



US FOREST SERVICE NORTHERN RESEARCH STATION

Research *Review*

A Window on Tomorrow's Forests

The Northern Forest Futures Project provides perspective on future forests of the Midwest and Northeast

Long before the Colonists stepped off the Mayflower, people shaped Northern forests. European settlement greatly accelerated the pace of change resulting from human influence, and the forests that surround us today largely reflect the needs and values of past generations. The forests of tomorrow will also be rooted in what we do, or do not do, today.

The 20 states that make up the northern United States constitute the most heavily forested and the most densely populated quadrant of the Nation. Whether your interest is in natural resources or energy, the economy or urban planning, how these forests change over the course of the next 50 years matters.

The Northern Forest Futures Project

Begun in 2009, the Northern Forest Futures Project takes a long-term, large-scale perspective by applying scenario analyses and other forward-looking analytical tools to help society understand the magnitude and consequences of cumulative forest changes anticipated over the next 50 years. Forests in the Northeast and Midwest are not just part of the landscape, they are part of all of our lives in the form of forest industry and sustainable rural communities (jobs, investment, tax base, economic activity), and outdoor recreation including hunting, birdwatching, camping, skiing, boating, and hiking. Forests give us clean water and clean air, renewable energy, and they sequester vast quantities of carbon from the atmosphere, partially offsetting carbon emissions associated with climate change. Research developed in the Northern Forest Futures Project gives forest owners, managers, and other decisionmakers information to guide sustainable management of the 174 million acres of public and private forests in the Northern United States.

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In the latest Northern Forest Futures report, scientists describe how past trends and today's choices might change the future forest landscape of the northern United States between 2010 (the baseline year) and 2060. Research results are intended to help resource managers and policy makers identify actions that will sustain the health, productivity, diversity, and resilience of these forests, which provide for the well-being of the 125 million people who currently live in the 20 Northern States and for 32 million additional people expected by 2060.

Yesterday's Trends

In many respects, northern forests are faring better than they did a century ago when widespread, exploitive logging was common, cutover forests were often converted to farms, and wild fires were uncontrolled. In the past 50 years with aggressive wild fire suppression, sustainable timber harvesting, and abandonment of marginal farmland, there have been some remarkably positive changes: an increase of 11 million acres of forest land and an increase of 144 million cubic feet of timber, both despite a population increase of 26 million people. Other changes have been of great concern: the expanding impact of invasive species, loss of species diversity, low diversity in forest age classes, increasing urban expansion that is shrinking forest acreage, fragmentation of forest land, parcellation of forest ownerships, loss of forest-based employment, effects of burgeoning white-tailed deer populations on tree regeneration and forest composition, and increasing atmospheric carbon emissions.

For good or for ill, human actions and inactions over the past century have shaped the condition of today's forests, and our actions and inactions going forward will inevitably shape the condition of future forests.

A Window on Tomorrow's Forests

Ecological, social, and economic changes anticipated over the next 50 years will profoundly affect future forest management needs and opportunities in the North. Important trends for the U.S. North over the next 50 years include:

- More people, but a slower rate of population growth than for the United States as a whole, leading to:
 - ◇ A larger proportion of people, up to 85 percent, living in urban areas
 - ◇ Greater energy demand and likely more greenhouse gas emissions
 - ◇ More urban and suburban expansion into private forest land
 - ◇ More forest fragmentation and parcellation, especially near urban areas
- Increased attention to the effects of climate on forests and forests on climate, leading to:
 - ◇ Greater attention to managing forests for resilience to climate change impacts, including extreme weather events
 - ◇ Increased emphasis on carbon sequestration as an ecosystem service provided by forests to mitigate climate change
- Less emphasis on timber production for most private forest owners and privately owned forest acres, leading to:
 - ◇ Modest changes in forest tree species composition
 - ◇ Increased global trade in wood products, with more reliance on imports
 - ◇ Fewer jobs in the forestry, logging, wood products, and paper products industries, especially as productivity per worker increases
 - ◇ Stagnant, slow, or even declining economic activity associated with wood product manufacturing, particularly in rural areas
- Forest growth and succession along with relatively low rates of management, leading to:
 - ◇ Aging forests—most forest area now falls in the 60- to 100-year-old age class and will be getting older
 - ◇ Low forest age-class diversity resulting in reduced habitat diversity for wildlife
 - ◇ Reduced growth rates for wood volume and biomass
 - ◇ Fewer issues with water quality and quantity compared to other U.S. regions because of large water yields coupled with low rates of forest disturbance; localized water issues, particularly near urban areas or in watersheds with substantial loss of forest cover





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Going Forward

The challenges facing northern forests are large, complicated, intertwined, and enduring. Northern Forest Futures offers suggestions for moving from thoughtful consideration of the issues to on-the-ground management.

