

Forest ThreatNet

...sharing knowledge and tools needed to anticipate and respond to emerging forest threats

In This Issue:

Message from the Director 1

What's In Your Drinking Water? 2

Western Wildland Environmental Threat Assessment Center Highlights..... 3

Center Scientist Named Most Distinguished in Forest Science..... 4

Forest Service Associate Chief Explores the Wonders of Forest Science..... 4

TACCIMO and **ForWarn** Help Natural Resource Managers..... 5

Forest Science Shared with Minority Landowners..... 6

Annual Reports Focus on Forest Trends 6

Eastern Threat Center In the News 7

The Climate Change Wildcard..... 8

Contact Us..... 8

FROM THE DIRECTOR...



March Madness. If you are even a casual fan of college basketball, you know what this phrase means. This is the time of the year where the unexpected becomes the

normal. Unknowns and underdogs rise to the occasion and knock off the better-known and higher ranked teams in game after game. Despite the best efforts of the professional prognosticators and amateurs alike, no one can foresee or predict the ultimate outcome. As March transitions into April, this is also the time of year when winter gives way to spring and even predicting the weather next week is a challenge. The calendar tells me that it should be spring outside, but the temperature gauge and the ice and snow on my back porch suggests that winter is still lingering. The late spring stands in stark contrast to the very early and very warm spring that we experienced just last year. All of this has me wondering, what is the value of a prediction?

I remember reading an article recently about the value of the forecasts that preceded Hurricane Sandy making landfall in the Northeast. Yes, the losses due to the storm were terrific. But they could've been so much worse had it not been for the efforts of NOAA and the National Weather Service to provide information ahead of time that allowed emergency response organizations and the many federal, state, and local agencies time to prepare. It's important to realize that this predictive capacity did not come easily, immediately, or cheaply. Years of effort and rigorous analysis went into developing the tools that were needed for an accurate prediction. As we approach the eighth anniversary of the Eastern Threat Assessment Center, I can see how our sustained efforts to develop predictive tools are beginning to pay off handsomely. Tools like **ForWarn**, **WaSSI**, and **ForeCASTS** are maturing nicely such that we can have greater confidence in their capacity to anticipate, predict, or assess forest threats. Other efforts are making similar progress, which raises my expectations that we will continue to provide first-rate, credible scientific information to all managers and users of our nation's forests and the services they provide. The incalculable value of these

forests demands nothing less.

Until next time,

Danny C. Lee



Southern Research Station Director Rob Doudrick (center in red shirt) honored Eastern Threat Center scientists and staff for significant research and partnership achievements in 2012.



Forest ThreatNet

Forest ThreatNet

is published by the Eastern Forest Environmental Threat Assessment Center. The Eastern Threat Center is an interdisciplinary resource actively developing new technology and tools to anticipate and respond to emerging eastern forest threats. The Center is a joint effort of the USDA Forest Service's Research and Development, National Forest System, and State and Private Forestry. Housed within the Southern Research Station in Asheville, NC, the Center also has offices in Raleigh and Research Triangle Park.

