

# Northern Institute of Applied Climate Science

Climate

Carbon

The Northern Institute of Applied Climate Science (NIACS) develops synthesis products, fosters communication, pursues science, and provides technical assistance in climate change adaptation and carbon management.

**Multi-institutional collaborative chartered by USDA Forest Service, universities, and non-profit and tribal conservation organizations**



# Our Work

- Provide **science translation, professional training,** and **technical assistance** to support natural resource professionals in addressing climate and carbon issues in their work
- Pursue **new scientific research** and **science synthesis** related to carbon biogeochemistry, climate impacts, and tree species responses
- Lead **climate change communication and outreach** for land managers via several regional and national outlets

## CORE EFFORTS:

- Carbon Trends and Management
- Landscape Change Research Group
- Adaptive Silviculture for Climate Change
- Climate Change Response Framework
- USDA Northern Forest Climate Hub
- Climate Change Resource Center



[www.niacs.org](http://www.niacs.org)

# USDA Northern Forests Climate Hub (Operated by NIACS)



United States Department of Agriculture  
Climate Hubs



**NIACS** operates the USDA NFCH on behalf of USFS (via NRS)

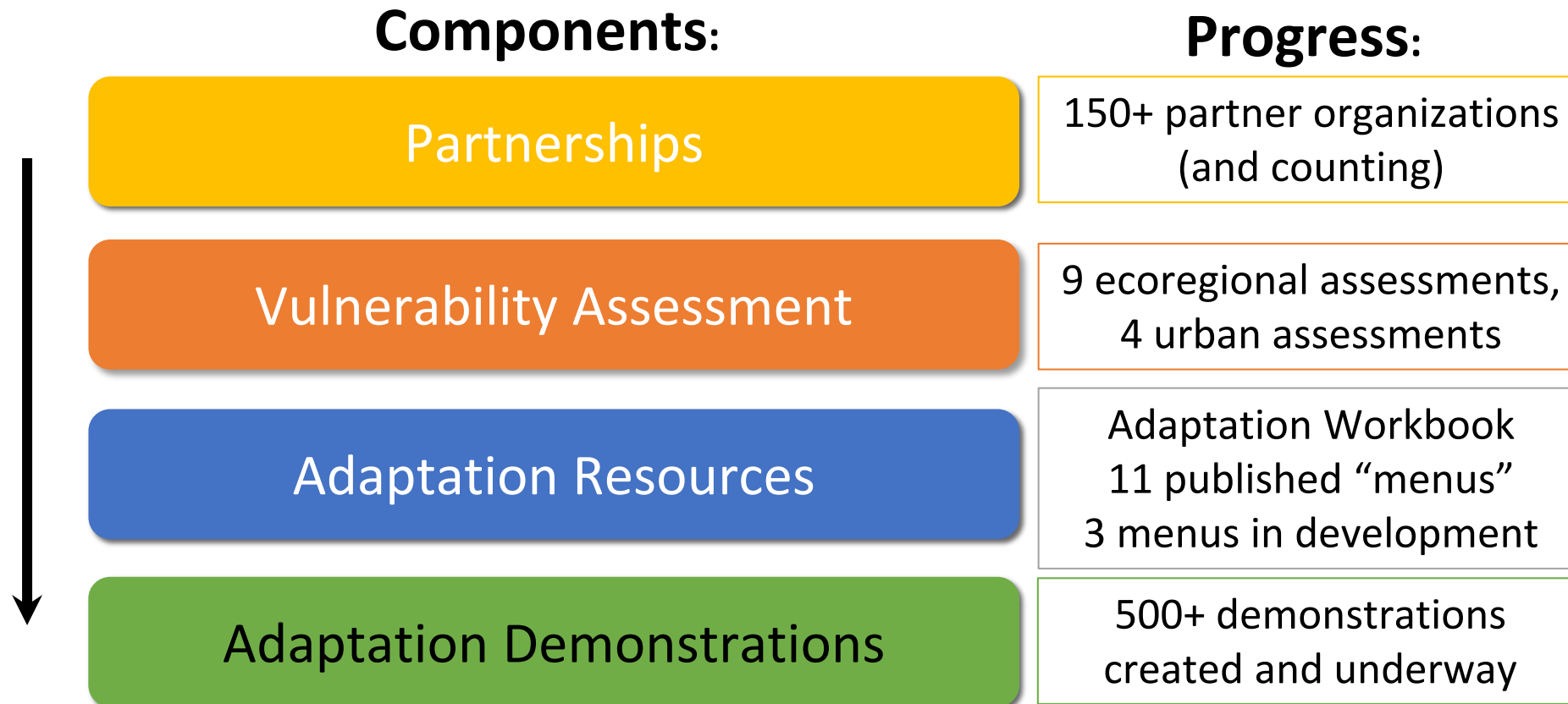
## Hubs Mission:

- Develop and deliver science-based, region-specific information and technologies to agricultural and natural resource managers that enable climate-informed decision-making, and to
- Provide assistance to implement those decisions

[www.climatehubs.usda.gov/hubs/northern-forests](http://www.climatehubs.usda.gov/hubs/northern-forests)

# Origins: Climate Change Response Framework

A collaborative, cross-boundary approach among scientists, managers, and landowners to incorporate climate change considerations into natural resource management.



# Vulnerability Assessment & Synthesis

- Series of reports for **natural resource professionals**
- Focus on **tree species and forest ecosystems**
- Examine a **range** of future climates
- Evaluate **key ecosystem vulnerabilities** to climate change



# Vulnerability Assessments

- Altered soil moisture
- Changes in hydrology
- Extreme weather events
- Fire risk
- CO2 fertilization
- Species range shifts
- Increased stressors
- Insect pests
- Forest pathogens
- Invasive plants

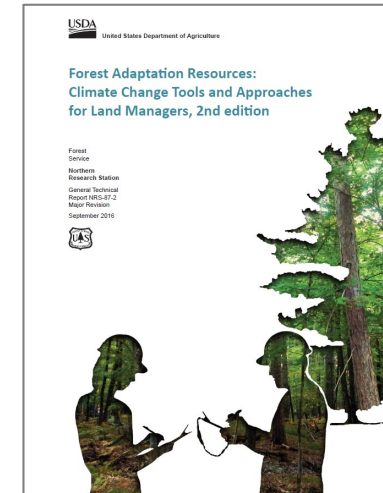
**Does not make recommendations**  
**Place based, model-informed, expert-**  
**driven, transparent**



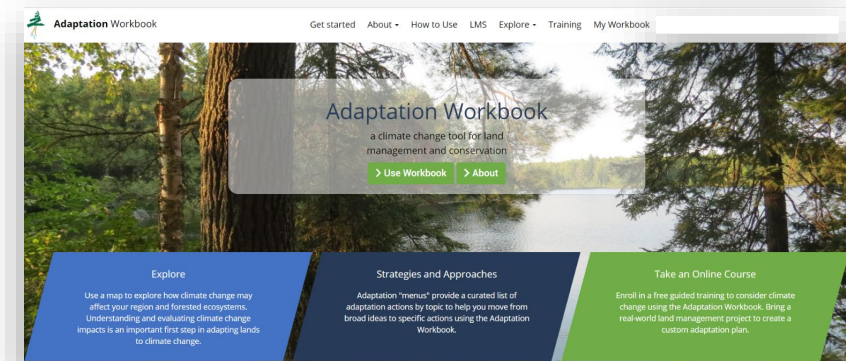
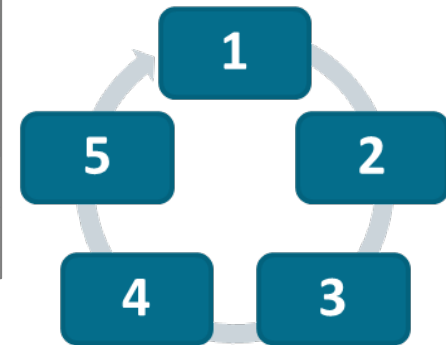
Sources: Handler et al. 2014, Janowiak et al. 2014

