REAL-WORLD FOREST ADAPTATION: TOOLS, EXAMPLES, AND LESSONS FROM THE NORTHEASTERN US

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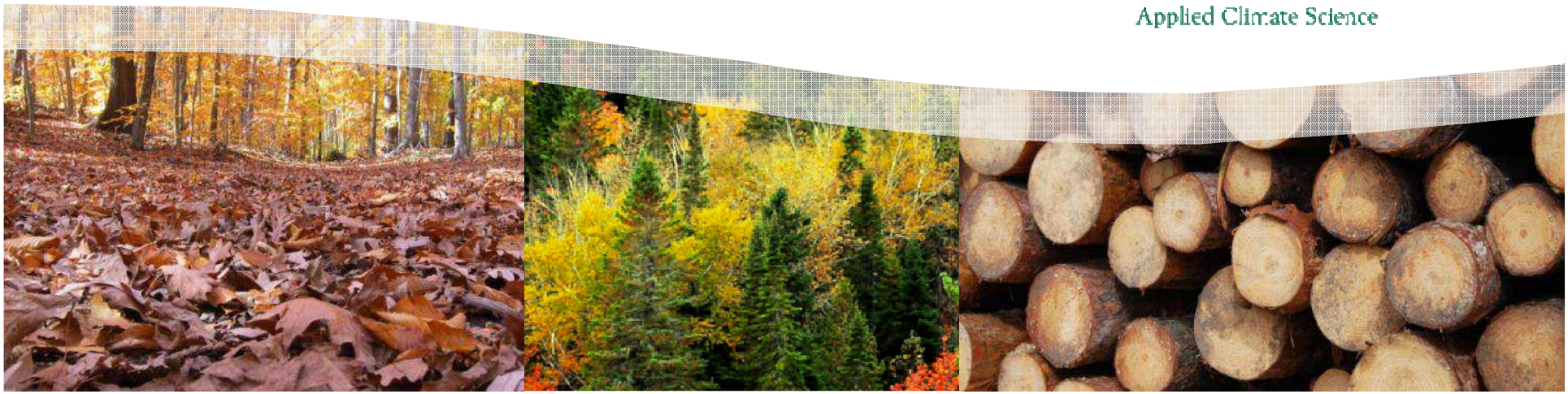
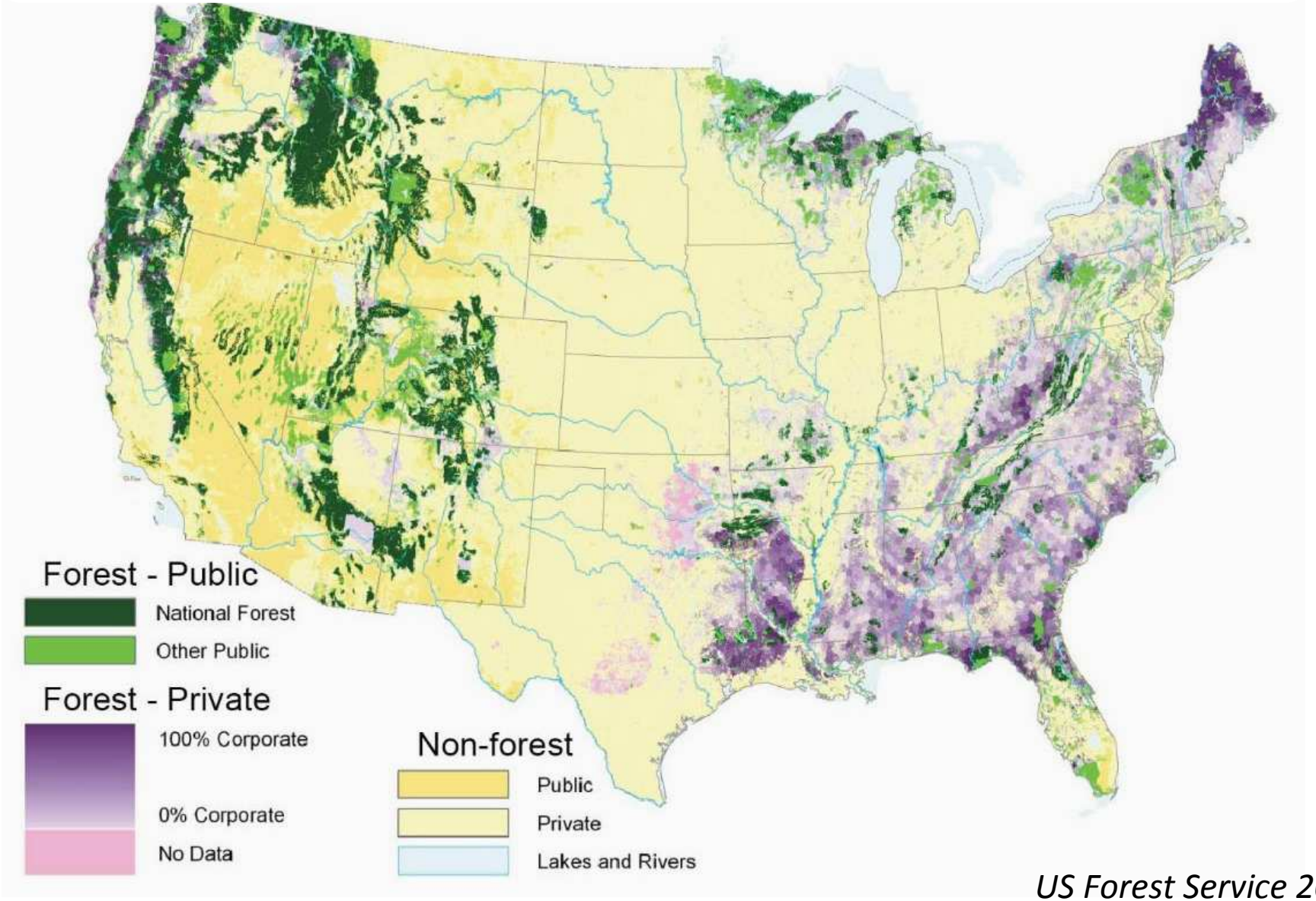