Editor

Perdita B. Spriggs
Eastern Threat Center

Assistant Editor

Stephanie Worley Firley
Eastern Threat Center

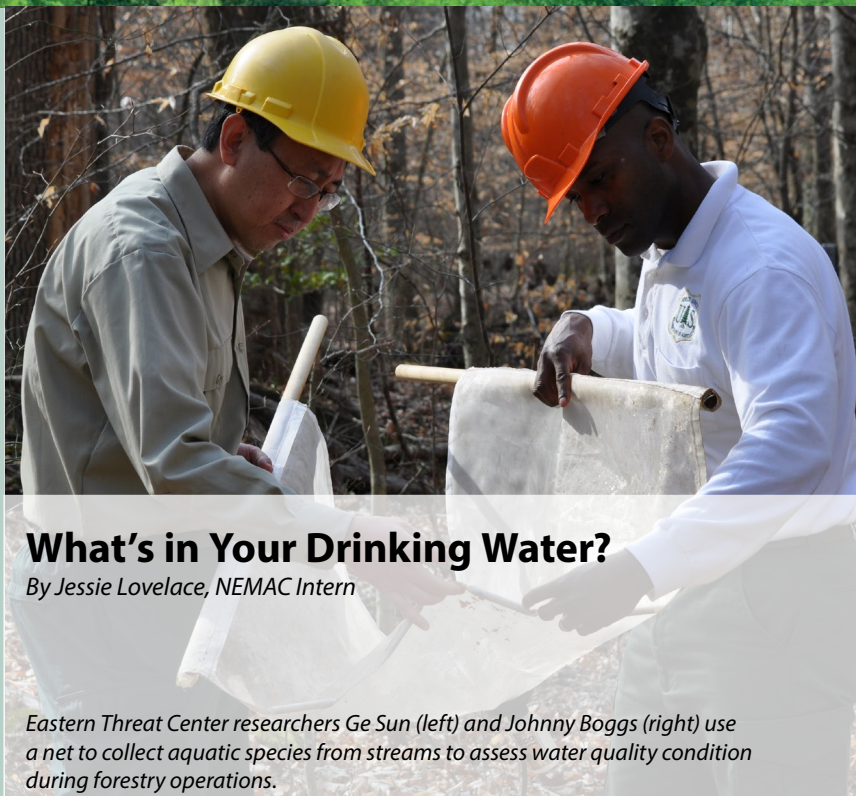
Contributing Writers

Jessie Lovelace
*University of
North Carolina
Asheville's National
Environmental
Modeling and Analysis
Center (NEMAC)*

Nancy Grulke
Western Threat Center

Newsletter Template Design

Rodney Kindlund
RodKraft Studio



What's in Your Drinking Water?

By Jessie Lovelace, NEMAC Intern

Eastern Threat Center researchers Ge Sun (left) and Johnny Boggs (right) use a net to collect aquatic species from streams to assess water quality condition during forestry operations.

Turning on the faucet and running a glass of tap water may not spark wonder about its origin, but with one sip you're able to assess its quality. What do you taste?

In the North Carolina Piedmont, Eastern Forest Environmental Threat Assessment Center scientists work to improve water quality and reduce the threat of water source contamination.

Raleigh-based Eastern Threat Center biological scientist **Johnny Boggs** investigates forestry Best Management Practices (BMPs) to help protect water quality. BMPs reduce or prevent sedimentation, polluted runoff, and other nonpoint source pollution, originating from logging activities, agricultural and residential lands, from entering major water sources. BMPs help achieve cleaner water in North Carolina and other states when implemented and used properly.

In 2008, Boggs and partner scientists from the North Carolina Forest Service, North Carolina State University, and Weyerhaeuser began monitoring a BMP method known as Streamside Management Zones (SMZs). The rapidly growing Piedmont area, home to six of the largest cities in the state's central region, needed strategies to purify water supplies impacted by multiple land uses. Researchers are

investigating if 50-foot buffers will help prevent sediment and nutrients from entering surface water, such as lakes and rivers.

Boggs is excited to lead the Center's effort and collaboratively evaluate BMPs' positive effects. "I am very interested in the immediate impact this work will have," says Boggs. "State agencies are looking for ways to reduce or minimize water contamination during forestry operations," and he feels forestry BMPs are the answer.

"Federal, state, and private organizations share a common desire to assure that current BMPs are adequately protecting

our forest water resources," says **Steve McNulty**, research ecologist and Eastern Threat Center Raleigh team leader. "When the North Carolina Forest Service sought assistance from us to help assess current practices, we were happy to join the partnership effort."

