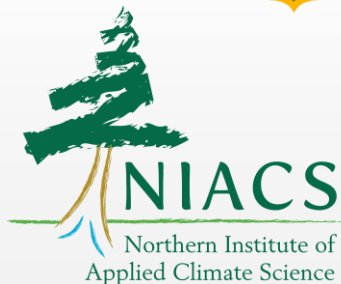
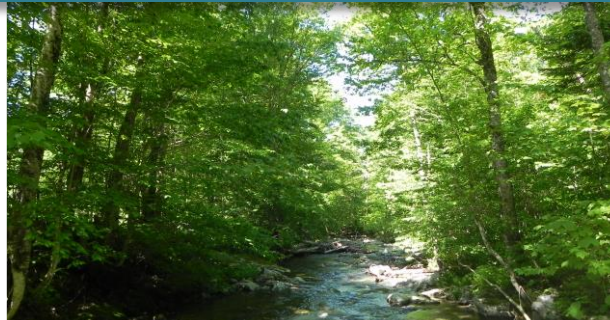


# Climate Change & Forests

## Relevance to Bird Sanctuaries in Connecticut



**Maria Janowiak** [maria.janowiak@usda.gov](mailto:maria.janowiak@usda.gov)

Northern Institute of Applied Climate Science

USDA Forest Service

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

**Steve Matthews**, Ohio State [matthews.204@osu.edu](mailto:matthews.204@osu.edu)

(aka NIACS)

# Northern Institute of Applied Climate Science

**Chartered by USDA Forest Service, universities, non-profit, and tribal conservation organizations**

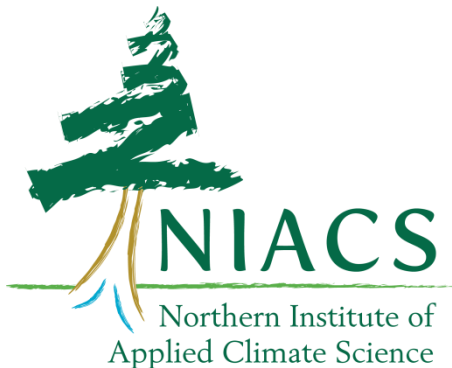
## Climate and carbon services

- Climate impacts modeling
- Vulnerability assessment
- Climate adaptation
- Carbon biogeochemistry
- Carbon management

## 21 staff members

### (Forest Service/universities)

- 10 climate outreach specialists
- 7 research scientists
- 2 web specialists
- 2 GIS/lab specialists



Michigan  
Technological  
University



The  
UNIVERSITY  
of VERMONT

UNIVERSITY OF MINNESOTA



AMERICAN FORESTS

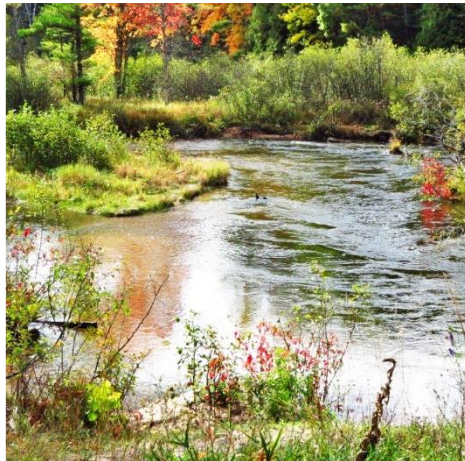


NCASI



# Responding to Climate Change

**What actions can help systems adapt to climate change and other threats while also meeting landowner needs?**

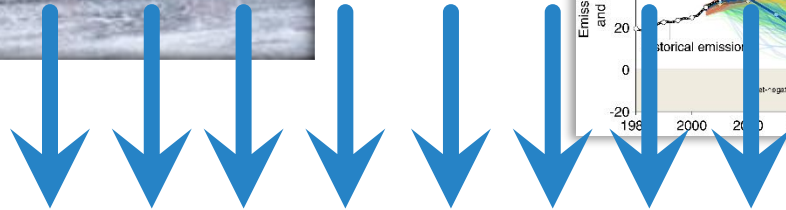
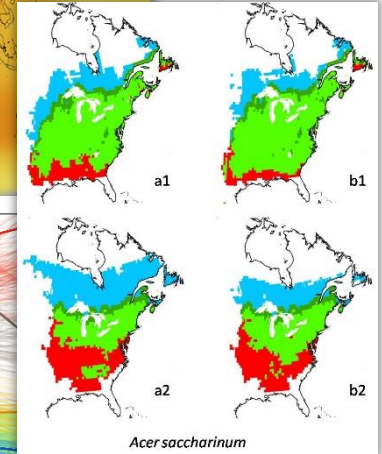
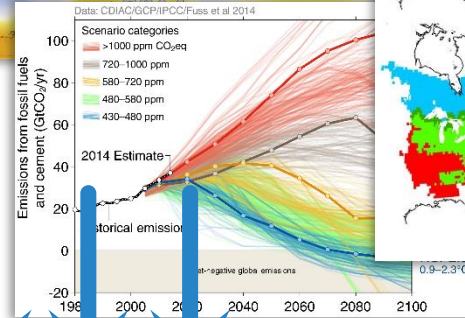
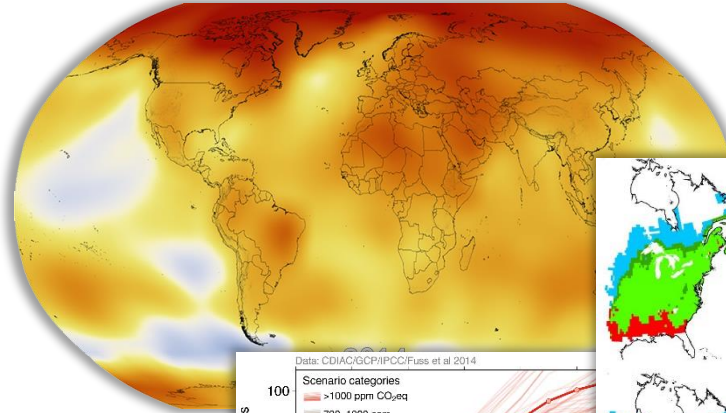


# Responding to Climate Change

- Understanding climate impacts
- Adapting ecosystems and habitats
- Communicating to stakeholders



# 1. Understanding Climate Impacts



# Climate Change Atlas

## Climate Change Atlas

Documents the current and possible future distribution of **134 tree species** and **147 bird species** in the eastern United States under climate change: [www.fs.fed.us/nrs/atlas](http://www.fs.fed.us/nrs/atlas)

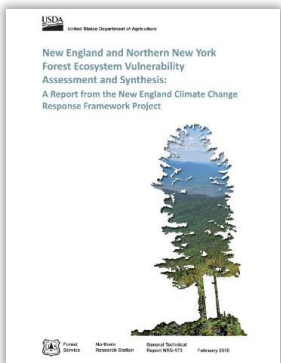
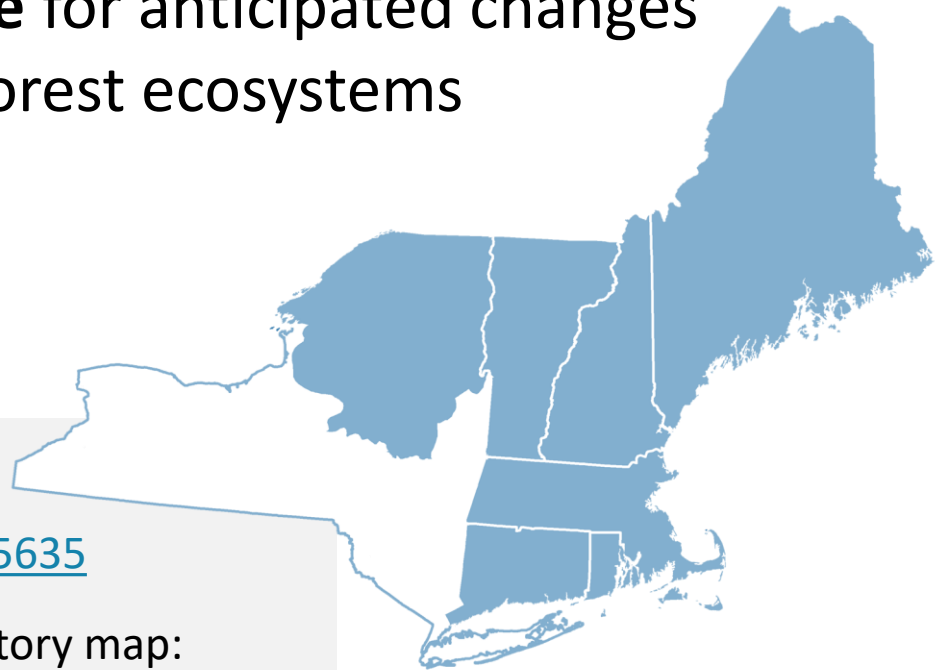
The screenshot displays the USDA Forest Service Northern Research Station website for the Climate Change Atlas. The page is titled "red maple (*Acer rubrum*)" and features a "Model Reliability: High" indicator. The main content area includes a map of the eastern United States showing the current distribution of red maple, with importance values ranging from 0 to > 50. The map is color-coded according to the importance value legend: 0 (white), 1-3 (light yellow), 4-6 (yellow), 7-10 (light green), 11-20 (green), 21-30 (dark green), 31-50 (dark blue), and > 50 (blue). A red outline indicates the species' range. The map is titled "Current Forest Inventory and Analysis".

