

Project Leader's Report

Center for Forest Disturbance Science

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Outreach

◆ Helen Mohr presented a talk on fire ecology to the first grade of Clemson Elementary School. She showed pictures of fire in the mountains and demonstrated fire fighting equipment to an enthusiastic audience. Her message to the group was that fire was an important tool but that it should only be used by professionals with training and experience.



Helen Mohr demonstrating use of safety equipment

◆ Eleven groups from Mercer University Biology Department visited the Brender/Hitchiti Forest this month, a total of 189 students. Thirty people came by the office for information and 235 signed the register to walk the Hitchiti Interpretive Trail.

Innovation

◆ From *Forestry Advance Alerts* comes the following information from a new publication by Dale Brockway and co-authors that included Ken Outcalt (2009). **Vegetation response to midstorey mulching and prescribed burning for wildfire hazard reduction and longleaf pine (*Pinus palustris* Mill.) ecosystem restoration.** “Dense midstorey vegetation, developed during fire exclusion, not only reduces understorey plant diversity and increases the risk of damaging wildfire but also impedes efforts to safely restore prescribed burning in longleaf pine (*Pinus palustris* Mill.) ecosystems. Our study examined the effects of midstorey reduction on stand structure and plant diversity in a forest treated by mulching alone and also when followed by prescribed fire during the winter, spring or summer. For trees ≥ 5 cm diameter at breast height (d.b.h.), mulching reduced stand density (1220 – 258 trees ha⁻¹) and basal area (24 – 17.7 m² ha⁻¹) and increased mean d.b.h. (12.8 – 29.2 cm), with the largest reductions in loblolly pine (*Pinus taeda* L.), sweetgum (*Liquidambar styraciflua* L.) and oaks (*Quercus* spp L.). Removing hardwoods and smaller pines resulted in a decline in tree species richness (8.9 – 4.4). Despite a modest increase in evenness (0.72 – 0.79), tree species diversity ($H' = 1.32 - 0.84$) dynamics were largely driven by changes in richness. While the cover of tree seedlings initially declined from 32.4 to 16.9 per cent, rapid regrowth of hardwoods led to recovery by end of the second growing season. This, along with gains by shrubs, vines, grasses and forbs, resulted in a near doubling of understorey plant cover. Although tree seedling increases were not related to fire season, peak responses occurred for shrubs and vines after winter fire and spring fire, grasses following winter fire and forbs after summer fire.

An increase in species richness (18.7 – 24.5) and decline in species evenness (0.86 – 0.70) produced only a small increase in understorey species diversity ($H' = 2.31 - 2.45$). The greater number of understorey species following treatment were less equitably distributed as a result of differential rates of plant growth. While mulching led to a short-term increase in woody and herbaceous understorey plants, prescribed fire is needed to curtail redevelopment of the woody midstorey and further increase grasses and forbs.”

◆ A new publication this month on the Fire and Fire Surrogate study appeared in *Ecological Applications* that included Tom Waldrop and Ken Outcalt as co-authors (Schwilk et al. 2009). **The national Fire and Fire Surrogate study: effects of fuel reduction methods on forest vegetation structure and fuels.** *Ecological Applications* 19: 285–304.) From the Abstract, we learned that:

“Changes in vegetation and fuels were evaluated from measurements taken before and after fuel reduction treatments (prescribed fire, mechanical treatments, and the combination of the two) at 12 Fire and Fire Surrogate (FFS) sites located in forests with a surface fire regime across the conterminous United States. To test the relative effectiveness of fuel reduction treatments and their effect on ecological parameters we used an information theoretic approach on a suite of 12 variables representing the overstorey (basal area and live tree, sapling, and snag density), the understorey (seedling density, shrub cover, and native and alien herbaceous species richness), and the most relevant fuel parameters for wildfire damage (height to live crown, total fuel bed mass, forest floor mass, and woody fuel mass). In the short term (one year after treatment), mechanical treatments were more

effective at reducing overstory tree density and basal area and at increasing quadratic mean tree diameter. Prescribed fire treatments were more effective at creating snags, killing seedlings, elevating height to live crown, and reducing surface woody fuels. Overall, the response to fuel reduction treatments of the ecological variables presented in this paper was generally maximized by the combined mechanical plus burning treatment. If the management goal is to quickly produce stands with fewer and larger diameter trees, less surface fuel mass, and greater herbaceous species richness, the combined treatment gave the most desirable results. However, because mechanical plus burning treatments also favored alien species invasion at some sites, monitoring and control need to be part of the prescription when using this treatment.”

◆ Tom Waldrop and Helen Mohr are working with Rod Kindlund of the SRS Science Delivery Group on a revision of the Southern Prescribed Fire Guide. Tom and Scott Goodrick are working with a number of scientists and practitioners across the South to update this popular publication. The new Guide should be available online and in hard copy format by the end of the fiscal year.

◆ Kenneth Outcalt assisted in conducting two workshops in Florida on “Reproduction techniques for sustainable management of longleaf pine.” The first was held April 14 at the Goethe State Forest, Dunnellon, Florida and the second on April 16 at the Blackwater River State Forest Milton, Florida. Workshops consisted of classroom presentations by co-principal investigators (Outcalt and Dale Brockway), cooperators, and graduate students of results from an operational-scale research study at each forest followed by field tours of each site. About 30 participants from state and federal agencies attended each workshop.

◆ Joe O'Brien conducted fieldwork on Eleuthera with the Kirtland's warbler field crew including Joseph Wunderle of International Institute of Tropical Forestry and Dave Ewert of The Nature Conservancy. They visited several field sites in order to plan research on disturbance effects on Kirtland's warbler wintering habitat. The bird breeds in Jack pine forests in the Great Lakes region but winters in the

Bahamas Archipelago. The bird has been observed foraging heavily on three species of early successional plant species. The objective of the research will be to determine what kinds of disturbance promote the establishment of these food plants and what sorts of interventions can augment the feeding habitat of the warbler. Interventions include browsing by goats, right-of-way maintenance, seeding of abandoned slash-and-burn gardens, fire, and establishing and planting fire breaks. Eleutheran forests are fire sensitive tropical dry forests with a long history of agricultural disturbance. Several wildfires have been ignited this spring because of extremely dry conditions coupled with an increase in agricultural burning. We plan to use structural equation models to examine the complex relationships among multiple disturbances on food plant abundance. Joe actually got to see a Kirtland's warbler (eat your heart out, Paul Hamel).