Strengthen people's connections to rural and urban forests

By 2060 urban areas will be the primary habitat for 85 percent of residents. Clearly, attention to the health and sustainability of urban trees and forests is important to human well-being. By 2060, rural forests will likely still cover about 40 percent of the land. Since there are already indications where urbanization will take place, it might be important to focus less on how much forest will be converted and more on how to accentuate potential benefits and mitigate undesirable consequences in the specific places where urbanization is most likely to occur.

Develop mutually beneficial partnerships among forest owners, managers, industry, and the larger society to support conservation goals

Collaboration is required for planning and management to create forest landscapes that are diverse, that are resilient, and that are economically, socially, and ecologically sustainable. Large, publicly owned forest tracts with long-term management plans can serve as focal points for forest landscape management, but significant progress in landscape-scale management ultimately requires participation of private forest owners who collectively control 74 percent of the North's forest land.

Develop measurable state and regional goals for forest diversity and monitor progress toward achieving them

Increasing the forest age-class diversity would increase other measures of forest diversity, expand habitat diversity for wildlife, and increase forest resiliency to undesirable consequences from stressors such as climate change and invasive species. Failure to address this issue has long-term implications (mostly bad) for future forest diversity and resilience.

Promote forward-looking forest management across all ownerships

Details of how to tailor management activities to achieve a desired outcome acre-by-acre may be complex and will certainly differ from place to place, but management procedures can generally be designed to avert or reduce the undesirable consequences of multiple stressors.

Estimate the types and number of forestry jobs that can be sustainably supported, now and in the future

There is a lack of understanding about the number of new jobs that would be supported for every additional 10 million cubic feet of timber that is sold and processed. Even less is known about the capacity of other rural and urban forest management activities to create jobs and generate economic activity. Greater knowledge of these relationships can help create sustainable rural communities.

Work to understand the many dimensions of forest change

Climate change will affect forest diversity, health, and ecosystem services in the North, but so will forest aging, species succession, logging, weather, fire, insects, disease, invasive plants, land-use change, recreation use, and management actions or inaction. Successful forest management requires society to consider which of these forces are most influential in the short run and which are the most amenable to manipulation in pursuit of long-term, large-scale forest conservation objectives.



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It Isn't Just Climate Change

Five short- and long-term factors will be highly influential in the future of Northern forests regardless of the nature and magnitude of the effects of climate change. Addressing these issues now also will make northern forests more resilient to future effects of climate change and other disturbances.

The five factors identified in the study are:

- *Northern forests lack age-class diversity and will uniformly grow old without management interventions or natural disturbances.* Nearly 60 percent of northern forest land is clustered in age classes spanning 40 to 80 years; young forests (age 20 years or less) are only 8 percent of all forests in the region; and forests older than 100 years are 5 percent of forests. Thus, forests are not as diverse or resilient as they could be.
- *The area of forest land in the North will decrease as a consequence of expanding urban areas.* With anticipated increases in population, over the next 40 years the expanding urban areas in the 20-state region are expected to subsume about 12 million acres of forest land. It is a relatively small loss (about 7 percent) of the total forest land area, but where it occurs it can have a huge local impact.
- *Invasive species will alter forest density, diversity, and function. Invasives are costly and difficult to control, if they can be controlled at all.* The U.S. North has the dubious distinction of having the greatest number of invasive insects and plants per county due to nearly three centuries of active commerce, diverse tree species that provide suitable habitats, and the means for invasive species to spread. Invasive species reduce forest health, diversity, and value.
- *Management intensity for timber is low in Northern forests and likely to remain so.* A low propensity or low capacity for forest management reduces options for addressing perceived problems such as low forest diversity, invasive species, or disease issues.
- *Management for nontimber objectives will gain relevance but will be challenging to implement.* Historically we have relied on timber sales to generate income that subsidizes forest management costs for nontimber values such as improving wildlife habitat, forest diversity, or recreation. An unintended consequence of reduced timber harvesting may be reduced capacity to subsidize other restoration activities—either through revenue from timber sales or through beneficial manipulation of vegetation and woody fuels during logging operations.



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RESOURCES AND REFERENCES

Web Resources:

<http://www.nrs.fs.fed.us/futures/>

<http://www.nrs.fs.fed.us/futures/about/>

http://www.nrs.fs.fed.us/futures/current_conditions/

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US Forest Service
Northern Research Station
359 Main Road
Delaware, OH 43015

Contact the Northern Research Station www.nrs.fs.fed.us



Stephen Shifley
Research Forester
202 Natural Resources Bldg.
University of Missouri
Columbia, MO 65211-7260

573-875-5341 x232
sshifley@fs.fed.us

Jane M. Hodgins
Writer and Editor
651-649-5281
jmhodgins@fs.fed.us

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