The page also includes a sidebar with the following information:

- Notice:** This is an updated version of the Climate Change Tree Atlas. You can view the [previous red maple page](#), or browse the [previous Tree Atlas](#).
- About red maple**
  - Family: Aceraceae
  - Guild: pioneer, spring-dispersed, moist-site tolerant
  - Functional Lifeform: medium-size deciduous tree
  - Links: [Life History and Disturbance Response](#), [Silvics Manual](#), [Photos of red maple in USDA Plants Database](#), [View current and modeled red maple distributions in Google Earth \(259 KB\)](#), [Download Google Earth for free](#)
- Climate Change Adaptability**
- Summary of Predicted Changes**
- Range and Niche Maps**
- Predictor Analysis**

# Vulnerability Assessment

- **Synthesize** existing assessments and scientific literature
- Incorporate new results from **forest impact models**
- Draw on local expertise of **scientists and land managers**
- Describe **state-of-knowledge** for anticipated changes in climate and response of forest ecosystems



**REPORT!**

[www.nrs.fs.fed.us/pubs/55635](http://www.nrs.fs.fed.us/pubs/55635)

Additional materials and story map:

[www.forestadaptation.org/ne-assessment](http://www.forestadaptation.org/ne-assessment)

# Effects on Forests

# Effects on Forests & Birds

SHIFTING SEASONS | SHIFTING SPECIES | SHIFTING STRESSORS

# Effects on Forests

**SHIFTING SEASONS** | SHIFTING SPECIES | SHIFTING STRESSORS

## THE GOOD:

Longer growing seasons.

## THE BAD:

Shorter, warmer winters.

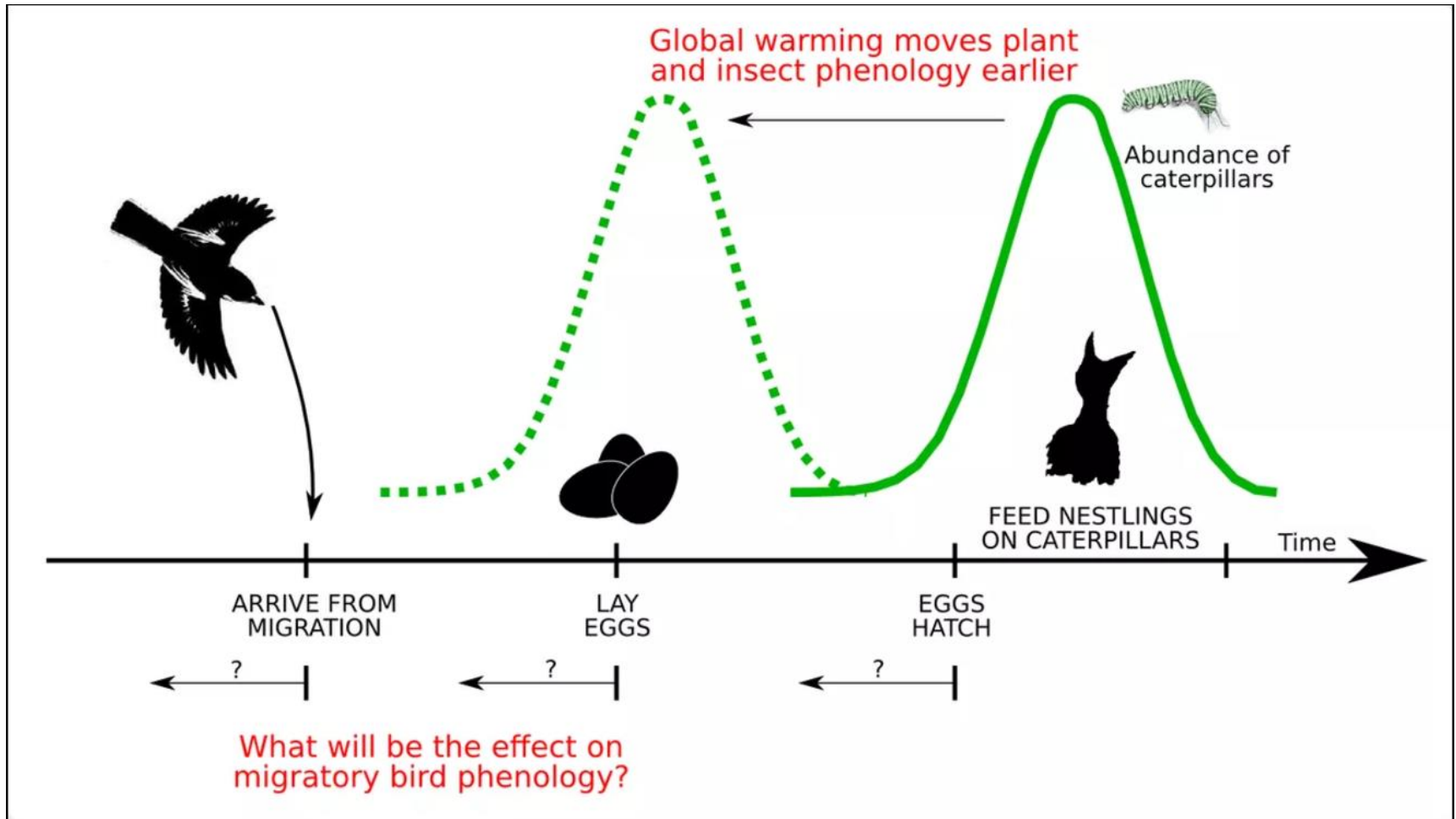
## THE UGLY:

More extreme events.