Diverse Forest Ownership



US Forest Service 2012

Diverse Forest Values

Challenges to Implementation

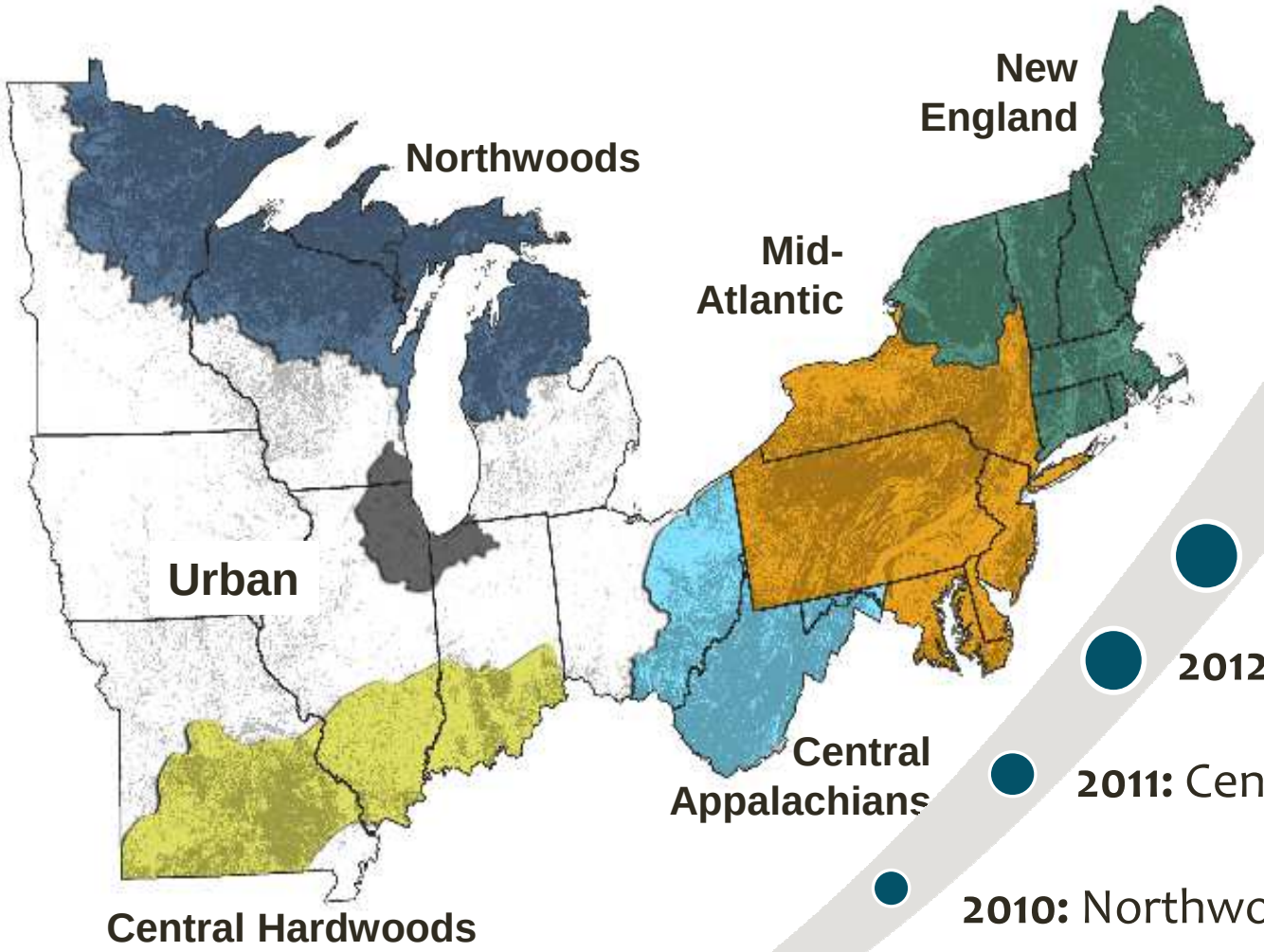
- Climate change is too big and too complex
- Climate information is not relevant enough
- One-size-fits-all answers are insufficient
- Not enough real-world examples

Climate Change Response Framework

Structured, process oriented, works on multiple scales

Components:	Progress:
Partnerships	125+ partner organizations (and counting)
Vulnerability Assessment	6 published assessments, 2 in press, 1 in prep
Forest Adaptation Resources	Published 2012, online version 2015, 2nd edition 2016
Adaptation Demonstrations	200+ demonstrations underway

Climate Change Response Framework



2013-15: Northeast, Mid-Atlantic

2013: Urban Forestry

2012: Central Appalachians

2011: Central Hardwoods

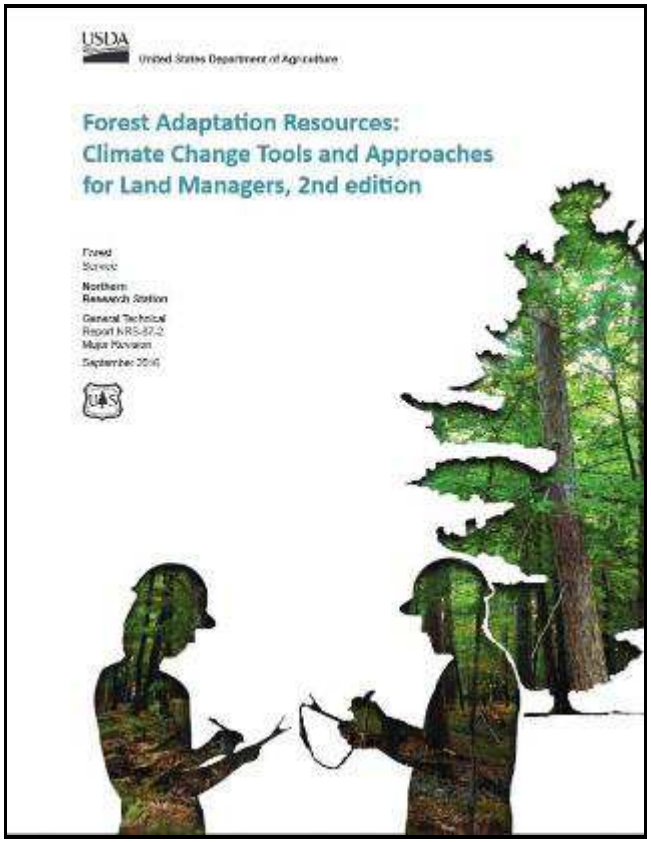
2010: Northwoods expansion

2009: Wisconsin pilot

Forest Adaptation Resources

Address diverse needs with menu and workbook

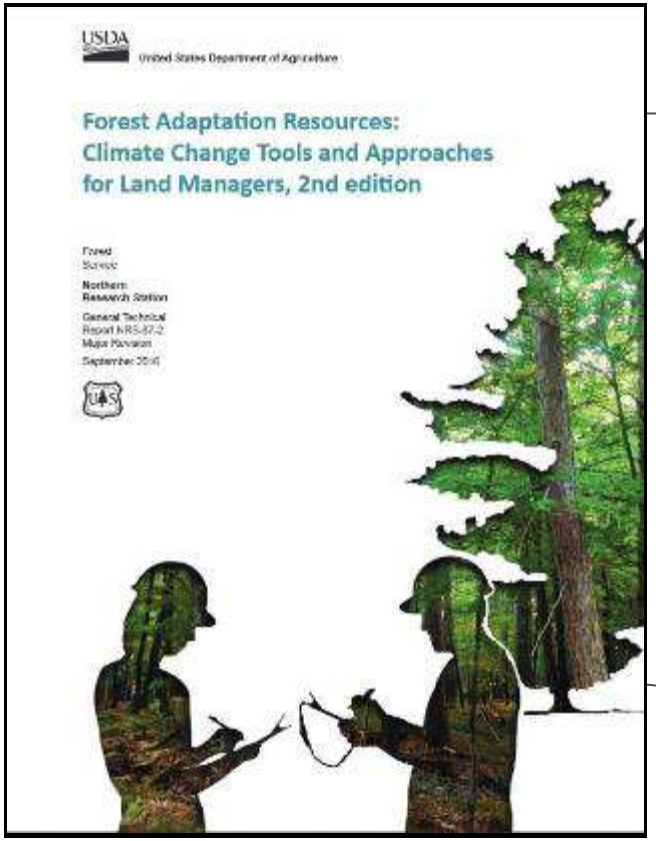
- Supports **diverse goals and objectives**
- Tailored to **eastern forest types**
- Menu of adaptation **strategies and approaches** for forest ecosystems
- **Does not make recommendations**



2nd edition – released 2016!