Preliminary data leads Boggs to believe that, "The 50-foot boundary is effectively reducing common water pollutants, which will be our final conclusion if existing runoff patterns remain consistent." Monitoring will continue into 2013 to confirm the data's accuracy.

"The most direct benefit resulting from the partnership is improved water quality which benefits aquatic species and enhances human health," said Boggs. "Forestry BMPs help bring us a step closer to cleaner drinking water at a reduced cost in the Raleigh area and throughout the Piedmont."

*Learn more about this research: **Boggs, Johnny, Ge Sun, David Jones, and Steven G. McNulty, 2012. Effect of Soils on Water Quantity and Quality in Piedmont Forested Headwater Watersheds of North Carolina. Journal of the American Water Resources Association (JAWRA) 49(1): 132-150. DOI: 10.1111/jawr.12001***



Western Threat Center Highlights

Nancy Grulke, Western Wildland Environmental Threat Assessment Center Director

Wildfire Risk and Fuels Management

The Western Threat Center continues to investigate increased potential for wildfire

risk in forests dying from bark beetle outbreaks. Through collaborative research and funding opportunities, Center researchers, visiting scientist and University of Idaho assistant professor **Jeff Hicke**, and partners are analyzing multiple publications and focusing on solutions that decrease bark beetles' impact on fragile forests.



Dying, beetle-infested forests often spark western wildfires.

Bark beetle-killed trees create different forest fuel dynamics than other disturbances because impacted trees die standing up and do not populate the forest floor as immediately as thinning or other disturbances, resulting in wildfire fuel. Western Threat Center researchers, including **David Peterson** and **Nicole Vaillant**, are using a Forest Service Joint Fire Science Program grant to continue collecting wildfire behavior data, analyze time-since-beetle outbreaks, gain increased confidence in expected wildfire behavior, and close knowledge gaps.

The Center also released two new assessment tools and updated the popular ArcFuels, a tool for wildfire fuels management. Center researchers began training fire ecologists and fuels managers in Landscape Treatment Designer,

a new tool that facilitates landscape-level design of fuel treatments. In addition to updating ArcFuels, Center researchers continued training opportunities. A new tool helps managers assess wildfire risk to fish habitat on three National Forests in eastern Oregon and Washington.

Landscape Disturbance Assessments

The Western Threat Center developed remote sensing, modeling and multi-state assessments estimating carbon storage related to fire risk, forest fuel treatments, natural and human-caused forest disturbance, and post-bark beetle epidemics. Center researchers created an approach to understanding fire transmission pathways among land ownership and use on National Forests, important to understanding wildfire behavior. They also demonstrated the Landscape Designer Tool, which shows location, distribution, and effectiveness of protecting pine from wildfire.

Exotic and Native Invasives

The Western Threat Center held a multi-agency workshop to develop and apply a framework to prioritize invasive plants treatment in the Intermountain West. Three supported projects demonstrated the framework's effectiveness on scablands, National Forests, and national grasslands. The projects potentially reduce field work, identify effective treatments, and offer a clear communication tool to management. Additionally, a workshop report highlighted private forest owners' perception of invasive plants risk and management strategies, which could be influenced by improved awareness of conservation issues and increased communication among landowners. During the workshop, Western Threat Center Director **Nancy Grulke** presented research focused on Jeffrey pine's susceptibility to the Jeffrey pine beetle, common in California and generally found following significant drought.

Photo credit: Dave Powell, USDA Forest Service, Bugwood.org

Climate Change

The Western Center's resident research sociologist **Paige Fischer** completed a study that identified private landowner vulnerabilities and land management strategies to reduce climate change impacts. She also identified social scientists working on environmental threats in the western United States. Relatively few researchers are investigating environmental change, and most research focuses on the increase in wildfire frequency and severity expected with future changes in the climate.