# Effects on Birds

SHIFTING SEASONS | SHIFTING SPECIES | SHIFTING STRESSORS



# Effects on Forests

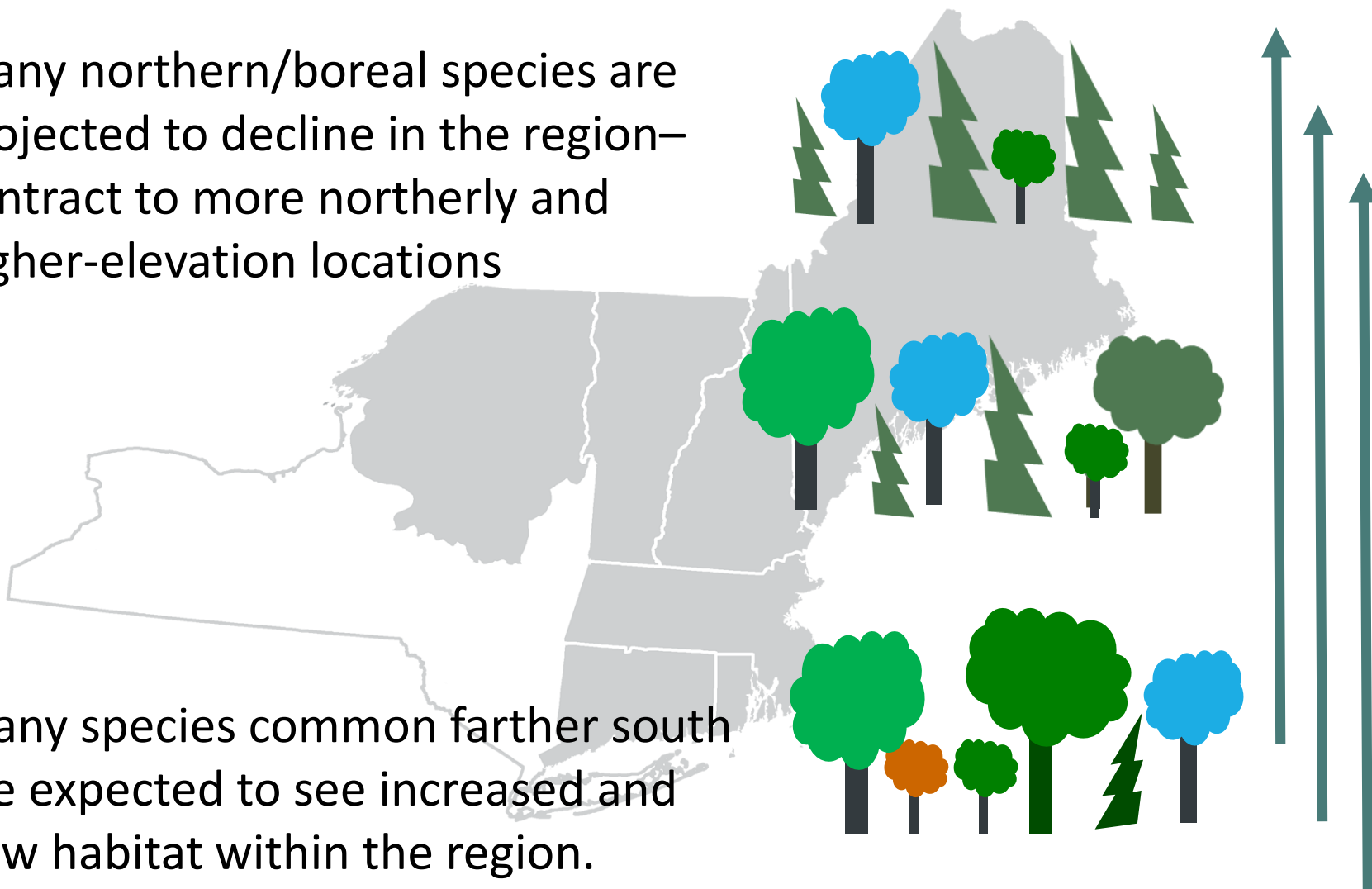
SHIFTING SEASONS | **SHIFTING SPECIES** | SHIFTING STRESSORS

# Effects on Forests

SHIFTING SEASONS | **SHIFTING SPECIES** | SHIFTING STRESSORS

Many northern/boreal species are projected to decline in the region—contract to more northerly and higher-elevation locations

Many species common farther south are expected to see increased and new habitat within the region.

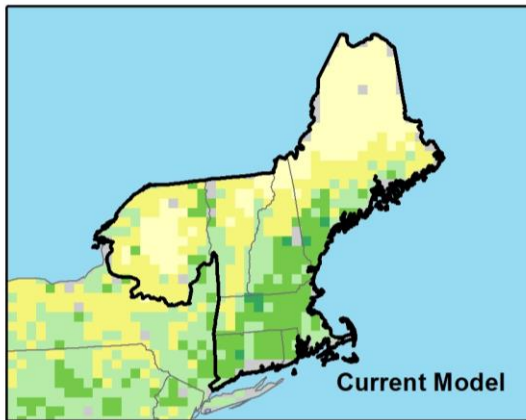


# Effects on Forests

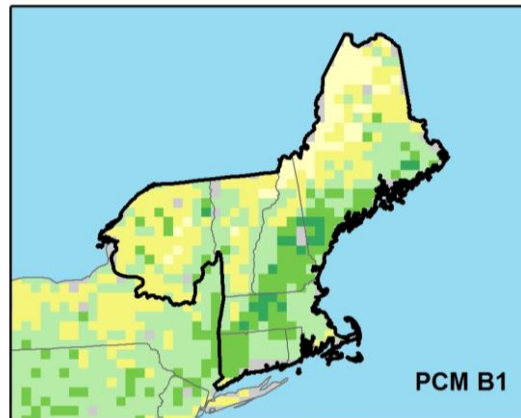
SHIFTING SEASONS | **SHIFTING SPECIES** | SHIFTING STRESSORS

## Northern Red Oak: Suitable Habitat (Climate Change Tree Atlas)

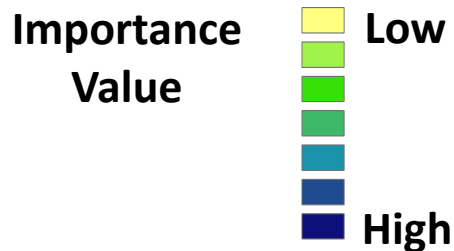
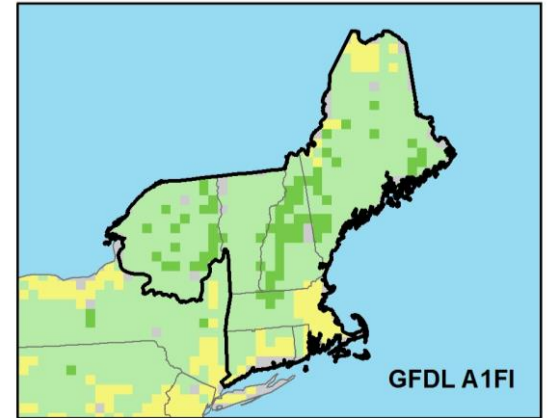
Current Distribution



PCM Low emissions (B1)  
2070-2100



GFDL High emissions (A1FI)  
2070-2100



# Effects on Forests

SHIFTING SEASONS | **SHIFTING SPECIES** | SHIFTING STRESSORS

## Likely to decline

- Balsam fir
- Black, red, & white spruce
- Northern white-cedar
- Eastern hemlock
- Black ash
- Paper birch
- Quaking aspen
- Tamarack

## Mixed model results

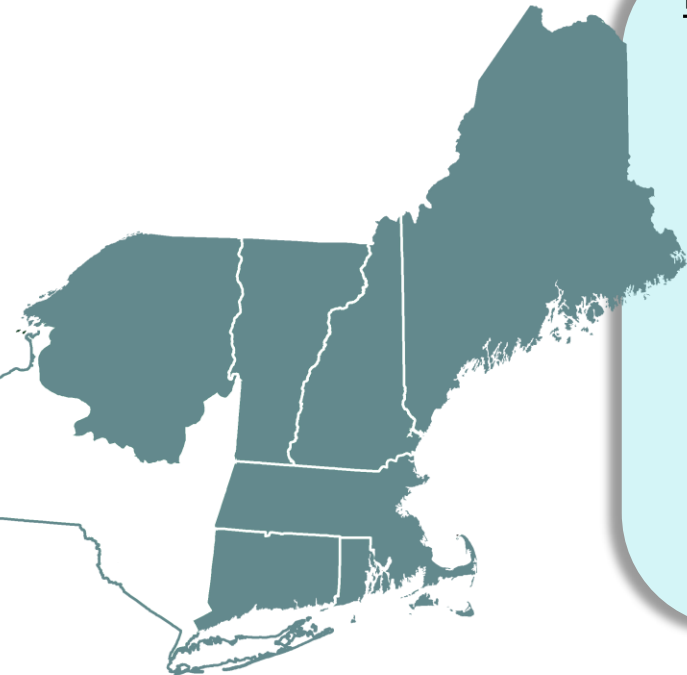
- American beech
- Sugar & red maple
- Yellow birch
- White pine

## Potential “winners”

- American elm
- American basswood
- Black cherry
- Eastern hophornbeam
- Gray birch
- Northern red oak
- Serviceberry
- Silver maple
- Sweet birch
- White oak