Swanston et al. 2016 (2nd edition); www.treesearch.fs.fed.us/pubs/52760

Forest Adaptation Resources



Swanston et al. 2016;
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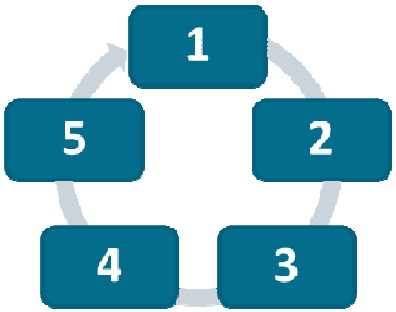
Strategies & Approaches

Menu of adaptation actions

Adaptation Workbook

- Structured process to integrate climate change considerations into management
- Workbook approach



Forest Adaptation Resources

Adaptation Strategies and Approaches *Menu*

- Reviewed adaptation literature
- Developed a menu of **10** strategies and **38** approaches
- Refined based comments from >50 reviewers

Swanston et al. 2016 (2nd edition);
www.treesearch.fs.fed.us/pubs/52760

Forest Adaptation Resources

Translating **concepts** to **actions**

Options (concepts):

•Resistance, Resilience, Transition

Strategies:

•Regionally specific conditions

Approaches:

•Actions for a specific ecosystem or forest type

Tactics:

•Prescriptions for local conditions and mgmt. objectives

Swanston et al. 2016 (2nd edition); www.treesearch.fs.fed.us/pubs/52760

Forest Adaptation Resources

The **Menu** helps you create **clear rationale** for your actions by connecting them to **broader adaptation ideas**.

"Intentionality"
"Success"

Swanston et al. 2016 (2nd edition);
www.treesearch.fs.fed.us/pubs/52760

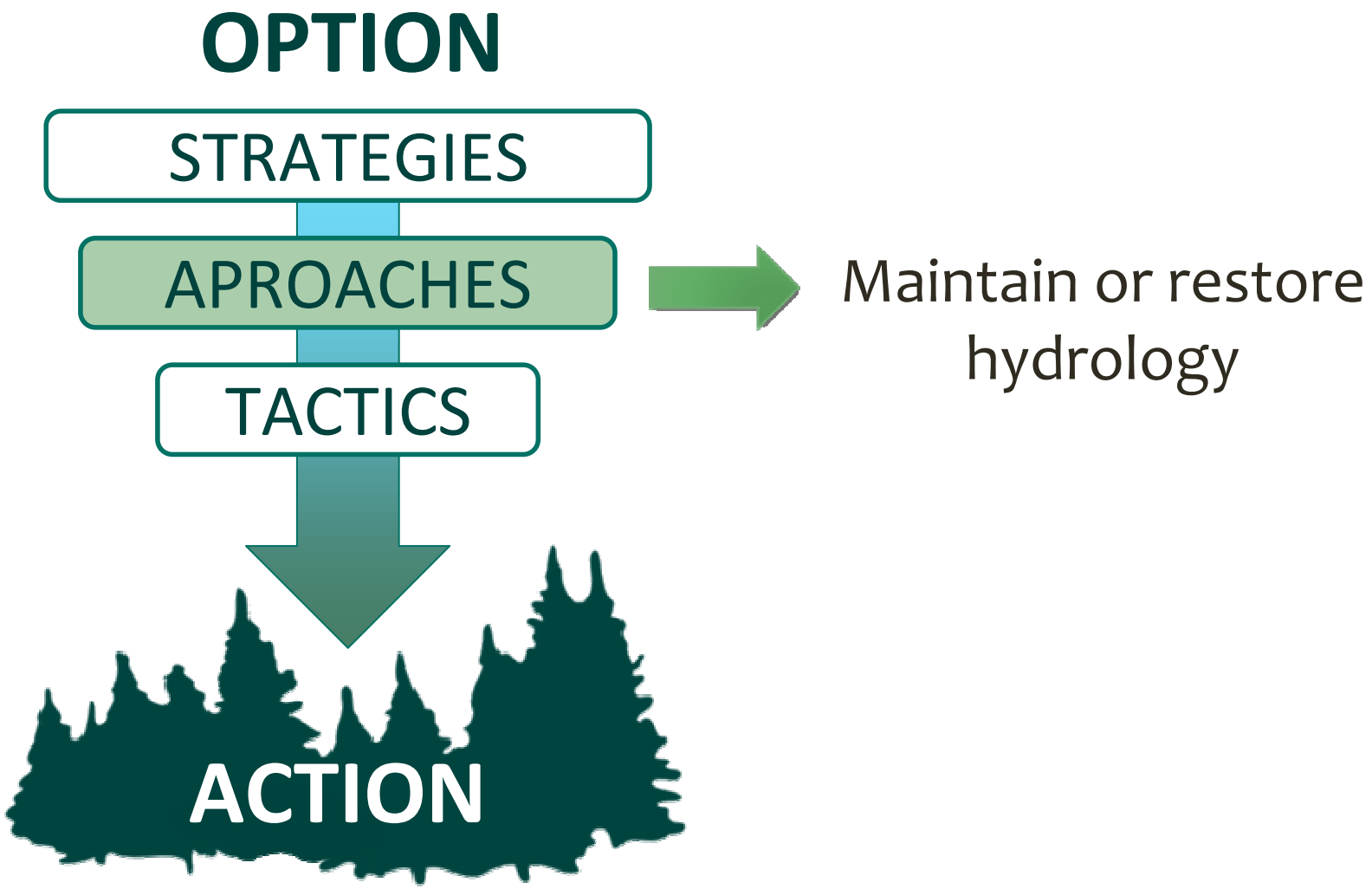
Adaptation Strategies and Approaches

Option: Resistance
(forestall change)

