Forest ThreatNet

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

The Eastern Forest Environmental Threat Assessment Center Volume 2 Issue 2 Fall 2009

From the Director

Many of the team members from the Eastern and Western Threat Assessment Centers met for the first time at a joint retreat in 2007.

Mention "official review" during November in much of the country and folks are likely to think you're talking football. And although I might admit to watching more than my share of gridiron action lately, the official review that is most on my mind is unrelated to athletic events. Rather, my thoughts turn to the recently submitted management review of the Eastern Forest Environmental Threat Assessment Center (EFETAC) and our sister center, the Western Wildland Environmental Threat Assessment Center (WWETAC). The review was conducted in July on behalf of the three deputy chiefs representing Forest Service Research and Development, State and Private Forestry, and the National Forest System; all three branches have vested interests in the Centers and provide financial support. Participants in the review included national and regional Forest Service staff and a representative from the National Association of State Foresters. Jerry Beatty, WWETAC Director, and I are currently drafting a response to the review that will outline our plans for addressing concerns and recommendations raised by the review team. *(The report of the management review team and our response will be posted on our website soon.)*

The review provided an excellent opportunity to showcase the work of the Centers, assess our progress, and suggest improvements for the future. It also was a chance for Center scientists and staff to engage agency leaders directly and discuss how our efforts address pressing concerns. Although we did not have time to cover everything, a full day packed with technical presentations left little doubt that EFETAC is engaged in cutting edge research and development that ultimately will be invaluable in predicting, detecting, and assessing forest threats. I see the hard work of our employees and cooperators every day, so I shouldn't be surprised, but even I found the breadth and quality of the efforts described impressive. Check out the on-line presentations from the review and I think you'll agree (http://www.forestthreats.org/publications/briefing-book/efetac-review-presentations).

Particularly noteworthy is the fact that much progress has been made at EFETAC in a relatively short time span. When I first arrived in Asheville in July 2005, EFETAC existed in name only. Not only was I the inaugural Director, I was the only employee for several months. My first priority beyond securing office furniture and a computer was to recruit and hire a core staff to carry out the mission of this new Center.

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In this Issue

Forest ThreatNet
is a Quarterly Newsletter

The Eastern Forest Environmental Threat Assessment Center (EFETAC) 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 Forest Service's Research and Development, National Forest System, and State and Private Forestry and housed within the Southern Research Station.

Editor

Perdita B. Spriggs
Eastern Forest Environmental Threat Assessment Center

Contributing Writers/ Photographers

Stephanie Worley Firley
Eastern Forest Environmental Threat Assessment Center

Karin Lichtenstein
University of North Carolina Asheville's National Environmental Modeling and Analysis Center

Bridget O'Hara
University of North Carolina Asheville's National Environmental Modeling and Analysis Center

Contributing Editor
Rod Kindlund
Southern Research Station

Director's Message (cont'd)

Our first scientists and communications director came on board in late 2006, which also roughly coincided with the reorganization of the Southern Research Station. During the reorganization, the existing Southern Global Change Program and National Forest Health Monitoring Research Unit merged with EFETAC and were placed under a single banner with a common mission. Since then, these two units have proven to be integral components of EFETAC, which has allowed a level of accomplishment and success unimagined when I first arrived.

Looking forward, I expect even greater progress to be made. The management review helped to identify areas where EFETAC can be more successful, especially in the area of technology transfer and education. The mission of the threat assessment centers has always been to not only develop information and tools, but also to deliver those products to land managers and stakeholders. Much of the technology and information that we have developed in recent years is just maturing to the stage where it is ready to hand over to others. Technology transfer is not trivial, however, so we will need a concerted and creative educational effort to ensure success. To that end, we have begun working with partners with advanced educational skills and experience and are considering adding staff to expand our own skill set and better manage this critical part of our program. Putting technology and knowledge to work is a top priority for the entire staff at EFETAC.

"Putting technology and knowledge to work is a top priority for the entire staff at EFETAC."

One insight that emerged from the review is that much of our previous work has been relatively unnoticed in the field. Undoubtedly, much of this is because of the newness of the Center and because many of our efforts are still in the research and development phase. We also often work in partnership with others, which can sometimes obscure the contribution of any particular cooperator. The review team noted that continued success of the Centers depends in part on being recognized for our contributions. Their point is valid, and we are working with our Board of Directors and staff to find ways of more clearly distinguishing the contributions we make to pressing national and regional issues.

