

THE FOREST THREATNET



*Can forest thinning help ease water shortages in the United States? See p. 3.
Photo by USDA Forest Service.*



May/June 2015



*Danny C. Lee, PhD
Eastern Threat Center Director*

QUESTIONS FROM ALL OVER ARE KEY TO DISCOVERY

Message from the Director

One characteristic shared by all scientists is that they enjoy answering questions. More often than not, the questions they answer come from themselves or other scientists. The best questions are those that haven't been answered before—or at least the answer is unknown to the scientist.

The really special occasions, however, are when the questions come from those outside the scientific community. This often occurs in informal, personal interactions with friends and family, but it can also occur in special events designed to create or foster interactions between scientist and others. I like to believe that these events benefit both scientists and the practitioners, students, or interested publics that attend. An added benefit is that such occasions allow the scientists to look at their work from a different angle, and even to discover things that they hadn't considered prior to being asked.

In the highlights that follow, we recap several recent events involving Eastern Threat Center staff members that fit the category of scientists talking with non-scientists; we also celebrate the anniversary of a new experiment in communicating science to landowners and managers.

From all of us, thanks for asking.

- Danny C. Lee

Southeast Regional Climate Hub Turns One

The Eastern Threat Center-hosted [Southeast Regional Climate Hub \(SERCH\)](#) is celebrating its first year and reflecting on its successes. In February 2014, the U.S. Department of Agriculture established SERCH and [other regional climate hubs and sub hubs](#) to deliver science-based information, tools, and technology to farmers, ranchers, and forest land managers. Since that time, SERCH has grown a network of

producers, educators, and researchers to develop and share the tools and strategies needed to address climate-related challenges such as drought, heat stress, excessive moisture, longer growing seasons, and changes in pest pressures. To learn about SERCH's recent achievements and to sign up for SERCH news and alerts, [read more in CompassLive...](#)



*During a SERCH field tour, Calvin Perry (left) and Gary Hawkins from the University of Georgia demonstrate a soil moisture instrument that is part of a precision irrigation system.
Photo by Steve McNulty.*

INSIDE THIS ISSUE

Eastern Threat Center Highlights. SERCH's first year. Earth Day at NCSU. Science in Action Day. Forest thinning and water supplies. Fire Learning Network. LGBT Pride Month. Publications, products, and events.

Western Threat Center Highlights. FP_DECK expands.

EASTERN THREAT CENTER HIGHLIGHTS

Traditional Knowledge, Science, and People Connect at "To Bridge a Gap" Meeting

"Successful partnerships often depend on trusting relationships," says **Serra Hoagland**, Eastern Threat Center biological scientist and a tribal liaison with the Southern Research Station. She was among the attendees of the recent "To Bridge a Gap" meeting, the 14th such gathering intended to strengthen relationships between the Forest Service and federally recognized tribal governments. Held in Wyandotte, Oklahoma, the meeting provided opportunities to



Charles Coleman from Thlopthlocco Tribal Town (far left) speaks during a panel discussion at the "To Bridge a Gap" meeting. Photo by Serra Hoagland.

exchange scientific research and traditional ecological knowledge and to discuss strategies for managing cultural and natural resources in the National Forests. Hoagland hosted and moderated two presentation sessions focused on natural resource issues, and Center extension and technology transfer specialist **Sarah Workman** shared information and tools with meeting participants. All 39 federally recognized Oklahoma tribes attended the meeting, as well as many tribes from other states and representatives from government agencies, academic institutions, and private industry. [Read more in CompassLive...](#)

Scientists and Managers Collaborate to Understand Fire's Role in Ecosystem Resilience

The Fire Learning Network (FLN) brings managers and scientists together to address common problems and solutions related to wildland fire. Eastern Threat Center research ecologist **Steve Norman** and biological scientist **Emrys Treasure** recently contributed to a [workshop](#) of the Southern Blue Ridge FLN, which highlighted efforts to restore and build resilient landscapes in the region. Norman [discussed](#) the [ForWarn](#) tool's use of moderate-resolution remote sensing data to provide monitoring insights into coarse changes in forest composition and structure associated with wildfire, prescribed fire, and restoration more generally. Treasure demonstrated the



During a field tour, workshop attendees found trillium thriving in a recently burned area. Photo by Steve Norman.