Location of Island of Eleuthera in the Bahamas



Kirtland's Warbler field crew, Dave Ewert, Joe Wunderle, Joe O'Brien in back

◆ John Stanturf participated in the Southern Appalachian Forest Restoration Roundtable Discussion between Region 8 and Southern Research Station Leadership held in Asheville, North Carolina. John gave a presentation by videoconference technology on sustainable restoration and Jim Vose, Project Leader at Coweta, gave a presentation on SRS restoration activity. One outcome of the meeting was the recognition of the top three research syntheses needs, which are the Role of Fire in the Southern Appalachians, Early Successional Habitat in the Southern Appalachians, and Oak Regeneration in the Southern Appalachians.



An example of swidden agriculture; Intercropping of bananas, peppers, tomatoes, pigeon peas and calabash. Fields are abandoned after 2-3 years and allowed to remain fallow for up to 20 years. Abandoned plots could be manipulated to favor KW food plants although invasive plants are becoming an issue.

◆ Tom Waldrop led a field tour of the Southern Appalachian site of the National Fire and Fire Surrogate Study for a national panel of biologists with The Nature Conservancy. The group was spending a week in the area to review their Conservation Plan for the Southern Blue Ridge Escarpment. Tom discussed the unique nature of the FFS Study and his ongoing work to synthesize results from multiple disciplines and study sites. Members of the Nature Conservancy were impressed with the multidisciplinary aspects of the study and stressed the need to maintain a research effort on fire ecology in the Southern Appalachian Mountains.

Connections

◆ UGA Ecology graduate student, James H. Blackmon IV (Jimmy), successfully defended his master's thesis in April. Jimmy's thesis was titled, "The use of fire in the control of invasive epigeic earthworm species in the Southeastern United States," and CFDS scientists Mac Callaham and Joe O'Brien were involved in the planning and execution of one of the experiments that went into Jimmy's thesis. In this experiment, we simulated a prescribed fire for the purpose of monitoring direct and indirect effects of fire on survival of a European invasive earthworm. Callaham also served as a member of Jimmy's thesis advisory committee.



Jimmy Blackmon monitoring the progress of our simulated prescribed fire

◆ John Stanturf provided information on Forest Service research activity in Korea to Maria Pool and Darcy Nelson. Pool is International Trade Specialist and Hong Kong, Korea, Macau, & Mongolia Desk Officer for USDA, Foreign Agricultural Service; Nelson is China Program Specialist for Forest Service International Programs. Pool is preparing briefing material in preparation for a meeting between US Ambassador to Korea, Kathleen Stephens, and Secretary of Agriculture Vilsack early next month. Ambassador Stephens is interested in discussing how the US Embassy and USDA can work together to expand the US-South Korea agricultural relationship. Stanturf was contacted because he is the technical lead on a Memorandum of Understanding between the Southern Research Station and the Korea Forest Research Institute. Stanturf quickly did an informal survey of collaborative activity by scientists around the country and found that much is occurring, primarily at a scientist-to-scientist level. Several scientists said they were on the program for the IUFRO World Congress to be held in Seoul next year, and hoped they would be able to attend. The summary was furnished to Pool and Nelson.



Diana Laarmann



Dr. Joo Han Sung

Small Change

◆ Joseph Wunderle, Dave Ewert, and Joseph J. O'Brien received \$125,000 in funding from Forest Service International Programs for work on The Kirtland's Warbler Research & Training Project. Based on their extensive research experience and network of cooperators, they will initiate a conservation program for the KW on Eleuthera. The approach includes providing public education about the warbler and experimentally testing hypotheses regarding the most effective means for creating habitats favorable to the KW and its fruit plants. Bahamian interns will be actively involved in the program to maximize the probability that the conservation program will be continued and expanded under Bahamian direction. The project has three major goals: 1. Develop and implement demonstration KW habitat conservation projects in cooperation with owners or managers of private or communal lands on Eleuthera to identify and highlight the most effective approaches for KW conservation. 2. Determine by various experimental management treatments cost-effective, practical methods for producing, enhancing, and maintaining KW winter habitat. 3. Train Bahamians in conservation and habitat management techniques for the KW and other species of concern and contribute to outreach and educational efforts highlighting the conservation of the warbler in the Bahamas

◆ Joe O'Brien, Bob Mitchell (Jones Ecological Research Center), Bret Butler and Dan Jimenez (Rocky Mountain Research Station), and Kevin Hiers (Jones Center) received \$297,000 in funding from Joint Fire Science for a proposal titled *Fuel life-cycle and long term fire behavior responses to fuel treatment in southeastern US pine ecosystems*. This work will examine the long term effectiveness and impacts of fuel treatment activities in Coastal Plain longleaf pine ecosystems utilizing long-term data from an existing long-term study to fundamentally connect vegetation patterns to fuels, fuels to fire, and fire to fire effects. The Nature Conservancy from 1994-1999 led a large-scale, long-term study at Eglin Air Force Base to compare the effectiveness of midstory reduction treatments, including herbicide, growing season fire, and mechanical clearing, on restoration of longleaf pine forests. Plot level information still exist for all experimental sites, which have been burned as part of the prescribed fire program at Eglin AFB since the study concluded. They will 1) evaluate the long-term (15 yr) effectiveness of midstory reduction techniques (fire, herbicide, mechanical) on midstory reinvasion in longleaf pine ecosystems, 2) relate fire behavior to midstory mortality using *in situ* fire behavior measurements in longleaf pine sandhills, and 3) document the long-term differences in fire behavior within these treatments as a measure of long-term effectiveness. The results of this study will allow the tuning of restoration procedures to maximize effectiveness of initial treatments and their longevity. In addition, the effects of treatments on fire behavior will be quantified with an unprecedented level of detail. These measurements will be useful not only for evaluating long term treatment effectiveness, but will provide a critical link among fuels treatments, fire behavior and desired fire effects in the southeast.

