Highlights 2012

NORTHERN RESEARCH STATION

Research that improves people's lives and helps sustain natural resources in the Northeast and Midwest . . .

FROM THE STATION DIRECTOR

Through leading-edge research, Northern Research Station scientists are finding answers and developing solutions for people and the landscapes they live in. America's forests and rangelands constitute a major national strategic asset that provides social, ecological, and economic benefits. We pursue innovative ways to protect these vital natural resources for the benefit of all. The work of the Northern Research Station and all Forest Service research stations across the country contributes to making forests healthier and more resilient and improving people's lives.

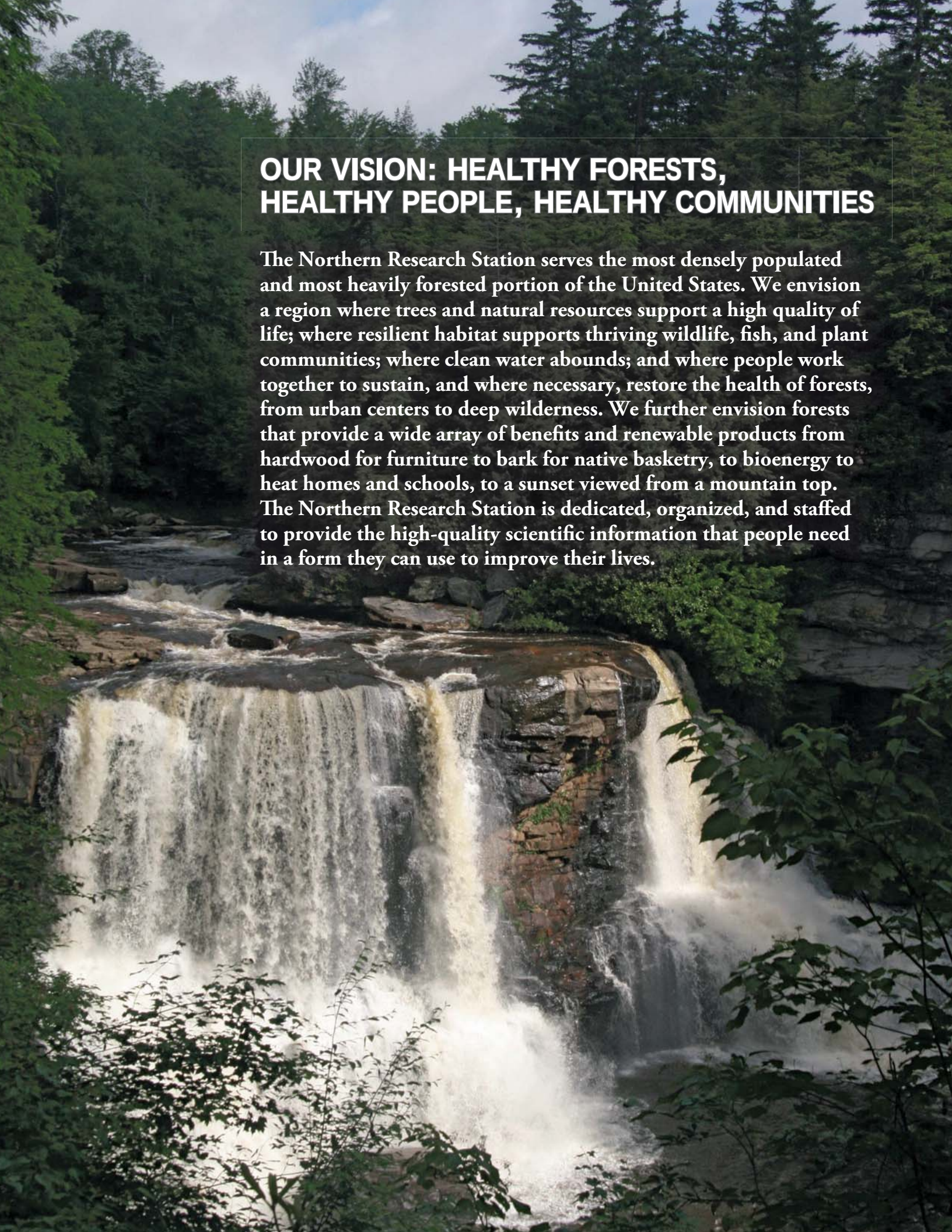
Forest Service science touches almost everyone, every day. This year, Northern Research Station scientists helped convert the world's largest landfill into a park and cultural destination in New York City. They helped ensure the environmental health and good water quality of the agricultural landscapes that feed us. Our snapshot of regional forest conditions and trends highlighted the importance and sustainability of forests in the Northeast and Midwest, which constitute 42 percent of the total land area.

Forest Service science makes land management decisions go from "good to great." This year, our researchers successfully predicted forest mortality caused by drought, helping Wisconsin forest managers anticipate effects on forest composition. An online tool created by our researchers helped civic environmental stewardship groups accomplish more cohesive and comprehensive urban natural resource management. A management guide for northern white-cedar gave New England foresters better guidance for managing this commercially important but little-studied species.

Forest Service Research and Development exists to support the restoration and conservation of landscapes, both urban and rural. This year, our researchers developed a means for predicting fire frequency anywhere in the country—a key piece of knowledge for land managers restoring ecosystems. After being nearly extirpated throughout North America, American chestnut trees returned to the forests of southern Ohio and Indiana, thanks to our trial plantings. Our analysis alerted city and regional planners to a decline in urban tree cover—4 million trees annually—and the need for better monitoring and management of urban forests.

