

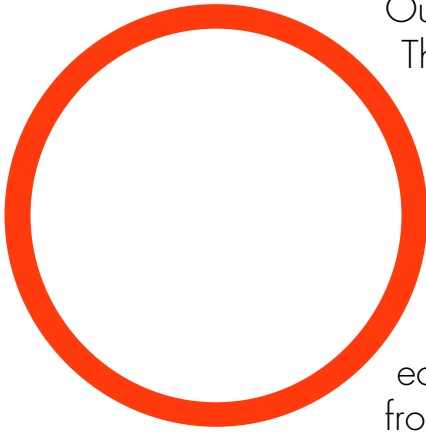


Leading our forests into the future

**Some of the greatest changes in climate in recent decades
have been observed during the winter.**

**By Maria Janowiak,
Chris Swanston**





Our region's forests are a defining feature of the landscape. They are a product of the climate (cold, but not too cold), soils (a relatively nutrient-poor product of the glaciers), and human actions that have been present in this area for thousands of years. A changing climate has the potential to affect these forests in many ways. Forest management plays a central role in maintaining the health and productivity of forests in order to provide the economic, social, and environmental benefits that we derive from these ecosystems.

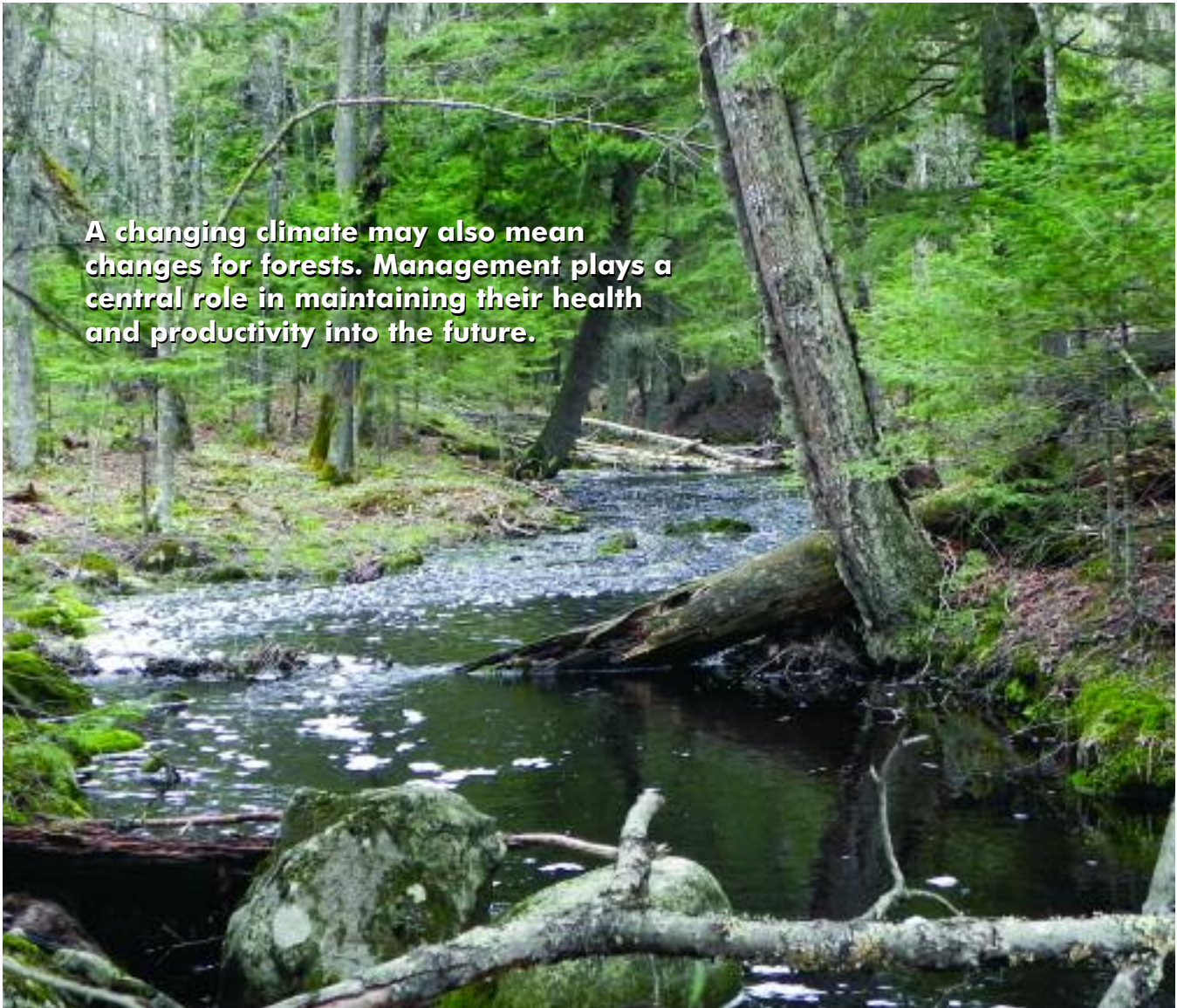


Observations of Local Change

There are many lines of evidence pointing to warmer conditions across the region. For example, recent research at the University of Wisconsin-Madison examined climate records since 1950 and found evidence that the climate of Wisconsin has been warming:

- Nighttime low temperatures have increased from 1.1°F in some areas to as much as 4.0°F in others, and nighttime lows are warming faster than daytime temperatures.
- Days with a minimum temperature below 0°F are occurring much less frequently, with 5 fewer days per year in southern Wisconsin and 12 to 18 fewer days per year in northwestern Wisconsin.