All of which brings me to my final point. The review may be over, but we still value your comments and suggestions regarding our efforts. Changes and improvements are coming, which affords a great opportunity for you to influence the future direction of EFETAC. Please contact me or any of our staff regarding changes you would like to see incorporated in our work.

Kudos to EFETAC team members selected for Southern Research Station Director's Awards—Ginny Burgess, management analyst, received the Excellence in Budget and Financial Accountability Award and research hydrologist Ge Sun received the Global Stewardship Award. Congratulations!!

Until next time,

Danny C. Lee

Forest Service Web-Based Tool Helps Manage Environmental Risk

EFETAC recently launched the **Comparative Risk Assessment Framework and Tools (CRAFT)**, a user-friendly, Web-based support system that helps natural resource managers address uncertainties inherent in land management decisions. CRAFT offers a structured, simplified approach to determine objectives and calculates risks and tradeoffs associated with different management scenarios. EFETAC soon will offer training workshops on CRAFT, which is available on-line at http://CRAFT.forestthreats.org.

According to **Danny C. Lee**, EFETAC Director, "Uncertainty is unavoidable in all types of management decisions, whether we're talking about climatic, ecological, or social factors. CRAFT allows planning teams to explore the implications of that uncertainty on the consequences of their decisions using a versatile and customizable framework that is amenable to a wide range of land management issues and venues."

CRAFT builds on the National Environmental Policy Act (NEPA) framework for managing public lands and approaches forest issues comprehensively. The tool incorporates decision making techniques that allow teams of managers and diverse stakeholders to outline their management objectives, design alternatives, consider effects of these alternatives, and synthesize this information to arrive at the best possible decision. Each step of the CRAFT process can be published in a Web-based format to ensure documentation and transparency.

"CRAFT emphasizes *comparative* risk assessment," explains **Steve Norman**, EFETAC research ecologist and CRAFT developer. "Users are empowered to focus on their measurable values, be more inclusive of tradeoffs, and understand associated uncertainties. With CRAFT, a more thorough consideration of stakeholder viewpoints, better vetted problem solutions, a broader understanding of consequences, and ultimately, more successful resource management are all possible."

EFETAC partnered with the University of North Carolina Asheville's National Environmental Modeling and Analysis Center (NEMAC) to develop CRAFT. The tool features a wealth of online resources created by NEMAC, including a tutorial and CRAFTiPedia—a "wiki" style reference database and glossary. For team projects, CRAFT has the capability to store and share diagrams, text, tables, data, and models created during the decision making process. NEMAC is available to provide assistance and team training.

For more information contact Danny C. Lee at (828) 257-4854, email dclee@fs.fed.us or Steve Norman at (828) 259-0535, email stevenorman@fs.fed.us. For assistance and training, contact Karin Lichtenstein at (828) 250-3892, email klichten@unca.edu.

Asheville Hosts First CRAFT Workshop

EFETAC and NEMAC coordinated a May CRAFT external workshop in Asheville. The workshop included individuals from the Forest Service's Southern Research Station (SRS), National Forests in North Carolina, and Southern Region; City of Asheville; Oak Ridge National Laboratory; Southern Group of State Foresters; NOAA's National Climatic Data Center; University of North Carolina Asheville; and the Nature Conservancy. The workshop introduced CRAFT in the context of addressing climate change in the Southern Appalachians.