The following pages capture just a few of the ways that the Northern Research Station made a difference for the nation and its forests in 2012. I am proud of what we accomplished and look forward to continuing that service in the coming year.

Michael T. Rains



OUR VISION: HEALTHY FORESTS, HEALTHY PEOPLE, HEALTHY COMMUNITIES

The Northern Research Station serves the most densely populated and most heavily forested portion of the United States. We envision a region where trees and natural resources support a high quality of life; where resilient habitat supports thriving wildlife, fish, and plant communities; where clean water abounds; and where people work together to sustain, and where necessary, restore the health of forests, from urban centers to deep wilderness. We further envision forests that provide a wide array of benefits and renewable products from hardwood for furniture to bark for native basketry, to bioenergy to heat homes and schools, to a sunset viewed from a mountain top. The Northern Research Station is dedicated, organized, and staffed to provide the high-quality scientific information that people need in a form they can use to improve their lives.

Overview

NORTHERN RESEARCH STATION

KEY POINTS

As part of the U.S. Forest Service Research and Development mission area, the Northern Research Station provides leading-edge science and technology applications and effective information delivery.

- Our work extends across 20 states of the Northeast and Midwest, as well as the inventory and monitoring of forests in Kansas, Nebraska, South Dakota, and North Dakota.
- Our 24 field locations include Baltimore, Chicago, and New York City.
- We operate a network of 24 official and cooperating experimental forests that produce unique insights into long-term trends in natural resource conditions.
- We work with a wide range of clients and partners to conduct research and deliver results.

Our work helps advance the stewardship of landscapes along a rural to urban gradient to ensure the long-term health and productivity of the region's natural resources.

SCIENCE THEMES

The Northern Research Station's five science themes are the driving force of its science portfolio. The program direction for each theme is achieved through the coordinated actions of 13 research work units. Our science themes are:

- Forest Disturbance Processes
- Urban Natural Resources Stewardship
- Sustaining Forests
- Providing Clean Air and Water
- Natural Resources Inventory, Monitoring, and Assessment

Our program focus of environmental literacy, to help create a more informed citizenry, integrates NRS research into regional efforts to improve environmental literacy, which helps people make responsible choices about the environment through lifelong, place-based, inquiry-based learning.

MODELING FIRE IN THE CONTINENTAL UNITED STATES

Knowledge of historic fire frequency is important in guiding restoration of fire-dependent ecosystems, but it is often missing or cannot be determined locally due to lack of fire-scar tree records. A Northern Research Station scientist and collaborators have developed a new model called PC2FM that predicts historic fire frequency for the continental United States. The model uses mean maximum temperature, precipitation, their interaction, and estimated reactant concentrations to estimate mean fire intervals. Having science-based estimates of historic fire frequencies for specific project areas is a major advancement in ecosystem restoration. Another important use of the model is in assessing potential changes in climate (temperature and moisture) on the likelihood of wildland fires. The PC2FM model can be used to map large-scale historic fire frequency and assess climate impact on landscape-scale fire regimes.

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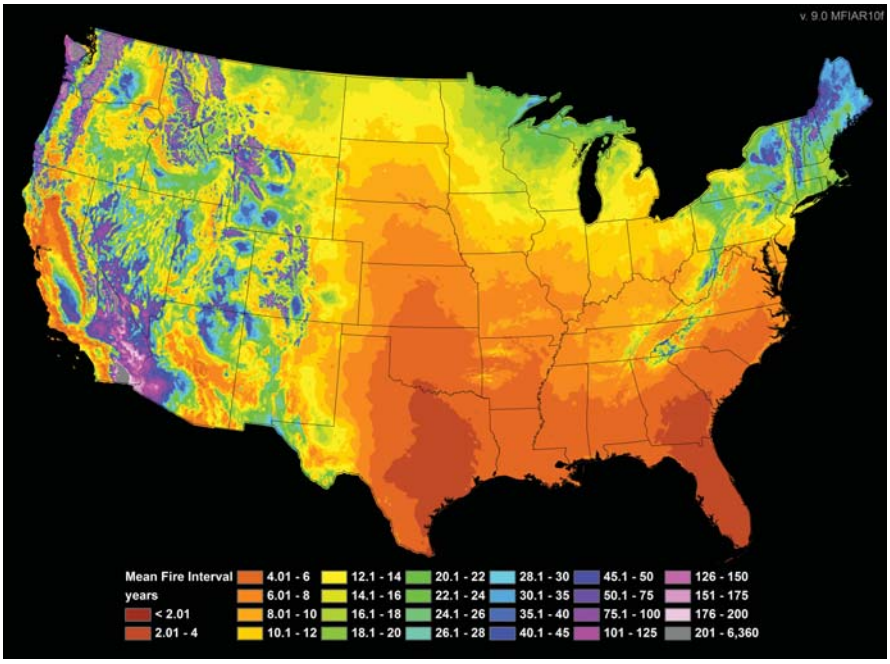

Map of estimated fire frequency for the historic period 1650–1850.

PARTNERS
Richard Guyette and Michael Stambaugh, University of Missouri-Columbia

IMPACT OF INVASIVE INSECTS AND FIRE ON FOREST WATER RESOURCES

Michael Gallagher, U.S. Forest Service

A prescribed fire burning in the New Jersey Pinelands. Prescribed fires reduce stand leaf area, resulting in lower evapotranspiration and increased ground water recharge during the following growing season.

