

Woods, Water, and Wildlife: Designing Management Actions for Changing Conditions



Maria Janowiak, mjanowiak02@fs.fed.us
Chris Swanston, Stephen Handler, Leslie Brandt,
Patricia Butler, Danielle Shannon, & Linda Nagel

www.forestadaptation.org

Northern Institute of Applied Climate Science

Climate

Carbon

Bioenergy

- Provides practical information, resources, and technical assistance related to forests and climate change
- Supports the integration of climate change information into natural resource management



www.nrs.fs.fed.us/niacs/

Regional multi-institutional partnership among:



Michigan Tech

ncasi



What I'll talk about today

Part 1: Tools & sources of **curated** information regarding climate change effects on ecosystems

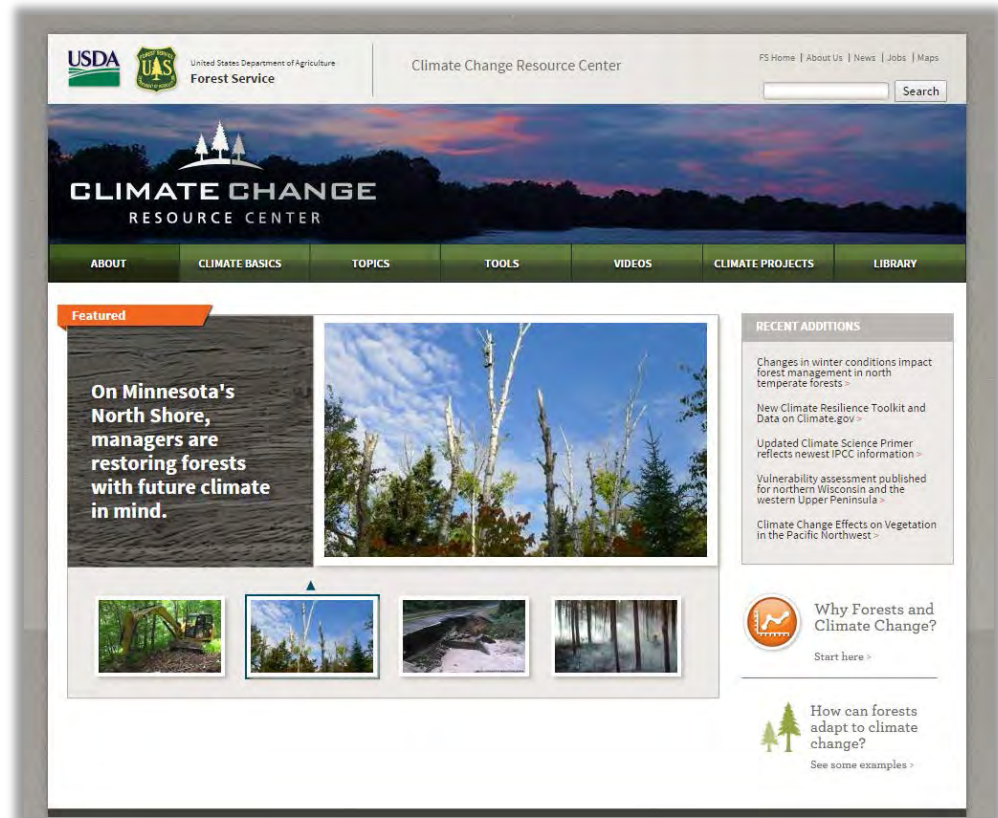


Part 2: A tool for **integrating** climate change information into management

Climate Change Resource Center

National FS site for natural resource professionals

- Topic pages
- Tools reviews
- Video library
- Adaptation examples
- Education modules



www.fs.usda.gov/ccrc/

USDA Climate Hubs

National USDA effort to provide info & tools to managers & landowners

In Midwest and Northeast, a **Northern Forests Sub Hub** provides sector-specific assistance (coordinated by NIACS).

The graphic is a promotional poster for the USDA Northern Forests Sub Hub. It features a blue background with a forest scene. At the top left is the USDA Climate Hubs logo. To the right is the text 'NORTHERN FORESTS SUB HUB' and a map of the United States highlighting the Midwest and Northeast. The central text reads 'The Climate Is Changing. How Will You Manage For It?'. Below this are several text boxes: a blue box with statistics on forest assets, an orange box with the title 'The climate is changing' and a list of climate trends, an orange box titled 'Science delivery' describing the sub hub's role, and another orange box titled 'The Sub Hub assists' listing partner types. At the bottom right, another orange box titled 'How to participate' mentions welcoming regional partners.

USDA CLIMATE HUBS **NORTHERN FORESTS SUB HUB**

The Climate Is Changing.
How Will You Manage For It?

The Northern Forests Sub Hub assists natural resource managers, woodland owners, and others interested in forests with integrating climate change information into planning, decision making, and management activities.

The region's forests are a national asset; they contain:

- 42% of U.S. forests
- 32% of U.S. timberland
- 41% of U.S. population

The climate is changing

The climate has changed and will continue to do so. How might climate change impact northern forests?

In the last century (1900 – 2010)

- Temperatures have risen 1.5 to 2° F
- Precipitation has increased more than 10% (0.4 inches per decade)

Science delivery

The USDA Climate Sub Hub delivers science-based tools and information to land managers so they can make climate-informed decisions now.

The Sub Hub is a collaborative effort between agencies, universities, states, tribes and other groups. Connecting land managers to the vulnerabilities and risks northern forests face in a changing climate, while also providing the tools necessary to manage for it.