◆ Steven F. Oberbauer, Elizabeth Losos, and Joseph J. O'Brien received \$819,000 in funding for 3 years from the National Science Foundation for a proposal titled *Causes and implications of dry season control of tropical wet forest tree growth at very high water levels: direct vs. indirect limitations*. The overarching aim of this project is to evaluate causes and implications of strong dry season rainfall correlation with tree growth revealed in our

Partnerships

◆ Visitors in April included Diana Laarmann, PhD candidate at the Estonian University of Life Sciences and Dr. Joo Han Sung, Korea Forest Research Institute who visited Stanturf. Laarmann spent three weeks working with Stanturf on several papers, including revisions to one just accepted by Forest Ecology and Management on ways to determine forest naturalness in periodic inventories. Sung is a Visiting Scientist at the University of Florida and worked with Stanturf in organizing the IUFRO Forest Landscape Restoration conference held in Seoul in 2007. Sung is working with Tim White at UFL on stemflow techniques. When he returns to Korea, he will use these techniques to better understand the effects of pine nematode on the native *Pinus koreansis*. He visited with Joe O'Brien and Dan Miller (RWU-4505).

annual plot-level diameter measurements in tropical rainforest at La Selva, Costa Rica. This dry season limitation of aboveground carbon storage occurs across a range of precipitation that by all standard measures would be considered sufficient for tree growth. Understanding the basis for this finding is crucial because tropical moist forests play important roles in the global carbon and water cycles and are important drivers of regional and global climate. Predictions of warming and drying of tropical moist forests have major implications for global climate. However, recent MODIS studies from the Amazon reporting greatest leaf areas during the dry season suggest that the dry season does not affect production as previously believed and that the role of the dry season should be re-evaluated.

◆ The Joint Fire Science Program has funded a project to synthesize existing knowledge of extreme fire behavior in a way that connects the weather, fuel, and topographic factors that contribute to development of extreme fire behavior. This synthesis will focus on the state of the science, but will also consider how that science is currently presented to the fire management community, including incident commanders, fire behavior analysts, incident meteorologists, National Weather Service office forecasters and firefighters in the field. It will seek to clearly delineate the known, the unknown, and areas of research with the greatest potential impact on firefighter protection. Scott Goodrick is part of the team of researchers that will develop the synthesis.

◆ The unit received new funding this fiscal year for Climate Change research that should be added to our base budget in coming years. The \$95,000 infusion will be used to develop regionally down-scaled climate scenarios for the South. Initially, we will work with scientists in the University of Georgia Department of Geography to use the Regional Climate Model from the National Center for Atmospheric Research to downscale global climate projections from different international models.

Science Highlight

This month we feature summaries of some new publications, provided by Kim Crider.

More evidence that carbon sinks could turn upside-down with increased warming
IUFRO (International Union of Forest Research Organizations) recently published a report "Adaptation of forests and People to Climate Change-A Global Assessment Report". The report is currently receiving attention worldwide for its findings regarding vulnerabilities of four main global forest types (boreal, temperate, tropical, and subtropical) and the predicted intensity of climate change impacts on these forests. In general, boreal forests are expected to experience the most intense effects of warming. Increased incidence of fires, storms and insect damage could lead to a net loss of carbon and further exacerbate climate change. In the tropics, increased drought will lead to potentially large carbon losses from tree death, also resulting in intensification of climate change, as recently reported in Amazonia by Phillips and colleagues (2009). IUFRO's report states that unless current carbon emissions are reduced substantially, the carbon sequestration services that forests provide will be lost completely, resulting in huge losses of carbon into the atmosphere—a large positive feedback adding existing levels of atmospheric CO₂. The study was published officially at the April session of the United Nations Forum on Forests (UNFF) in New York City, during a side event, "Making Forests Fit For Change – IUFRO-Led Activities at the Science-Policy Interface." An article published by Nature can be accessed at: <http://www.nature.com/news/2009/090416/full/news.2009.369.html>

Pollution is good for fighting climate change?
On a positive note, increased air pollution has increased plant production by one quarter since the 1960s according to a recent study published in Nature (Mercado et al. 2009). Aerosols in the atmosphere (primarily sulphur dioxide) enhance rates of photosynthesis by diffusing radiation-enabling plants under the canopy to take in more sunlight, increasing their total productivity. The increased productivity led to a net gain of 10% of carbon stored in the soil, after accounting for other factors. If these data are applied at a global scale, plants pulled 23.7% more carbon from the atmosphere during 1960-1999 than they would have in an aerosol-free atmosphere. Ironically, governments are phasing out industrial emissions of sulphate aerosols

which, in light of this new evidence, will lessen the uptake of excess atmospheric CO₂ that is itself largely emitted by industrial and other anthropogenic sources and is the leading driver of climate change.

Role of Fire in Climate Change Underestimated
A new report suggests that fire has more of an influence on global warming than previously believed. A joint study by two University of California, Santa Barbara centers, Kavli Institute for Theoretical Physics and the National Center for Ecological Analysis and Synthesis, funded by the National Science Foundation attribute human cause deforestation by burning as contributing as much as one fifth of gases causing the greenhouse effect. The scientists say that the report clearly shows that fire is a driver of global climate change. The fire cycle feeds more warming of the planet which feeds more fires. The fires release sequestered carbon held in vegetation, more fire means more carbon dioxide in the atmosphere, and the soot is fine carbon further contributing to the greenhouse effect. Fires are a major player in climate change and the report urges the Intergovernmental Panel on Climate Change to include fire in their climate change models. The authors say the IPCC ignoring the role of fire is excluding an integral part of the carbon cycle on the earth. Full text of the article on the report available on the web: <http://www.sciencedaily.com/releases/2009/04/090423142332.htm>

All About Us

◆ Lauren Dame, undergraduate student worker with the Invasive Species and Restoration Team, has accepted a 5 week internship to study the herpetofauna of the island of Trinidad. Lauren will be assisting UGA Ecology graduate students from Prof. Cathy Pringle's lab group as they assess amphibian populations on the island. Although we will miss having Lauren around, we certainly wish her well as she expands her horizons and gains valuable experience in ecological research!