Northern Research Station scientists quantified water use in three representative upland forest stands in the New Jersey Pinelands that were either defoliated by gypsy moth or burned by prescribed fire. Both defoliation and prescribed fire initially had little effect on overall stand biomass but did reduce leaf area, which altered energy partitioning and reduced evapotranspiration. At the landscape scale, defoliation of about 20 percent of the forest increased ground water input by 7 percent. This research indicates that non-stand-replacing disturbances can have significant, but typically short-term, effects on energy partitioning and evapotranspiration at the stand and landscape scales.

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PARTNERS
Rutgers University (Newark and New Brunswick); U.S. Geological Survey

DO INSECT-KILLED TREES INCREASE FIRE RISK?

Insect disturbance is thought to increase fire risk by increasing dead fuels across large landscapes. But results from a recent simulation study by Northern Research Station scientists and partners challenge that notion. They applied a landscape succession and disturbance model (LANDIS-II) to evaluate the relative strength of interactions between eastern spruce budworm (a native but destructive insect that feeds on the needles of fir and spruce), vegetation change, and fire disturbances in the Boundary Waters Canoe Area (BWCA) in northern Minnesota. The researchers found that spruce budworm disturbance decreased area burned and fire severity when averaged across 300-year simulations. They concluded that budworm disturbance can partially mitigate long-term future fire risk by periodically reducing live ladder fuels within the mixed forest types of the BWCA, although budworm disturbance will do little to reverse the compositional trends caused in part by fire suppression. These results have important ramifications for both fire mitigation strategies and ecosystem restoration initiatives in the region.

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Brian Sturtevant, U.S. Forest Service

Spruce budworm disturbance periodically kills balsam fir, affecting both live and dead fuel loads.

PARTNERS

Bruce Anderson, Superior National Forest; Ellen Bogardus-Szymaniak, TEAMS Enterprise Unit; Douglas Shinneman, U.S. Geological Survey; Peter Wolter, University of Wisconsin-Madison

PREDICTING LANDSCAPE EFFECTS OF FOREST MORTALITY CAUSED BY DROUGHT

Climate change is expected to affect forest landscape dynamics in many ways, but one of the most important direct effects will probably be drought stress. Northern Research Station scientists used weather and Forest Inventory and Analysis (FIA) data to develop equations to predict drought mortality and incorporated them into a landscape forest dynamics model (LANDIS-II). They found that incorporating drought as a tree-killing disturbance does significantly modify forest composition and landscape dynamics. Through model simulations applied to a test landscape in Wisconsin, scientists were able to conclude that, for the Upper Midwest, (1) a drought-induced tree mortality signal can be detected using FIA data; (2) tree species respond primarily to the length of drought events rather than their severity; (3) the differences in drought tolerance of tree species can be quantified; and (4) future increases in drought could bring changes to forest composition.

Joseph O'Brien, U.S. Forest Service

Leaf scorch and drought symptoms in linden.

Contact: Eric Gustafson (egustafson@fs.fed.us)

FROM WORLD'S LARGEST LANDFILL TO NEW YORK CITY'S NEWEST PARK

The Fresh Kills Salt Marsh, at the southwestern corner of Staten Island in New York City, was once the world's largest landfill. Now the NYC Department of Parks and Recreation is converting the landfill into a park and a citywide cultural and recreation destination through extensive ecological restoration and landscape planning efforts. At 2,200 acres, Fresh Kills Park will be the largest park developed in New York City in more than 100 years. Forest Service researchers at the New York City Urban Field Station and throughout the NRS are working with university cooperators to explore the process of conversion and its impacts on the social and biophysical landscape. Researchers assessed Staten Island residents' attitudes toward the park, developed a communications strategy to address public health concerns about it, and used focus groups to understand residents' memories of the landfill as well as their fears and interests in using the future park. In another study, native poplar and willow plants collected from Staten Island are being propagated at the NRS Institute for Applied Ecosystem Studies in Rhinelander, WI, where they will be grown in the greenhouse and hybridized, and the most successful genotypes will be outplanted at Fresh Kills Park.

Contacts: Lindsay Campbell (lindsaycampbell@fs.fed.us) and Erika Svendsen (esvendsen@fs.fed.us)

City of New York. Used with permission.

Kayakers in Fresh Kills Park, NYC.

PARTNERS

Herb Schroeder (retired), NRS; David Klenosky, Purdue University; Carrie Grassi and Eloise Hirsh, NYC Department of Parks and Recreation Fresh Kills Team; Phil Gleason, NYC Department of Sanitation; Christine Vogt, Michigan State University; Deborah Popper and Rich Flanagan, College of Staten Island

U.S. URBAN TREE COVER DECLINING

Trees in urban areas provide many benefits to city residents. But Northern Research Station scientists have found that urban tree cover has been declining in recent years at a rate of about 20,000 acres per year or about 4.0 million trees per year. Recent analyses by NRS scientists reveal that many forces such as urban development, insects and diseases, natural regeneration, and tree planting are constantly changing the urban tree cover, both positively and negatively. Although tree cover is declining within most urban areas, the development of some urban areas can increase regional tree cover, especially in grassland-dominated states. Understanding these changes is leading to better management plans for sustaining tree cover and its associated benefits for current and future generations.