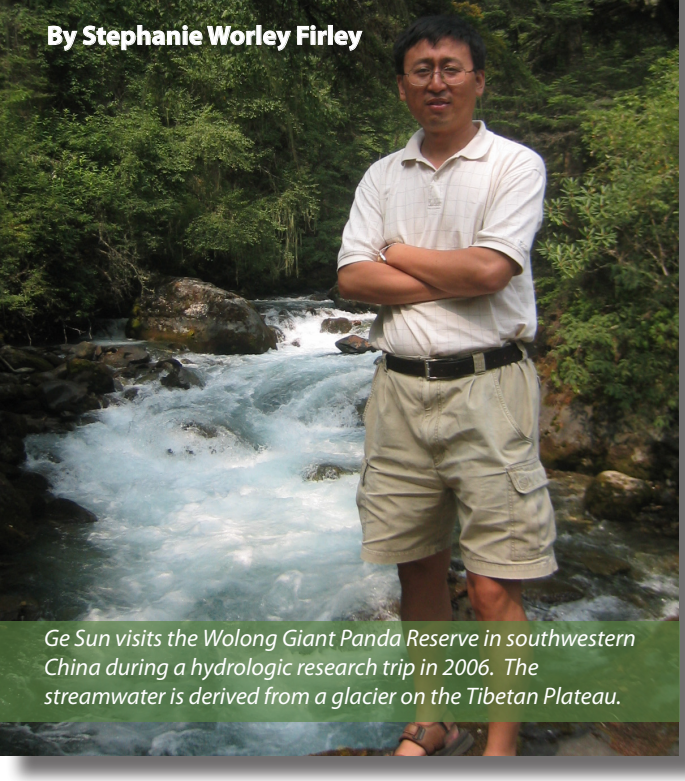
(From left)—Kier Klepzig (SRS), Ge Sun (EFETAC), Jim Fox (UNCA), Steve McNulty (EFETAC), Bill Hargrove (EFETAC), and Matt Hutchins (UNCA) use a computer model to simulate the effects of climate change and land cover on annual water yield in a western North Carolina watershed.

Fred Allen (Southern Group of State Foresters) and Stephanie Worley Firley (EFETAC) construct an objectives hierarchy for the preservation of forest health in a changing climate.

From China to Carolina…and Back

EFETAC hydrologist's research goes global

By Stephanie Worley Firley



Ge Sun visits the Wolong Giant Panda Reserve in southwestern China during a hydrologic research trip in 2006. The streamwater is derived from a glacier on the Tibetan Plateau.

Timing is everything….and so it was for EFETAC's Southern Global Change Program (SGCP) research hydrologist **Ge Sun** when he was admitted to Beijing Forestry University in 1981 at age 16.

"China had just started its 'open door' policy and resumed its higher education system after 10 years of Cultural Revolution (1966-1976). In the late 1970s and early 1980s, only five percent of kids had the fortune to get to college through a very rigorous national exam system," explains Sun, who was born in a small rural village about 100 miles east of Beijing City.

"I did not have many choices back then, but I developed an interest in forest hydrology during my senior year and decided to pursue a master's degree," says Sun. "My graduate studies took place in a remote mountainous area in southern China where I read some of the interesting literature produced by the Coweeta Hydrologic Lab of the Southern Research Station."

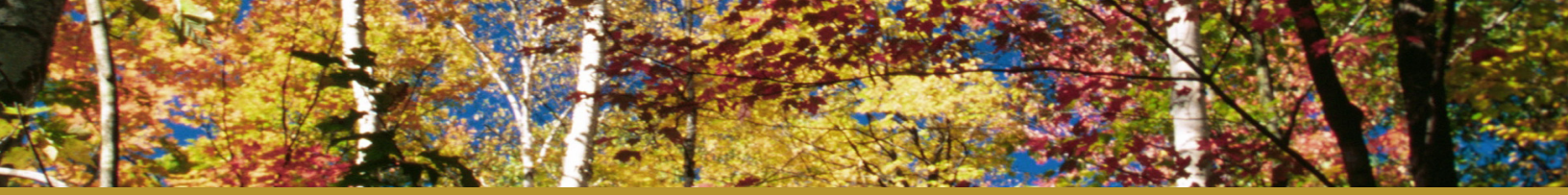
In 1995, Sun received his PhD in forest hydrology from the University of Florida. Shortly thereafter, he presented a paper at a conference in Athens, GA, where SGCP team leader Steve McNulty was in attendance. "As fate would have it, I gave a presentation just before Ge. When I heard his presentation, I was so impressed with his work that I recruited him to join the SGCP," recalls McNulty. Says Sun, "It has been a dream come true to work for the U.S. Forest Service."