◆ Mac Callaham was named to the faculty of the UGA Graduate School in April. In addition to other privileges, this appointment means that Callaham may now serve as the major advisor of UGA graduate students in the future. Good news for CFDS, bad news for grad students!

◆ As wildfires continue in the Myrtle Beach area of South Carolina, resources for fighting fires in other parts of the state remain limited. On April 27, a wildfire began on the Andrew Pickens Ranger District in the mountains of South Carolina. Ross Phillips, Mitch Smith, and Helen Mohr were called after 5 pm and asked to help. Each responded and reported directly to the fire. Even though the fire was relatively small (approximately 100 acres), it was not contained until after midnight on April 28 because of the rugged terrain and heavy shrub cover. The crew was relieved at 5 am after a full night of digging fire lines.

◆ The unit will be hiring a GS-11 Biological Scientist to be stationed at Clemson, South Carolina. The opening should be posted on USAJobs in May.

What's Up

◆ Jay Jensen was named USDA Deputy Under-Secretary for Natural Resources and Environment (NRE). In this position, Jensen will have responsibility for the US Forest Service. Since May 2005, Jensen has been Executive Director of the Council of Western State Foresters/Western Forestry Leadership Coalition. The Coalition is a federal-state governmental partnership. Jensen had served earlier as the Coalition's Government Affairs Director. He has also served as Senior Forestry Advisor for the Western Governors Association, where he was responsible for the biomass energy program. Before that, as lead forestry advisor for the U.S. House Committee on Agriculture, Jensen helped develop programs under the 2002 Farm Bill. He has also served as lead policy analyst for the National Association of State Foresters. Jensen holds a BS degree from the University of California at Los Angeles and an MS in Forestry from Colorado State University and is a member of the Society of American Foresters.

◆ Virginia Tech has named Paul Winistorfer as new dean of the College of Natural Resources. Winistorfer, who currently heads the college's Department of Wood Science and Forest Products, will assume the duties of dean on August 1, when Mike Kelly steps down. Winistorfer came to the College of Natural Resources in 2001 from the Forest Products Center at the University of Tennessee to head up the wood

science and forest products department. From 1996 to 2001 Winistorfer was professor and director of the Forest Products Center, which he founded, at the University of Tennessee. In addition to his administrative duties, he continued to direct and fund his research program in composites, design, manufacture, and performance. In 1984 he was a senior research coordinator and post-doctoral research associate at the University of Georgia. A native of Marion, Iowa, Winistorfer earned his bachelor's of science at Iowa State University through the university honors program with emphasis in education and forest products, and his PhD in wood science.



Paul Winistorfer

◆ Rod Kindlund, art director for the SRS Science Delivery group was honored in April by the National Association of Government Communicators with a second place finish for his design of the 2007 annual report for the SRS. Congratulations Rod! We are all very proud of the good work you do for us.

◆ Dana Nelson, Project Leader for SRS-4160, Forest Genetics and Ecosystems Productivity, Saucier, Mississippi and Research Triangle Park, North Carolina will be taking on a new science leadership role as one of three co-Principal Investigators (PI)'s with the newly established Forest Health Initiative aimed at restoring the American chestnut. Dana will be working with other co-PI's to develop a program that will integrate biological, environmental and social sciences and regulatory policy towards the efficient development of well-adapted, blight-resistant American chestnut trees. These trees will form the base populations from which the species may reclaim its historic position in the eastern US forests. Kurt Johnsen will be acting Project Leader for the year. The Forest Health Initiative is a collaborative effort to advance the country's understanding and role of biotechnology to address some of today's most pressing forest health challenges. The initiative will initially focus on restoring a test

species and an icon of eastern US forests – the American chestnut – whose numbers were decimated during the past century by chestnut blight. While working to restore the American chestnut as the test tree, the program will explore new approaches to enhance the health and vitality of other trees, forests, and forest ecosystems. The Initiative will use a holistic approach to address emerging forest health threats by assessing not just the science but the societal and regulatory issues concurrently. Please visit the website for an overview of the initiative and to read the press release, www.foresthealthinitiative.org/resources.html

◆ *The East Valley Tribune* (Arizona) has reported on an "unprecedented" agreement between Arizona Forest Restoration Products and two environmental organizations—the Center for Biological Diversity and the Grand Canyon Trust—that aims to balance economic and ecological interests. The agreement will allow Arizona Forest Restoration Products to harvest trees in the Mogollon Rim area of the Coconino National Forest and in more remote wildland areas, as well as preserve large-diameter trees. **According to the paper, the agreement resulted from the parties' realization that, without commercial activity, there will not be enough revenue to restore the area's more than three million acres of forest back to health.** For more information, visit the *East Valley Tribune* website. (This synopsis from the *E-Forester* published by the Society of American Foresters; emphasis added).

◆ The Forest Service will transition to an all-white fleet of non-emergency vehicles in the interest of simplifying processes and saving money for higher mission priorities. The increasing cost of retaining the traditional green vehicle color, combined with an estimated 5-year savings of \$9 million and the decreasing availability of Forest Service green paint, drove the decision to implement this change. Beginning with the FY 2010 fleet vehicle orders, all non-emergency fleet vehicles will be the manufacturer's standard color white. Exceptions to the all-white policy are limited to requirements dictated by law enforcement and national fire standards. Official markings will consist of a 10-inch white, reflective Forest Service shield with brown outline.