Contact: David Nowak (dnowak@fs.fed.us)

PARTNERS

U.S. Forest Service: RPA Assessment Staff and State and Private Forestry Urban and Community Forestry Program; SUNY; National Science Foundation

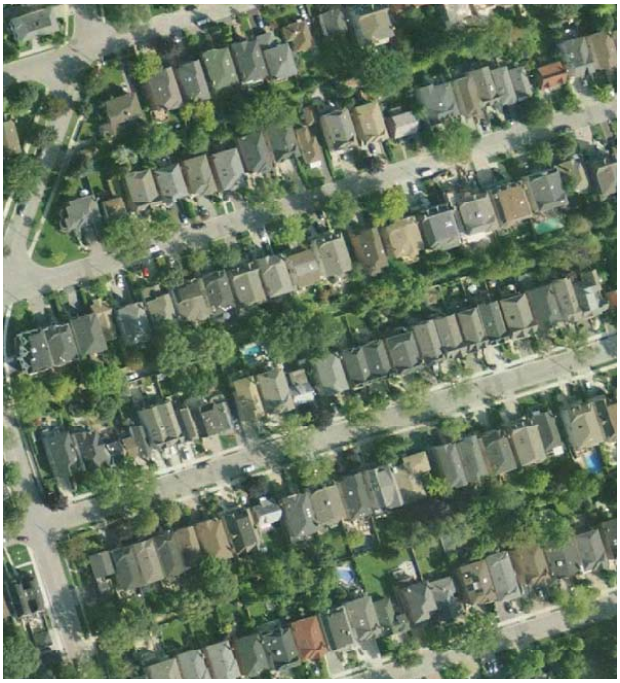

Image source: Quickbird

Trees in urban areas provide numerous benefits to residents. Tree cover in urban areas is on the decline while the process of urbanization is altering regional tree cover.

MORE TREES ASSOCIATED WITH LESS CRIME IN GREATER BALTIMORE

Northern Research Station scientists found a strong inverse relationship between tree canopy and crimes of robbery, burglary, theft, and shooting when they compared high-resolution tree canopy data and geocoded crime point data in the Baltimore region. These findings add to the literature on the relationship between crime and vegetation in a number of ways. First, the findings show that where there are more trees there is less crime. Second, this result holds for both public and private land, but it is stronger for public land. Third, when spatial autocorrelation is adjusted for, the overall result still holds, but the magnitude is not as great. Finally, it appears there is some slight geographic variability in the relationships between trees and crime and that a few isolated areas see a positive relationship between trees and crime. The modeling results indicated conservatively that a 10 percent increase in tree canopy was associated with a roughly 12 percent decrease in crime.

Contact: Morgan Grove (mgrove@fs.fed.us)

Kim Hairston, Baltimore Sun

Morgan Grove, NRS scientist, speaks with Barbara Rock, a longtime resident of Franklin Square, Baltimore, about the results of his research during a tour with Baltimore Sun.

PARTNERS
Austin Troy, University of Vermont

UNDERSTANDING URBAN CIVIL ENVIRONMENTAL ACTION ACROSS THE U.S.

Visualizing where and how hundreds of civic environmental stewardships groups are working in cities across the United States has gotten easier for the public, municipal agencies, and nonprofits, thanks to the continued work of the Stewardship Mapping and Assessment Project (STEW-MAP). STEW-MAP, developed by scientists from the Northern Research Station, supports urban natural resource management, policymaking, and public outreach with databases and interactive maps. This year, the STEW-MAP team continued to expand the project's geographic reach as well as its products and platforms. The team has launched a new multi-city online portal (http://stewmap.net/), which provides information about STEW-MAP projects in New York City, Chicago, Baltimore, and Seattle, including maps, network diagrams, and publications to date.

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U.S. Environmental Protection Agency

Gathering prairie seed is an easy, educational, and fun stewardship activity in the Chicago region. Stewards can be any age.

PARTNERS
Dale Blahna, Kathy Wolf, PNWRS; Dana Fisher, University of Maryland; James Connolly, Northeastern University; Dexter Locke, NRS/New York City Department of Parks and Recreation; Steve Romalewski and Christy Spielman, CUNY Center for Urban Research; Oliver Bazinet, University of Washington; Mark Bouman, Field Museum

USING HARVEST GAPS TO RESTORE TREE DIVERSITY IN MANAGED FORESTS

A medium-size (20-m-diameter) gap has been accepted in practice as the "perfect" gap size to restore or maintain tree diversity in northern hardwood forests. However, when tree regeneration in harvest gaps of various sizes was examined for over a decade in northern hardwoods, the results were surprising. Less abundant tree species were found to grow better in larger gaps (up to 46 m in diameter) but survive better in small gaps (6- to 10-m-diameter), suggesting that medium gaps may provide an acceptable tradeoff between growth and survival. However, the density of these species was low, regardless of gap size, suggesting that the role of gap size in tree diversity may be dampened by other site factors such as deer browsing and shrub competition. This work challenges conventional wisdom about the perfect gap size and provides empirical evidence to guide management decisions on responses of trees to gap size. Results from this research are already influencing forest management practice and planning on public lands in Minnesota and Wisconsin.

Contact: Christel Kern (cckern@fs.fed.us)

Trisha Moore, University of Minnesota and U.S. Forest Service

Researchers search under thick raspberry (*Rubus* sp.) for tree seedlings in a large gap 13 years after harvest.

PARTNERS

National Forest System: Chequamegon-Nicolet National Forest; University of Minnesota

IS A ONCE MIGHTY TREE SPECIES READY FOR A COMEBACK?

American chestnut was the dominant tree species in the Appalachian Mountains before an introduced fungus almost extirpated it and changed the way of life for early inhabitants who relied on this tree for food, shelter, and animal production. Helping the American chestnut tree move toward a comeback, the Northern Research Station's Hardwood Tree Improvement and Regeneration Center (HTIRC) and The American Chestnut Foundation (TACF) have begun two restoration plantings on the Wayne and Hoosier National Forests. HTIRC staff from both NRS and Purdue University and the Indiana Chapter of TACF helped coordinate and plant the initial restoration sites in the Midwest. These plantings are an important next step to test blight resistance in the field and to understand the ecological steps necessary for successful restoration of American chestnut.