As a research hydrologist, Sun leads numerous projects centered on the interactions between climate change and forest water resources. "For example, my team is developing a simulation system to estimate water balances across 2,100 basins in the lower 48 United States. This system can be used to project human water supply stress by considering future climate change, population growth, and landcover change along with water demand for a variety of purposes," says Sun. "We are also synthesizing carbon flux data around the world so we can link water balance to ecosystem productivity and biodiversity. Eventually, we will be able to evaluate the tradeoffs among all ecosystem services under multiple climate change and management conditions."

Sun's work with SGCP is internationally significant. He has collaborated with Chinese scientists for over a decade through more than 30 organized exchange opportunities, including the U.S.-China Carbon Consortium (USCCC). Established in 2004, USCCC members contribute global comparisons and promote understanding of the combined effects of climate change and land management on carbon sequestration and water resources. "This collaboration is very important because China is increasingly becoming a major economic power and carbon dioxide emitter. Yet we know very little about the ability of China's ecosystems to sequester carbon dioxide. This collaboration has produced many publications and has greatly increased our understanding of China's carbon sequestration potential," says Sun. "Solving global issues like climate change requires global participation, and China must be part of these efforts. Many of the lessons learned in the southern United States or China, such as deforestation-water relations, are of mutual benefit for both countries."

As for his future research plans, Sun says, "Climate change will be the largest environmental issue of our, our children's, and our grandchildren's lifetime. Since climate change is hydrologic change, I'll continue to study how climate change affects water yield and quality and develop models for managing the forests we all depend on for our water supplies."

The timing couldn't be better.



Citizen Scientists Trek the Appalachian Trail

Volunteers help survey abundant invasive exotic plants

By Bridget O'Hara, NEMAC

Increasing numbers of invasive, exotic plants pose serious threats to forest communities and rare, threatened, and endangered species. Individuals passionate about protecting forest health now have an opportunity to learn monitoring and management techniques to help scientists understand how to address these threats. EFETAC's National Forest Health Monitoring (FHM) research ecologist **Ken Stolte** is working with Equinox Environmental Consultation and Design, Inc. (http://www.equinoxenvironmental.com/) on a project that uses citizen scientists to investigate and protect forest health along the Appalachian Trail and adjacent National Forests.

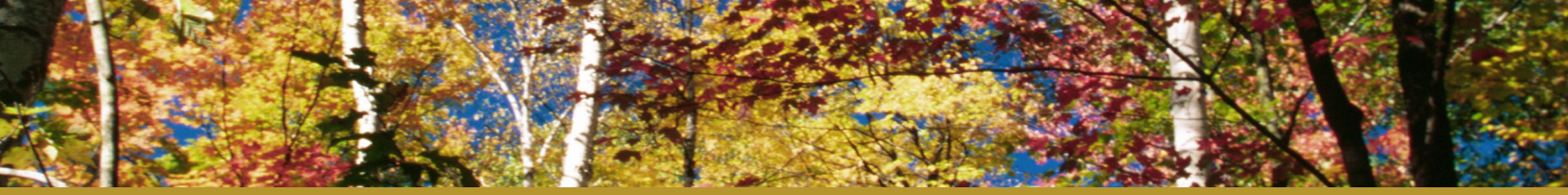
Top: Lindsay Majer, Equinox environmental planner, directs teams for invasive plant removal in Hot Springs, NC. Bottom: A citizen scientist removes invasive plants along a roadside.

The Southern Appalachian Man and Biosphere Foundation and Equinox Environmental, led by Equinox's environmental planners Andy Brown and Lindsay Majer, and plant ecologist Sarah Marcinko, originally began working with citizen scientists to collect invasive plant data in early 2002 – collaborating with the Forest Service, Appalachian Trail Park Office (ATPO), Appalachian Trail Conservancy (ATC), Western North Carolina Alliance, and other partners. Since then, Equinox has trained nearly 150 volunteers to collect extensive invasive plant data on rights-of-way in National Forests and along the Appalachian Trail in North Carolina, Tennessee, and Virginia. Similar data gathering efforts have also been conducted along the Trail in northern states. "Volunteer data collectors throughout both regions were doing an outstanding job gathering the information," says Raleigh-based Stolte, "but using different sampling methods makes scientific data comparisons more challenging."

