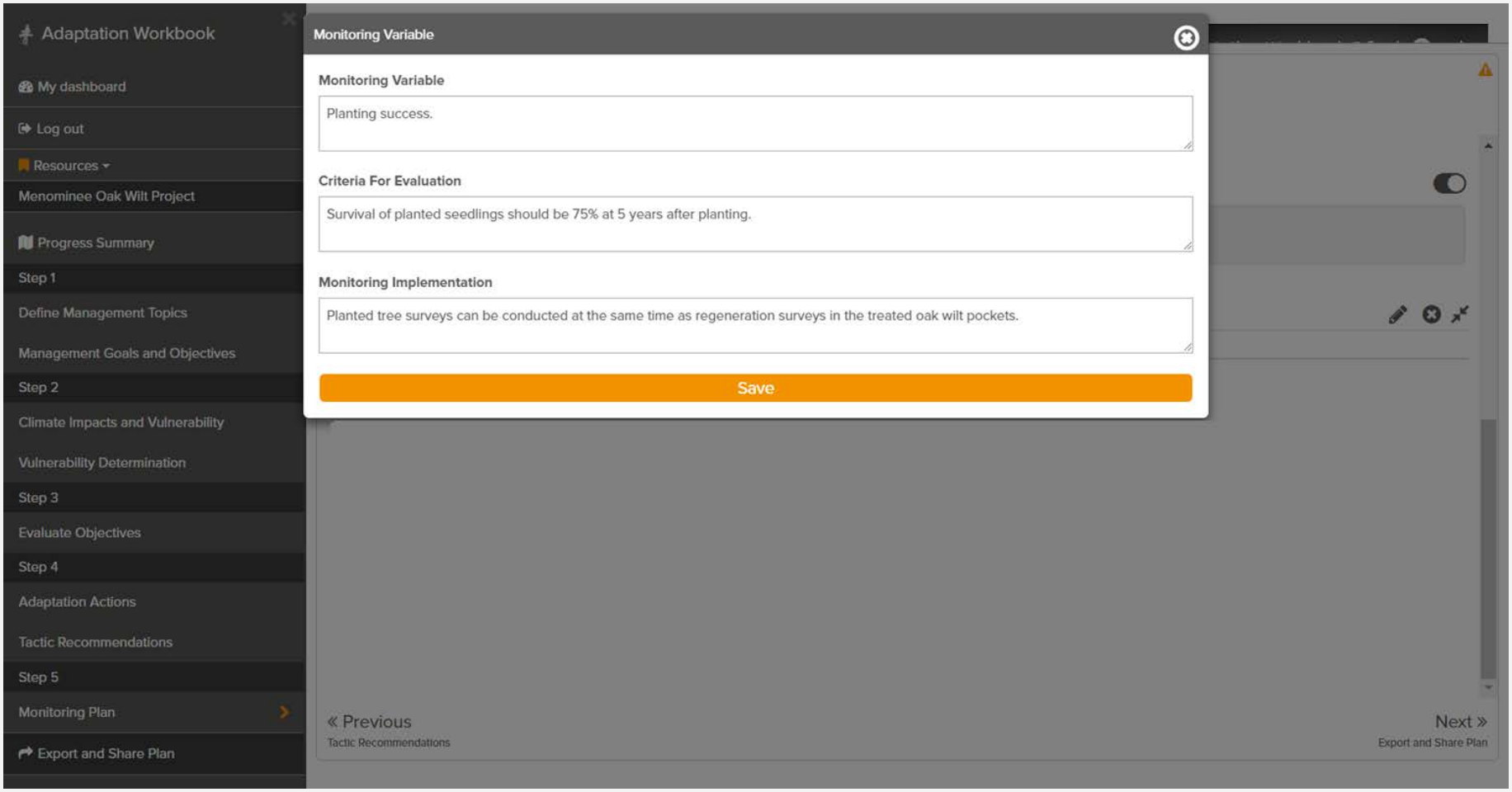
Step 5 Landing Page



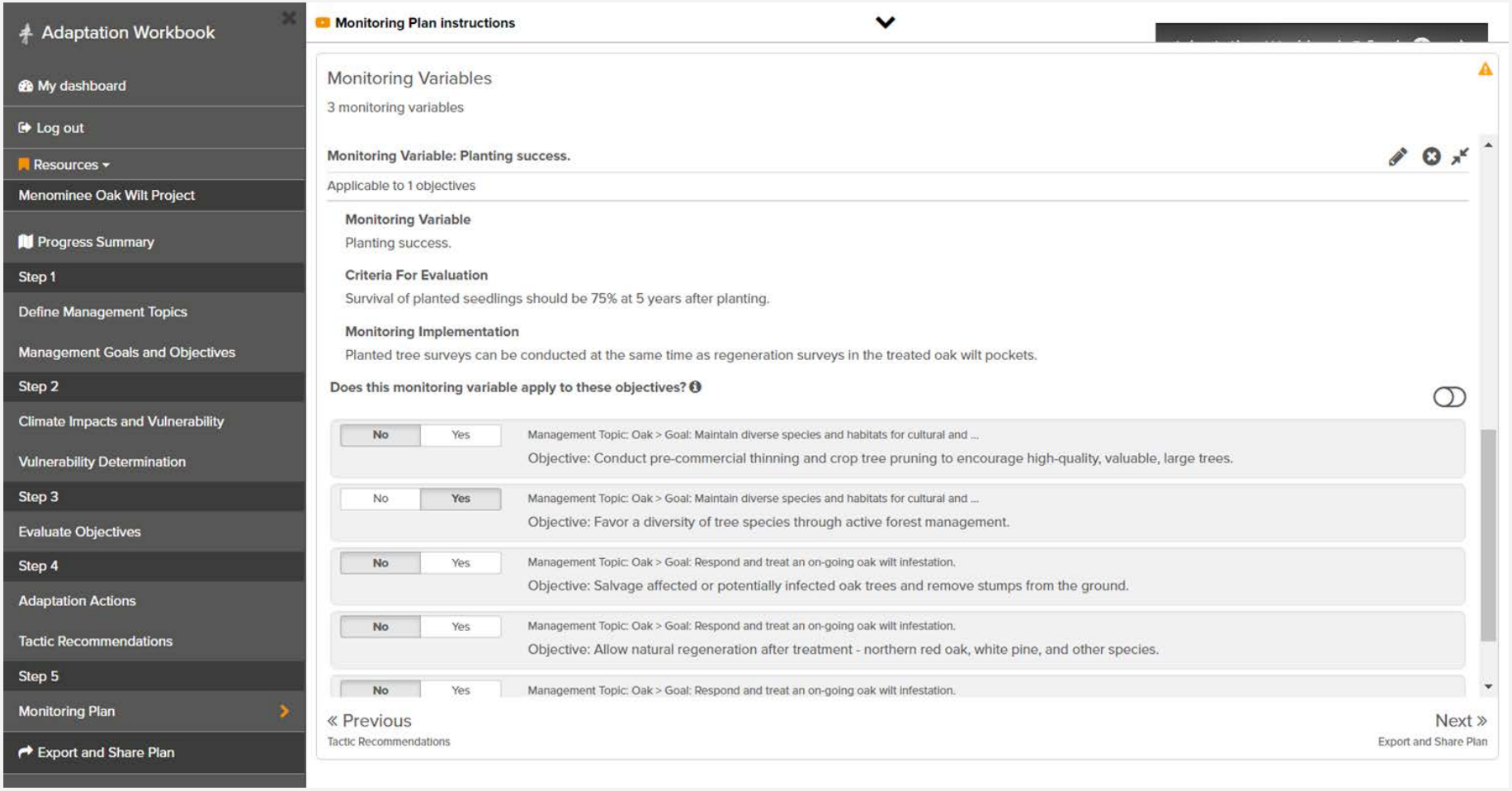
Add a Monitoring Variable



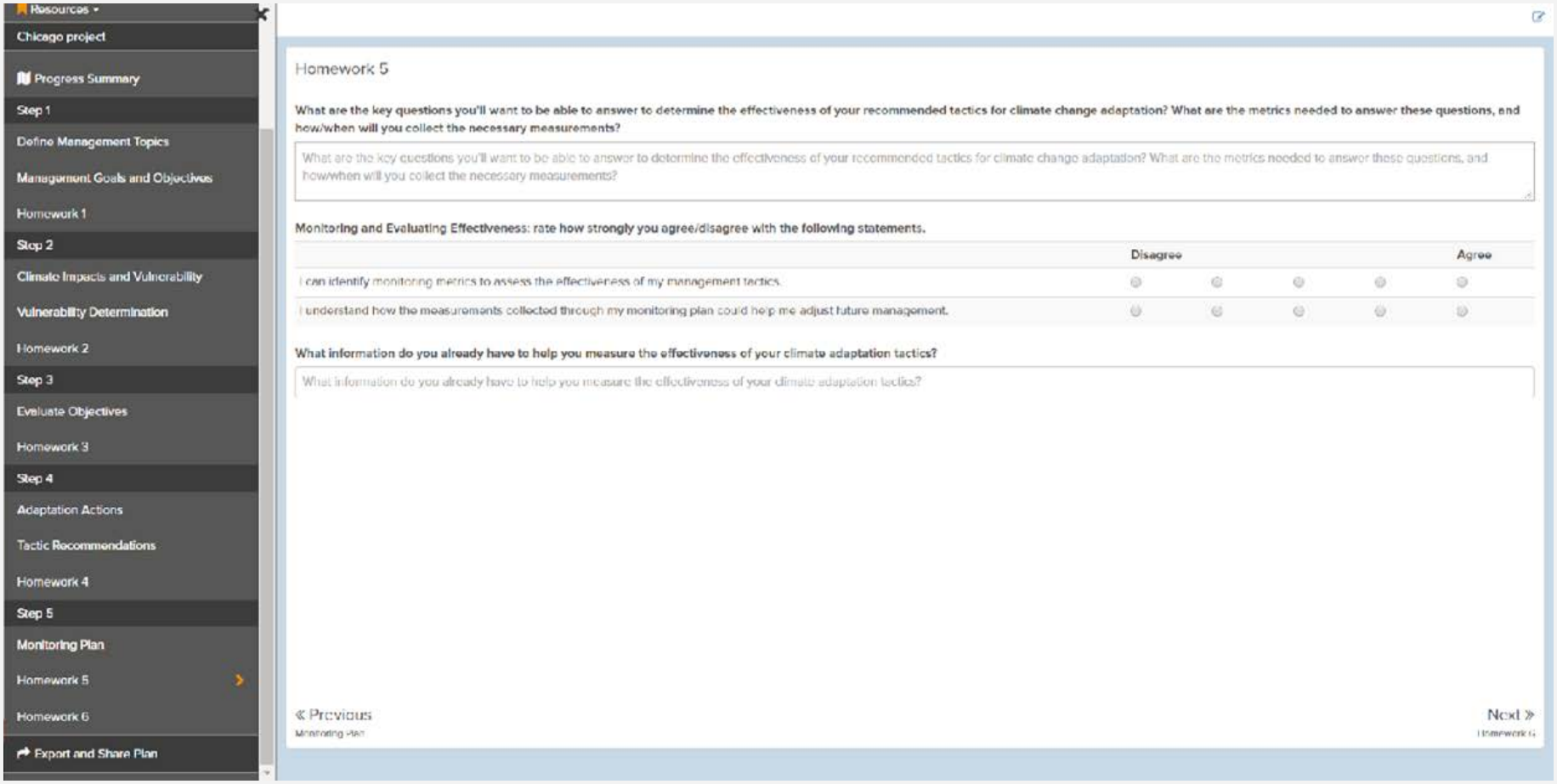
Add a Monitoring Variable



Apply to Objectives



Homework


Resources
Chicago project
Progress Summary
Step 1
Define Management Topics
Management Goals and Objectives
Homework 1
Step 2
Climate Impacts and Vulnerability
Vulnerability Determination
Homework 2
Step 3
Evaluate Objectives
Homework 3
Step 4
Adaptation Actions
Tactic Recommendations
Homework 4
Step 5
Monitoring Plan
Homework 5
Homework 6
Export and Share Plan
Homework 5
What are the key questions you'll want to be able to answer to determine the effectiveness of your recommended tactics for climate change adaptation? What are the metrics needed to answer these questions, and how/when will you collect the necessary measurements?
What are the key questions you'll want to be able to answer to determine the effectiveness of your recommended tactics for climate change adaptation? What are the metrics needed to answer these questions, and how/when will you collect the necessary measurements?
Monitoring and Evaluating Effectiveness: rate how strongly you agree/disagree with the following statements.
Disagree
Agree
I can identify monitoring metrics to assess the effectiveness of my management tactics.
I understand how the measurements collected through my monitoring plan could help me adjust future management.
What information do you already have to help you measure the effectiveness of your climate adaptation tactics?
What information do you already have to help you measure the effectiveness of your climate adaptation tactics?
« Previous
Next »

Climate-Informed Inventory

What can commonly collected forest inventory data tell us about climate change risks or adaptability?