Contact: Charles Michler (cmichler@fs.fed.us)

PARTNERS

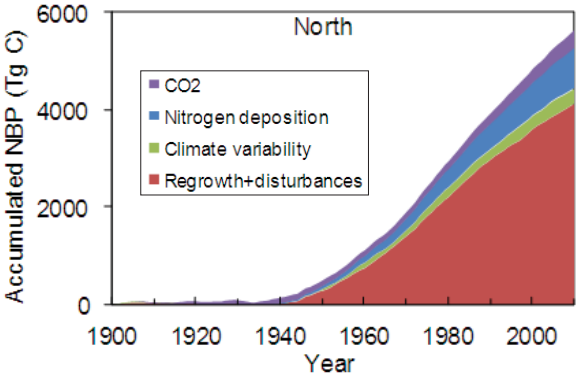
National Forest System: Wayne and Hoosier National Forests; Indiana State Nursery; Purdue University; The American Chestnut Foundation, Indiana Chapter

James McKenna, U.S. Forest Service

The Northern Research Station, the Hoosier National Forest, and the Indiana Chapter of The American Chestnut Foundation established a blight resistant American chestnut planting at Buck Creek on the Hoosier National Forest in spring, 2012.

EFFECTS OF DISTURBANCE, CLIMATE, AND MANAGEMENT ON U.S. FOREST CARBON

Recent climate variability (increasing temperature and droughts) and atmospheric composition changes (nitrogen deposition, rising carbon dioxide concentration), along with harvesting, wildfires, and insect infestations, have had significant effects on U.S. forest carbon uptake. The carbon changes in forests of the conterminous U.S. can be attributed to disturbance and non-disturbance factors. Scientists from the Northern Research Station combined an advanced ecosystem process model with data from Forest Inventory and Analysis and remote sensing to separate the effects of disturbance factors (harvesting, fire, and insects) from non-disturbance factors (climate variability, carbon dioxide fertilization, and nitrogen deposition). Results showed that disturbance factors had the strongest effects overall, but with significant regional and temporal differences. This is the first time such separation of causes has been possible at the continental scale. This new information can be used to support development of policies and approaches to improve sustainable forest management and provide for cleaner air and water.



Contributions of elevated CO_2 concentration, N deposition, climate variability, and regrowth+disturbances to accumulated net biome productivity (NBP) in the northeastern U.S.

Contact: Yude Pan (ypan@fs.fed.us)

PARTNERS
University of Toronto; Nanjing University, China

NEW MANAGEMENT STRATEGIES FOR NORTHERN WHITE-CEDAR

Northern white-cedar (*Thuja occidentalis* L.) is one of the least studied commercially important species in the northeastern U.S. and Canada. White-cedar is valued as a source of niche products such as shingles and fence posts and as a sacred plant for Native Americans; it contributes to biodiversity by increasing local tree species richness and providing wildlife habitat. But foresters have little and often contradictory information about cedar ecology and silviculture. In response to this information need, Northern Research Station scientists and their partners conducted more than a decade of research, resulting in new silvicultural guidelines for white-cedar in the variety of habitat types where it is found. Their work includes a synthesis of knowledge as well as new studies of white-cedar regeneration, growth, mortality, site relationships, and responses to treatment. Their recommendations include retaining and releasing cedar in managed stands, and establishing and protecting advance regeneration and residual trees during harvesting. A new management guide, jointly published by the U.S. Forest Service and the Canadian Forest Service in English and French, has been produced.

Contact: Laura Kenefic (lkenefic@fs.fed.us)

U.S. Forest Service

Foresters inspect a northern white-cedar tree in northern Maine.

PARTNERS
Morrisville State College, New York; Northeastern States Research Cooperative; University of Maine, School of Forest Resources; Centre d'enseignement et de recherché en foresterie de Sainte-Foy, Inc., Ministere des Ressources naturelles et de la Faune du Quebec; Natural Resources Canada; Canadian Wood Fibre Centre; Nova Sylva Inc.; Universite Laval, Quebec, Canada; Southern Sciences and Information Section, Ontario, Canada

PROVIDING CLEAN AIR and WATER

IMPROVING ENVIRONMENTAL HEALTH AND COMMUNITY VITALITY IN AGRICULTURAL LANDSCAPES

Traditional agricultural practices have led to a number of environmental problems including increased erosion, high nutrient losses, loss of diversity, and degraded surface and ground water resources. Northern Research Station scientists and their partners are helping midwestern farming communities understand how to transform portions of the agricultural landscape into perennial plant communities. In ongoing studies in Iowa, scientists are testing strategically placed prairie strips in agricultural watersheds. Already they are seeing compelling results of the benefits of those strips in reducing sediment and nutrient transport to streams (and ultimately to the Gulf of Mexico). The partners have developed a handbook for growers and agency personnel describing the potential benefits of perennials in agricultural landscapes and techniques that achieve those benefits. The results are now being incorporated into field days and training for Iowa farmers.

Matt Helmers, Iowa State University

Prairie strip embedded in an agricultural (corn) watershed. The prairie strips increase nutrient and sediment retention, reduce runoff, and increase biodiversity.