Stolte's involvement focuses on invasive plants' potential to move beyond rights-of-way into forest interiors. He also recognized an opportunity to standardize citizen scientist data collection efforts for multiple projects. Working with Equinox staffers, ATPO, ATC, and several other collaborators, Stolte began evaluating roles that citizen scientists could play in establishing modified Forest Inventory and Analysis (FIA) (http://www.fia.fs.fed.us/) monitoring plots on the Appalachian Trail as an early warning system of climate change and other stressors.

"FIA plots extensively evaluate many forest health indicators, including trees, soils, understory vegetation, ozone biomonitors, and lichens," Stolte explains. "The FIA system provides excellent information on forest health, and I felt it would be mutually beneficial for our volunteers to learn the basic monitoring techniques." Standardized FIA protocols allow scientists to compare data gathered over the entire Appalachian Trail and neighboring forests. "Citizen scientists are valuable assets that allow data collection over more extensive areas than would otherwise be possible. They benefit by becoming more knowledgeable about their resources and current FIA monitoring techniques that provide information about them," says Stolte.

Information about invasive species habitat preferences resulting from the EFETAC/Equinox/citizen scientist collaboration ultimately assists eradication efforts, some of which are led by Equinox. Brown, also Equinox's president, points out that citizen scientist volunteers are part of the solution. "Volunteers were collecting a lot of data but felt unsure about how the information was being used to address the problem," he says. "Now, our citizen scientists can participate in eradication projects. They feel good about their involvement, and the Forest Service receives additional help to manage the problem. More importantly, these volunteers become ambassadors spreading the word about invasive species, the damage they cause, and our collaborative efforts to address the issue and preserve our natural resources."



Center Highlights...

Forest Health Indicators Workshop Aids Land Management in Mexico

FHM research team leader **Bill Bechtold** was among 20 scientists and forest inventory specialists from Mexico and the United States who attended a workshop on forest health indicators in Guadalajara, Mexico, in late April. Workshop participants shared information and experiences related to the use of forest health indicators in the United States and spent two days in forests near Guadalajara demonstrating data collection, processing, and analysis methods. A pilot test of forest health indicators was implemented in Mexico in summer 2009.

FHM team leader Bill Bechtold (2nd from left) was among the U.S. and Mexican forest health specialists rating tree crowns in the forests near Guadalajara, Mexico. Photo by Borys Tkacz.

McNulty Shares Research in Cambodia and Thailand

Steve McNulty, SGCP ecologist and team leader, traveled to Cambodia in June with U.S. Forest Service International Programs ecologist Beth Lebow in an effort to share climate change and hydrology research and explore opportunities for collaboration. The trip began with a briefing to the U.S. Ambassador to Cambodia, followed by a discussion with senior staff members at the U.S. Agency for International Development office and a lecture at Pannasastra University in Cambodia's capital, Phnom Penh. McNulty also lectured at the Delta Research and Global Observation Network Summit, centered on hydrologic studies, in the Mekong Delta in Siem Reap. He then traveled to Bangkok, Thailand, to attend the Regional Payment for Ecosystem Services Meeting along with international delegates from southeastern Asia. At the meeting, which focused on the establishment of a payment system for ecosystem services, McNulty represented the Forest Service's interest in the program.

SGCP team leader Steve McNulty and Forest Service International Programs ecologist Beth Lebow tour Cambodia's Tonle Sap Lake.

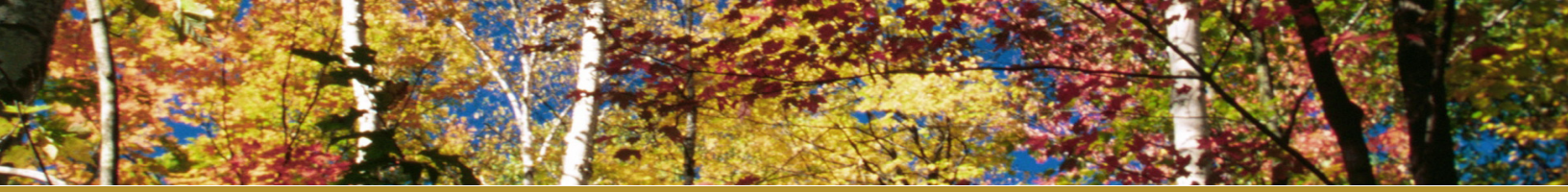
SGCP Hosts 2nd International Conference on Forests and Water in a Changing Environment

To address the growing need for science-based guidance for forest managers and policy makers, SGCP hosted the 2nd International Conference on Forests and Water in a Changing Environment in Raleigh, NC, September 14-16. Keynote speakers from around the world with expertise in the fields of ecohydrology, restoration ecology, forest ecology, watershed management, and global change sciences convened to discuss a variety of topics. Additionally, two field trips to key hydrologic research sites in the mountains and coastal plain of North Carolina engaged conference participants. The conference was sponsored by a variety of stakeholders in academia, government, and business, with over 120 scientists and students attending from more than 12 countries.