## New habitat (esp. south)

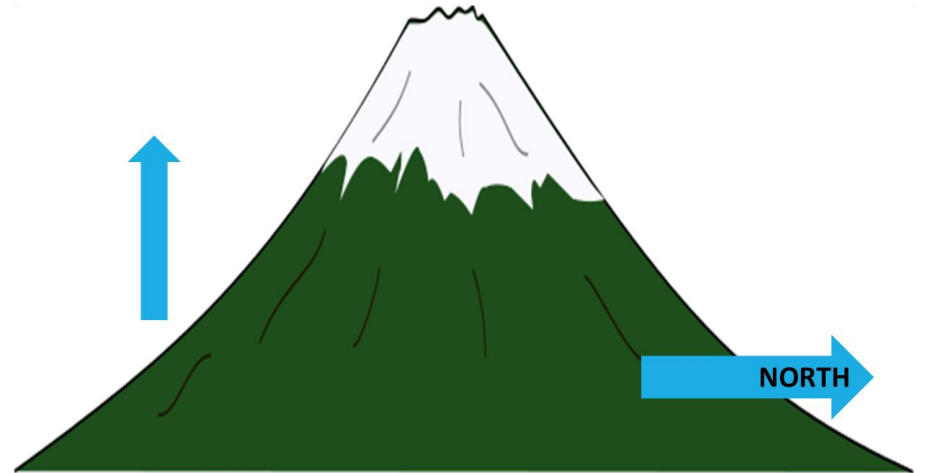
- Black hickory
- Chinkapin oak
- Common persimmon
- Hackberry
- Loblolly pine
- Osage-orange
- Shortleaf pine
- Southern red oak
- Sweetgum
- Virginia pine



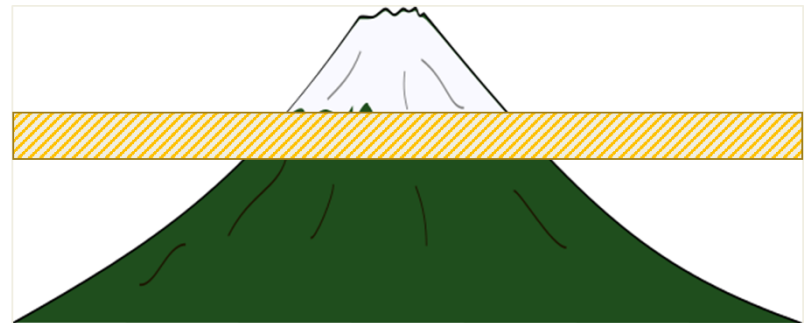
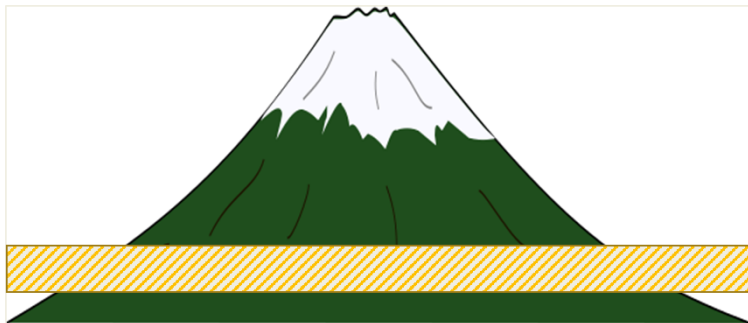
# Effects on Birds

SHIFTING SEASONS | **SHIFTING SPECIES** | SHIFTING STRESSORS

- Movement northward (poleward) and to higher elevations



- Reductions in area of potential habitat at higher elevations:



# Effects on Birds

SHIFTING SEASONS | **SHIFTING SPECIES** | SHIFTING STRESSORS

## Black throated Blue Warbler: Suitable Habitat (Climate Change Bird Atlas)

- Habitat projected to declined to 50-80% of current across the Northeast, depending on scenario.
- Model shows strong association with mixed woods (black spruce, yellow birch, eastern hemlock, striped maple, etc.) as well as climate determinants.

Black-throated Blue Warbler		BTBW
		<b>ID Tips</b> Deep blue on top with black mask and throat; white wing-patch "handkerchief."
		<b>Song</b> A thick & buzzy <i>I'm-to-la-zee</i> with endnote rising up to the "blue" sky.
		<b>Habitat</b> Large, continuous tracts (250+ acres) of hardwood or mixedwood with 50-80% canopy cover and a dense understory (0-5' layer) of hobblebush and/or small saplings of sugar maple, American beech, striped maple, and softwoods.
		<b>Territory</b> 2.5 – 10 acres (smaller in forests with a dense and diverse understory).
		<b>Nest</b> Open cup of bark strips held together with spider web and saliva placed in the fork of a sapling or shrub in 0-5' layer.
		<b>Food</b> Insectivorous, feeding largely on moth and butterfly larvae and adults.

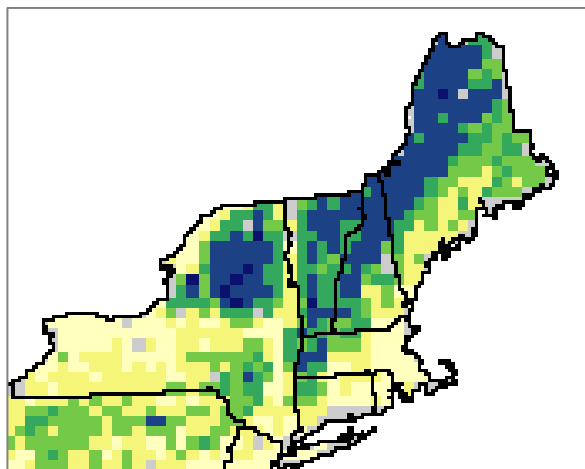
# Effects on Birds

SHIFTING SEASONS | **SHIFTING SPECIES** | SHIFTING STRESSORS

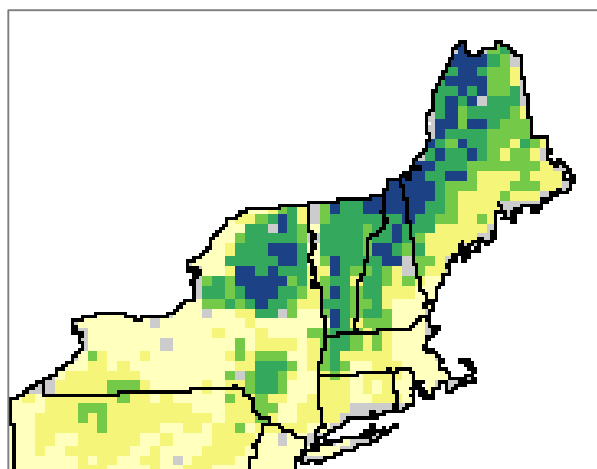
## Black throated Blue Warbler: Suitable Habitat

(Climate Change Bird Atlas)

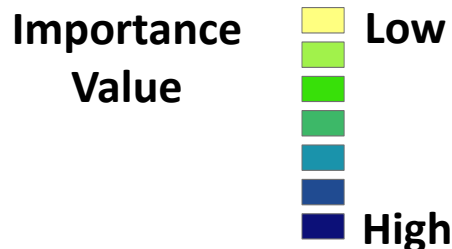
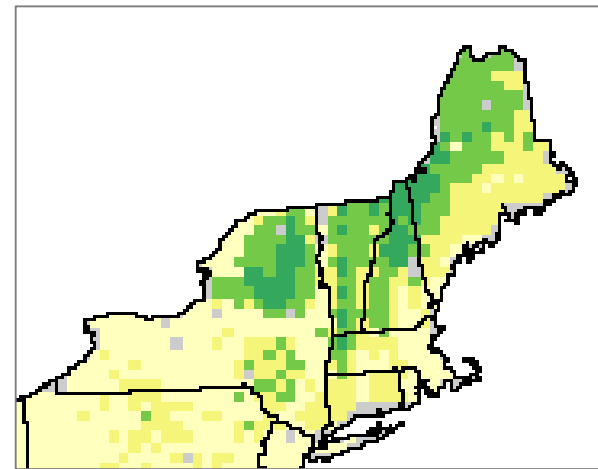
Current Distribution