# Climate Adaptation Workbook and Adaptation Resources

- Flexible 5-step workbook designed for a variety of landowners with diverse goals
- Works at project level
- Centers around manager's expertise, and judgement
- Creates **clear rationale** for actions by connecting them to **broader adaptation ideas**
- **Does not make recommendations**
- **Includes:**
  - Adaptation workbook
  - Adaptation strategies for different resource areas (menus)

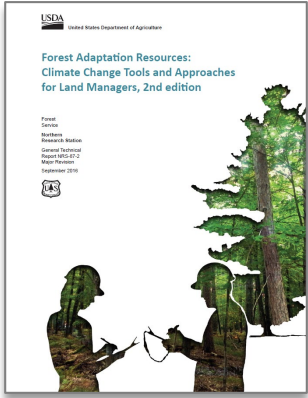
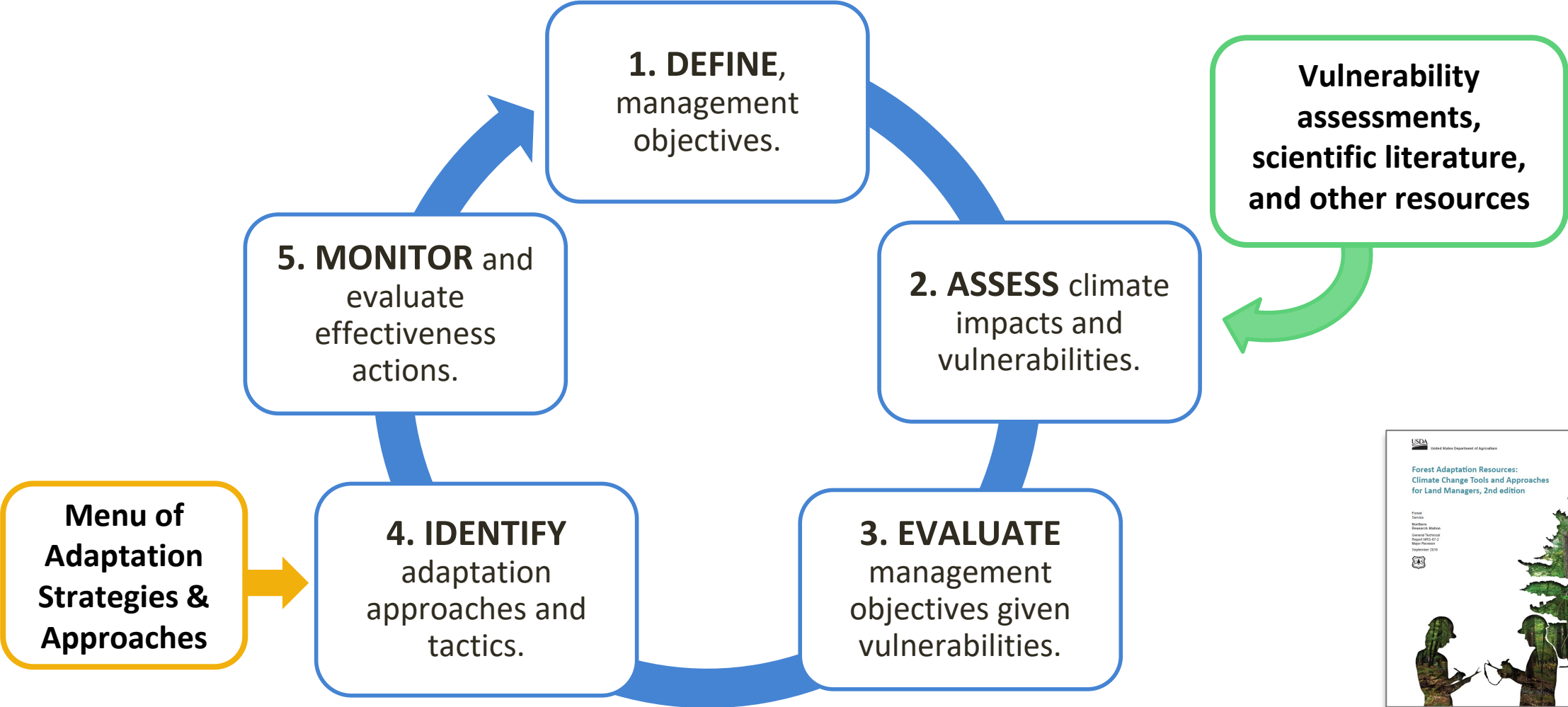