Research on Coast Redwood Fire Regimes Supports Management Decisions

EFETAC ecologist **Steve Norman** is researching the historical importance of fire and the long-term effects of continued fire exclusion across California's northern redwood range in several ongoing collaborative projects. "Coast redwood forests are among the most spectacular forests on earth, yet unlike most forests of North America, the importance of fire for their perpetuation remains highly controversial," says Norman. "We are learning that despite the cool moist climate, past fires were often very frequent, largely due to human ignitions. The key question remaining involves understanding the relevance of their complex histories, given the tradeoffs of present day management." Much more information about Norman's coast redwood research is available at http://www.redwood.forestthreats.org.

Top: The hollow and charred remnants of ancient redwoods are common across the species range. Bottom: Redwood basal sprouting following the 2003 Canoe Fire in Humboldt Redwoods State Park. Photos by Steve Norman.



In the News....

Interns Enhance Center Research and Partnerships

SGCP welcomed five summer interns to the staff. Funding support came from the Hispanic Association of Colleges and Universities, Southern Research Station Multicultural Workforce Strategic Initiative, and a National Science Foundation Geographic Information Systems grant through the Department of Environmental, Earth, and Geospatial Sciences at North Carolina Central University.

EFETAC Welcomes New Member

Stephanie L. Worley Firley joined EFETAC as a biological science information specialist in May 2009. She is actively involved with the Center's communication, outreach, and technology transfer efforts in addition to working closely with EFETAC scientists, partners, and customers. She holds a B.S. in environmental studies (policy and management) from the University of North Carolina at Asheville.

Magazine Articles Highlight EFETAC Hydrology Research

SGCP cutting-edge hydrology research appears in two recent magazine articles. The May/June 2009 issue of *Forest Landowner* features **Ge Sun**, SGCP research hydrologist, in "Forests and Future Water Stress in the Southeast." The article by **Stephanie Worley Firley** addresses the impacts of climate change, population growth, and land use change on water supplies based on SGCP projections. **Steve McNulty** discusses the impacts of climate change and variability on water resources in "Rivers of Change" by Cathryn McCue, a *Blue Ridge Country* Web exclusive. Read the articles at http://www.forestthreats.org.

SGCP scientist featured on *Forest Eco* podcast

Steve McNulty lends his voice to the August 2009 edition of *Forest Eco* in a brief overview of climate change impacts on southern forests. *Forest Eco* is a two-minute podcast and radio module distributed monthly by the Service Southern Research Station. Listen to the podcast at http://www.srs.fs.usda.gov/foresteco/archives.html.

Distribution of forest threats now viewable in Google Earth

EFETAC's Forest Threat Summary Viewer offers maps that indicate the presence of specific forest threats by state. Now, these maps can also be downloaded for viewing in Google Earth. With this feature, the distribution of multiple forest threats can be viewed simultaneously and compared with landscape features. Check out the Forest Threat Summary Viewer at http://www.threatsummary.forestthreats.org.

Treesearch

New Publications and Products

For a complete list of new publications, please visit www.forestthreats.org or www.treesearch.fs.fed.us.

Threat Assessment
Fitzpatrick, M.C. and **W.W. Hargrove**. 2009. The projection of species distribution models and the problem of non-analog climate. Biodiversity and Conservation 18:2255-2261.

Guo, Q. 2009. Interactive effects of diversity and biomass on productivity: insights from succession. Pages 58-73 in Wu, J. and J. Yang (eds.), Lectures in Modern Ecology (IV): Theory and Applications. Higher Education Press and Springer, Beijing.