Contact: Randy Kolka (rkolka@fs.fed.us)

PARTNERS

National Agroforestry Center, USDA Agriculture Research Service's National Laboratory for Agriculture and the Environment; Neil Smith National Wildlife Refuge; Iowa State University; the Leopold Center for Sustainable Agriculture; University of Michigan

BIOMASS POTENTIAL OF POPLAR ENERGY CROPS IN MINNESOTA AND WISCONSIN

Short-rotation woody crops such as poplars (*Populus* spp. and their hybrids) are a significant component of the total biofuels and bioenergy feedstock resource in the U.S. Woody production systems and conversion technologies are needed to maintain healthy forests and ecosystems, create high paying manufacturing jobs, and meet local/regional energy demands. Poplars are dedicated energy crops that can be strategically placed in the landscape to conserve soil and water, recycle nutrients, and sequester carbon. But production of these crops may result in large-scale land conversion, which leads to questions about their economic, logistic, and ecologic feasibility. To address these concerns, Northern Research Station scientists used social (i.e., land ownership and cover) and biophysical (i.e., climate, soil characteristics) spatial data to map eligible lands suitable for establishing and growing poplar biomass for bioenergy crops across Minnesota and Wisconsin.

Ron Zalesny, U.S. Forest Service

Industrial poplar farm.

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PARTNERS

William Headlee and Richard Hall, Iowa State University; David Coyle, University of Georgia; Raymond Miller, Michigan State University; Brian Stanton, GreenWood Resources, Inc.; Dan Langseth and Mike Young, Verso Paper; Bernie McMahon and Bill Lazarus, University of Minnesota

MODELING ALTERED RIVER FLOWS THAT AFFECT FISH IN THE NORTH ATLANTIC

Rivers flowing into the North Atlantic Ocean, both eastern North America and northwestern Europe, have long been modified for human use. Facing increasing demands for water and hydropower energy, and with fisheries and other ecosystem services at risk, managers desperately need sound science for informed decisionmaking. Northern Research Station researchers reviewed the state of science relating river flow regimes to fish populations and outlined a framework for meeting research needs. They made the case that, to generate robust predictions, models need to acknowledge the complex life-histories of riverine fishes and integrate stage-specific effects on population dynamics.

Steve McCormick. Used with permission.

An Atlantic salmon smolt, ready to migrate to the ocean.

Contact: Keith Nislow (knislow@fs.fed.us)

PARTNERS
U.S. Geological Survey, Conte Anadromous Fish Research Center; Marine Scotland Freshwater Laboratory

FOREST MANAGEMENT IMPACTS ON SOIL CARBON

Coeli Hoover, U.S. Forest Service

Heavily thinned (left) and unthinned (right) Allegheny hardwood plots on the Kane Experimental Forest, Pennsylvania.

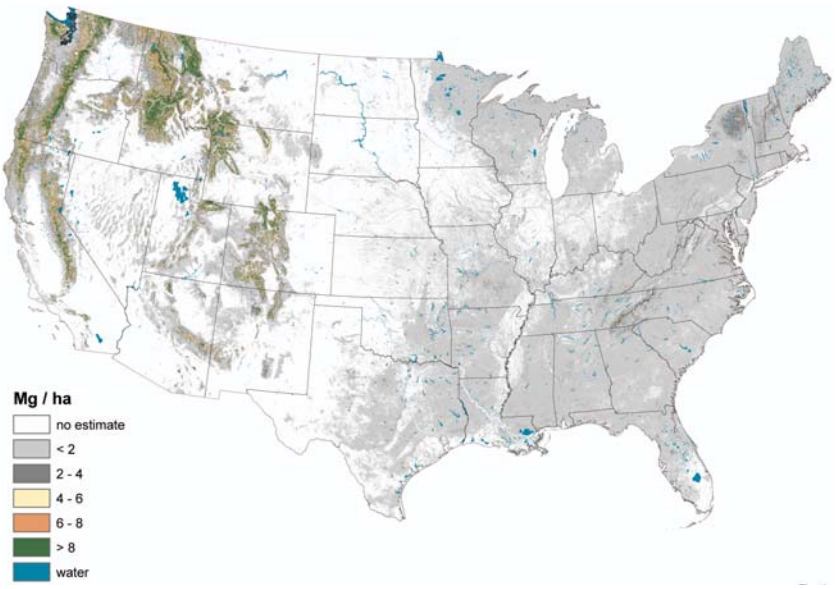
Forests remove carbon dioxide from the atmosphere, and maintaining or increasing their role in this function is becoming a more common objective for forest managers to consider. In many forests there can be more carbon stored in the soil than in the trees themselves, so it is important to understand the effects of common forest management practices on soil carbon stocks. Northern Research Station researchers measured soil and forest floor carbon in six long-term forest management studies in five northern states to assess the effects of partial and complete harvesting practices on these carbon stores. The study found no differences in the amount of carbon in the upper layers of soil between the sites that had no cutting, light thinning, heavy thinning, or complete harvests. The results show that it is unlikely that standard management practices as applied in northern hardwood forests lead to a loss of carbon from the soil, although the carbon in the forest floor may decline temporarily.