The Sub Hub assists

- Professional Resource Managers
- Cooperative Extension agents
- Private Landowners
- USDA Technical Service Providers

How to participate

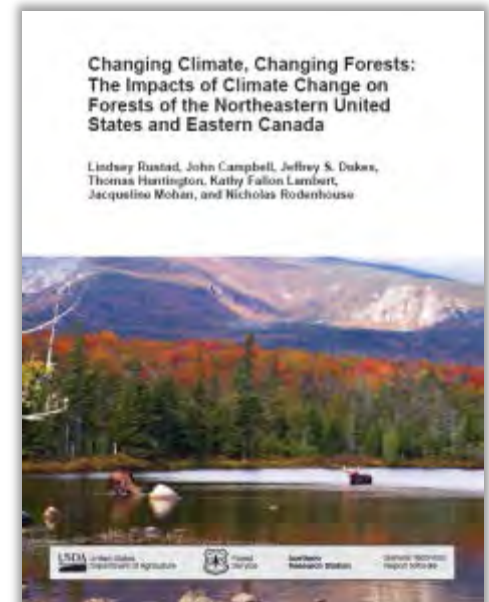
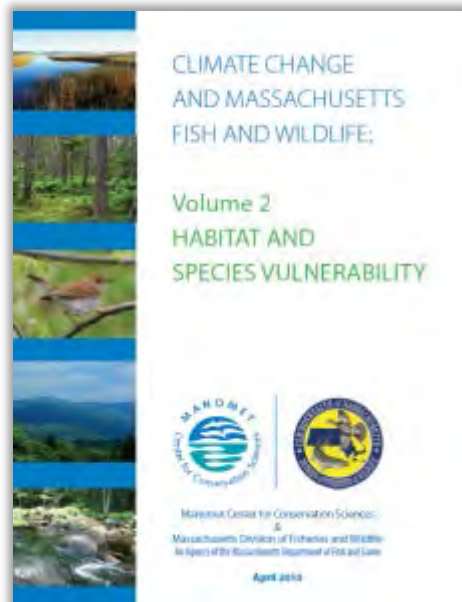
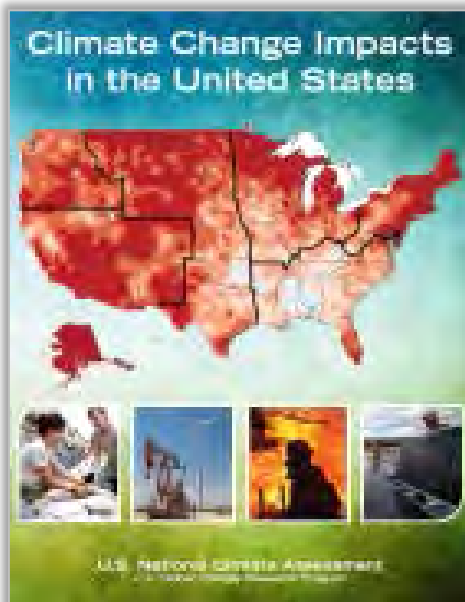
The USDA Northern Forests Sub Hub welcomes all regional partners to participate and

The Sub Hub highlights regional resources related to

<http://climatehubs.oce.usda.gov/midwest-subHub-forestry>

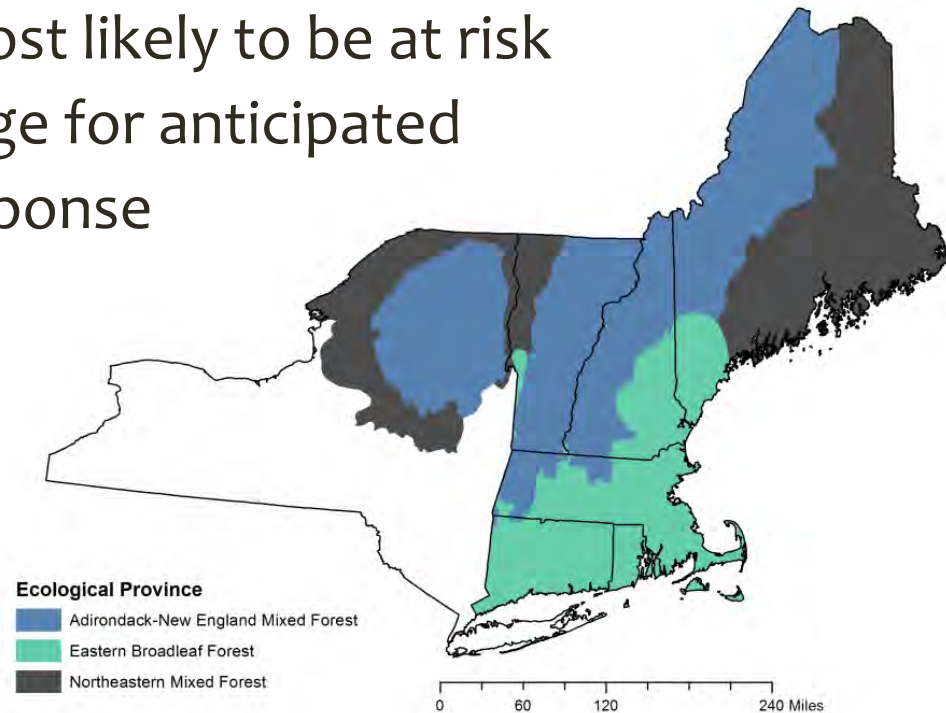
Vulnerability Assessments (p1)

- High-quality information about future change in climate and potential effects on ecosystems
- In New England, several high-quality regional and state level assessments exist