Adaptation Strategies and Approaches

Sustain fundamental ecological functions

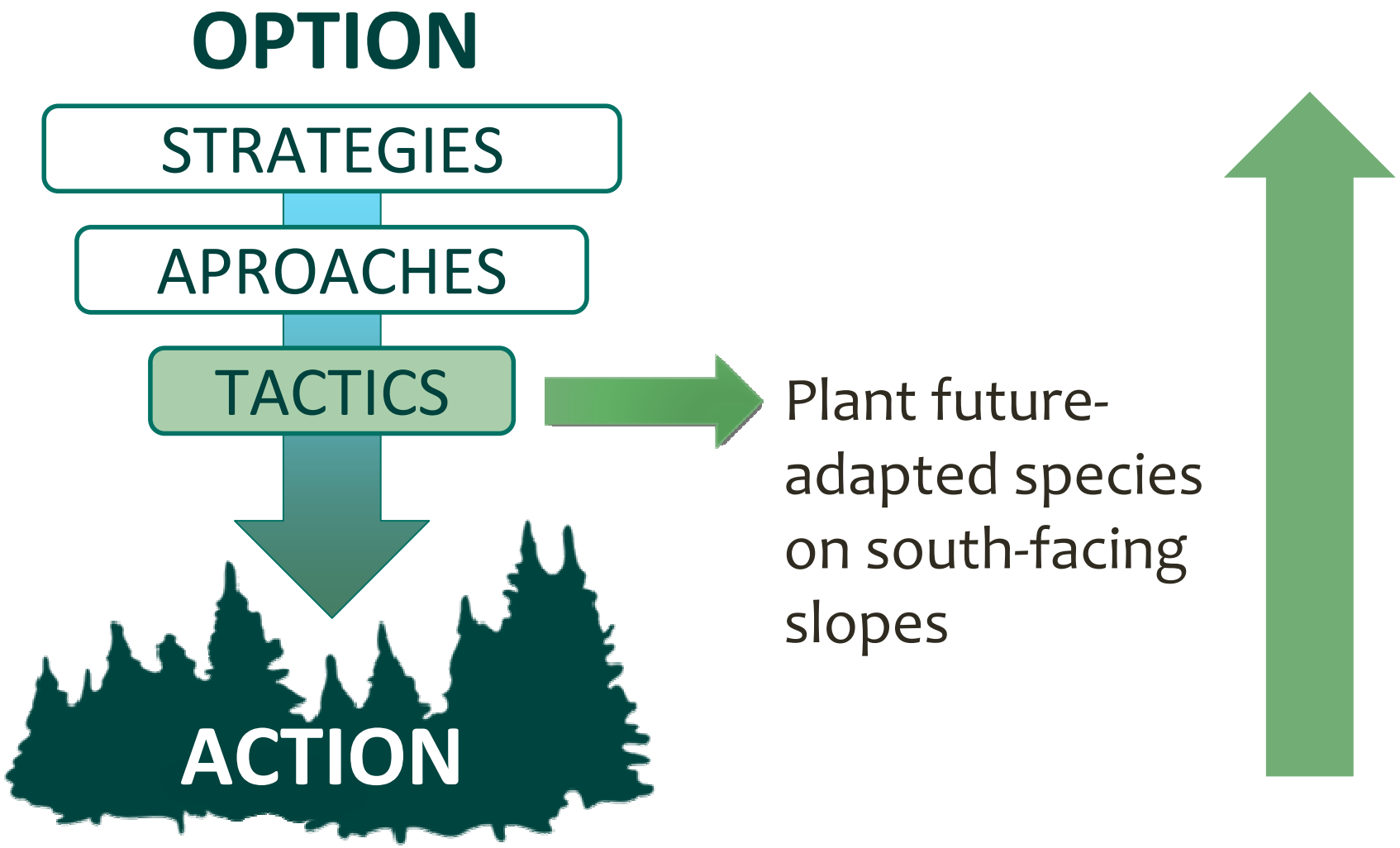
Adaptation Strategies and Approaches



Adaptation Strategies and Approaches

Use water control structures to maintain key wetland habitats

Adaptation Strategies and Approaches



Adaptation Strategies and Approaches

Emphasize drought- and heat-tolerant species & populations

Adaptation Strategies and Approaches

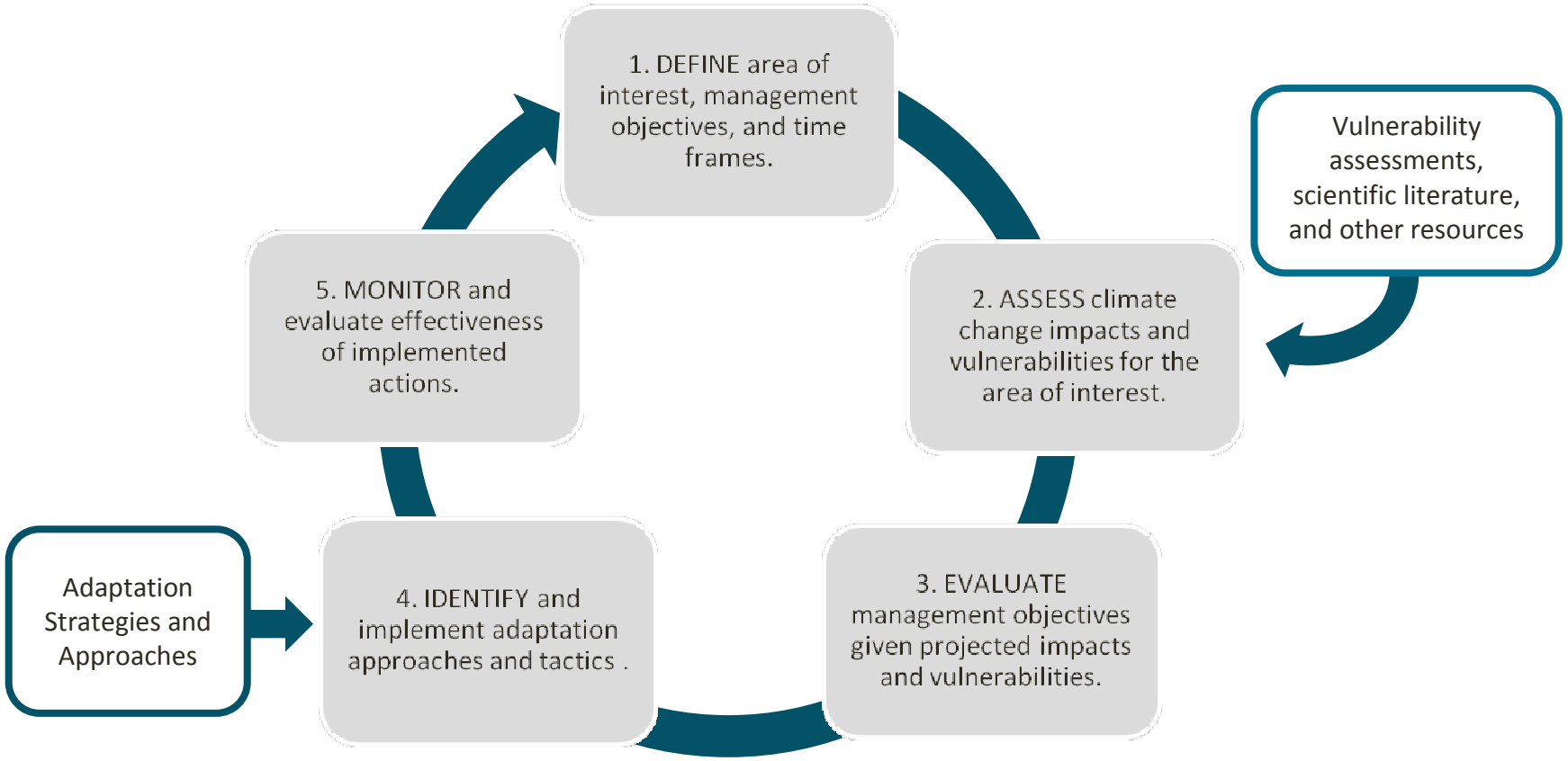
Facilitate community adjustments through species transitions