- Boerner, R.E.J.; Coates, A.T.; Yaussy, D.A.; **Waldrop, T.A.** 2008. Assessing ecosystem restoration alternatives in eastern deciduous forests: the view from belowground. *Restoration Ecology* 16(3): 425-434. (Citation update, listed in FY 2008)
- Boerner, R.E.J.; Huang, J.; Hart, S.C. 2009. Impacts of fire and fire surrogate treatments on ecosystem nitrogen storage patterns: similarities and differences between forests of eastern and western North America. *Canadian Journal of Forest Research* 38: 3056-3070.
- Boerner, R.E.J.; Huang, J.; Hart, S.C. 2009. Impacts of Fire and Fire Surrogate treatments on forest soil properties: a meta-analytical approach. *Ecological Applications* 19: 338-358.
- *Brockway, Dale G., **Outcalt, Kenneth W.**, Estes, Becky L., Rummer, Robert B. 2009. Vegetation response to mid-storey mulching and prescribed burning for wildfire hazard reduction and longleaf pine (*Pinus palustris* Mill.) ecosystem restoration. *Forestry* doi:10.1093/forestry/cpp010
- Callaham, M.A., Jr.**, L. Heneghan, C.C. Rhoades (Guest Editors). 2008. Special Section: Soil Ecology and Restoration Ecology. *Restoration Ecology* 16:604-712.
- Callaham, M.A., Jr.**, C.C. Rhoades, and L. Heneghan. 2008. A striking profile: Soil ecological knowledge in restoration management and science. *Restoration Ecology* 16:604-607.
- Gardiner, Emile S., **Stanturf, John A.**, Leininger, T.D., Hamel, P.B., Dorris, L.C., Portwood, C.J., and Shepard, J.P. 2008. Establishing a research and demonstration area initiated by managers: the Sharkey Restoration Research and Demonstration Site. *Journal of Forestry* 106:363-369.
- Heneghan, L., S.P. Miller, S. Baer, **M.A. Callaham, Jr.**, J. Montgomery, M. Pavao-Zuckerman, C.C. Rhoades, S. Richardson, 2008. Integrating soil ecological knowledge into restoration management. *Restoration Ecology* 16:608-617.
- Hendrix, P.F., **M.A. Callaham, Jr.**, J.M. Drake, C.-Y. Huang, S.W. James, B.A. Snyder, and W.X. Zhang. 2008. Pandora's box contained bait: The global problem of introduced earthworms. *Annual Reviews in Ecology, Evolution, and Systematics*. 39:593-613.
- Jimenez, E., Hussaini, M.Y. and **Goodrick, S.** 2008. Quantifying parametric uncertainty in the Rothermel model. *International Journal of Wildland Fire* 17(5): 638-649. doi: 10.10071/WF07070
- Kitchen, D.J., J.M. Blair, and **M.A. Callaham, Jr.** 2009. Annual fire and mowing alter biomass, depth distribution, and C and N content of roots in soil in tallgrass prairie. *Plant and Soil*. Online First. DOI 10.1007/s11104-009-9931-2
- Lockhart, B.R.; Gardiner, E.; Leininger, T.; **Stanturf, J.** 2008. A stand-development approach to oak afforestation in the Lower Mississippi Alluvial Valley. *Southern Journal of Applied Forestry* 32: 120-129.
- Matthews, Charlotte E.; Moorman, Christopher E. Greenberg, Cathryn H.; **Waldrop, Thomas A.** 2009. Response of Soricid populations to repeated fire and fuel reduction treatments in the southern Appalachian Mountains. *Forest Ecology*
- Mitra, O.; **Callaham, M.A., Jr.**; Smith, M.L.; Yack, J.E. 2008. Grunting for worms: reactions of *Diplocardia* to seismic vibrations. *Biology Letters* 5:16-19 (updated citation)
- Peterson, C.J.; Leach, A.D. 2008. Salvage logging after windthrow alters microsite diversity, abundance and environment, but not vegetation. *Forestry* 81(3): 361-376. (Citation update, listed in FY 2008)
- Peterson, C.J., and Leach, A.D. 2008. Limited salvage logging effects on forest regeneration after moderate-severity windthrow. *Ecological Applications* 18 (2): 407-420.
- O'Brien, J.J.**; Hiers, J.K., **Callaham, M.A. Jr.**; Mitchell, R.J.; Jack, S. 2008. Interactions among overstorey structure, seedling life history traits and fire in frequently burned neotropical pine forests. *Ambio* 37:542-547.
- Qu, John J.; Hao, Xianjun; **Liu, Yongqiang**; Riebau, Allen R.; Yi, Haoruo; Qin, Xianlin. 2008. Remote sensing applications of wildland fire and air quality in China. In Bytnerowicz, Andrzej; Arbaugh, Michael J.; Riebau Allen R.; Andersen, Christian (Editors), Wild Land Fires and Air Pollution, Vol. 8, *Developments in Environmental Science*, pp. 277-288. The Netherlands: Elsevier.
- *Schwilk, D.W., Keeley, J.E., Knapp, E.E., McIver, J., Bailey, J.D., Fettig, C.J., Fiedler, C.E., Harrod, R.J., Moghaddas, J.J., **Outcalt, K.W.**, Skinner, C.N., Stephens, S.L., **Waldrop, T.W.**, Yaussy, D.A., and Youngblood, A. 2009. The national Fire and Fire Surrogate study: effects of fuel reduction methods on forest vegetation structure and fuels. *Ecological Applications* 19: 285-304.
- Stanturf, John A.**, Gardiner, Emile S., Shepard, J.P., Schweitzer, Callie J., Portwood, C. Jeffrey, Dorris, Lamar C., Jr. 2009. Restoration of bottomland hardwood forests across a treatment intensity gradient. *Forest Ecology and Management* 257: 1803-1814
- Wang W.; Qu, J.J.; Hao, X.; Liu, Y. 2009. Analysis of the moderate resolution imaging spectroradiometer contextual algorithm for small fire detection, *Journal of Applied Remote Sensing* Vol.3. DOI: 10.1117/1.3078426
- Zhang, Chi, Hanqin Tian, Shufen Pan, Mingliang Liu, Graeme Lockaby, Erik B. Schilling, and **John Stanturf**. 2008. Effects of forest regrowth and urbanization on ecosystem carbon storage in a rural-urban gradient in the Southeastern United States. *Ecosystems* 11: 1211-1222. DOI: 10.1007/s10021-006-0126-x
- Zhang, D. and **Stanturf, J.A.** 2008. Forest Plantations. In Sven Erik Jørgensen and Brian D. Fath (Editors-in-Chief), *Ecosystems*. Vol. [2] of Encyclopedia of Ecology, 5 vols. pp. 1673-1680. Oxford: Elsevier.