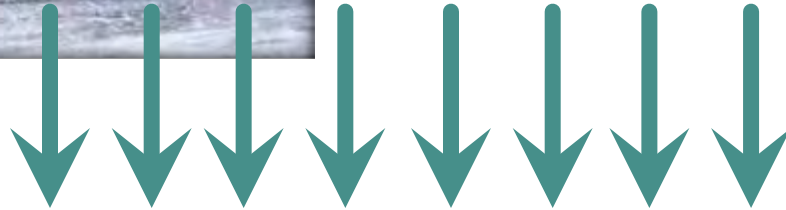
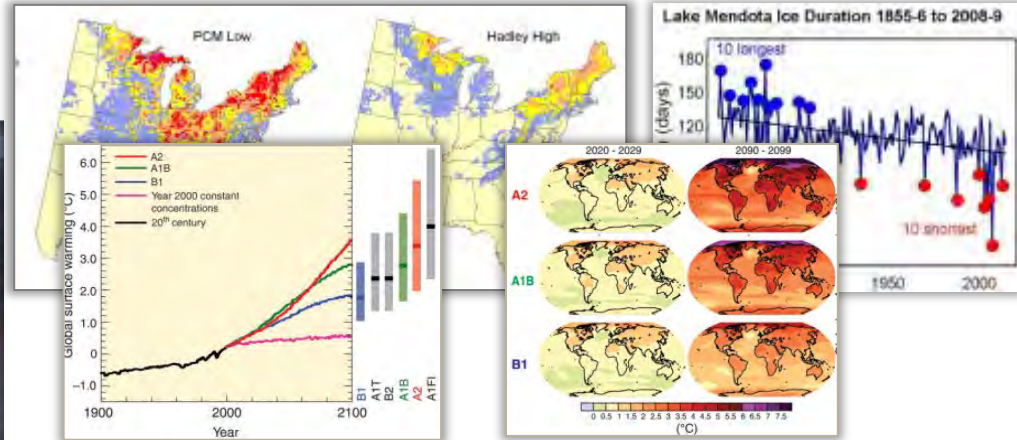


Vulnerability Synthesis (in prep)

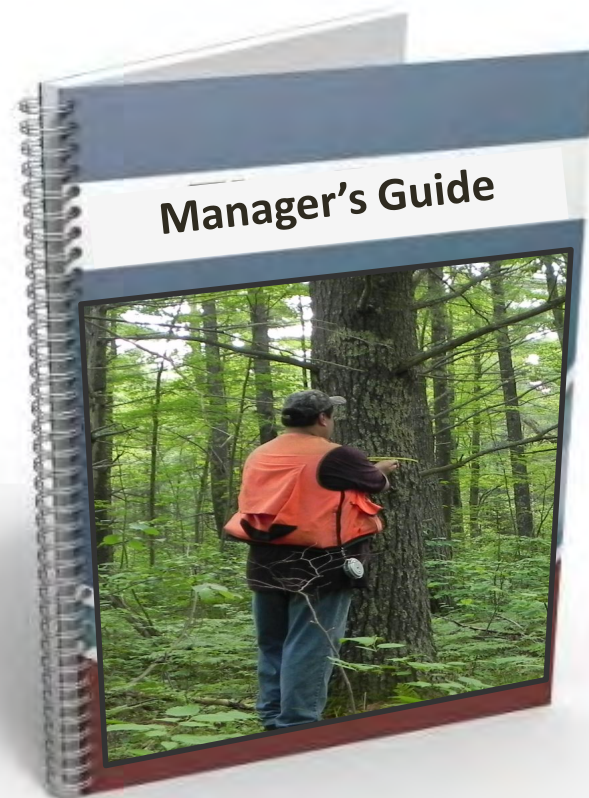
- Synthesize findings of state/regional assessments and scientific literature
 - Identify common areas of agreement regarding ecosystems and species most likely to be at risk
 - Describe state-of-knowledge for anticipated changes in climate and response of forest ecosystems
- Incorporate results of the Climate Change Tree Atlas for three sub-regions



How to use this info to respond?



Responding to Climate Change



If you want a single “answer” for how to respond to climate change, it’s

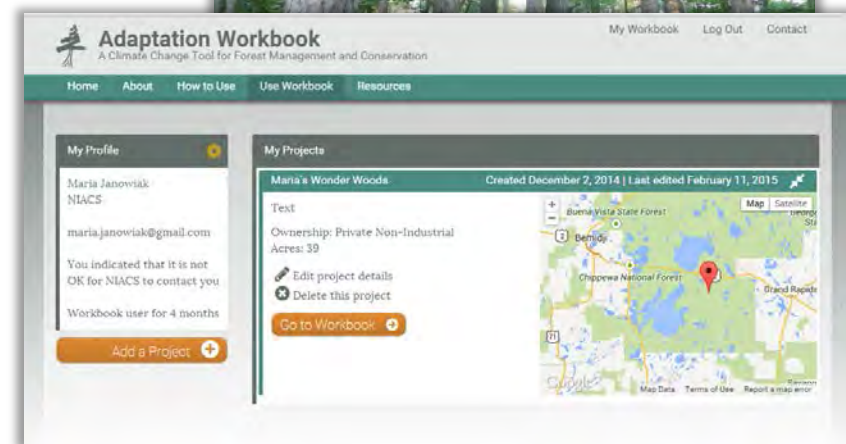
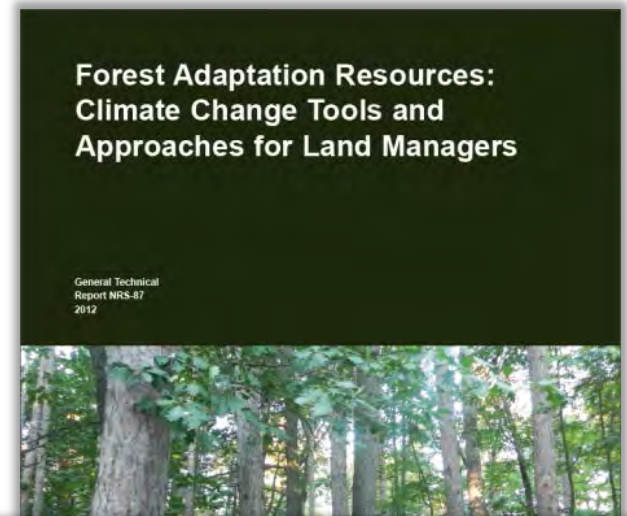
“It depends”

It depends on **where** you are working and **what** you’re trying to achieve.