Adaptation Strategies and Approaches

Option: Transition
(facilitate change)

Forest Adaptation Resources

- **Adaptation Workbook** provides a **structured, flexible process**



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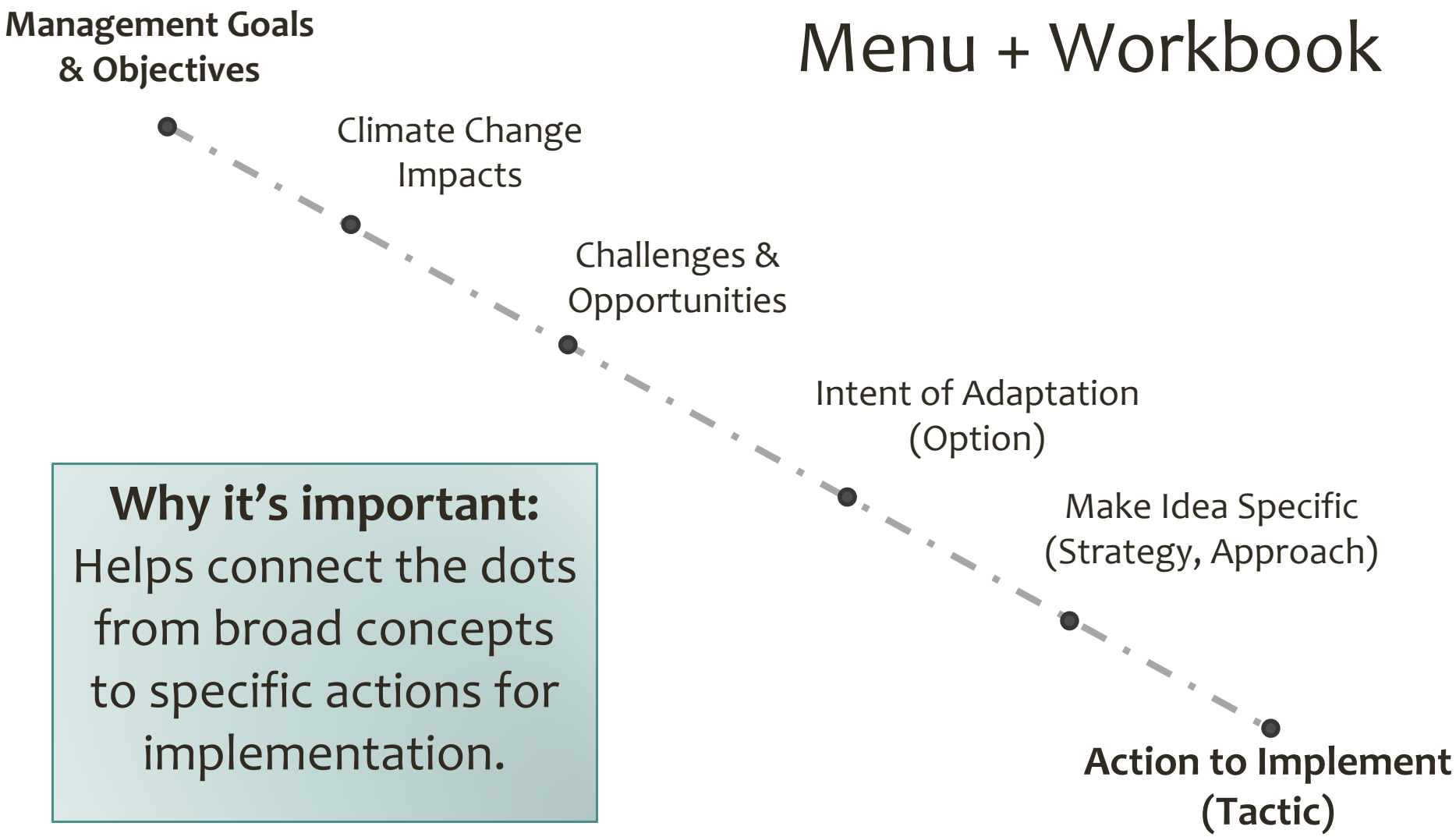
Forest Adaptation Resources

- Step-by-step **Adaptation Workbook** for planning

Management Objectives	Challenges	Opportunities	Feasibility	Other Considerations

Adaptation Actions			Benefits	Drawbacks/ Barriers	Recommend Tactic?
Approach (From Chapter 2)	Tactic	Time Frame			

Forest Adaptation Resources



Menu + Workbook

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

Forest Adaptation Resources

Ways the Adaptation Workbook can be used:

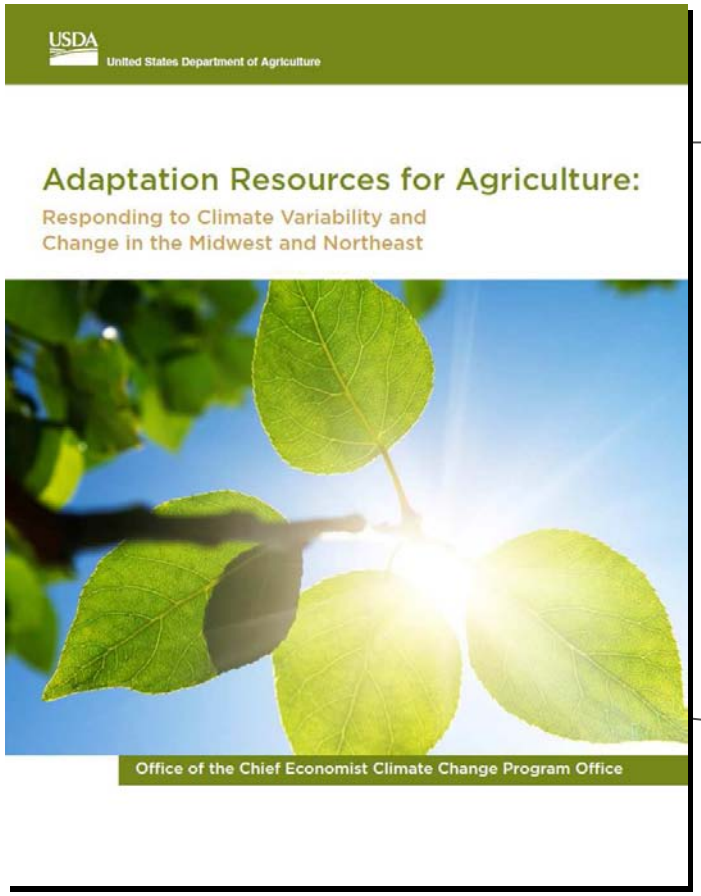
- Coordinator facilitates individual or small group
- Forest Adaptation Planning and Practices workshop
  - General (state agencies; SFEC)
  - Tribal (Sault; Menominee)
  - Conservation (WCS; DU)
- Managers use the workbook independently
  - Online version!!