Center vegetation modeler **John Kim** provided helpful current and future vegetation estimates, impacted by climate change, on four National Forests in the Pacific Southwest Region revising forest plans. **Lisa Balduman**, Western Threat Center information specialist, also completed Template for Assessing Climate Change Impacts and Management Options (TACCIMO) information for California's forest plan revision. Balduman and Eastern Threat Center TACCIMO team members will soon begin focusing on the Forest Service Southwestern Region.

Forest ThreatNet

Research Ecologist Bridges Eastern Threat Center and Northern Research Station

Lindsey Rustad, team leader and research ecologist with the Northern Research Station's (NRS) Center for Research on Ecosystem Change, has joined the Eastern Threat Center as an adjunct scientist.

In this inaugural adjunct role, Lindsey will be a key point of contact between the Eastern Threat Center and the NRS. Located in Durham, NH, Lindsey will serve as a northern US representative of the Eastern Threat Center and will be in a unique position to share Eastern Threat Center research with NRS scientists and stakeholders. In turn, she will report NRS information and technology transfer needs to the Eastern Threat Center during monthly video teleconference staff meetings and other virtual communication opportunities.



Eastern Threat Center Highlights

Center Scientist Named "Most Distinguished" in Forest Science, Other Researchers Honored



Steve McNulty (c) accepted the national Forest Service Distinguished Science Award from Jim Reaves, Deputy Chief of Research and Development (l) and Rob Doudrick, Director, Southern Research Station.

Eastern Threat Center research ecologist **Steve McNulty** recently received the Forest Service national Research and Development "Distinguished Science Award." He is recognized for sustained research productivity, proactive science technology, innovative leadership, applied forest science and longtime federal service. McNulty, a 21-year career scientist based in Raleigh, NC, has authored more than 150 scientific papers and given hundreds of scientific presentations.

Eastern Threat Center team members received additional awards, including the Southern Research Station Director's Awards for Science Delivery (**Bill Hargrove** and the **ForWarn** team) and Partnership (**Perdita Spriggs**). The **ForWarn** team was among the agency recipients selected for both the southeast region and national Federal Laboratory Consortium for Technology Transfer's 2013 Interagency Partnership Award.



Wagner discusses a lab experiment with North Carolina State University student and lab intern Britne Hackett (l).

Forest Service Associate Chief Explores the Wonders of Forest Science

Mary Wagner, Forest Service Associate Chief, recently toured project and partnership sites within the Southern Region and Southern Research Station (SRS). She spent an afternoon with SRS Raleigh-based partners at the North Carolina Museum of Natural Sciences' new wing, the Nature Research Center. Wagner learned more about current and future Station collaborative efforts with North Carolina State University, the North Carolina Department of Agriculture, and the museum, all uniquely poised to expand awareness and understanding of SRS research efforts. During the visit, key Eastern Threat Center projects were highlighted, including the Template for Assessing Climate Change Impacts and Management Options and **ForWarn**, the Center's forest disturbance monitoring tool.


Below, Forest Service Associate Chief Mary Wagner (3rd from left) is flanked by (from left) SRS Director Rob Doudrick, North Carolina State University Department of Forestry Head Barry Goldfarb, Nature Research Center Director Meg Lowman, SRS Assistant Director Kier Klepzig, SRS Partnership Director Cheryl Jefferson, and Nature Research Center Biodiversity and Earth Observation Lab Director Roland Kays.



Southern University Students Learn About Eastern Threat Center Carbon and Water Research

Students from Southern University in Baton Rouge, LA, toured carbon and water research sites near Plymouth, NC. Eastern Threat Center biological scientists **Michael Gavazzi** and **Emrys Treasure** (pictured center and third from left, respectively) led the tour. Students learned more about different pine management operations used at the sites, and the Eastern Threat Center's role in studying the impact of forest management and climate on carbon and water budgets and allocations. The trip was funded by a research grant to bring climate change awareness to Southern University students and better prepare them to enter environmental science-related fields.