PCM Low emissions (B1)  
2070-2100



GFDL High emissions (A1FI)  
2070-2100



# Effects on Forests

SHIFTING SEASONS | SHIFTING SPECIES | **SHIFTING STRESSORS**

# Effects on Forests

SHIFTING SEASONS | SHIFTING SPECIES | **SHIFTING STRESSORS**

**Climate change is a “threat multiplier”**

- Chronic stress
- Disturbances
- Insect pests
- Forest diseases
- Invasive species

**Interactions make all the difference.**

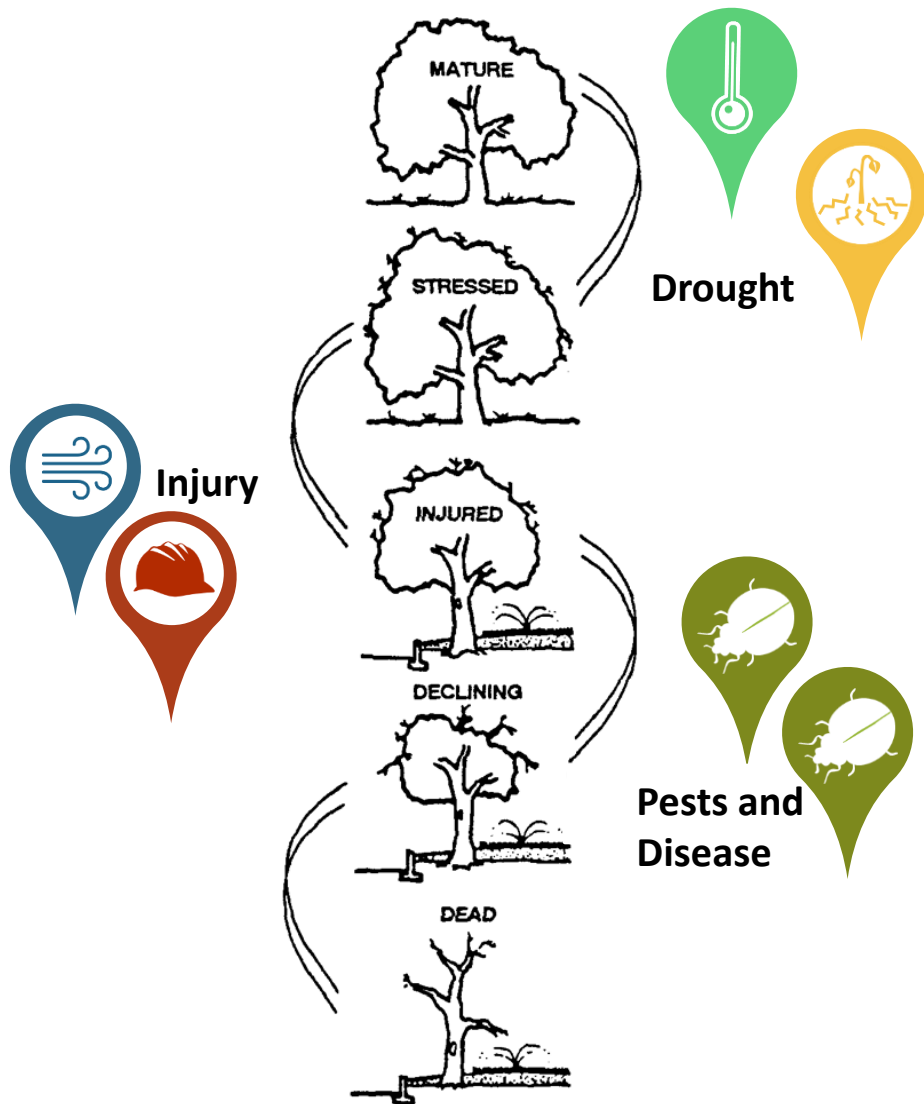


Image: Bartlett Tree Experts

# Effects on Birds

SHIFTING SEASONS | SHIFTING SPECIES | **SHIFTING STRESSORS**

## Climate change is a “threat multiplier”

- Altered food availability and type
- Extreme weather and heat
- Climate-related in habitat quality and composition.
- Land-use change and non-climate factors.

**Interactions make all the difference.**



## 2. Adapting Ecosystems and Habitats

**Adaptation** is the adjustment of systems in response to climate change.



Adaptation actions are designed to specifically address climate change impacts and vulnerabilities in order to meet goals/objectives.

**Adaptation** is the adjustment of systems in response to climate change.



Ecosystem-based adaptation activities build on sustainable management, conservation, and restoration.

# A Spectrum of Adaptation Options

## RESISTANCE



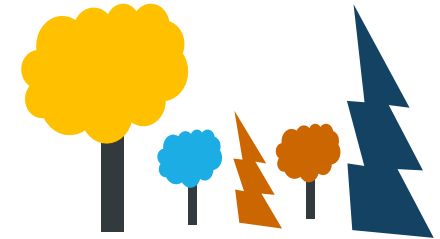
- Improve defenses of forest against change and disturbance
- Maintain relatively unchanged conditions

## RESILIENCE



- Accommodate some degree of change
- Return to prior reference condition following disturbance

## TRANSITION

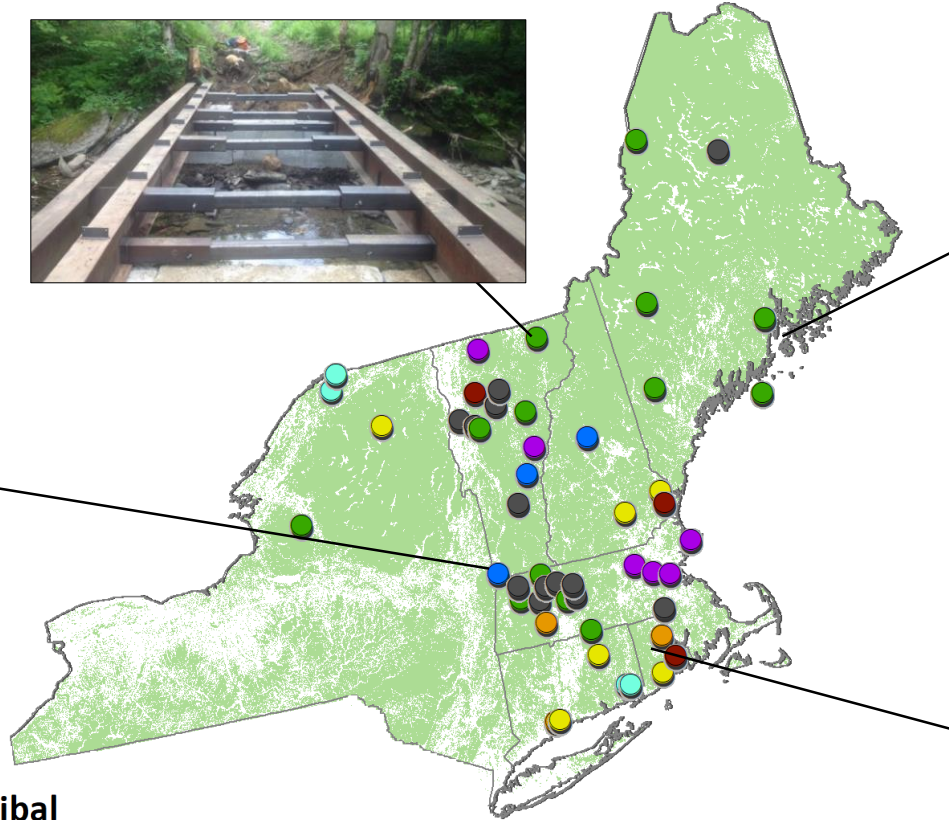


- Intentionally facilitate change
- Enable ecosystem to respond to changing and new conditions