Forest Adaptation Resources

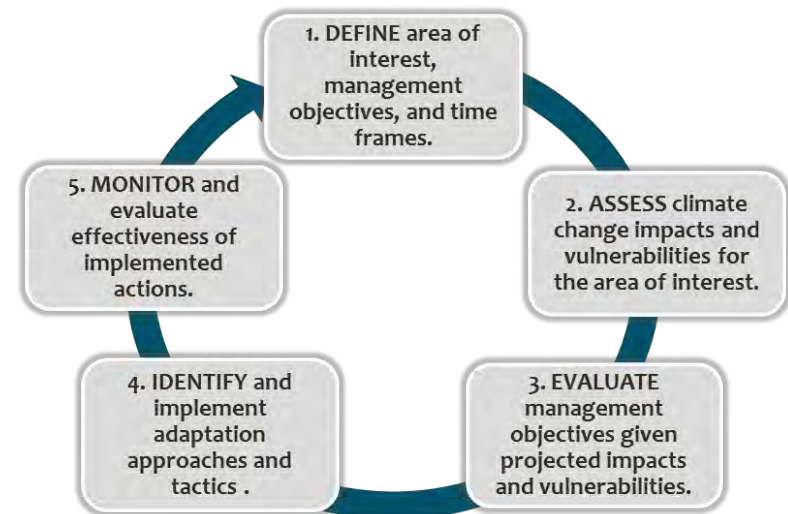
Adaptation Workbook

- Process for integrating climate change into management & conservation projects
- Designed for a variety of natural resource managers (public, private, tribal, NGO, ...)
- Tailored to **eastern forest types**
- Print/excel/word versions
- **NEW online version!**

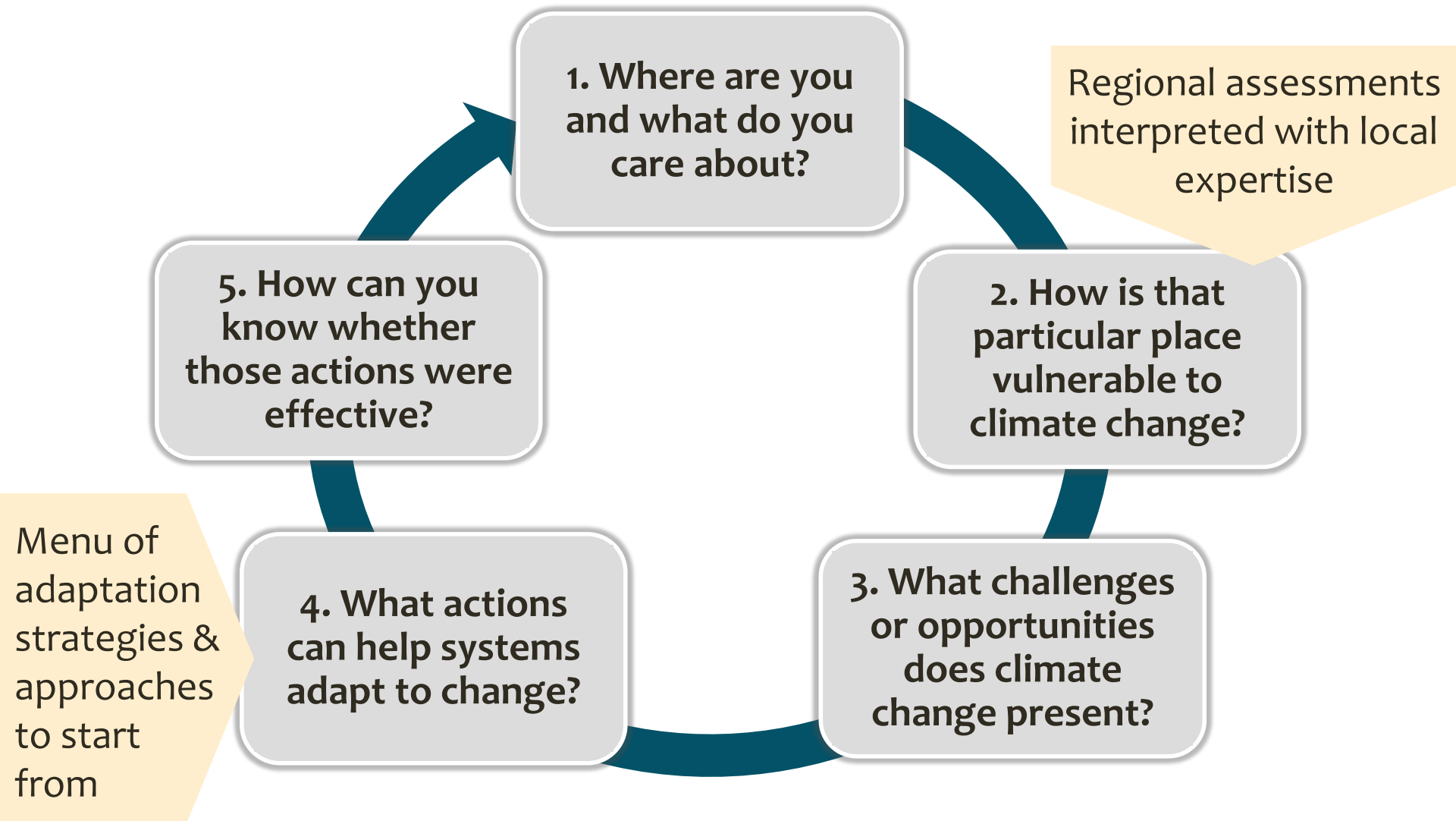


Adaptation Workbook Process

- Driven by landowner goals and objectives
- Draws upon **climate impacts** from state/ regional assessments
- Uses a menu of adaptation strategies and approaches to help identify **specific** management actions
- Complements current management planning