REPORTS

- Marshall, D.J., Bettinger, P., Wimberly, M.C., **Stanturf, J.** 2008. Synthesis of knowledge of hazardous fuels management in loblolly

pine (*Pinus taeda*) forests. Gen. Tech. Rep. SRS-110. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 43 pp. <http://www.treearch.fs.fed.us/pubs/32484>

Goodrick, S.L. editor, Southern Smoke Issues, v.2, no. 1.

PUBLISHED ABSTRACTS

Achtemeier, G.L. 2009. Modeling superfog: A case study of the I-4 disaster of 9 January 2008. 24th Tall Timbers Fire Ecology Conference, Tallahassee, FL, January 12-15, 2009. (oral)

Achtemeier, G.L. 2009. On the relevance of the ventilation index as a tool for regulating prescribed fire. 24th Tall Timbers Fire Ecology Conference, Tallahassee, FL, January 12-15, 2009. (oral)

Achtemeier, G.L. 2009. Field validation of PB-Piedmont. 24th Tall Timbers Fire Ecology Conference, Tallahassee, FL, January 12-15, 2009. (oral)

Achtemeier, G.L. and **Liu, Y.** 2009. Smoke transport and dispersion from prescribed burns: complications posed by mountainous terrain. 24th Tall Timbers Fire Ecology Conference, Tallahassee, FL, January 12-15, 2009. (poster)

Berrill, J-P and **Dagley, C.M.** 2009. An economical and compact experimental design to evaluate restoration treatments. In Ciccarese, L., Ferreira, R., Simeone, M.C. (Compilers). Innovation and New Horizons in Tree Nursery Stock Production and Forest Restoration - From Research to Business. EC-IUFRO International Conference, Rome, Italy- March 12-14, 2009. P. 43.

Callaham, M.A., Jr., S.C. Rostkowski, Jr., E.S. Gardiner, **J.A. Stanturf**, and B.A. Snyder. 2008. Litter-dwelling arthropods in a bottomland hardwood restoration experiment in the Lower Mississippi Alluvial Valley, USA. Poster presentation at 15th International Colloquium on Soil Zoology and Ecology, August 2008, Curitiba, Brazil.

Callaham, M.A., Jr., **J.J. O'Brien**, P.F. Hendrix, D.L. Camp, and S.R. Bennett. 2008. Carbon and nitrogen dynamics in soils with native North American and introduced European earthworms determined with stable isotopes. Poster presentation at 15th International Colloquium on Soil Zoology and Ecology, August 2008, Curitiba, Brazil.

Callaham, M.A., Jr., K.R. Butt and C.N. Lowe. 2008. Stable isotope evidence for marine-derived avian inputs of nitrogen into detrital foodwebs on the Isle of Rum, Scotland, UK. Poster presentation at 15th International Colloquium on Soil Zoology and Ecology, August 2008, Curitiba, Brazil.

Carlson, J.D. and **Achtemeier, G.L.** 2009. Field validation of PB-Piedmont, a mesoscale smoke dispersion model for application to Oklahoma landscapes. 24th Tall Timbers Fire Ecology Conference, Tallahassee, FL, January 12-15, 2009. (oral)

Crider, K.K. 2008. Direct and indirect effects of a native predator on weed biological control. Poster presentation at Ecological Society of America annual meetings, August, 2008, Milwaukee, WI.

*Dey, D.C., Gardiner, E.S., Kabrick, J.M., **Stanturf, J.A.**, Jacobs, D.F. 2009. Innovations in afforestation of agricultural bottomlands to restore native forests in the United States. In Ciccarese, L., Ferreira, R., Simeone, M.C. (Compilers). Innovation and New Horizons in Tree Nursery Stock Production and Forest Restoration - From Research to Business. EC-IUFRO International Conference, Rome, Italy- March 12-14, 2009. P. 41.

Hanson, P.J.; McFarlane, K.; Trumbore, S.; Guilderson, T.; Torn, M.S.; Matamala, R.; Jastrow, J.D.; **Callaham, M.A.**; Parton, W.J., Jr. 2008. Quantifying organic and mineral soil carbon turnover along climate gradients: The EBIS-AmeriFlux Project. Poster presentation at the Annual AmeriFlux Science Meeting, Boulder, CO, October, 2008.

Hiers, J.K.; Starr, G.; **Callaham, M.A., Jr.**; **J.J. O'Brien, J.J.**; Mitchell, R.J. 2008. The silvics of sequestration in frequently burned longleaf pine forests. Oral presentation delivered at the Longleaf Alliance annual meetings, Destin, FL, October, 2008.

Liu, Y.; **Achtemeier, G.**; **Goodrick, S.L.** 2009. Sensitivity and evaluation of smoke plume rise schemes for regional air quality simulation. 24th Tall Timbers Fire Ecology Conference, Tallahassee, FL, January 12-15, 2009. (poster)

Liu, Y.; **Goodrick, S.L.**; **Achtemeier, G.**; Jackson, W.A. 2009. SHRMC-4S as a fire and air quality management tool for prescribed burning. 24th Tall Timbers Fire Ecology Conference, Tallahassee, FL, January 12-15, 2009. (poster)

Liu, Y.; **Goodrick, S.L.**; **Achtemeier, G.** 2009. A smoke plume pattern of 2007 Georgia/Florida wildfires related to atmospheric cyclonic circulation over Atlantic Ocean. 24th Tall Timbers Fire Ecology Conference, Tallahassee, FL, January 12-15, 2009. (poster)

Lockhart, Brian Roy; Gardiner, Emile S.; Leininger, Theodor D.; **Stanturf, John A.** 2008. A conceptual model for developing mixed-species plantations in the Lower Mississippi Alluvial Valley. In Lockhart, Brian Roy, Gardiner, Emile S., Dey, Daniel C. (eds.). 2008. Tenth Workshop on Seedling Physiology and Growth Problems in Oak Plantings; 2007 October 16-17; Jackson, MS. General Technical Report NRS-P-32. Newtown Square, PA: US Department of Agriculture, Forest Service, Northern Research Station. P. 6.