Climate Change Tool Aids Forest Planning and Management across the Nation

 **TACCIMO** The *Template for Assessing Climate Change Impacts and Management Options* (TACCIMO) continues to expand and provide land managers, planners, and other decision makers with the best climate change science available. TACCIMO's scientific literature database now contains information from more than 1,000 peer-reviewed sources describing climate change effects on natural resources and land management options that can help forests adapt to changing conditions. TACCIMO currently supports Land and Resource Management Plan revision processes for El Yunque, Francis Marion, Nantahala-Pisgah, and Southern Sierra National Forests, as well as the California Landscape Conservation Cooperative's Vulnerability Assessment for the Sierra Nevada region.

The TACCIMO development team recently

partnered with the North Carolina Forest Service to publish a brochure highlighting potential forest threats and forestry practices that promote resilient forests.

ForWarn Helps Natural Resource Managers Track Coast-to-Coast Forest Change

ForWarn

The Eastern and Western Threat Centers unveiled **ForWarn** in 2012 to help natural resource managers

monitor forest change due to seasonal rhythms, growth and mortality, year-to-year climate variation, and the effects of disturbance from insects, diseases, wildfires, extreme weather, or other natural or human-caused events. **ForWarn's** Forest Change Assessment Viewer provides weekly forest change maps as well as tools to help managers identify disturbance causes, such as the Pest Proximity database which lists most likely insect "suspects" for a disturbance at any point on the map based on previous insect disturbance events. Researchers are also using **ForWarn** for several applications, including monitoring national evergreen health, southern Appalachian hemlock mortality, and long term fire effects and recovery.

Eastern Threat Center Research Extends to Global Community

International collaborations involving Eastern Threat Center scientists and staff are helping to sustain natural resources around the globe. Recent efforts include:

- Ecologist **Bill Hargrove** is helping Istanbul Technical University scientists to produce maps of Turkey's National Ecoclimatic Regions (areas characterized by similar climatic influences on ecosystems) and to design a set of sampling locations for a national ecological monitoring network in Turkey.
- The International Union of Forest Research Organizations (IUFRO) Landscape Ecology Working Group selected research ecologist **Kurt Riitters** as Deputy Working Group Coordinator for North America.
- Eastern Threat Center research hydrologist **Ge Sun** is a co-chair of the 2013 Water for Mega-Cities: Challenges and Solutions conference to be held in Beijing, China, in September.

Strategies Help Control Invasive Plants Under Changing Climate

Human activities, including development, that spread non-native invasive plants reduce forest habitat and threaten native plant species. Population increase and changing climate add to the complexity of the problem.

Natural resource managers restoring native plant communities must address these interacting threats.

In a recently published book chapter, Eastern Threat Center research ecologists **Qinfeng Guo** and **Steve Norman** discuss strategies for promoting stable and resilient ecosystems able to withstand unusual environmental changes. "For restoration efforts under growing and, in some cases unseen threats, coordinated actions that minimize human disturbances and simultaneously maximize habitat conservation are essential for success," says Guo.

Learn more about the research: **Guo, Q.F. and S.P. Norman**. 2012. *Improving restoration to control plant invasions under climate change*. Pages 201-214 in S. Jose, H. Singh, D. Batish, and R. Kohli, eds. *Invasive Plant Ecology*. CRC Press, Boca Raton.

Forest ThreatNet

Forest Science Shared With Minority Landowners

The Southern Research Station (SRS) recently co-sponsored *Minority Landowner Magazine's* Seventh Anniversary Conference in Greensboro, NC. More than 250 participants attended workshops and gained insight from speakers focused on this year's theme, "Keeping Your Farm Productive, Profitable, and Yours."

Station and Eastern Threat Center attendees shared informational materials and discussed forest science products and services to help keep forestland healthy. *Minority Landowner Magazine* publisher Victor Harris lauded the Station's support, "SRS has been a tremendous partner, showing support to help minority landowners improve their operations."