Repurposed metrics:

Inventory Metric	Normally would be used to…	In the context of climate change…
Tree Species Richness Tree Species Evenness	Give an indication of stand- or forest-level diversity	Higher species evenness and richness may have greater adaptive capacity/ lower risk
Regeneration	Show effectiveness of regen treatments; inform future actions	Regeneration may be most influenced by climate change; potential early indication of change or future issues

New Climate Risk Metrics

Are the trees in this stand/forest/area at risk from climate change?

- Integrates Climate Change Tree Atlas projections, which are part of published vulnerability assessments
- "At risk" species identified for an ecoregion
  - Suitable habitat reduced >20% by 2100
  - Classified as decrease or large decrease
- ***IMPORTANT:*** **Metric signals that species is at risk of decline across a general region, but it is up to manager to evaluate that information given local knowledge**

New Risk Metrics

Northern Hardwood Stand:

Species	Basal Area	Stems Per Acre	Freq. (%)	Proportion of Stand (IV %)
Sugar maple	79.0	117.1	100.0	40.8
White ash	33.1	30.7	96.2	17.9
American basswood	18.5	23.7	73.1	12.3
Yellow birch	7.7	12.4	53.8	7.0
Bigtooth aspen	10.0	16.1	15.4	5.5
Red maple	4.2	8.6	42.3	5.0
Northern red oak	1.5	0.7	42.3	3.2
American elm	0.4	0.4	34.6	2.4
Paper birch	1.9	5.3	11.5	2.0
Black ash	1.5	2.6	7.7	1.2
Black cherry	0.4	0.2	15.4	1.1
Eastern hemlock	1.2	1.9	3.8	0.8
Quaking aspen	0.8	0.6	7.7	0.8
Total	**160.2**	**220.3**		**100.0**

New Risk Metrics

Northern Hardwood Stand: **Low (PCM B1)**

Species	Basal Area	Stems Per Acre	Freq. (%)	Proportion of Stand (IV %)	Future: Current Habitat	Change Class	At-risk Proportion of Stand (%)
Sugar maple	79.0	117.1	100.0	40.8	0.8	No Change	0.0
White ash	33.1	30.7	96.2	17.9	1.6	Increase	0.0
American basswood	18.5	23.7	73.1	12.3	1.1	No Change	0.0
Yellow birch	7.7	12.4	53.8	7.0	0.8	Decrease	7.0
Bigtooth aspen	10.0	16.1	15.4	5.5	1.0	No Change	0.0
Red maple	4.2	8.6	42.3	5.0	1.0	No Change	0.0
Northern red oak	1.5	0.7	42.3	3.2	1.3	Increase	0.0
American elm	0.4	0.4	34.6	2.4	2.3	Increase	0.0
Paper birch	1.9	5.3	11.5	2.0	0.7	Decrease	2.0
Black ash	1.5	2.6	7.7	1.2	0.7	Decrease	1.2
Black cherry	0.4	0.2	15.4	1.1	2.4	Large Increase	0.0
Eastern hemlock	1.2	1.9	3.8	0.8	1.2	Increase	0.0
Quaking aspen	0.8	0.6	7.7	0.8	0.6	Decrease	0.8
Total	**160.2**	**220.3**		**100.0**		***Proportion at-risk:***	***11.0***