Madsen, Palle, Olesen, Carsten Riis, **Stanturf, John A.**, Löf, Magnus, Ammer, Christian. 2008. Effects of light and soil moisture on a mixed species natural regeneration of beech (*Fagus sylvatica*), ash (*Fraxinus excelsior*), and sycamore maple (*Acer pseudoplatanus*). In Terazawa, K., Madsen, P., and Sagheb-Talebi, K. (eds). Proceedings: 8th International Beech Symposium, 8-13 September 2008, Nanae, Hokkaido, Japan. Hokkaido Forestry Research Institute, Bibai, Hokkaido, Japan. P. 67-69.

McGee, J.D., N.A. Jansen, J.K. Hiers, **M.A. Callaham, Jr.**, R.J. Mitchell, and M.P. Greene. 2008. Recalcitrant carbon pools in burned and unburned longleaf pine systems. Poster presentation at Ecological Society of America annual meetings, August, 2008, Milwaukee, WI.

Snyder, B.A., **M.A. Callaham, Jr.**, C.N. Lowe, S.C. Rostkowski, Jr., and P.F. Hendrix. 2008. Interactions between the invasive earthworm *Amyntas agrestis* (Megascolecidae) and the North American millipede *Sigmoria ainsliei* (Xystodesmidae). Oral presentation (delivered by Callaham) at 15th International Colloquium on Soil Zoology and Ecology, August 2008, Curitiba, Brazil.

Stanturf, J.A. 2008. Silviculture and ungulates: Implications of restoration and climate change. Expert Workshop on New Ways to Optimize the Joint Management of Ungulates, Forests, and Forest Landscapes, Løvenholm Castle, Denmark; Forest and Landscape-KVL.

Stanturf, J.A. 2009. Contemporary forest restoration: socially acceptable and sustainable solutions. 2009. In Ciccarese, L., Ferreira, R., Simeone, M.C. (Compilers). Innovation and New Horizons in Tree Nursery Stock Production and Forest Restoration - From Research to Business. EC-IUFRO International Conference, Rome, Italy- March 12-14, 2009. P. 38.

Wang, G. Geoff; Zhi-Ping Wang, Aaron D. Stottlemeyer, and **Thomas A. Waldrop**. 2009. A Test of FIA's Down Woody Material Indicator for Regional Fuel Estimation in the Southern Appalachian Mountains. 2009 Annual Meeting, U.S. Forest Service Forest Health Monitoring Program. February 2009, Savannah Georgia. [poster abstract]

Calendar

2009

May 14-15: Conference on Ecology and Management of High-Elevation Forests in the Central and Southern Appalachians; Snowshoe Mountain Resort, Slatyfork, WV http://www.forestry.caf.wvu.edu/wvu_divforestry/

May 19-21: Southern Research Station Leadership Team meeting, Auburn, Alabama.

May 31-Jun 9: 2nd International Summit on Hurricanes and Climate Change, Corfu, Greece; <http://www.aegeanconferences.org/>

***Jun 7-11:** 2009 IUFRO 3.08 Small-Scale Forestry Symposium, "Seeing the Forest beyond the Trees: New possibilities and expectations for products and services from small-scale forestry," Morgantown, WV; <http://ssf09.com/>

Jun 10-11: Carbon in Northern Forests: Integration of Research and Management Traverse City, MI <http://forest.mtu.edu/cinfi/>

***Jun 10-12:** The Conference on the Inland Impacts of Tropical Cyclones, hosted by the Metro Atlanta Chapter of the American Meteorological Society and National Weather Association, Atlanta, Georgia; <http://www.ametsoc.org/chapters/atlanta/iitc.html>

Jun 15-19: National Silviculture Workshop, Integrated Management of Carbon Sequestration and Biomass Utilization Opportunities in a Changing Climate, Boise, Idaho <http://fswb.wof.fs.fed.us/fm/silviculture/index.shtml> (only available to Forest Service users)

Jun 22-26: 7th North American Forest Ecology Workshop, Logan, Utah; <http://www.nafew2009.org/>

Jun 29-Jul 3: 6th International Symposium on Ecosystem Behavior, BIOGEMON 2009, Helsinki, Finland; <http://www.environment.fi/default.asp?contentid=298085&lan=EN>

Jul 12-15: 12th Biennial Conference of the Soil Ecology Society, with the Society of Nematologists, Burlington, Vermont; <http://www.uvm.edu/conferences/sonsesconference/>

Aug 2-7: Ecological Society of America Annual Meeting, Albuquerque, New Mexico <http://www.esa.org/albuquerque>

***Aug 4-5:** International Conference on Woody Biomass Utilization, Mississippi State University, Starkville, Mississippi; <http://www.forestprod.org/confbiomass09.html>

Aug 4-8: First World Congress of Environmental History, Copenhagen, Denmark; <http://www.wceh2009.org>

Aug 16-21: 10th International Congress of Ecology (INTECOL), Brisbane, Australia; <http://www.intecol10.org/>

Aug 23-28: Society for Ecological Restoration International World Congress, Perth, Western Australia <http://www.seri2009.com.au>

Aug 23-29: World Congress of Agroforestry, Nairobi, Kenya; <http://www.worldagroforestry.org/wca2009/>

***Sep 7-11:** International Conference on Long-term Ecosystem Research—Understanding the Present to Shape the Future; Zurich, Switzerland, <http://www.wsl.ch/lwf/anniversary/second-announcement-updated-EN?redir=1&>

Sep 20-25: International Conference on Multipurpose Forest Management: Strategies for Sustainability in a Climate Change Era, Niigata, Japan; <http://www.keiri.fr.a.u-tokyo.ac.jp/multiFM/>

Sep 30-Oct 4: Society American Foresters Annual Meeting, Orlando, Florida

Oct 8-11: First meeting of the Association for Environmental Studies and Sciences, Madison, Wisconsin; <http://aess.info/>