Adaptation Workbook Process



Adaptation Workbook

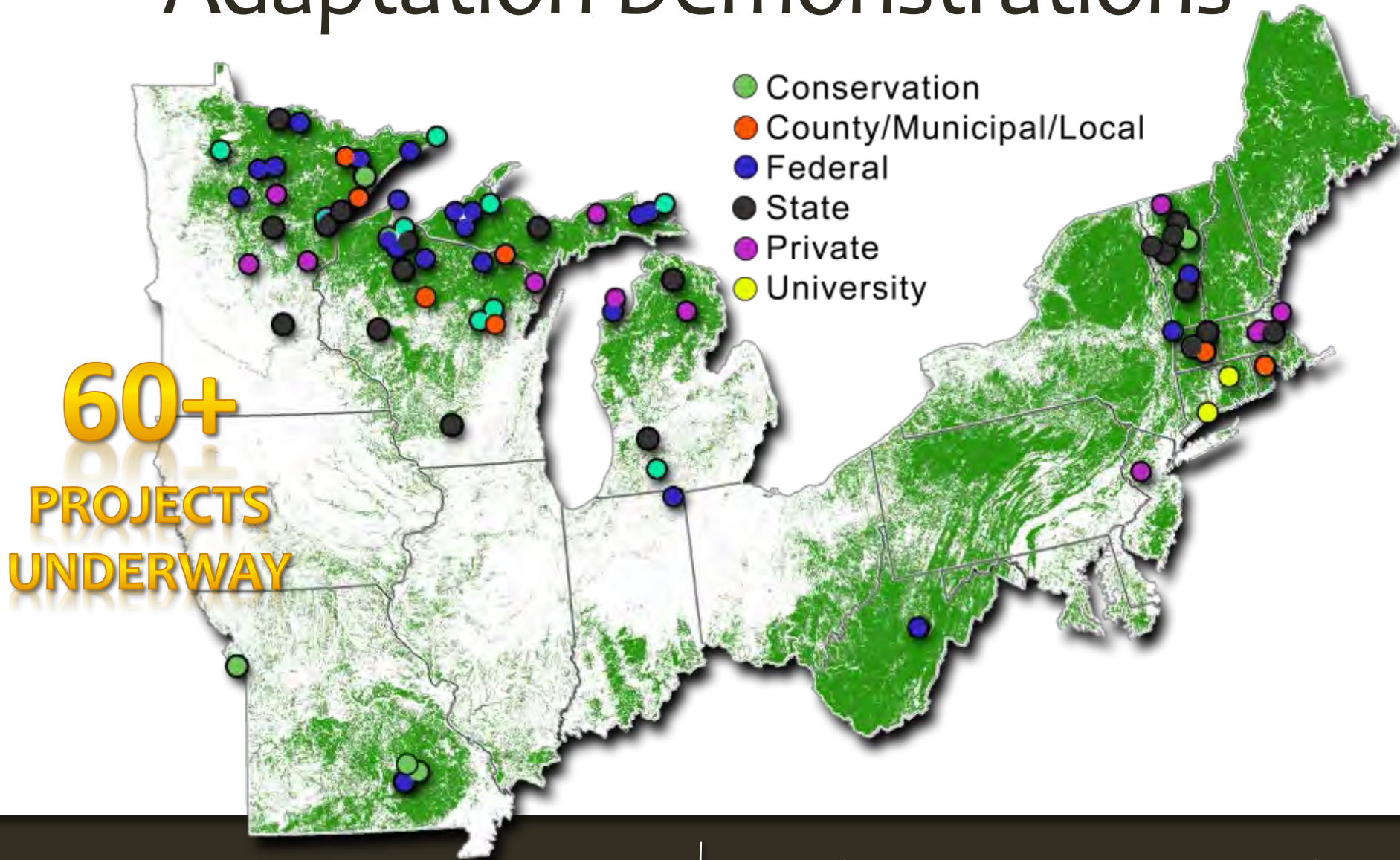
Ways the **Adaptation Workbook** can be used:

- Coordinator facilitates individual or small group
- Forest Adaptation Planning and Practices workshop
 - General (VT ANR; UConn, etc.)
 - Conservation (WCS; DU)
- Managers use the workbook independently
 - Online version now available!
 - Future: tutorials & online course



The screenshot displays the 'Adaptation Workbook' web application interface. The header includes the title 'Adaptation Workbook' and the subtitle 'A Climate Change Tool for Forest Management and Conservation'. The navigation menu shows 'Home', 'Dashboard', and 'Sugar Hills Demonstration Project (1,600 acres)'. The main content area is titled 'Vulnerability Determination' and includes a 'Progress Summary' sidebar with steps 1 through 5. The main content area shows 'Instructions' and 'Review Potential Regional Climate Impacts'. It features a 'Vulnerability Determination - Mesic Hardwood Forest System' section with a 'My vulnerability rating for this property' of 'Region-wide vulnerability: Moderate'. Below this, there are sliders for 'Adaptive Capacity' and 'Potential Impacts', and a 2D plot showing the relationship between them. The plot has 'Adaptive Capacity' on the y-axis (Low to High) and 'Potential Impacts' on the x-axis (Low to High). A red dot is positioned in the upper right quadrant, indicating a high adaptive capacity and high potential impacts. The plot is divided into four quadrants: 'Very supportive to ecosystem' (top-left), 'Mixed/Neutral' (center), 'Disruptive' (top-right), and 'Very disruptive to ecosystem' (bottom-right). The current rating is 'Vulnerability Determination: Low'. The interface also includes a 'Next' button at the bottom right.