[Template for Assessing Climate Change Impacts and Management Options \(TACCIMO\)](#) as a source of science that could help FLN members respond to climate change.

Center Scientists and Staff Reach Out on Earth Day

People across the globe marked the 45th Earth Day on April 22 with celebrations and activities to raise awareness of environmental issues. One such activity was North Carolina State University (NCSU)'s Earth Fair, where the Eastern Threat Center's **Erika Mack**, **Dennis Hallema**, **Emrys Treasure**, **Sarah Wiener**, and **Jennifer Moore Myers** staffed a table and engaged with the NCSU community. They shared printed materials along with online resources and live demonstrations of



Moore Myers speaks with Earth Fair attendees. Photo by Emrys Treasure.

Center tools, including the [Template for Assessing Climate Change Impacts and Management Options \(TACCIMO\)](#) and the [Water Supply Stress Index \(WaSSI\)](#). More than 100 students, NCSU staff, and members of the general public stopped by the table to learn about the Center's current research projects as well as efforts of the [Southeast Regional Climate Hub](#), and several students connected with opportunities for service learning projects and internships. The Earth Fair event was part of NCSU's [Earth Month](#) programming.

WESTERN THREAT CENTER HIGHLIGHTS

Threat Centers and PALS Expand Forest Plan Database

Newly added data and tools are growing the searchable archive of land and resource management plans known as FP_DECK (Forest Plan Database Exchange of Current Knowledge), a collaborative project of the Eastern and Western Threat Centers. Western Threat Center staff members are inputting current and older versions of management plans to assist national forest planning teams with revision processes. Planning teams can also use FP_DECK to align management plan goals to National Environmental Policy Act requirements via the PALS (Planning, Appeals, and Litigation System) tool, and can link to useful planning information from Forest Service tools including the Template for Assessing Climate Change Impacts and Management Options, the Wildland Threat Mapper, and the MC2 model of current and future vegetation and carbon content. Based on interest from planning teams, Western Threat Center staff are also populating FP_DECK with national grassland management plans, the Northwest Forest Plan, and state forest plans throughout 2015. Next year, staff will add management plans from the U.S. Department of Interior's Bureau of Land Management. For more information, contact technical information specialist Lisa Balduman at lbalduman@fs.fed.us or visit www.fs.fed.us/wwetac.

EASTERN THREAT CENTER HIGHLIGHTS

Can Forest Thinning Help Ease Water Shortages in the United States?

Planning for the future of the nation's water resources is more important now than ever before as severe drought grips the West, affecting heavily populated areas and critical agricultural regions. Forests generally yield huge quantities of water—much more than crops or grasslands—but also use a lot of water during the growing season, so some land managers wonder if forest thinning could boost water supplies to people and ecosystems in a changing climate. Researchers from the Eastern Threat Center and Coweeta Hydrologic Laboratory tested this idea and found that the results were not so cut and dried. Their findings were [recently published](#) in a special issue* of the journal *Hydrological Processes*.



Researchers found that thinning could boost water yield, but the results are not proportional. Photo by U.S. Forest Service.

The researchers examined how water yield could change with various levels of forest thinning based on reductions in Leaf Area Index (LAI)—the ratio of leaves per unit of ground area, which provides a measure of forest productivity and water use. They considered the effects of LAI reduction in the context of climate and used the [Water Supply Stress Index](#) (WaSSI) model to simulate water yields based on combined changes in LAI, temperature, and precipitation as well as four

future climate scenarios across 2,100 U.S. watersheds.

Model results indicate that thinning could increase water yield, but LAI reduction and water gains are not proportional. Even with substantial thinning, water yield increases were relatively minimal. “As a whole across the United States, water yield could increase by 3%, 8%, and 13% if LAI is reduced by 20%, 50%, and 80%, respectively,” says **Ge Sun**, Eastern Threat Center research hydrologist and the study's lead author.

Changes in temperature and precipitation also have profound effects on water yield due to their influence on evapotranspiration—the combination of evaporation and water uptake through roots. “Temperature increases of 2 degrees Celsius (3.6 degrees Fahrenheit) could increase forest water use and decrease water yield by 11%. If precipitation is reduced by 10% or 20%, forest water yields could decrease by 20% or 39%, respectively,” says Sun.