Forest Adaptation Resources

Adaptationworkbook.org

- Interactive, self-guided
- Flexible
- Tailored by location
- Built using peer-reviewed resources
- Creates custom adaptation plan based on inputs
- Online courses

Adaptation Resources for Agriculture

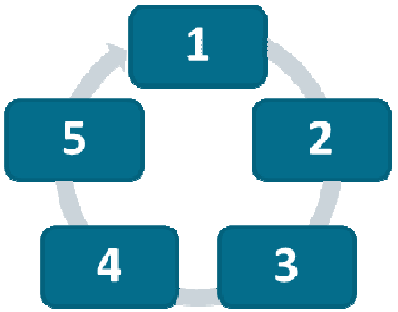


Janowiak et al. 2016

Strategies & Approaches

New menus
- Water resources
- Range management
- California ecosystems

- Structured process to integrate climate change considerations into management
- Workbook approach



Adaptation Demonstrations

Learn through examples!

- Provide **real-world examples** of forest management activities that:
  - Enhance the ability of forests to cope with changing conditions
  - Achieve land owner management goals
- Foster **cross-ownership** dialogue and learning
- Illustrate **diverse goals** and approaches

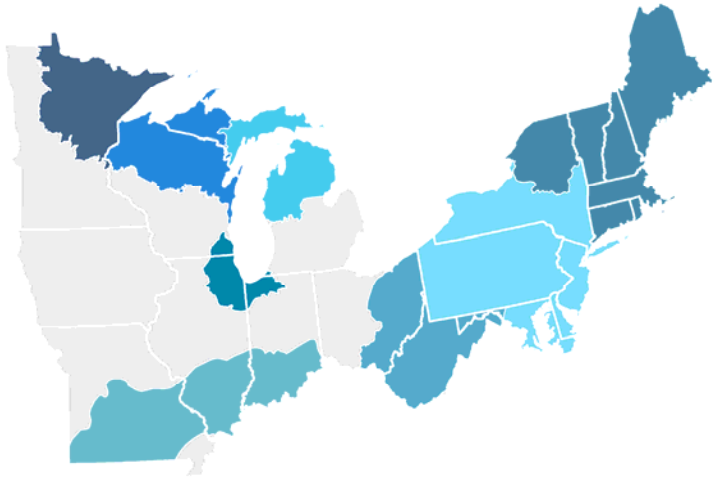
Menominee Tribal Enterprises

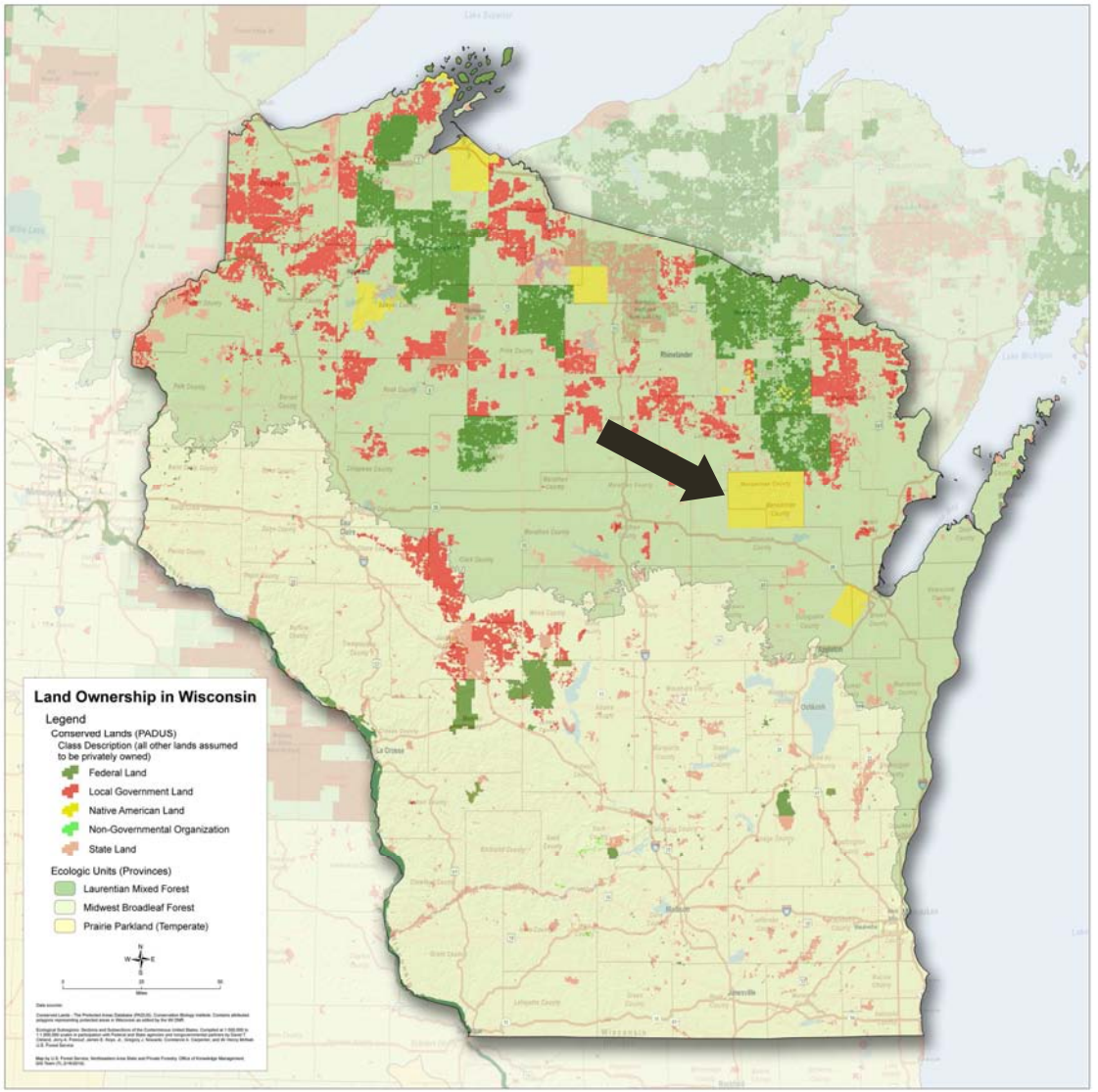
Photo: College of Menominee Nation SDI

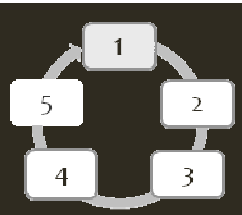
Menominee Forest

Menominee Tribal Enterprises

- Manages about 220,000 acres of forest
- Forest products business arm of the Menominee Indian Tribe of Wisconsin



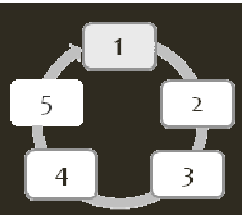




Step 1: DEFINE area of interest, management goals and objectives, and time frames.

Where are you working?

What are your management goals and objectives for this area?



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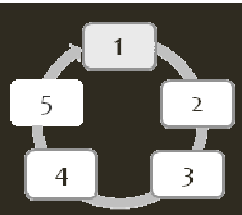
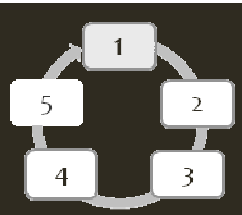


Step 1: DEFINE area of interest, management goals and objectives, and time frames.