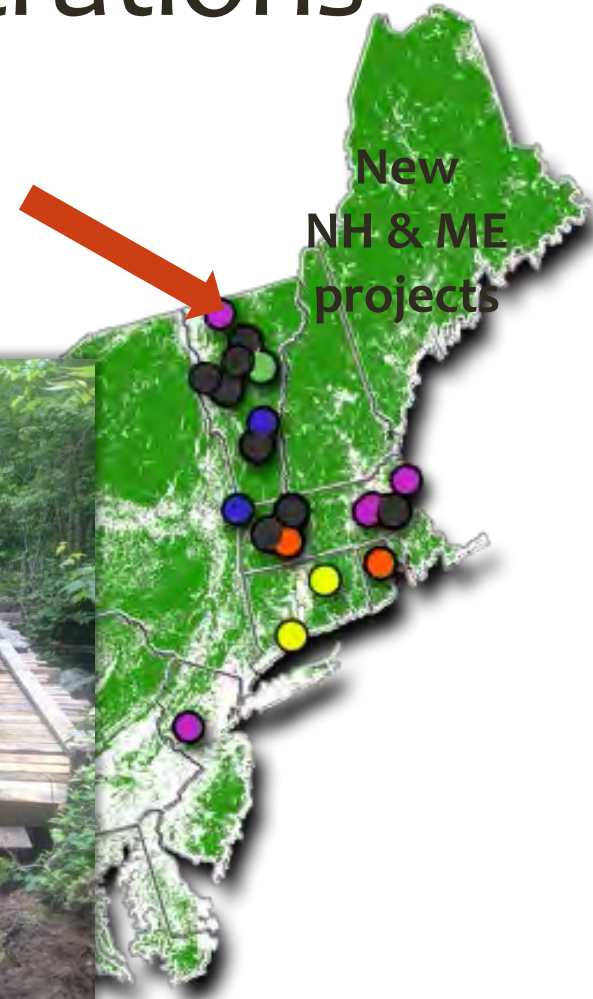
Adaptation Demonstrations



Adaptation Demonstrations

- 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

Adaptation Demonstrations



Atlas Timberlands

What does it take to do a timber harvest given shorter winter seasons?

Adaptation Demonstrations



Cold Hollow to Canada

- Build on existing conservation work of private landowners
- Improve songbird habitat