New Risk Metrics

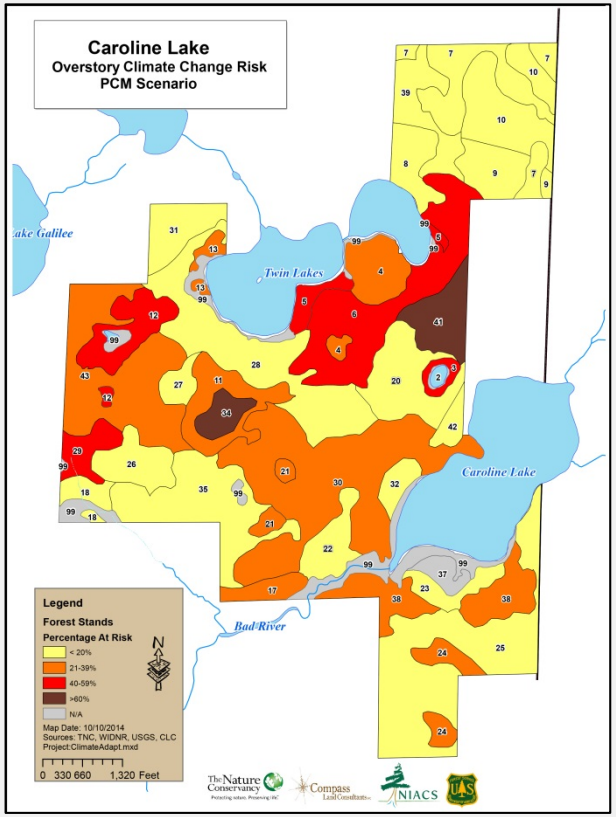
Northern Hardwood Stand: | **Low (PCM B1)** | **High (GFDL A1F1)**

Species	Basal Area	Stems Per Acre	Freq. (%)	Proportion of Stand (IV %)	Future: Current Habitat	Change Class	At-risk Proportion of Stand (%)	Future: Current Habitat	Change Class	At-risk Proportion of Stand (%)
Sugar maple	79.0	117.1	100.0	40.8	0.8	No Change	0.0	0.3	Large Decrease	40.8
White ash	33.1	30.7	96.2	17.9	1.6	Increase	0.0	1.9	Increase	0.0
American basswood	18.5	23.7	73.1	12.3	1.1	No Change	0.0	1.4	Increase	0.0
Yellow birch	7.7	12.4	53.8	7.0	0.8	Decrease	7.0	0.2	Large Decrease	7.0
Bigtooth aspen	10.0	16.1	15.4	5.5	1.0	No Change	0.0	0.4	Large Decrease	5.5
Red maple	4.2	8.6	42.3	5.0	1.0	No Change	0.0	0.6	Decrease	5.0
Northern red oak	1.5	0.7	42.3	3.2	1.3	Increase	0.0	1.1	No Change	0.0
American elm	0.4	0.4	34.6	2.4	2.3	Increase	0.0	3.2	Large Increase	0.0
Paper birch	1.9	5.3	11.5	2.0	0.7	Decrease	2.0	0.2	Large Decrease	2.0
Black ash	1.5	2.6	7.7	1.2	0.7	Decrease	1.2	0.6	Decrease	1.2
Black cherry	0.4	0.2	15.4	1.1	2.4	Large Increase	0.0	1.4	Increase	0.0
Eastern hemlock	1.2	1.9	3.8	0.8	1.2	Increase	0.0	0.4	Large Decrease	0.8
Quaking aspen	0.8	0.6	7.7	0.8	0.6	Decrease	0.8	0.2	Large Decrease	0.8
Total	**160.2**	**220.3**		**100.0**		***Proportion at-risk:***	***11.0***		***Proportion at-risk:***	***63.0***

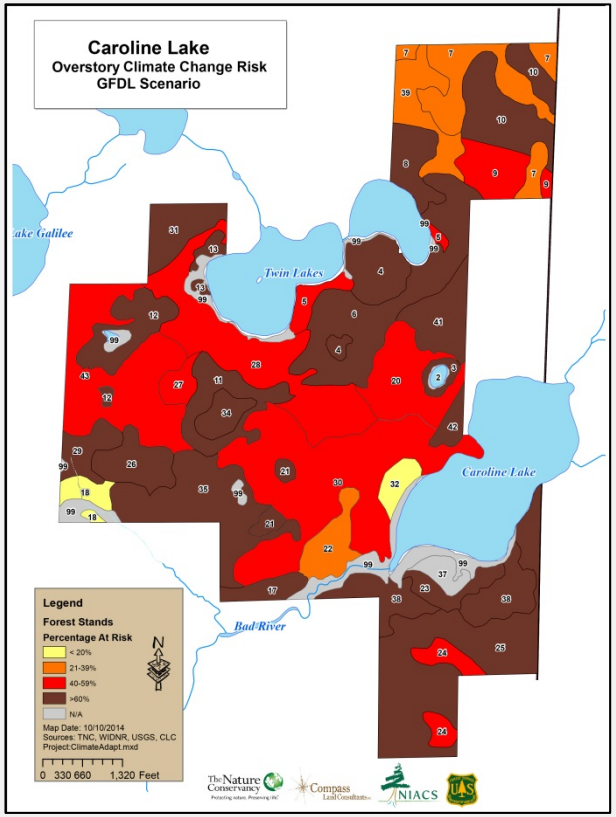
Risk by stand:

Overstory:

Low (PCM B1)



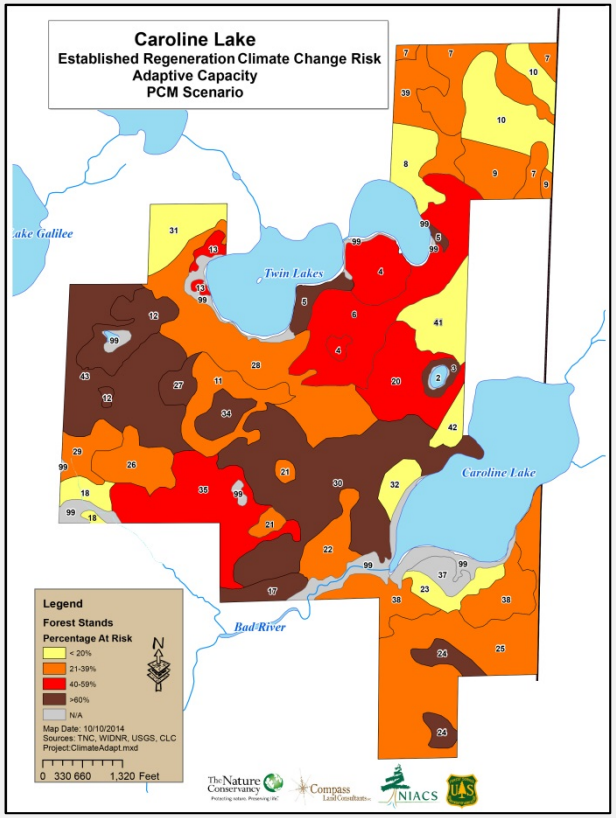
High (GFDL A1F1)



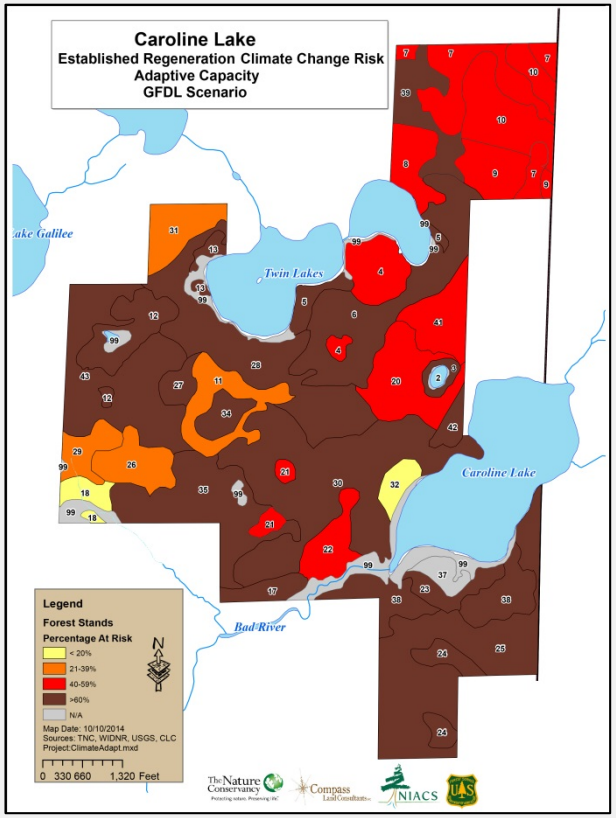
Risk by stand:

Established regen/saplings

Low (PCM B1)



High (GFDL A1F1)



Assignment

- Complete **Step 5:** Monitor and evaluate effectiveness
- Complete the **Homework** section after Step 5
- Additional reading:
  - Janowiak et al. 2017
  - Rowland and Cross 2015
- Come to Session 6 (Feb. 20) ready to discuss your monitoring!

Thanks everyone!

Troubleshooting? Stay on the line.