Southern Global Change Program
Blate, G.M., L.A. Joyce, J.S. Littell, **S.G. McNulty**, C.I. Millar, S.C. Moser, R.P. Neilson, K. O'Halloran, and D.L. Peterson. 2009. Adapting to climate change in United States national forests. Unasylva 60(231/232):57-62.

Forest Health Monitoring
Schulz, Bethany K; **Bechtold, William A**.; Zarnoch, Stanley J. 2009. Sampling and Estimation Procedures for the Vegetation Diversity and Structure Indicator. Gen. Tech. Rep. PNW-GTR-781. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 53 p.

New EFETAC Brochure, Fact Sheets
A newly published EFETAC brochure provides an overview of Center teams and research activities. Additionally, fact sheets describing SGCP research related to water supply stress, carbon flux, carbon sequestration, and nitrogen deposition are now available. Download from the EFETAC website or contact us to request printed copies.

Center Staff

Threat Assessment Team

Southern Research Station 200 WT Weaver Blvd., Asheville, NC 28804

Danny C. Lee
EFETAC Director
828-257-4854
dclee@fs.fed.us

Qinfeng Guo
Ecologist
828-257-4246
qguo@fs.fed.us

Bill Hargrove
Ecologist
865-241-2748
whargrove@fs.fed.us

Steve Norman
Ecologist
828-259-0535
stevenorman@fs.fed.us

Stephen Creed
GIS Specialist
828-259-0544
stephencreed@fs.fed.us

Perdita B. Spriggs
Communications Director
828-259-0542
pspriggs@fs.fed.us

Ginny Burgess
Management Analyst
828-257-4354
glburgess@fs.fed.us

Stephanie Worley Firley
Biolgical Science Information Specialist
828-257-4380
sworleyfirley@fs.fed.us

Lloyd Edwards
Physical Science Technician
828-257-4370
laedwards@fs.fed.us

National Forest Health Monitoring Research Team

3041 E. Cornwallis Rd., Research Triangle Park, NC 27709

Bill Bechtold
Research Forester, Team Leader
828-257-4357
wabechtold@fs.fed.us

Kurt Riitters
Landscape Ecologist
919-549-4015
kriitters@fs.fed.us

William Smith
Biometrician
919-549-4067
bdsmith@fs.fed.us

Kenneth Stolte
Research Ecologist
919-549-4022
kstolte@fs.fed.us

Valerie Cooper
Financial Assistant
919-549-4014
vcooper@fs.fed.us

Partners at North Carolina State University (NCSU)
(Department of Forestry and Environmental Resources)

Fred Cubbage
Professor
919-515-7789
fred_cubbage@ncsu.edu

Barbara Conkling
Research Assistant Professor
919-549-4084
bconkling@fs.fed.us

Kevin Potter
Research Assistant Professor
919-549-4071
kpotter@ncsu.edu

Frank Koch
Research Assistant Professor
919-549-4006
fkoch@fs.fed.us

Mark Ambrose
Research Assistant
919-549-4078
mambrose@fs.fed.us

Southern Global Change Program

920 Main Campus Drive, Venture Center II, Suite 300, Raleigh, NC 27606

Steve McNulty
Ecologist, Team Leader
919-515-9489
smcnulty@fs.fed.us

Ge Sun
Research Hydrologist
919-515-9498
gesun@fs.fed.us

Johnny Boggs
Biological Scientist
919-513-2973
jboggs@fs.fed.us

Michael Gavazzi
Biological Scientist
919-515-2916
mgavazzi@fs.fed.us

Jennifer Moore Myers
Resource Information Specialist
919-515-9497
jmooremyers@fs.fed.us

Robert Herring
Applications Programmer
919-513-0588
rherring@fs.fed.us

Erika Cohen
Resource Information Specialist
919-513-3189
eccohen@fs.fed.us

William Foster
Financial Assistant
919-513-2974
wfoster@fs.fed.us

Emrys Treasure
Forestry Technician
919-515-9490
emrys.treasure@gmail.com

Partners at NCSU

Asko Noormets
Research Assistant Professor
919-515-7040
anoorme@ncsu.edu

Jean-Christophe Domec
Research Associate (Post-Doc)
919-513-3331
jdomec@ncsu.edu

Photo by Steven Katovich, USDA Forest Service, Bugwood.org