Contact: Coeli Hoover (choover@fs.fed.us)

PARTNERS
National Forest System: Monongahela, Allegheny, Chequamegon-Nicolet, and White Mountain National Forests; SUNY Heiberg Memorial Forest

FIRST NATIONAL INVENTORY DEVELOPED OF STANDING DEAD TREE BIOMASS/CARBON

Scientists at the Northern Research Station have developed a nationally consistent and comprehensive inventory of standing dead trees for the National Greenhouse Gas Inventory and Biomass Assessments. The inventory replaces models that were generalizations of regional averages by broad forest types. Instead of missing the impact of disturbances such as droughts and insect outbreaks, their effects on standing dead tree biomass/carbon estimates can now be measured in yearly time-steps as opposed to decades. Additionally, beyond simply counting standing dead trees, emerging research on standing dead-tree wood density reduction and structural deductions improves the accuracy of carbon stock estimates of standing dead trees. Mapping these pools of biomass indicate they are very prevalent in forests of the western United States.



Ty Wilson and Christopher Woodall, U.S. Forest Service

Estimates of standing dead tree carbon stocks across the conterminous U.S.

Contact: Christopher Woodall (cwoodall@fs.fed.us)

PARTNERS
Mark Harmon, Oregon State University

NEW NRS PUBLICATION RELEASED ABOUT FORESTS OF THE NORTHERN UNITED STATES

Northern Research Station scientists recently produced "Forests of the Northern United States," a detailed portrait of recent trends and current conditions for the 20 northern states bounded by Maine, Maryland, Missouri, and Minnesota. This assessment of the Nation's most densely forested and most densely populated quadrant presents conditions in terms of eight criteria related to sustainable forests. Details for individual northern states are included in more than 100 maps, graphs, and tables as well as in online data exploration tools. Overarching issues identified for northern forests include interactions of forests and people, managing invasive species, sustaining biodiversity, and sustaining capacity for forest management.

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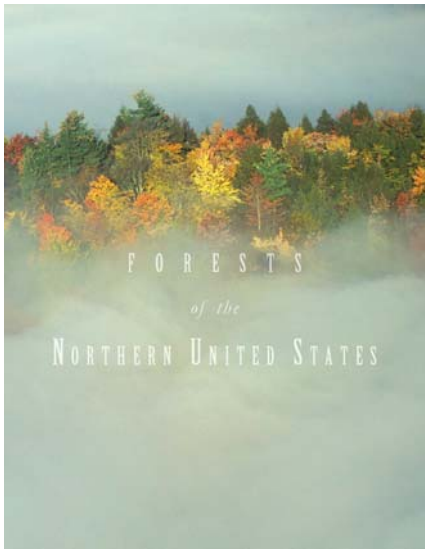


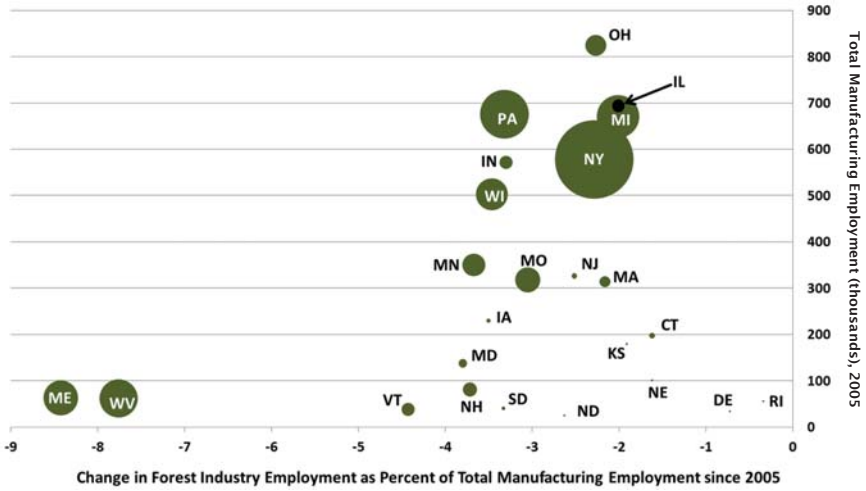
"Forests of the Northern United States" uses more than 100 maps, graphs, and tables to summarize current conditions and recent trends for the 172 million acres of forest land in the 20 states that make up the Northern United States. U.S. Forest Service General Technical Report NRS-90 can be downloaded or ordered in hard copy at http://www.treesearch.fs.fed.us/pubs/40189

PARTNERS
Sherri Wormstead, U.S. Forest Service Northeastern Area State and Private Forestry; Francisco Aguilar and Nianfu Song, University of Missouri

DOWNTURN IN THE FOREST PRODUCTS INDUSTRY OF THE UNITED STATES

In recent years, the forest products sector of the United States has been reeling in the wake of the housing collapse, domestic and international financial crises, and the global economic recession of 2007-2009. Hundreds of thousands of jobs have been lost in the forestry and related sectors of the economy, and wood product output has been reduced to levels not seen in decades. The pattern of the downturn has varied by industry. Globalization of manufacturing and expanded use of electronic media have contributed to a decline in U.S. pulp, paper, and paperboard output since the late 1990s. The collapse of housing construction since 2005 and movement of furniture production offshore have contributed to declines in U.S. wood product output. Northern Research Station scientists have analyzed the downturn, focusing on trends in forest sector economic activity and employment. The analysis points to structural changes that may be difficult to reverse, but also finds some prospects for growth in the future, including increased forest product exports and wood-based biorefining.

Contact: Christopher Woodall (cwoodall@fs.fed.us)



The change in forest industry employment from 2005 to 2010 compared to each state's total manufacturing employment in 2005 with each state's circle scaled to its total timberland growing stock volume in 2010, northern region.