Oct 13-16: 2nd International Conference on Wind Effects on Trees, Meteorological Institute, Albert-Ludwigs University, Freiburg, Germany, <http://www.wind2009.uni-freiburg.de/>

Oct 18-25: World Forestry Congress, Buenos Aires, Argentina; http://www.wfc2009.org/index_1024.html

Nov 1-5: Soil Science Society of America Annual Meeting, Pittsburgh, PA

Nov 9-13: Genomics of Forest and Ecosystem Health in the Fagaceae (Beech Family, Research Triangle Park, North Carolina; http://forestbiotech.org/fagaceae_2009.php)

Nov 30-Dec 4: 4th International Congress of the Association for Fire Ecology, Savannah, GA <http://www.fireecology.net/congress09/home>

2010

***Apr 5-7:** 17th Central Hardwood Forest Conference, Lexington, KY; <http://www.chfc2010.org>

*** May 3 – 7:** SRS joint Leadership Team meeting with Region 8; location TBD

May 25-28: Third EastFIRE Conference, George Mason University, Fairfax, VA

Aug 1-6: Ecological Society of America Annual Meeting, Pittsburgh, Pennsylvania

Aug 23-28: XXIII UFRO World Congress, Seoul, Republic of Korea <http://www.iufro2010.com/>

Aug 1-6: Ecological Society of America Annual Meeting, Pittsburgh, Pennsylvania

Sep 21-27: IUFRO Landscape Ecology WG conference on Forest Landscapes and Global Change New Frontiers in Management, Conservation and Restoration; Bragança, Portugal <http://www.ipb.pt/iufro2010>

Oct 31-Nov 4: Soil Science Society of America Annual Meeting; Long Beach, California

Nov 15-19: VI International Conference on Forest Fire Research; Coimbra, Portugal http://www.fire.uni-freiburg.de/course/meeting/2010/1st_announcement.pdf

Sept. TBD: International Poplar Society Symposium, Orvieto, Italy.

2011 International Year of the Forests

May 9-13: International Fire Congress, South Africa; <http://www.wildfire2011.org/>

Aug 7-12: Ecological Society of America Annual Meeting, Austin, Texas

Oct 14-20: Soil Science Society of America Annual Meeting; San Antonio, Texas

TBD: IUFRO Wind and Trees Conference, Athens, Georgia; Chris Peterson, University of Georgia to organize



Kirtland's Warbler



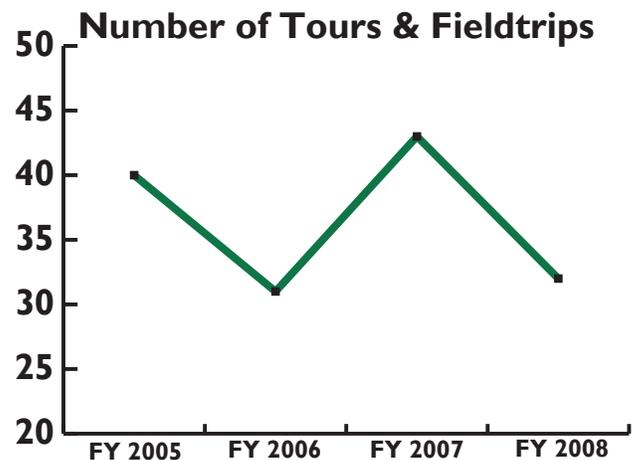
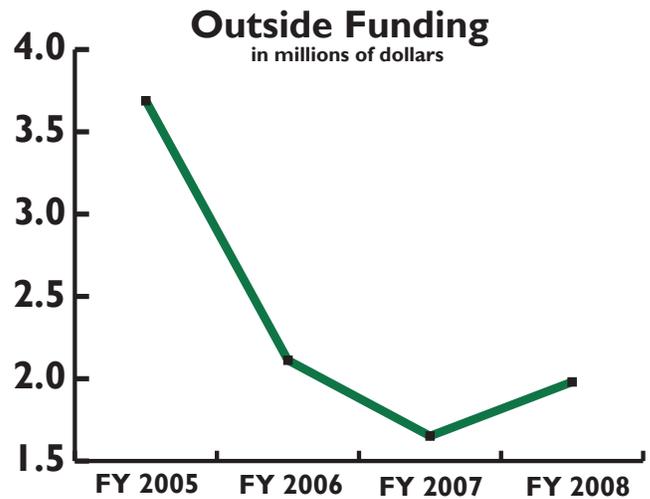
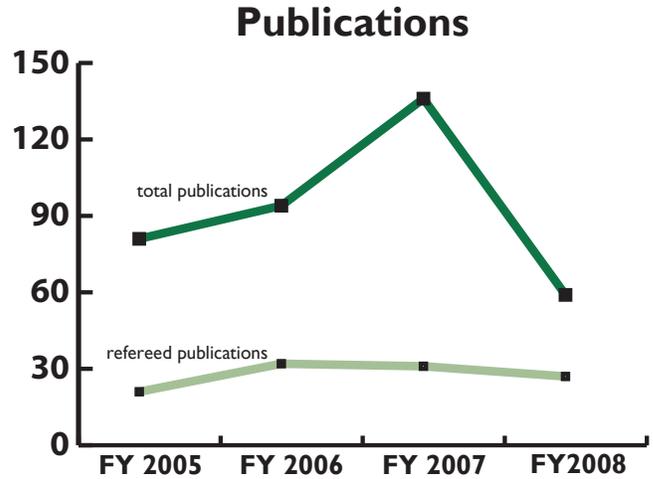
Early successional habitat where KW forages



The Grapevine Camp Wildfire

Scoreboard

Category	Fy2009
Number of Refereed Journal Publications	21
Number of Non-Refereed Publications (include abstracts)	25
Total Number of Publications	46
Number of Tours	34
Number of Short Courses/Training	7
Number of Invited Presentations to Scientific Organizations	5
Number of Invited Presentations to Lay Organizations	22
Number of Volunteer Presentations to Scientific Organizations	19
Number of Technology Transfer Activities (other than above)	58
Number of Tools Developed	0
Outside Funding	\$485,296



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