# Real-World Adaptation Projects

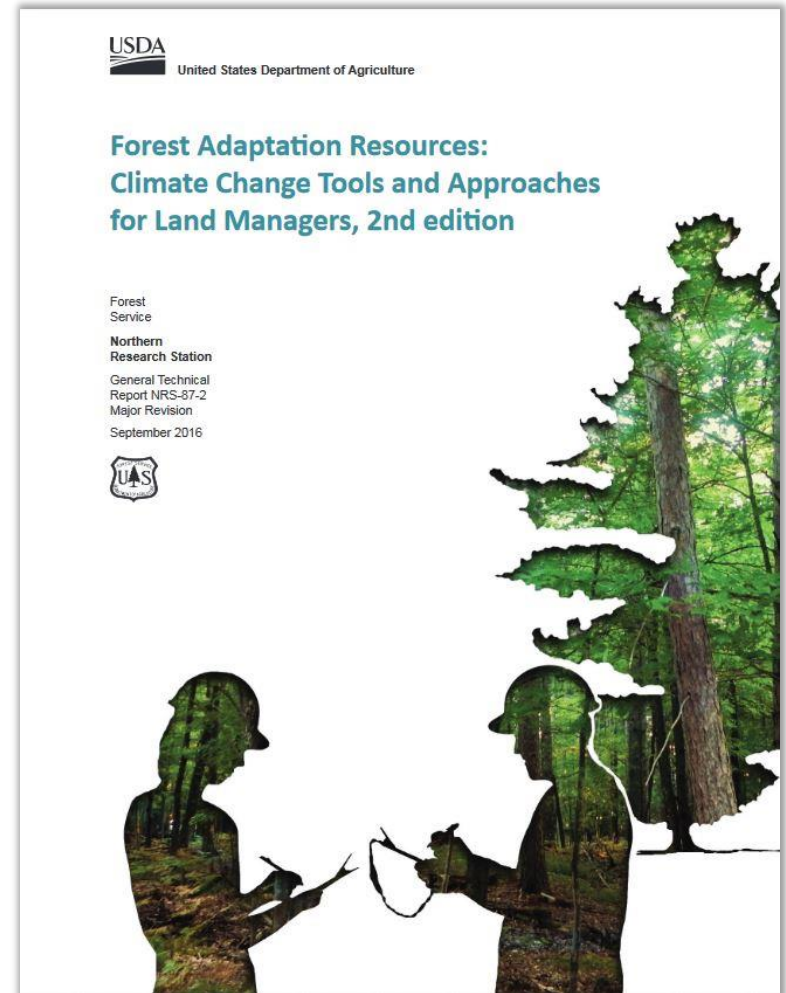
## More than 50 projects in New England



- Federal
- State
- Local
- Multi-ownership
- Tribal
- University
- NGO
- Private

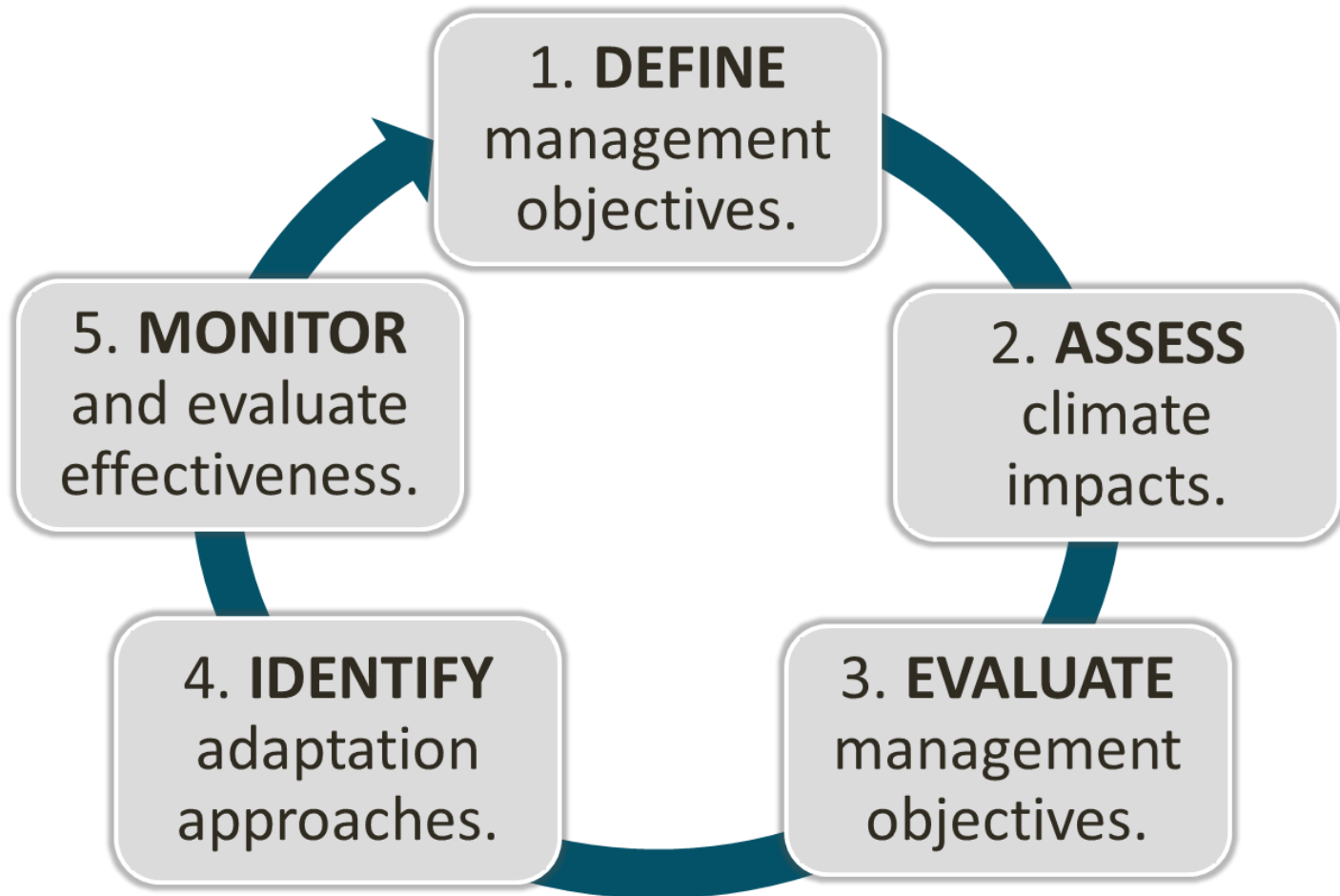
# Adaptation Resources

- Designed for a variety of land owners with **diverse goals and objectives**
- Tailored to eastern forest types
- Does not make recommendations
- Menu of adaptation strategies and approaches for forest ecosystems (and **NEW wildlife** menu!)



# Adaptation Workbook

A workbook process provides “structured flexibility”



# Adaptation Actions

## **Climate Change Filter = Intentionality**

- Actions specifically address climate change impacts & vulnerabilities in order to meet climate-informed goals/objectives.
- Actions might be the same/similar to what you're already doing, but its necessary to explore potential modifications to address climate change.