PARTNERS

U.S. Forest Service: Ken Skog and Peter Ince, Forest Products Laboratory; Brad Smith, WO RD; Francisco Aguilar, University of Missouri; Don Hodges, University of Tennessee; Charles Keegan and Colin Sorenson, University of Montana

ESTIMATING TREE VOLUME/BIOMASS FOR THE NATIONAL GREENHOUSE GAS INVENTORY

Nationally consistent and documented procedures for estimating forest volume/biomass are central to both bioenergy assessments and National Greenhouse Gas Inventories. To fill this need, scientists from the Forest Inventory and Analysis program of the Northern Research Station have documented a national approach to tree volume/biomass estimation (Component Ratio Method), evaluated its output in comparison to past methods, and implemented it in the 2012 National Greenhouse Gas Inventory.

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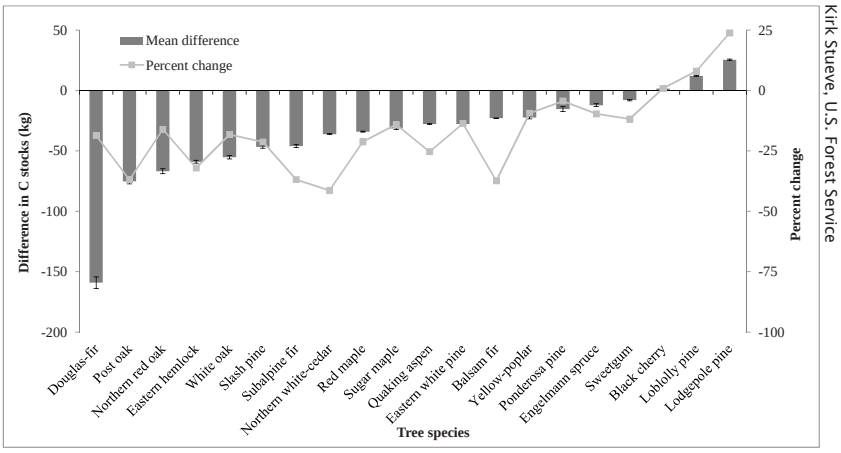

Kirk Stueve, U.S. Forest Service

Mean difference in tree-level carbon stocks between the Component Ratio Method and Jenkins' approach for tree species in the conterminous U.S.

SUSTAINABILITY SCIENCE FELLOWSHIPS ENCOURAGE FUTURE SCIENTISTS

Mentoring and college-level research experiences improve a student's chances for graduating with a degree in science. The Northern Research Station has created the Philadelphia Sustainability Science Fellows Program, through its Philadelphia Field Station, to promote environmental literacy and collaborative learning experiences and to increase the number of young scientists in the field of urban forestry. The program provides $5,000 grants to undergraduate students from diverse backgrounds for conducting research projects relating to a better understanding of urban forests and the ways in which trees affect the lives of city residents and the environment. Six students received fellowships in the first year of the program.

Contacts: Barbara McGuinness (bmcguinness@fs.fed.us), and Dave Nowak (dnowak@fs.fed.us)

PARTNERS
Pennsylvania Horticultural Society

Ross Elliot, University of Delaware. Used with permission.

Sustainability Science Fellow Melanie Allen is studying small mammals to find out if they can be used as a Rapid Assessment Tool to measure forest fragmentation health. (Left to right: Melanie Allen, Emily Giraud, and Njeri Kimani)

KIDS HELPING THEIR COMMUNITIES ADAPT TO FIRE

In the U.S., most wildland fire preparedness and mitigation programs have focused on adults, but Northern Research Station scientists have found that kids too are playing a significant role in prevention, safety, and suppression. NRS scientists and partners studied seven youth wildfire education programs and found that a program is more likely to contribute to a community's capacity to adapt to wildfire if the program (1) develops partnerships between educational institutions and wildland fire management professionals, (2) contributes to each partner's goals by building on ongoing efforts, (3) provides information and activities that address local conditions, (4) empowers youth to act locally, and (5) attracts and builds community support.

Contact: Pamela Jakes, retired (pjakesfs@gmail.com)

PARTNERS
University of California-Davis, University of Florida, Southern Oregon University

Pamela Jakes, U.S. Forest Service

Students from Hedgesville (WV) High School discuss opportunities to reduce wildfire risk with homeowners during their annual field trip to The Woods, a neighboring Firewise Community.

NRS RESEARCH WORK UNITS

RWU No.	Research Work Unit	RWU Leader
NRS-01	Ecological and Economic Sustainability of the Appalachian Forest in an Era of Globalization	Thomas Schuler
NRS-02	Sustaining Forests in a Changing Environment	Susan Stout
NRS-03	Ecology and Management of Invasive Species and Forest Ecosystems	Kurt Gottschalk
NRS-04	Genetics, Biological Control, and Management of Invasive Species	Jim Slavicek
NRS-05	Forest Inventory and Analysis	Dennis May
NRS-06	Climate, Fire, and Carbon Cycle Sciences	Rich Birdsey
NRS-07	Center for Research on Ecosystem Change	John Brissette
NRS-08	Urban Forests, Human Health, and Environmental Quality	Dave Nowak
NRS-09	People and Their Environments: Social Science Supporting Natural Resource Management and Policy	Lynne Westphal
NRS-10	Biological and Environmental Influences on Forest Health and Productivity	Jim Slavicek
NRS-11	Sustainable Management of Central Hardwood Ecosystems and Landscapes	Dan Dey
NRS-13	Institute for Applied Ecosystem Studies: Theory and Application of Scaling Science in Forestry	Deahn Donner
NRS-14	Hardwood Tree Improvement and Regeneration Center	Charles Michler

*NRS-12 has been discontinued and its program components moved to other units within the Northern Research Station.

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