Minority Landowner Magazine Publisher Victor Harris (l) and SRS Project Leader Jeff Prestemon at the SRS exhibit during the magazine's Seventh Anniversary Conference.

Center Highlights (cont'd)



Climate Change Resource Center Features Eastern Threat Center Research

Among its vast collection of educational resources and tools for land managers and decision makers, the Climate Change Resource Center (CCRC) website features original content summarizing natural resource issues affected by a changing climate. Eastern Threat Center ecologists **Frank Koch** and **Qin Guo** partnered with other Forest Service researchers to co-author new peer-reviewed papers for the CCRC, "Forest Tree Diseases and Climate Change" and "Climate Change and Invasive Plants in Forests and Rangelands," respectively.

Annual Reports Focus on Forest Trends

The Forest Service Forest Health Monitoring Program, Eastern Threat Center, and North Carolina State University (NCSU) Department of Forestry and Environmental Resources' long-term collaboration produces the highly anticipated *Forest Health Monitoring: National Status, Trends and Analysis* reports, describing the health of the nation's forests. Produced annually since 2001, the reports (formerly known as National Technical Reports) provide forest managers, scientists, and decision makers with current and relevant information about issues impacting important forest resources.

Led by NCSU researcher **Kevin Potter** and co-editor **Barbara Conkling**, the annual reports include analysis of data from a variety of sources, providing a national and multi-state regional overview of forest health trends. Scientists from the Forest Service, other agencies, and universities contribute chapter-specific information, addressing a variety of forest health topics such as tree mortality, drought, geographic hotspots of insect and disease occurrences, wildland fire, forest fragmentation, and invasive plants. The annual reports also include a summary of targeted investigations funded by the Forest Service Forest Health Monitoring national program.

Please visit the Eastern Threat Center and Forest Health Monitoring websites to view the reports.



Center Scientist Supports Southern Research Station Tribal Relations

Serra Hoagland, Eastern Threat Center biological scientist and doctoral student at Northern Arizona University, serves as a point of contact for the Southern Research Station's (SRS)

Tribal Relations initiatives. She and SRS forester Wayne Zipperer are working to increase reciprocal communication, expand science delivery, and share technical and scientific information and tools to enhance natural resource management. Hoagland, who is Laguna Pueblo, recently represented the Station at the United Southern and Eastern Tribes conference. She serves on numerous local, regional, and national American Indian organizations, including the Intertribal Timber council, the American Indian Science and Engineering Society, and the Native Peoples Wildlife Management Working Group.

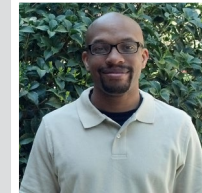
The Eastern Threat Center Welcomes Enthusiastic Research Support



Neil Williams joined the Eastern Threat Center as a forestry technician.



Lori Barrow is the new South Atlantic Landscape Conservation Cooperative information transfer specialist and Forest Service liaison.



Keith Lee is a University of North Carolina at Chapel Hill computer science doctoral student supporting TACCIMO web-based tools.

North Carolina State University (NCSU) Cooperators:



Catalina Segura is a postdoctoral fellow studying the impacts of global change on hydrologic and ecosystem processes at the continental and regional scales.

Center Highlights (cont'd)



Eric Ward is a postdoctoral researcher whose research focuses on water and carbon cycles of forested ecosystems.



Jamison Douglas is a graduate research assistant reviewing and summarizing scientific literature for TACCIMO and the El Yunque National Forest.



Andrew Radecki is a master's student focusing on the movement of water through plants and soil of a coastal forested wetland.



David Zietlow is a master's student focusing on energy and water cycles of different ecosystems in the lower North Carolina coastal plain.



Jennifer Constanza is a landscape ecologist investigating land management and future climate change effects on landscape and vegetation dynamics in the southeast.