Swanston et al. 2016  
(2<sup>nd</sup> edition)



# Adaptation Workbook: Decision-support tool

Provides “structured flexibility”





# Adaptation Menu of Strategies and Approaches

A collection of plausible adaptation actions that are:

- Specific to a discipline
- Organized into a tiered hierarchy
- Thoroughly researched, co-developed, and tested

## Published:

- Forestry
- Urban Forestry
- Forested Watersheds
- Tribal Perspectives
- Agriculture
- Forest Carbon Management
- Recreation
- Non-Forested Wetlands
- Glacial Lake Fisheries

## In Preparation:

- Fire-Adapted Ecosystems
- Wildlife Management
- Ocean Coastal Ecosystems
- Fresh-Water Coastal Ecosystems
- Grasslands



# Menu of Adaptation Strategies and Approaches

*Developed for forests*

## **Strategy 1: Sustain fundamental ecological functions.**

- 1.1. Reduce impacts to soils and nutrient cycling.
- 1.2. Maintain or restore hydrology.
- 1.3. Maintain or restore riparian areas.
- 1.4. Reduce competition for moisture, nutrients, and light.
- 1.5. Restore or maintain fire in fire-adapted ecosystems.

## **Strategy 2: Reduce the impact of biological stressors.**

- 2.1. Maintain or improve the ability of forests to resist pests and pathogens.
- 2.2. Prevent the introduction and establishment of invasive plant species and remove existing invasive species.
- 2.3. Manage herbivory to promote regeneration of desired species.

## **Strategy 3: Reduce the risk and long-term impacts of severe disturbances.**

- 3.1. Alter forest structure or composition to reduce risk or severity of wildfire.
- 3.2. Establish fuelbreaks to slow the spread of catastrophic fire.
- 3.3. Alter forest structure to reduce severity or extent of wind and ice damage.
- 3.4. Promptly revegetate sites after disturbance.

## **Strategy 4: Maintain or create refugia.**

- 4.1. Prioritize and maintain unique sites.
- 4.2. Prioritize and maintain sensitive or at-risk species or communities.
- 4.3. Establish artificial reserves for at-risk and displaced species.