# Case Study: Audubon Vermont

## Green Mountain Audubon Center: Forest Birds Initiative



# Case Study: Audubon Vermont

## Green Mountain Audubon Center: Forest Birds Initiative

### Forest origin



Images: VermontHistory.org; Audubon Vermont

# Case Study: Audubon Vermont

## Green Mountain Audubon Center: Forest Birds Initiative



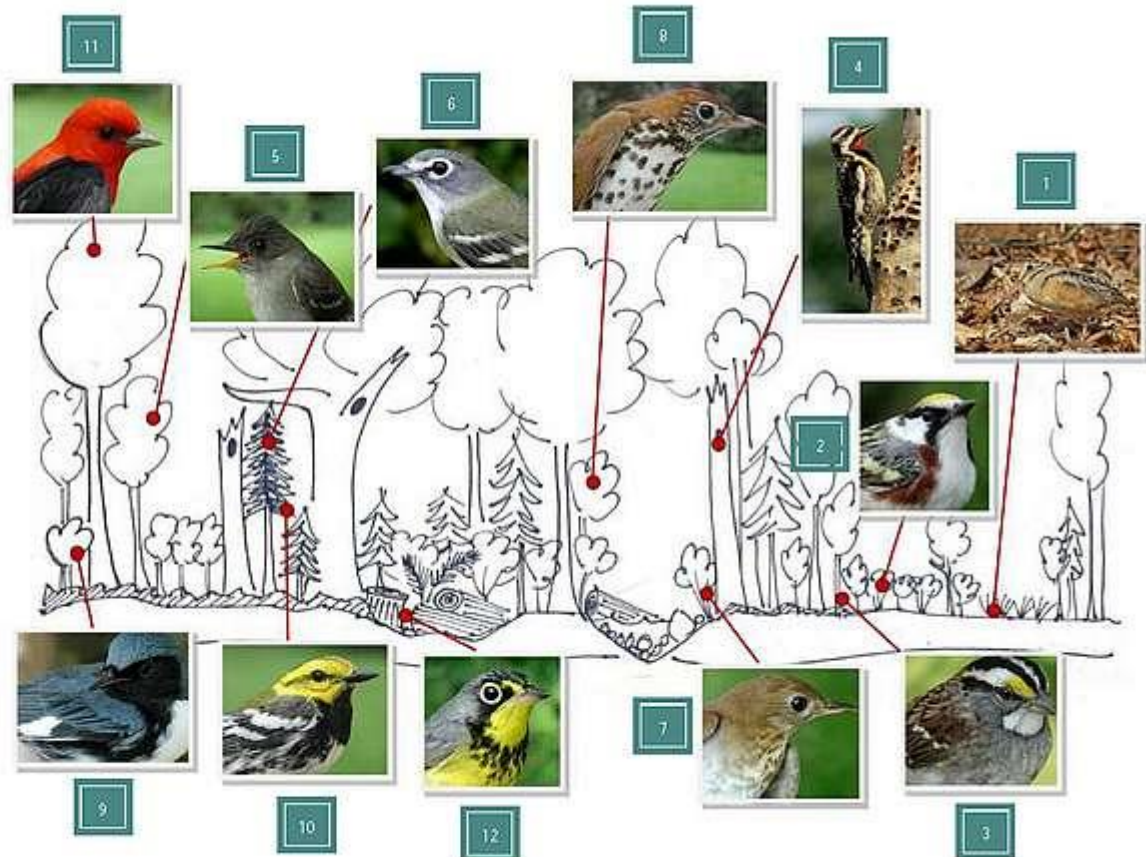
### The Birder's Dozen

The Birder's Dozen includes twelve of the 40 forest birds that the Audubon Vermont Forest Bird Initiative is working to protect. These twelve birds:

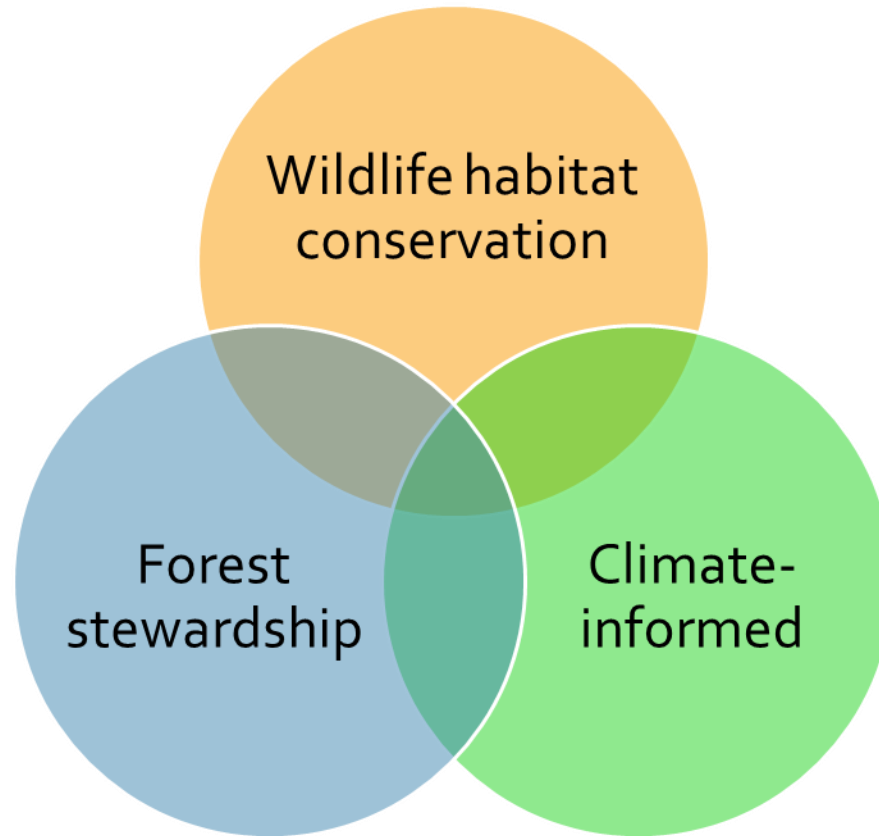
- Have a high percentage of their global breeding populations in our Northern Atlantic Forest.
- Use a variety of forest types and conditions for feeding and breeding. Most nest in complex, diverse mature forest habitats.
- In the case of some species, including Wood Thrush and Canada Warbler, are showing serious, long-term declines in their global populations.
- Are simple to identify by sight or sound.

We encourage you to get to know the Birder's Dozen and to explore your woods to find out who is residing there!

Bird photos provided courtesy of the Powdermill Avian Research Center, US Fish & Wildlife Service, Charley Eroman & Roy Pitcher



# Can all these goals be accomplished?

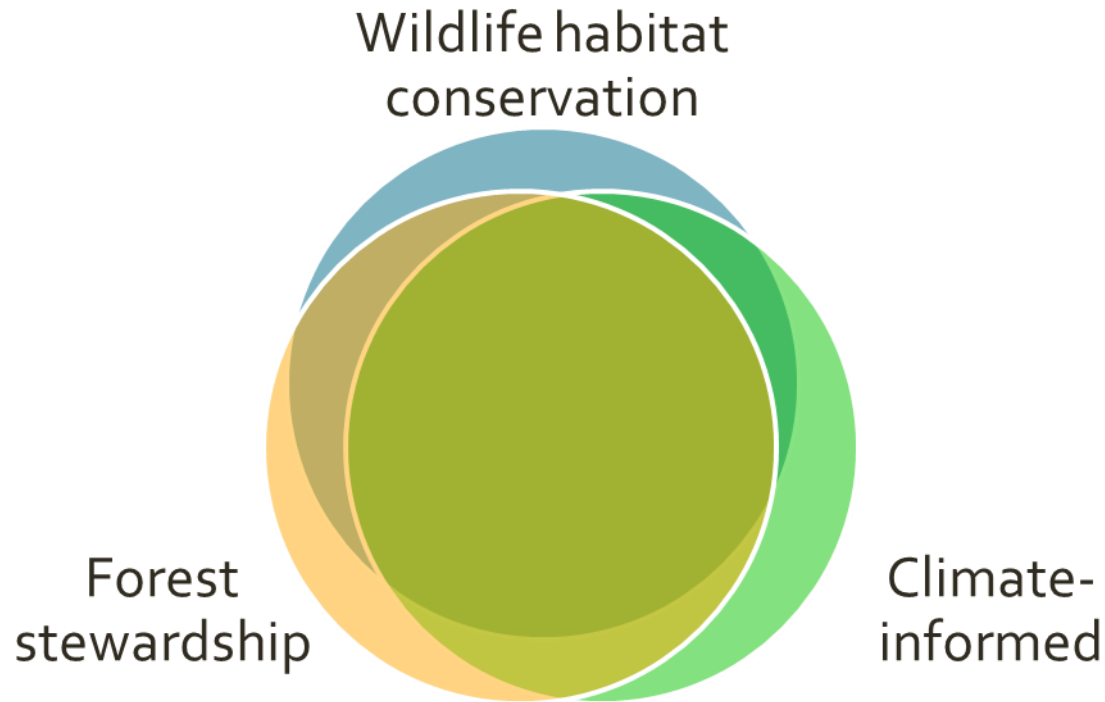


# Case Study: Audubon Vermont

## Green Mountain Audubon Center: Forest Birds Initiative

Action	Bird Habitat	Adaptation	Mitigation
Maintain forest land as forest	Habitat for forest birds	Supports broader landscape connectivity	Maintains carbon stocks and sequestration
Forest harvest, including group selection and gaps; retain snags	Improves structure used by a diversity of species; increases tree species diversity	More species and structurally diverse stands are more resilient	Improves growth of remaining trees; more structure can increase carbon storage
Promote or plant red oak in harvested areas	Oaks support many insects and animals	Oak is projected to have more habitat in the future	Reduces risk from species declines by increasing diversity
Maintain no harvest area	Habitat for interior birds; increases large trees, snags, dead wood	Supports landscape connectivity and diversity	Allows trees to grow larger; forest retains carbon

# Can all these goals be accomplished?



# 3. Communicating to Stakeholders

# Working lands – landowner outreach

- **New England Forestry Foundation and partners**— Grant from USDA Forest Service to connect landowners in MA and CT with trained foresters to keep their woods healthy and resilient in a changing climate.

