

Forests are a prominent feature of the landscape across New England and northern New York. From the coasts of the Atlantic to the mountain peaks of the Appalachians and Adirondacks, the region contains more than 50 million acres of forest land.

The area's forests will increasingly be affected by a changing climate. Understanding the potential impacts is an important first step to sustaining healthy forests in the face of changing conditions.

As part of New England Climate Change Response Framework, more than 30 scientists and natural resource professionals collaborated to assess the vulnerability of the region's forests across a range of possible future climates. Learn more other project activities at:

www.forestadaptation.org/new-england

The climate has changed

Over the past century, the region has warmed by about 2.4° F on average. Winter temperatures have increased the most, and average winter temperatures are now 3.5 °F warmer than in the early 1900s. Warmer temperatures have increased the growing season by more than 10 days.

Winter temperatures are 3.5 °F degrees warmer since the turn of the last century, and heavy rainfall events have become more common.

Precipitation has increased across the region, with the greatest increases occurring in October and November. Across the region, much of the additional precipitation is coming in heavy rain events.



Funded in part by the US Forest Service. The USDA is an equal opportunity provider and employer.

Project Contact: Maria Janowiak

Northern Institute of Applied Climate Science &
US Forest Service. mjanowiak02@fs.fed.us

New England & Northern New York

Forest Ecosystem Vulnerability Assessment and Synthesis



SUMMARY AND HIGHLIGHTS

Global climate models can help us understand how climate may change in the future given changes in greenhouse gas emissions. In this assessment, we report climate projections for two global climate models under two contrasting greenhouse gas emissions scenarios (high and low) over the next century compared to the average over the last 30 years of the 20th century.

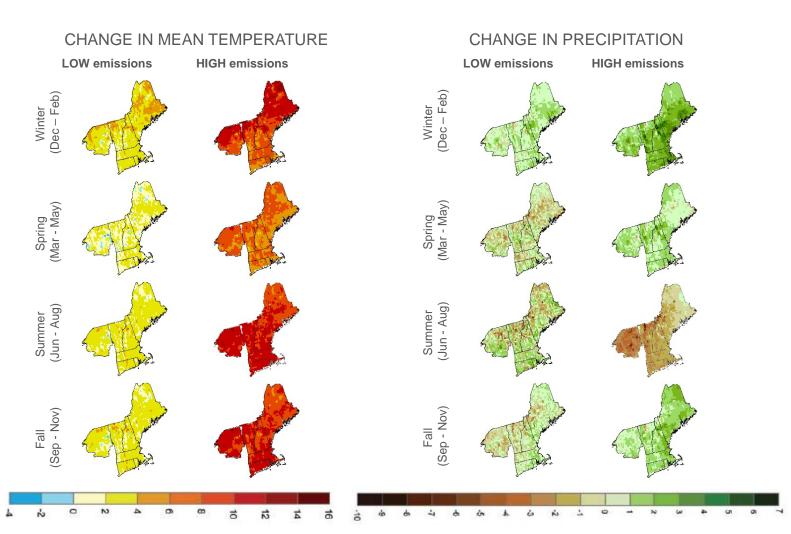
Temperatures will increase

All global climate models project that temperatures will increase in the region. Model projections suggest an increase in temperature over the next century by 2 to 8 °F in all seasons. Growing seasons will continue to lengthen due to warmer temperatures.

Evidence suggests that winter temperatures will increase in the area, even under low emissions, leading to changes in snow patterns and freeze-thaw cycles.

Precipitation will change

Precipitation is projected to increase in winter. There are greater differences in model projections for the growing season, but evidence seems to indicate there may be a decrease in summer precipitation in at least some parts of the region. Even if the total amount of annual precipitation increases, some evidence suggests it may fall during heavier rain events interspersed among relatively drier periods.



New England & Northern New York

Forest Ecosystem Vulnerability Assessment and Synthesis



SUMMARY AND HIGHLIGHTS

Forests will experience both direct and indirect impacts from a changing climate

Two global climate models, three forest impact models, hundreds of scientific papers, and professional expertise were combined to assess the regional effects of climate change on forest ecosystems.

Soil moisture patterns will change, and vegetation may experience moisture stress.