Continued on page 36



A changing climate may also mean changes for forests. Management plays a central role in maintaining their health and productivity into the future.

Continued from page 35

- Little change has occurred in the number of hot days reaching 90°F.
- The date of the last spring freeze is occurring earlier across most of Wisconsin, with the last spring freeze occurring nearly two weeks earlier in the far northwest part of the state.
- The first fall frost is coming later across much of the state, with the central and northwest portions experiencing the greatest change. Earlier springs and later fall frosts combined have led to a 12-day increase in growing season length statewide.

These changes may not seem big, but they can have important effects on local communities. There is already some concern about how our northern winters may be changing. As one example, the “ice road” that connects Madeline Island to Bayfield, WI, during the winter months is critical for the small community that lives on the island, but the duration

of this road has shortened more than 45 days over 150 years, with the most dramatic changes occurring in recent decades. More broadly, continuing increases in winter temperatures could lead to contractions in the duration of frozen conditions needed for winter logging operations and other activities.

Working with Greater Uncertainty

Forest owners, managers, and others already work with uncertainty every day – conditions and circumstances are always changing, making it impossible to predict the exact condition of forests in the future. One of the hallmarks of a changing climate

Continued on page 38

Continued from page 36

is increased uncertainty about future climate conditions. This does not mean that there is scientific disagreement that the trend is toward an altered climate. Rather, the complexity of the entire climate system makes it difficult to predict exact future conditions, and it is wise to consider a range of likely future climates.

In the context of a changing climate, it becomes more important to consider how forests may change over time and to anticipate potential ways to respond to those changes. Looking across a wide variety of information, it is possible to see several important trends for forests in the future:

- It's not just about temperature. Warmer temperatures and longer growing seasons have the potential to increase growth if water is available to trees. The quantity of precipitation and its timing are important factors in determining whether trees will grow better or are more likely to experience drought. Current predictions of future climate suggest that summers may become drier even as other seasons become wetter.

- Stressors on forest ecosystems will shift over time. Extreme weather (including droughts, strong

winds, and floods) may become more frequent, and increase the exposure of forests to disturbances. Stressed trees may also be more susceptible to pests and diseases.

- Forests will respond to new conditions. Forests are dynamic systems that naturally respond to altered conditions. As the climate changes, forests will also change. Some tree species or forest types may not be well-suited to future conditions, while others may have new opportunities for habitat in the region.

While we don't know everything about climate change or how it will influence our forests, we do know enough to begin to take action. Forest management is already very complex, and climate change just becomes an additional facet to management. Rather than managing to a specific future condition, management will increasingly examine a range of possible future conditions and develop actions that can accommodate a variety of future scenarios.

The Role of Forestry

Even though climate change increases uncertainty



**Forests are dynamic systems that naturally respond to altered conditions.
As the climate changes, forests will also change.**



about the future, many actions can be taken now to understand potential changes, reduce risks, and capture new opportunities for managing resources and providing benefits. Managing forests and other systems to respond to climate change is called adaptation, and adaptation actions focus on making forests more healthy and resilient. There is no single “answer” or one-size-fits-all approach to responding to a changing climate – a variety of actions will be needed to match forest conditions and management needs.

Many adaptation actions that can be implemented in the near-term will complement current efforts to sustainably manage forests. In fact, many near-term management activities that consider climate change may not look very different than current management. At first, adaptation is more likely to involve “small tweaks” to management as we gain experience adapting forests and as the direction of climate trends becomes clearer. These tweaks will ideally create more options for the future and reduce the need to make exceptionally large changes.

There are some general things to consider when thinking about climate change and forest management:

- Working to maintain forest health, reduce the impacts of pests and diseases, and slow the spread of invasive species will help to reduce stress on forests and make them more resistant to climate change impacts.

- Increasing the diversity of tree species within forests may be a valuable way to increase the ability of forests to adjust to changes and to create greater flexibility for future management. While one species may become less productive in the future, others may thrive and be able to fill in newly available habitat.

- Paying attention to consistent changes occurring in your woods can be a huge step forward in recognizing how climatic or other changes may be influencing a particular place. Some forest components may be more sensitive to change and need intervention, while others may actually prosper. Be ready to take advantage of new opportunities.