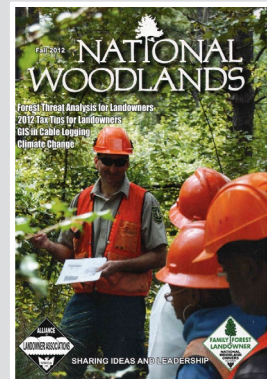
In the News

New Book Featuring Center Research Aims to "Link People and Nature"

Urban-rural interfaces, the area where human developments and natural areas meet, can be difficult to define and challenging to manage. Scientists, natural resource managers, planners, and decision makers can gain insight into the unique characteristics of these places in a new book, "Urban-Rural Interfaces: Linking People and Nature." A chapter co-authored by Eastern Threat Center hydrologist **Ge Sun** examines how population growth and urban development affect water quality and quantity.

Eastern Threat Center Featured in National Woodlands Magazine

The Fall 2012 issue of *National Woodlands* magazine features the Eastern Threat Center in a cover story about Center tools and technology that can help forest landowners evaluate and respond to forest threats, including wildland fire, insects and disease, invasive plants, and climate change. *National Woodlands* is published by the National Woodland Owners Association to promote the wise use of America's forest resources.



Carbon In, Carbon Out: How Tree Harvests Affect Carbon Balance in a Planted Forest

Compared to natural forests, harvests on planted forests equate to frequent ecosystem disturbances. To determine how harvests affect the long-term carbon balance of a planted forest, Eastern Threat Center researchers and cooperating scientists from North Carolina State University (NCSU) developed a 25-year carbon budget (which describes the amounts of carbon entering and leaving an ecosystem) for a typical planted forest—a commercial loblolly pine plantation in North Carolina. Results were recently published in the journal *Global Change Biology*.

Fire Lines Newsletter Features TACCIMO Ahead of International Conference

The September/October 2012 issue of the Southern Fire Exchange's *Fire Lines* newsletter includes the Template for Assessing Climate Change Impacts and Management Options (TACCIMO) as a featured online tool. The TACCIMO feature previews a workshop scheduled during the 4th International Fire Behavior and Fuels Conference in Raleigh, NC. Eastern Threat Center biological scientist **Emrys Treasure** and North Carolina State University research assistant **Lisa Jennings** lead the interactive workshop on February 18 to familiarize participants with the TACCIMO tool through guided case studies focusing on the effects of climate change on fire and fuel management in the southern United States.



New Publications and Products

For a complete list of Eastern Threat Center publications and products, please visit www.forestthreats.org or www.treeseearch.fs.fed.us.

Caldwell, P.V., G. Sun, S.G. McNulty, E.C. Cohen, and J.A. Moore Myers. 2012. Impacts of impervious cover, water withdrawals, and climate change on river flows in the conterminous US. *Hydrology and Earth System Sciences* 16:2839-2857.

Guo, Q. 2012. Incorporating latitudinal and central-marginal trends in assessing genetic variation across species ranges. *Molecular Ecology* 21:5396-5403.

Wickham, J.D., T.G. Wade, and **K. Riitters.** 2012. Comparison of cropland and forest surface temperatures across the conterminous United States. *Agricultural and Forest Meteorology* 166-167:137-143.

New and updated fact sheets summarizing Eastern Threat Center research topics and tools are available at www.forestthreats.org/products/fact-sheets.

Forest ThreatNet

Contact Us:

**USDA Forest Service
Eastern Forest
Environmental
Threat Assessment
Center**

**Danny C. Lee, PhD
Director**

Asheville, NC
Southern Research Station
200 W.T. Weaver Boulevard
Asheville, NC 28804
(828) 257-4298