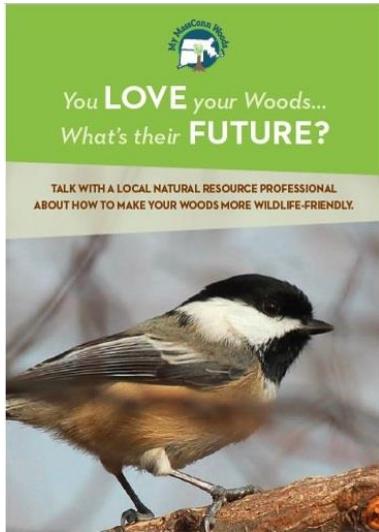
Help foresters



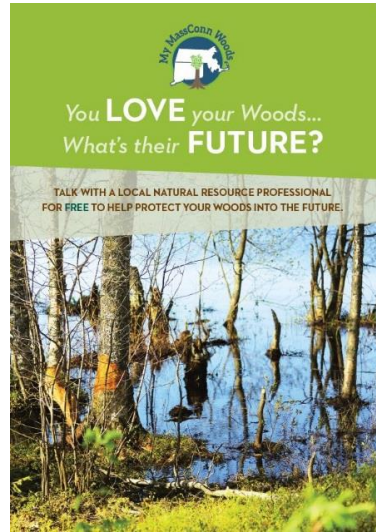
talk to landowners.



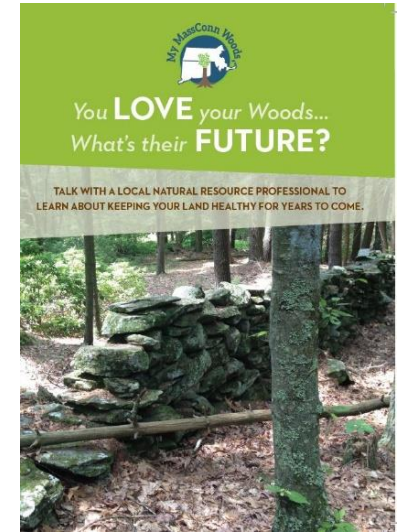
# My Mass Conn Woods... What messages resonate?



Wildlife



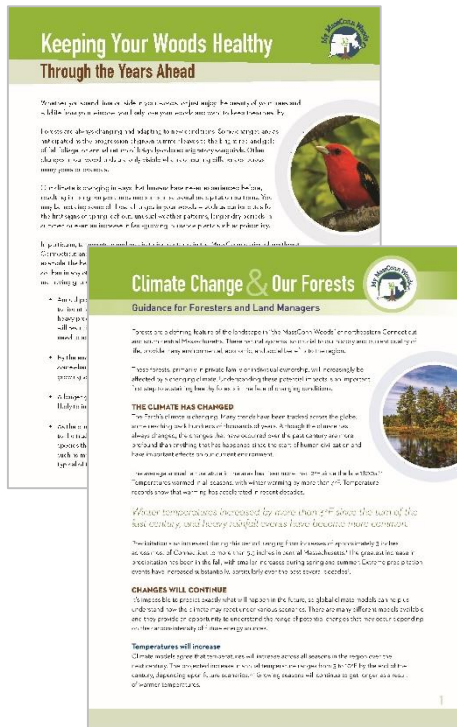
Extreme Weather



Healthy Woods

- Direct mailings to 613 MA and CT woodland owners
- Also offered “free” forester visits at MassConn events and Woodland Ambassador workshops
- “Considerations for Your Woodlot’ print materials

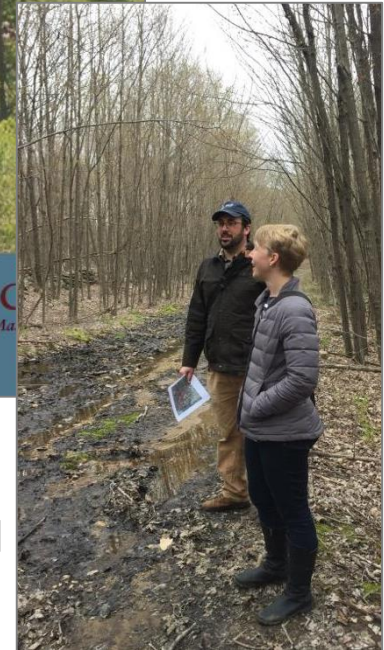
## Forester and landowner handouts:



- Protect water and soils on your land.
- Improve ability of your trees to resist bugs and disease.
- Prevent and control non-native plants and weeds that already threaten native plants and animals.
- Manage damage to young trees from excessive deer browsing.
- Prepare for big weather events by promoting strong, healthy trees in your woodlot.
- Respond quickly after big disturbance events to help your woods bounce back.
- Promote a diversity of tree species and tree sizes.
- Protect rare or sensitive plant and animal communities.
- Consider how your current trees and new trees that you may want to plant will react to future conditions.
- Monitor your woods and the effect of different management tactics.

# Integrating Forest Birds & Climate

## Foresters for the Birds *+ Climate Adaptation!*



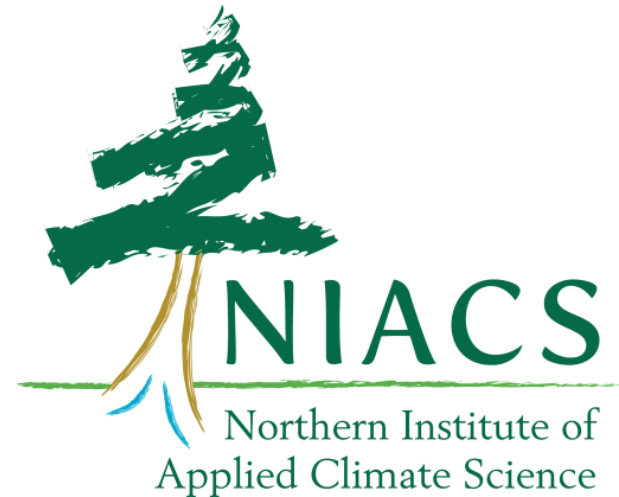
**1-day training on May 1, 2019:**  
Forests with Birds and Climate in Mind



# We Want to Help You!

## Climate and carbon services

- Climate impacts modeling
- Vulnerability assessment
- Climate adaptation
- Carbon biogeochemistry
- Carbon management



**Maria Janowiak**

[maria.janowiak@usda.gov](mailto:maria.janowiak@usda.gov)

**Steve Matthews**

[matthews.204@osu.edu](mailto:matthews.204@osu.edu)



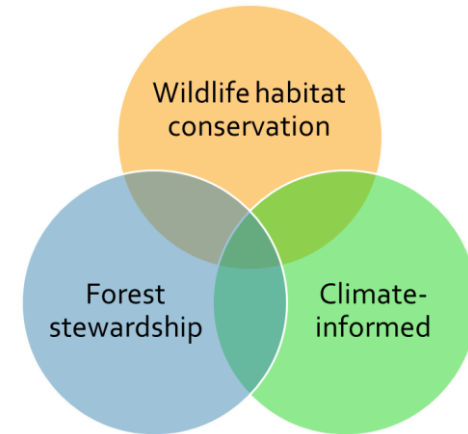
# Norcross Wildlife Sanctuary

## Increase diversity of tree species and sizes (tree thinning)

- Favor species valuable for wildlife and promote diversity
- Improve growth and health of remaining trees

**Retain:** Den trees, dead trees, and downed wood for habitat

**Protect:** Establish riparian wetland reserves



# Mass Audubon: Elm Hill Forest

## **Increase diversity of tree species and sizes (tree thinning)**

- Use a variety of timber harvest techniques to increase forest age classes and structure

**Reduce stressors:**  
manage invasive plants

**Protect:** Limiting  
management within  
sensitive areas