Treatment

- Harvest affected & adjacent oaks
- Pull stumps
- Harvest other species in pocket



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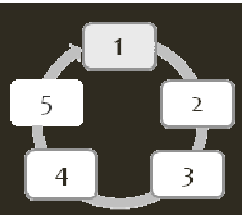
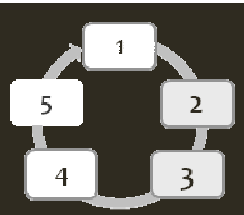


Step 1: DEFINE area of interest, management goals and objectives, and time frames.

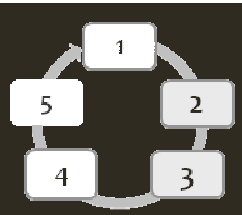
Project Area:	Menominee Forest Oak Wilt Pockets

Forest Type	**Management Goals & Objectives**	**Time Frames**
Oak-Northern Hardwoods	**Maintain diversity for cultural and economic values and sustainably produce forest products** •Use timber harvest to produce high-quality, valuable, sawtimber trees •Increase plant species diversity	•Ongoing



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?



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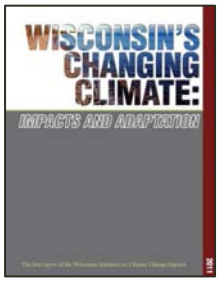
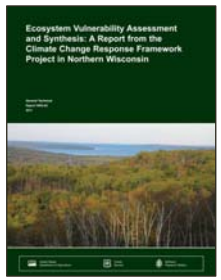
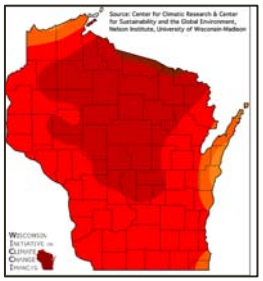
Broad-scale Impacts & Vulnerabilities

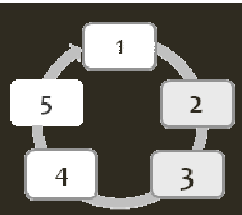
- Warmer temps, altered precipitation, drier summers
- Declines in many common northern species







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



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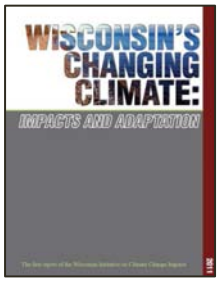
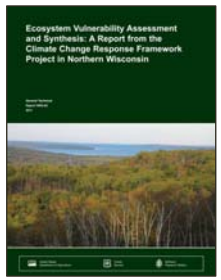
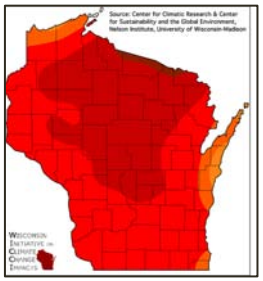


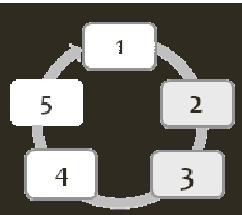




Impacts & Vulnerabilities for Project Area

- Diverse, mostly contiguous forest
- Dry-mesic sites may be more prone to drought
- Disturbed sites may be particularly sensitive to invasive plants
- Location at transition between northern and southern forests

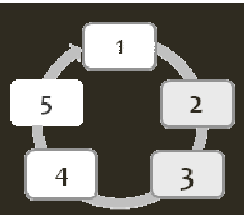
Overall vulnerability: High *(Impacts > Adaptive Capacity)*



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

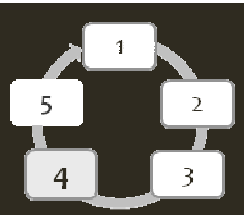
What management challenges or opportunities are created by climate change?

Can current management meet management goals?



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

Mgmt. Obj.	Challenges	Opportunities	Feasibility
• Use timber harvest to produce high-quality, sawtimber trees	• Decreased tree growth or increased mortality • Oak wilt is disruptive if not addressed early	• Desirable sawtimber species could be favored or introduced	• Medium
• Increase plant species diversity	• Northern species are projected to decline	• Southern species are expected to gain habitat	• High



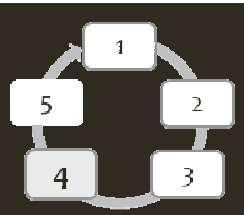
Step 4: IDENTIFY and adaptation approaches and tactics for implementation.

What actions can be taken to

enhance the ability of a system to cope with change

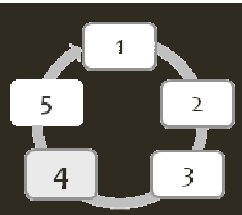
and

meet goals and objectives?



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

Adaptation Approach	Tactic	Consider:	Recommend Tactics?
• Favor or restore native species that are expected to be adapted to future conditions. • Establish or encourage new mixes of native species.	• Restore some oak wilt sites with tree and plant species that are expected to fare better in the future: *Bur oak* *White oak* *Chinkapin oak* *DED-resistant elm* *Understory plants*	• Benefits • Drawbacks • Barriers • Practicability	Yes



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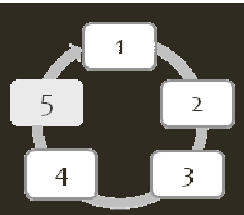
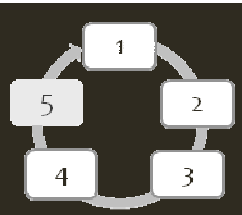


Step 5: MONITOR and evaluate effectiveness of implemented actions.

Were the selected actions effective?