In already wet or moderately wet areas of the country, forest thinning could lead to greater increases in water yield compared to drier areas. But since these increases in water yield are directly related to precipitation trends, excessive forest thinning could lead to flooding. In dry areas where water is needed most, managers may thin forests to reduce wildfire risk, which could make soil water more available to remaining trees and improve overall forest health. Any increases in water yield could be an added bonus in some cases. Still, researchers are challenged to project water yield as future climate change could lead to significant shifts in forest dynamics. The historically water-rich South, for example, is becoming drier—a trend that is expected to continue over the next several decades.

Uncertainty is an inherent part of planning, especially in the face of climate change, but managers should remain vigilant to sustain forests and their critical services. “Mitigating and adapting to climate change impacts on forest water supplies will require innovative management approaches, which could include thinning. But forest managers must preserve forest values and balance the tradeoffs among water quantity, quality, carbon sequestration, management costs, and other benefits and concerns,” says Sun. “Now and in the future, active conservation and management efforts are critical to protect our forests, which are the main sources of clean water for many metropolitan areas and aquatic ecosystems.”

*This special issue includes research presented at the 3rd International Conference on Forests and Water in a Changing Environment.

Middle School Students Experiment with Remote Sensing on Science in Action Day

Asheville area scientists recently joined Owen Middle School in celebrating its second annual Science in Action Day. Eastern Threat

Center ecologist and ORISE fellow **Bjorn Brooks** was among the scientists who guided students through

science activities reflecting their area of expertise. Brooks introduced two classes to his work--remote sensing of the environment--and demonstrated how sensors can be used to gather data from leaves and indicate tree health. “It's amazing how much kids relish technology, and these students jumped at the chance to manipulate my DIY light sensor. All we have to do is show them how just about anything can be accurately measured and identified using homemade computer scraps, and they'll do the rest,” says Brooks. About 35 scientists and 600 students participated in the event as part of the [NC Science Festival](#).

Brooks introduces middle school students to remote sensing. Photo by Carl Firley, Owen Middle School.



Center News, Publications, Products, and Events

- The recently published **2013 Forest Health Monitoring report**, edited by Eastern Threat Center cooperating scientists **Kevin Potter** and **Barb Conkling**, features chapters authored by Center scientists and cooperators that summarize a variety of forest health issues and trends. The draft 2014 report is also [available online](#).
- A planning team from the Francis Marion National Forest has used the [Template for Assessing Climate Change Impacts and Management Options \(TACCIMO\)](#) to address climate change concerns and strategies during the revision of the forest's management plan. An article featured on the [U.S. Climate Resilience Toolkit website](#) tells the story. TACCIMO v3.0 is now available for beta testing.
- Visit the [First Friday All Climate Change Talks \(FFACCTs\) webpage](#) for archived resources and upcoming FFACCTs topics.
- “Color Our World with Pride” is the 2015 theme of Lesbian, Gay, Bisexual, and Transgender (LGBT) Pride Month celebrated across the nation in June (right). A Presidential Proclamation states, “We celebrate the proud legacy LGBT individuals have woven into the fabric of our Nation, we honor those who have fought to perfect our Union, and we continue our work to build a society where every child grows up knowing that their country supports them, is proud of them, and has a place for them exactly as they are.” Learn more: www.loc.gov/lgbt.
- The U.S. Forest Service is celebrating 100 years of forest science! Its research branch was established June 1, 1905.
- [New Publications and Products](#) (search [Treesearch](#) for all pubs and abstracts):



Franklin Kameny was a tireless activist for LGBT civil rights until his death in 2011. Photo by Jacquelyn Martin, Associated Press.

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Coyle, D.R., K.D. Klepzig, **F.H. Koch**, L.A. Morris, J.T. Nowak, S.W. Oak, W.J. Otrosina, W.D. Smith, and K.J.K. Gandhi. 2015. A review of southern pine decline in North America. *Forest Ecology and Management* 349:134-148.

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The interdisciplinary Eastern Threat Center develops new technology and tools to anticipate and respond to emerging forest threats. The Eastern and Western Threat Centers are a joint effort of the USDA Forest Service Research and Development, National Forest System, and State and Private Forestry. The Eastern Threat Center is headquartered with the Southern Research Station in Asheville and has offices in Raleigh and Research Triangle Park, NC.

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