Climate change is a new issue for everyone who works with forests, and it will have very important local impacts on forests and the human communities that depend on them for income, wood products, clean water, and recreation. More information is constantly becoming available to help people make decisions and work towards developing forests that

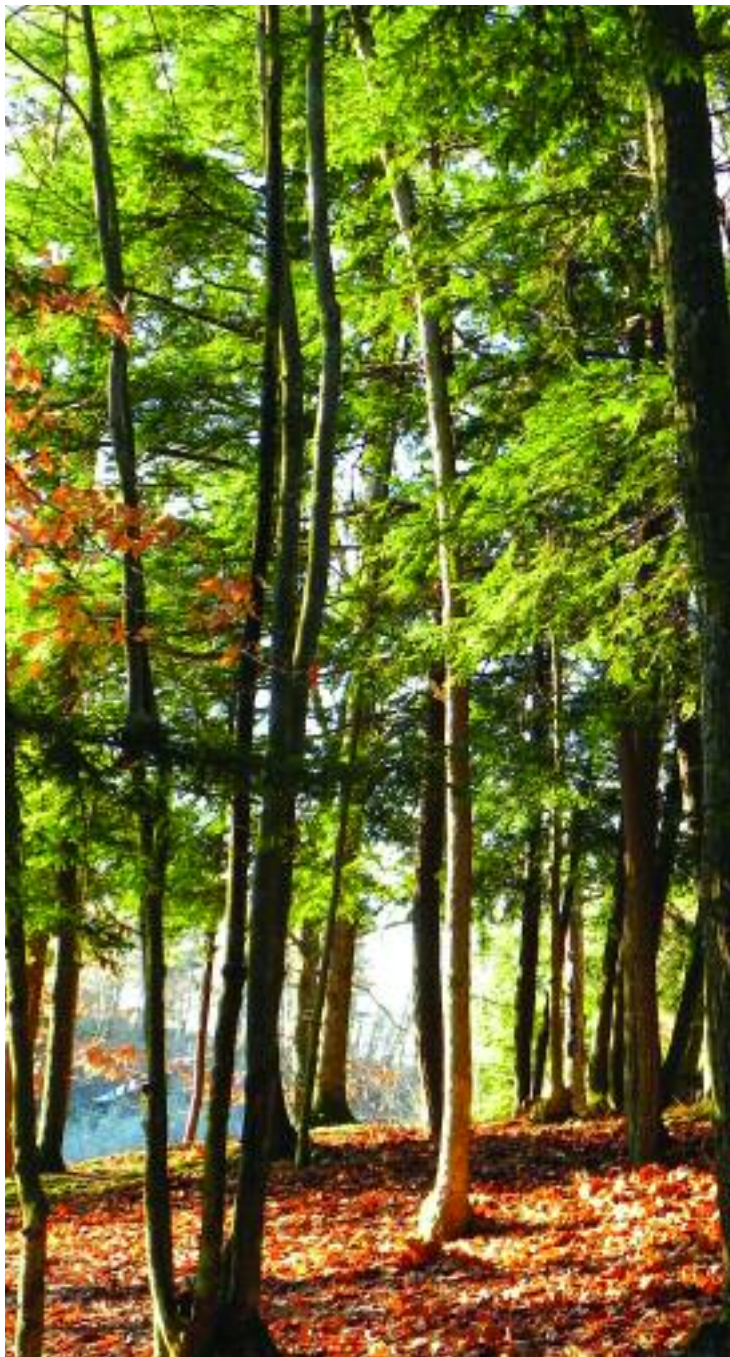
Continued on page 41

Continued from page 39

are well-adapted to future conditions. Additionally, there is a lot to be learned from the observations and experiences of others who are thinking about how climate change may affect their forest or community. Continuing to learn and discuss this emerging topic is the best first step in ensuring the health and productivity of our forests. ▲

Maria Janowiak (mjanowiak02@fs.fed.us; Phone: 906-482-6303x29) works with the Northern Institute of Applied Climate Science (NIACS) and is co-coordinator of the Northwoods Climate Change Response Framework.

Chris Swanston (cswanston@fs.fed.us; Phone: 906-482-6303x20) is the director of NIACS and a research ecologist for the U.S. Forest Service Northern Research Station.



Want to learn more, but not sure where to start?

Climate change is an emerging issue in the forestry community. While the amount of information that is available for those who are interested in learning more can seem overwhelming, more and more scientific information is being summarized and made accessible for a wide variety of audiences.

The Northwoods Climate Change Response Framework started in northern Wisconsin in 2009 to pull together relevant information about regional forests and climate change, as well as to work with the natural resource professionals and the forestry community to identify actions to improve the ability of forests to adapt to changing conditions. Working with a variety of partners, the project has expanded to cover the 64-million-acre forested landscape stretching from Minnesota to Michigan. A Shared Landscapes Initiative in northern Wisconsin provides a forum for the forestry community to discuss and learn about climate change.

www.climateframework.org

The Wisconsin Initiative on Climate Change Impacts is a statewide collaboration of scientists working to understand the impacts of climate change on the state and develop ways to adapt to climate change. The Initiative's website includes a statewide assessment, presentations, and other resources describing past and predicted climate change within the state.

www.wicci.wisc.edu

The Climate Change Resource Center is a comprehensive resource for land managers on climate change, ecosystem response, and management for adaptation. New information and resources are continually added to the site.

www.fs.fed.us/ccrc/