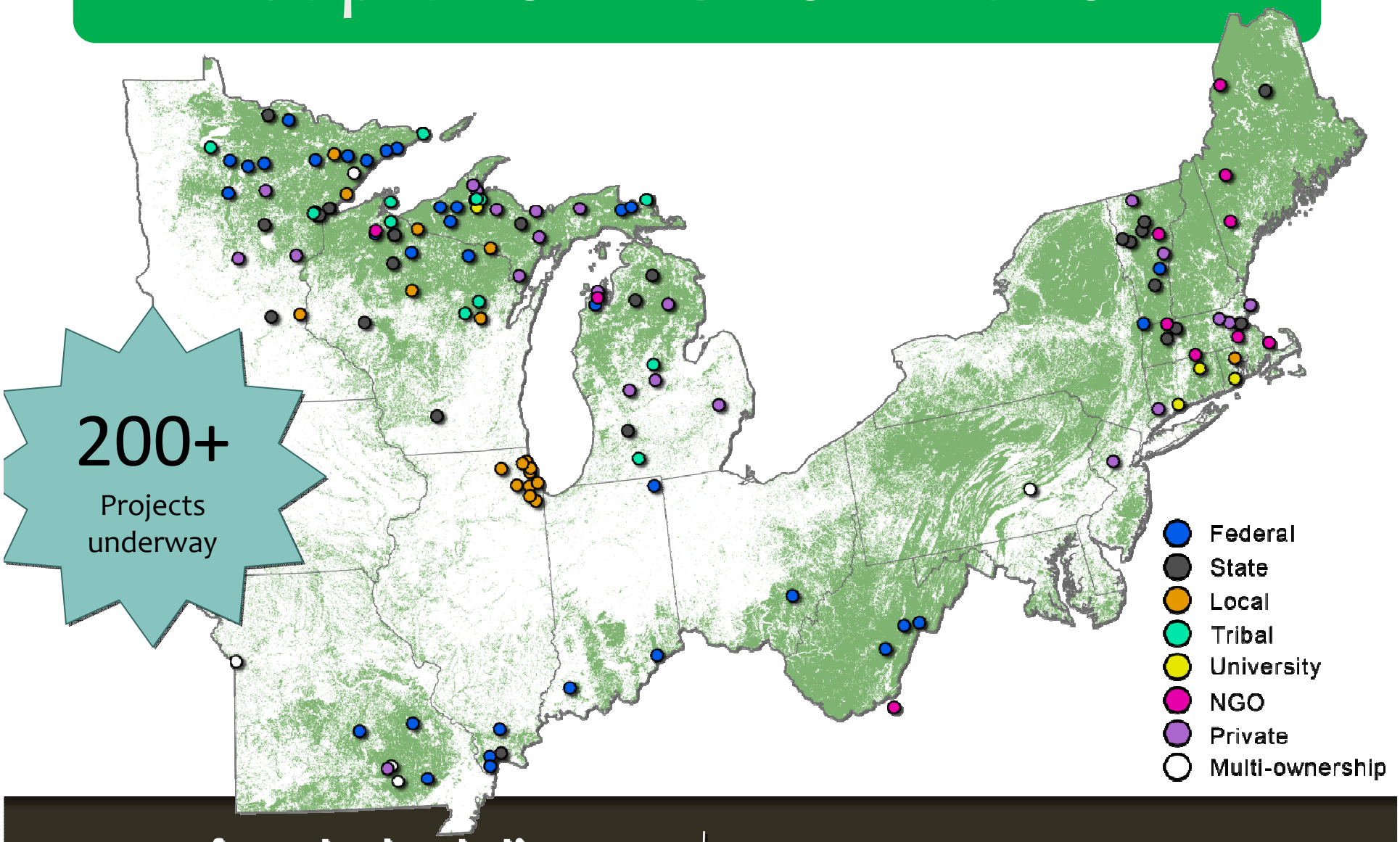
What can we learn from these actions to inform future management?



Step 5: MONITOR and evaluate effectiveness of implemented actions.

Monitoring Variable	Criteria for Evaluation	Implemention
Regeneration in oak wilt pockets	Abundance, composition	Regeneration surveys
Survival of planted trees	Percent survival at 1,2, and 5 years	Regeneration surveys
Oak wilt control in treated pockets	Greater than 95% control	Forest health surveys

Adaptation Demonstrations



www.forestadaptation.org | *Click 'Demonstration Projects'*

Adaptation Demonstrations

Learn through examples!!

- Diversity in lands
- Diversity in objectives
- Acknowledge difference, build on similarities
- Demonstrate shared perspectives

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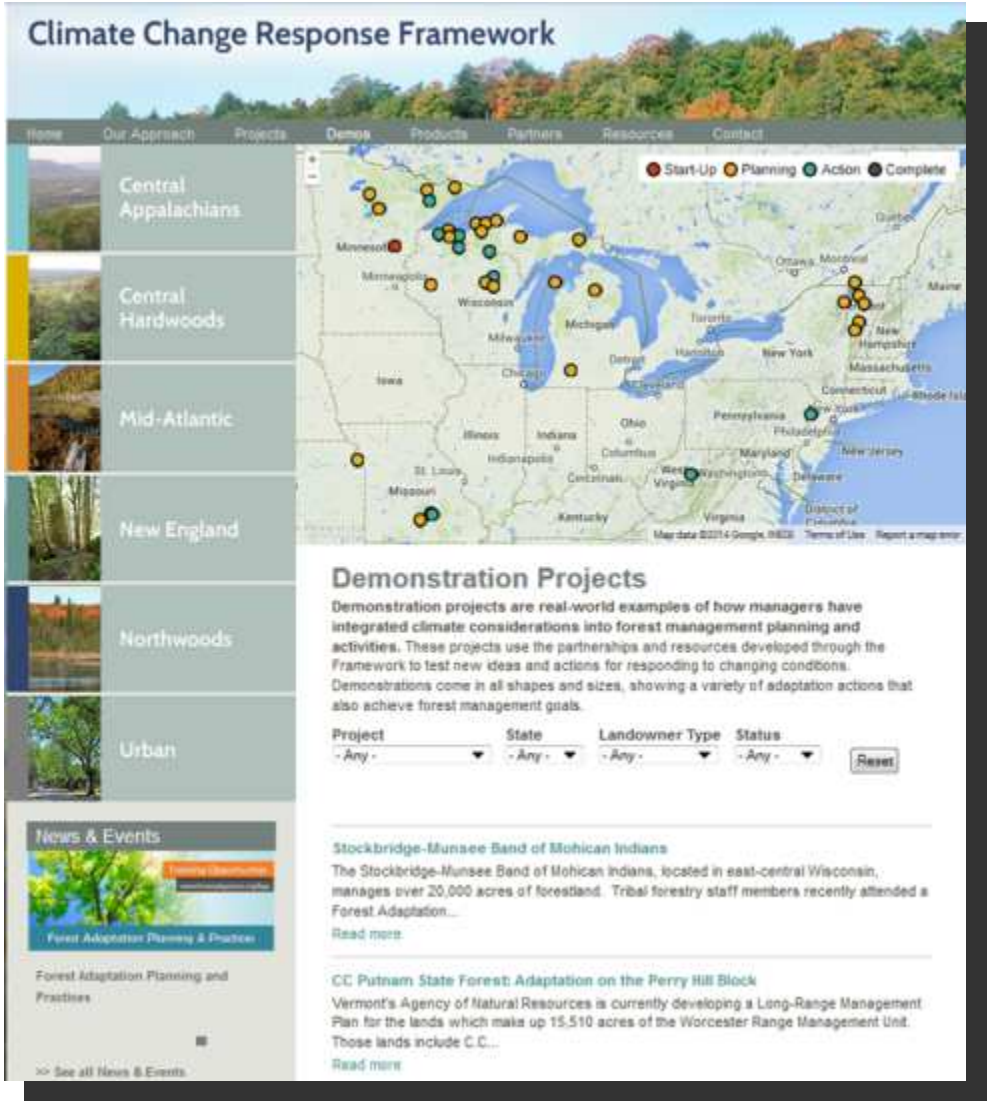

Lessons

Climate-informed decisions are typically about people and place, not about climate.

- Help people do their jobs and meet their goals

Build trust

- People manage the land (not agencies, industry, etc)
- Show up. Listen. Be forthright. Be transparent.

People want *The Answer*

- Beware of recommendations.
- "Structured flexibility" gets them to *their* answer

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