Seasonal changes in precipitation are expected across the assessment area, and the trend toward more frequent heavy rainfall events is expected to continue. Warmer winters may lead to earlier snowmelt in the spring, and longer growing seasons combined with warmer temperatures may lead to more frequent moisture stress during the growing season.

Northern species will face increasing stress from climate change.

Each species will have a unique response to climate change. Several northern and boreal species, such as black spruce, red spruce, tamarack, and paper birch, are expected to have reduced habitat and productivity by the end of the 21st century. The degree to which tree species decline will vary greatly by location and site conditions, with greater risk at southern locations and low elevations.

Southern species will be favored by climate change.

Many tree species currently at the central or northern extent of their range are projected to have increases in habitat and productivity through the next century. Several tree species that are currently present south of the assessment area are projected to increase, but fragmentation may limit the natural migration of these species.

Species and forests that can tolerate disturbance are at lower risk.

Climate change is expected to increase some types of disturbance over the next century, including extreme rain events, floods, and pest outbreaks. Tree species and forest types that are better able tolerate these disturbances may be favored. At the same time, it still may be possible for disturbance-adapted systems to undergo too much disruption.

Healthy and diverse forests generally have greater resilience to change.

Studies have consistently shown that more-diverse ecosystems are more resilient to changing conditions, while those with lower diversity have fewer options to respond to change. There are many aspects to forest diversity—including species, structural, and genetic diversity—and each of these can generally help reduce risk and increase the ability of forests to adapt to climate change.

More information at forestadaption.org/new-england

New England & Northern New York

Forest Ecosystem Vulnerability Assessment and Synthesis



SUMMARY AND HIGHLIGHTS

Vulnerability of Forest Communities

Climate change will not affect all forest species, communities, and parts of the landscape in the same way. A panel of experts from a wide range of organizations worked together to assess the vulnerability of different forest systems in the assessment area.

Vulnerability is the susceptibility of a system to the adverse effects of climate change. It is a function of potential climate change impacts and the adaptive capacity of the system. A system is vulnerable if it is at risk of a fundamental change in identity, or if the system is anticipated to suffer substantial declines in health or productivity.

Both montane and low-elevation spruce-fir forests as well as lowland mixed conifer forests were considered to be the most vulnerable to climate change because a number of important northern and boreal species are expected to decline. Central hardwood, transition hardwood, and pitch pine-scrub oak forests were rated the least vulnerable because of these forests contain species are generally expected to be favored under climate change.

These vulnerability determinations generally apply across the landscape, but they will be influenced by local conditions, forest management, and land use. The assessment doesn't consider future changes in management, land use, fire suppression, or other social and economic factors that could affect forest health or productivity.

What can managers do?

Confronting the challenge of climate change presents opportunities for land managers to plan ahead, assess risk, and ensure that the benefits forests provide are sustained into the future.

Forest managers and landowners will naturally have different goals and objectives, and different opportunities and constraints for how they might respond to climate change risk. These factors will help determine the most appropriate actions to prepare for climate change.

Managers can use scientific information from this assessment, in combination with site-specific knowledge, to better understand how particular forests may be more or less vulnerable.

Resources are available to help forest managers and planners incorporate climate change considerations into forest management. A set of Forest Adaptation Resources is available at www.forestadaptation.org.



More information

Maria Janowiak – New England Coordinator Northern Institute of Applied Climate Science & US Forest Service mjanowiak02@fs.fed.us More information at forestadaption.org/new-england

<u>Citation</u>: Janowiak, MK, AW D'Amato, CW Swanston, LR Iverson, F Thompson III, W Dijak, S Matthews, M Peters, A Prasad, JS Fraser, LA Brandt, PR Butler, SD Handler, PD Shannon, D Burbank, J Campbell, C Cogbill, MJ Duveneck, M Emery, N Fisichelli, J Foster, J Hushaw, L Kenefic, A Mahaffey, TL Morelli, N Reo, P Schaberg, KR Simmons, A Weiskittel, S Wilmot, D Hollinger, E Lane, L Rustad, P Templer. 2017. New England and New York Forest Ecosystem Vulnerability Assessment and Synthesis: a report from the New England Climate Change Response Framework. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. Gen. Tech. Rep. NRS-173. www.forestadaptation.org/ne-assessment