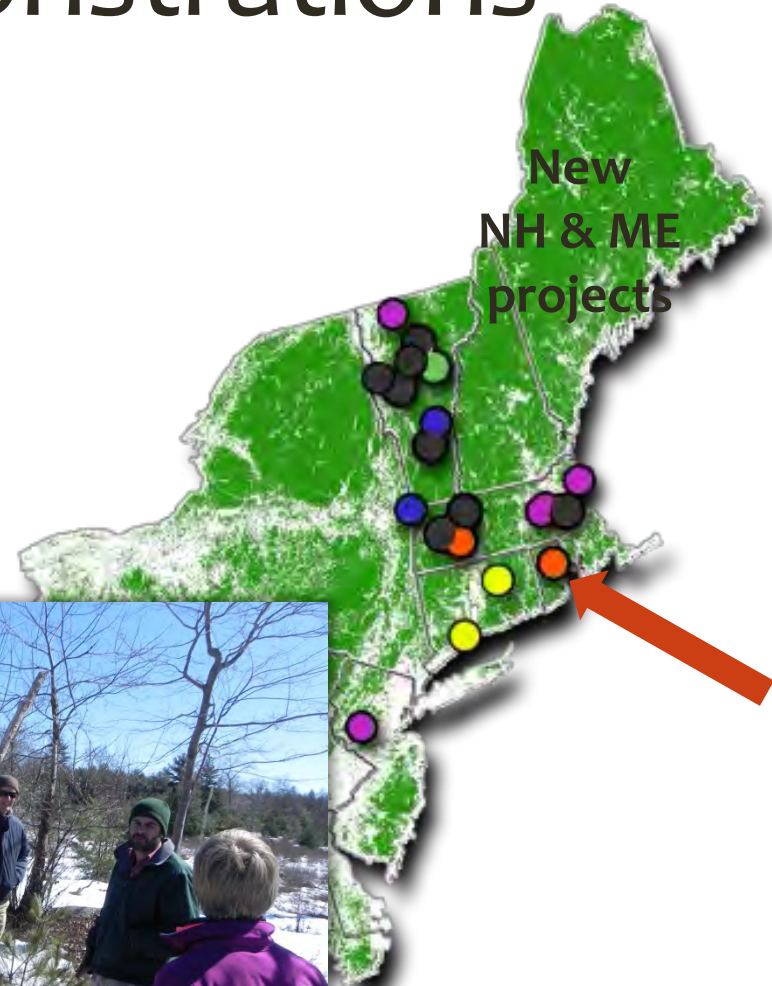


Adaptation Demonstrations

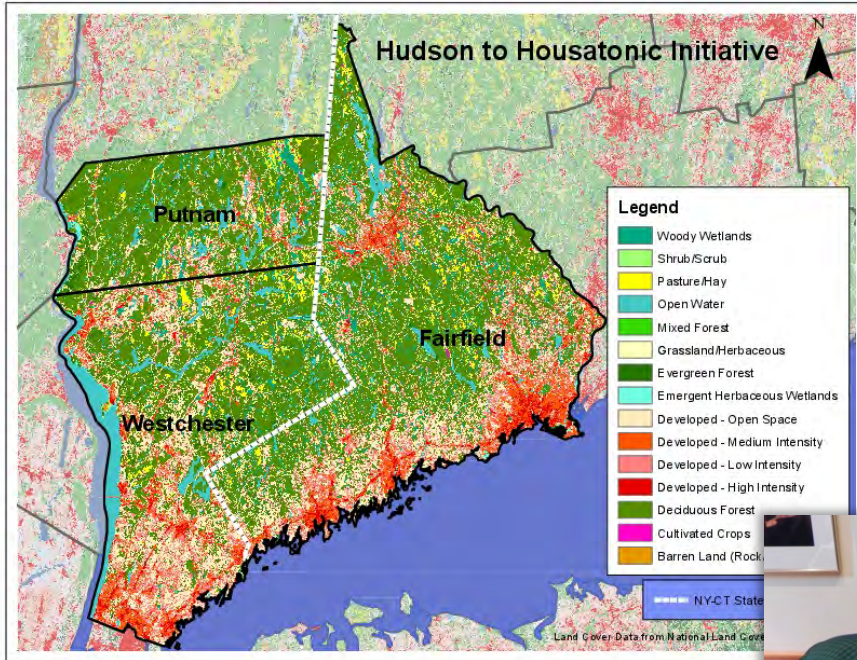


Providence Water

Is regeneration failure and opportunity to test new species and genotypes?



Adaptation Demonstrations



Hudson to Housatonic

How to we engage rural-urban landowners in climate-informed stewardship?

If you want a single “answer” for how to respond to climate change, it’s

“It depends”

It depends on **where** you are working and **what** you’re trying to achieve.

Next time you're in the woods

Take a look around & think about:

What's important here?

How might it change?

What am I already doing to help?

What else can I do to help?

1. Where are you and what do you care about?

Regional assessments interpreted with local expertise

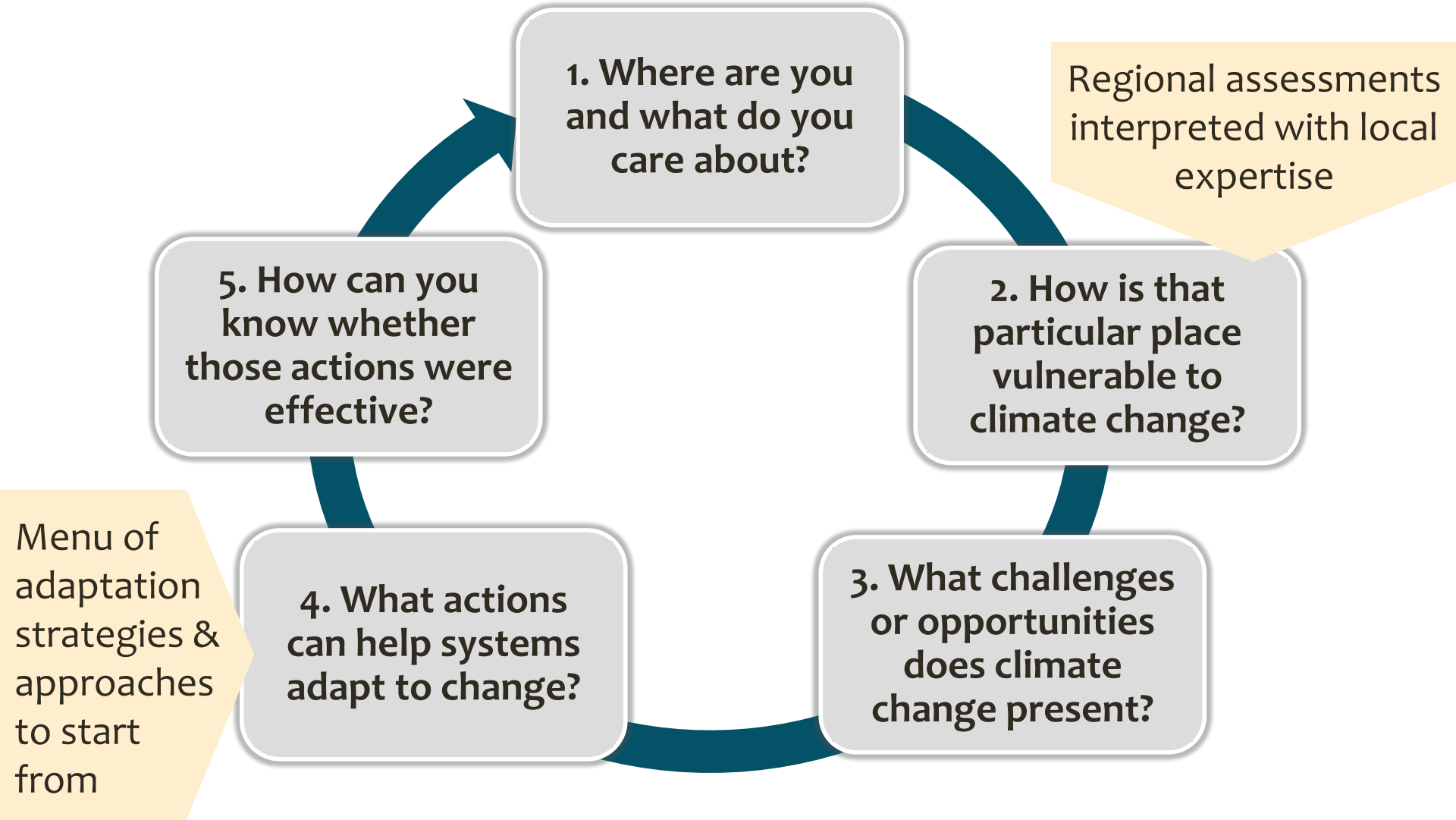
2. How is that particular place vulnerable to climate change?