# Helping Managers Connect the dots

Management Goals & Objectives

Climate Change Impacts

Challenges & Opportunities

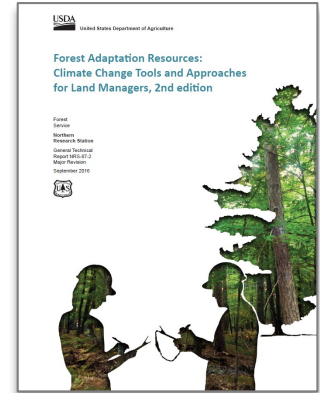
Intent of Adaptation  
**(Option)**

Make Idea Specific  
**(Strategy, Approach)**

Action to Implement  
**(Tactic)**

Monitoring effectiveness

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



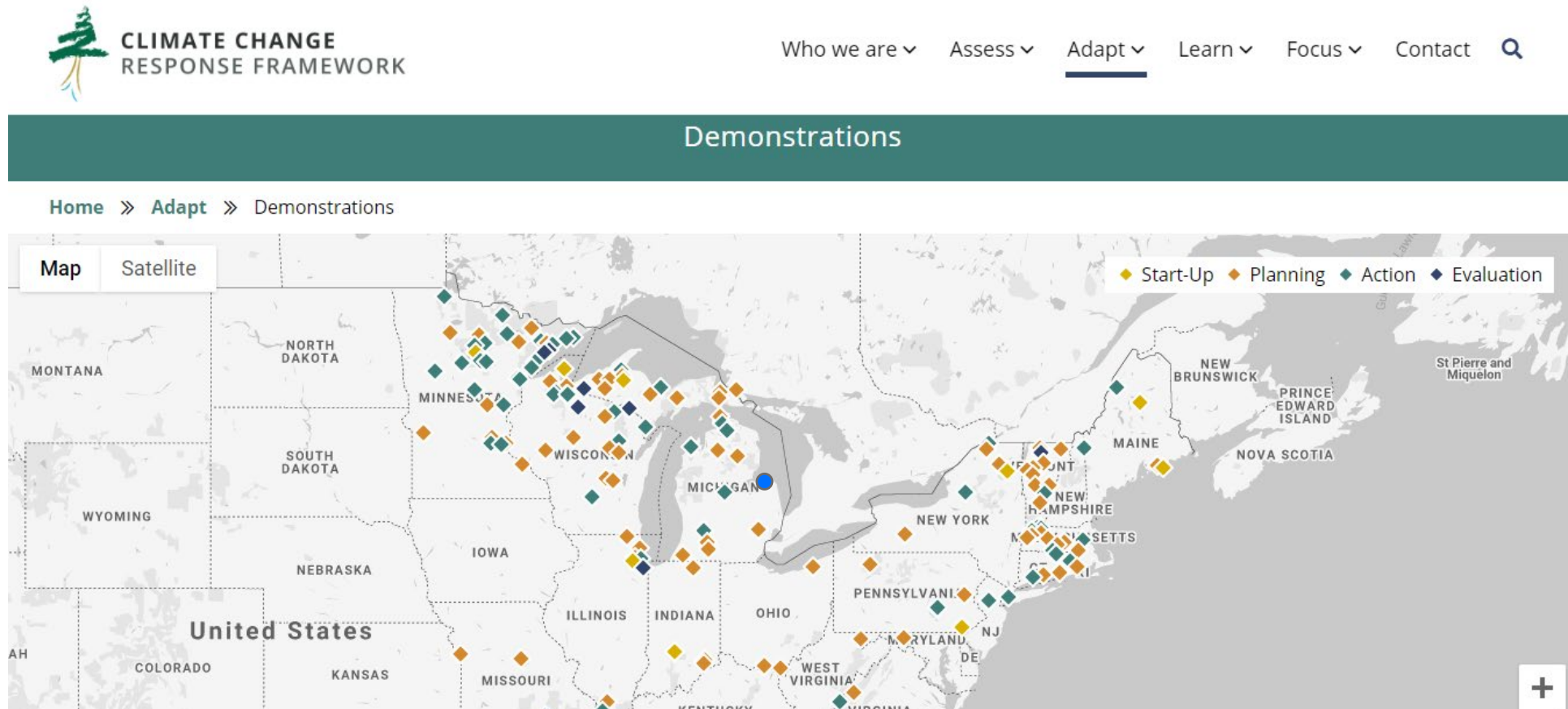
*Adaptation Workbook*

# Adaptation Demonstrations

Real-world examples of climate-informed forest management.

More than 500 projects have used the **Adaptation Workbook** to consider climate change and identify adaptation actions.

More than 170 are described online



[www.AdaptationWorkbook.org/demos](http://www.AdaptationWorkbook.org/demos)

Time for a Break!



**Return at 10:40ET/9:40CT**

# LUNCH BREAK!



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**Return at 1:00ET/12:00CT**

# Contact Us!

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