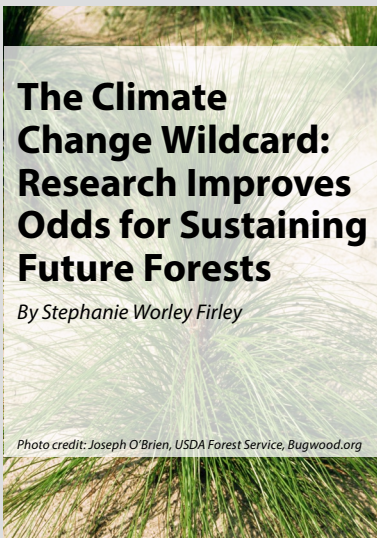
Research Triangle, NC
Forestry Sciences Laboratory
3041 E. Cornwallis Road
Research Triangle Park, NC 27709
(919) 549-4000

Raleigh, NC
North Carolina State
University Centennial Campus
920 Main Campus Drive,
Venture Center II, Ste. 300
Raleigh, NC 27606
(919) 515-9489

**Western Wildland
Environmental Threat
Assessment Center**
**Nancy E. Grulke, PhD
Director**

3160 NE Third St.
Prineville, OR 97757
(541) 416-6693

USDA is an equal
opportunity provider
and employer.



The Climate Change Wildcard: Research Improves Odds for Sustaining Future Forests

By Stephanie Worley Firley

Photo credit: Joseph O'Brien, USDA Forest Service, Bugwood.org

As climate conditions change, tree species will have to “adapt, move, or die,” says **Kevin Potter**, a North Carolina State University scientist working with the Eastern Threat Center. Trees can and do move their ranges over time in response to changing environments,

but the process is relatively slow. A new climate may already be forcing shifts in some forest tree species, including their distribution across the landscape. Research by Potter and Eastern Threat Center ecologist **Bill Hargrove** aims to help forest managers remove some of the guesswork to ensure that trees planted for restoration, reforestation, or production are more likely to survive and thrive through environmental change.

Potter and Hargrove are developing methods to help forest managers decide where best to plant seeds based on the origin of the seed source as well as where to collect seeds that are to be planted in specific locations. To inform these decisions, the researchers have mapped 30,000 global “ecoregions,” areas with similar environmental characteristics, including temperature, precipitation, growing season, and soils.

By comparing maps of current ecoregions with future ecoregions determined by multiple climate projections for the years 2050 and 2100, Potter and Hargrove are able to visualize where on the landscape environmental conditions could be more similar or different as the climate changes. Using longleaf pine, flowering dogwood, and American chestnut as test cases, they have identified seed source origins and future suitable habitats for these native species important to the eastern United States.

“It takes an immense amount of time and effort to perform field experiments in order to determine where trees from a particular location can thrive in current conditions, let alone under climate change,” Potter says. “Previously, researchers have done that work only for a small number of economically important species, so there’s very little information to help guide planting decisions for other species. Instead, we use the environmental conditions at a given species location to predict other places where that species could survive, both now and in the future.”

“Seeds and seedlings may not be well adapted to their existing locations anymore as the climate changes,” Hargrove explains. “This is an approach that can help managers decide where else those local seeds should be planted, as well as where to go to get seeds that are more likely to grow into healthy trees at this location, in order to sustain forest resources for future generations of Americans.”

Learn more about this research: **Potter, K.M. and W.W. Hargrove. 2012. Determining suitable locations for seed transfer under climate change: a global quantitative method. *New Forests* 43:581-599.**



Retired Eastern Threat Center researcher Ken Stolte shares memories with Southern Research Station administrative assistant Jean Beck.

Center Scientist Bids Farewell....

Eastern Threat Center research ecologist **Ken Stolte** recently said farewell after more than 30 years with the Forest Service. Stolte, who retired from the Forestry Sciences Lab in Research Triangle Park, NC, was involved in several research efforts. He led citizen scientists who assisted with exotic plant surveys, developed forest monitoring systems for unique forest systems, and monitored forest health and sustainability. He also located and monitored exotic invasive plant species and developed risk maps and models. Stolte is looking forward to traveling and spending time with family. We'll miss you!