3. What challenges or opportunities does climate change present?

4. What actions can help systems adapt to change?

5. How can you know whether those actions were effective?

Menu of adaptation strategies & approaches to start from



New England Assessments

Recent Global and National Assessments

- Intergovernmental Panel on Climate Change (IPCC). 2013. [Climate Change 2013: The Physical Science Basis](#).
- Horton, R.; Solecki, W.; Rosenzweig (eds.), C. 2012. [Climate change in the Northeast - A sourcebook: Draft technical input report prepared for the U.S. National Climate Assessment](#). Washington, DC: U.S. Global Change Research Program.
- Melillo, J.M.; Richmond, T.C.; Yohe, G.W.; (eds.). 2014. [Climate change impacts in the United States: the third National Climate Assessment](#). U.S. Global Change Research Program.

Regional Assessments

- Adaptation Subcommittee to the Governor's Steering Committee on Climate Change. 2010. [The impacts of climate change on Connecticut agriculture, infrastructure, natural resources, and public health](#).
- Anderson, M.G.; Clark, M.; Ferree, C.; Jospe, A.; Olivero Sheldon, A.; Weaver, K. 2013. [Northeast habitat guides: A companion to the terrestrial and aquatic habitat maps](#). Boston, MA: The Nature Conservancy, Eastern Conservation Science, Eastern Regional Office.
- Frumhoff, P.C.; McCarthy, J.J.; Melillo, J.M.; Moser, S.C.; Wuebbles, D.J. 2007. [Confronting climate change in the U.S. Northeast: Science, impacts, and solutions](#). Synthesis report of the Northeast Climate Impacts Assessment (NECIA). Cambridge, MA: Union of Concerned Scientists. 160 p.
- Galbraith, H. 2010. [NEAFWA regional vulnerability assessment project - Report 1: forming the expert panel](#). Plymouth, MA: Manomet Center for Conservation Sciences.
- Galbraith, H. 2011. [NEAFWA regional vulnerability assessment project - Report 2: the habitat vulnerability model](#). Plymouth, MA: Manomet Center for Conservation Sciences.
- Galbraith, H. 2011. [Report to the NEAFWA vulnerability assessment expert panel: exposure information](#). Plymouth, MA: Manomet Center for Conservation Sciences.
- Wildlife. 2010. [Climate change and Massachusetts fish and wildlife: Habitat management \(Volume 3\)](#). Commonwealth of Massachusetts.

New England Assessments

- Galford, G.L.; Hoogenboom, A.; Carlson, S.; Ford, S.; Nash, J.; Palchak, E.; Pears, S.; Underwood, K.; Baker, D.V.; (eds.). 2014. [Considering Vermont's Future in a Changing Climate: The First Vermont Climate Assessment](#). Gund Institute for Ecological Economics, University of Vermont.
- Jacobson, G.L.; Fernandez, I.J.; Mayewski, P.A.; Schmit, C.V.; (eds.). 2009. [Maine's Climate Future: An Initial Assessment](#). Orono, ME: University of Maine.
- Kunkel, K.E.; Stevens, L.E.; Stevens, S.E.; Sun, L.; Janssen, E.; Wuebbles, D.; Rennells, J.; DaGaetano, A.; Dobson, J.G. 2013. [Regional climate trends and scenarios for the U.S. National Climate Assessment. Part 1. Climate of the Northeast U.S.](#) Washington, DC: US Department of Commerce, National Oceanic and Atmospheric Administration.
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- Manomet Center for Conservation Sciences; Massachusetts Division of Fisheries and Wildlife. 2010. [Climate change and Massachusetts fish and wildlife: Habitat management \(Volume 3\)](#). Commonwealth of Massachusetts.
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- Manomet Center for Conservation Sciences; National Wildlife Federation. 2012. [The vulnerabilities of fish and wildlife in the Northeast to climate change: a report to the Northeastern Association of Fish and Wildlife Agencies and to the North Atlantic Landscape Conservation Cooperative](#). Plymouth, MA: Manomet Center for Conservation Sciences. 49. Available at
- Manomet Center for Conservation Sciences; National Wildlife Federation. 2012. [The vulnerabilities of Northeastern fish and wildlife habitats to sea level rise: a report to the Northeastern Association of Fish and Wildlife Agencies and to the North Atlantic Landscape Conservation Cooperative](#). Plymouth, MA: Manomet Center for Conservation Sciences. 49.
- Manomet Center for Conservation Sciences; National Wildlife Federation. 2013. [Implementing climate smart conservation in northeastern upland forests: a report to the Wildlife Conservation Society and Northeastern Association of Fish and Wildlife Agencies](#). Montpelier, VT: Manomet Center for Conservation Sciences.
- Manomet Center for Conservation Sciences; National Wildlife Federation. 2012. [Climate change and cold water fish habitat in the Northeast - a vulnerability assessment: a report to the Northeastern Association of Fish and Wildlife Agencies and to the North Atlantic Landscape Conservation Cooperative](#). Plymouth, MA: Manomet Center for Conservation Sciences.

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Regional Assessments

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- Rustad, L.; Campbell, J.; Dukes, J.S.; Huntington, T.; Fallon Lambert, K.; Mohan, J.; Rodenhouse, N. 2012. [Changing climate, changing forests: The impacts of climate change on forests of the northeastern United States and eastern Canada](#). Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station.
- Stager, J.C.; Thill, M. 2010. [Climate change in the Champlain Basin: What natural resource managers can expect and do](#). Montpelier, VT: The Nature Conservancy.
- Tetra Tech Inc. 2013. [Climate change adaptation framework: Full report](#). Montpelier, VT: Vermont Agency of Natural Resources.
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