2004

Forest Science in the South

United States Department of Agriculture

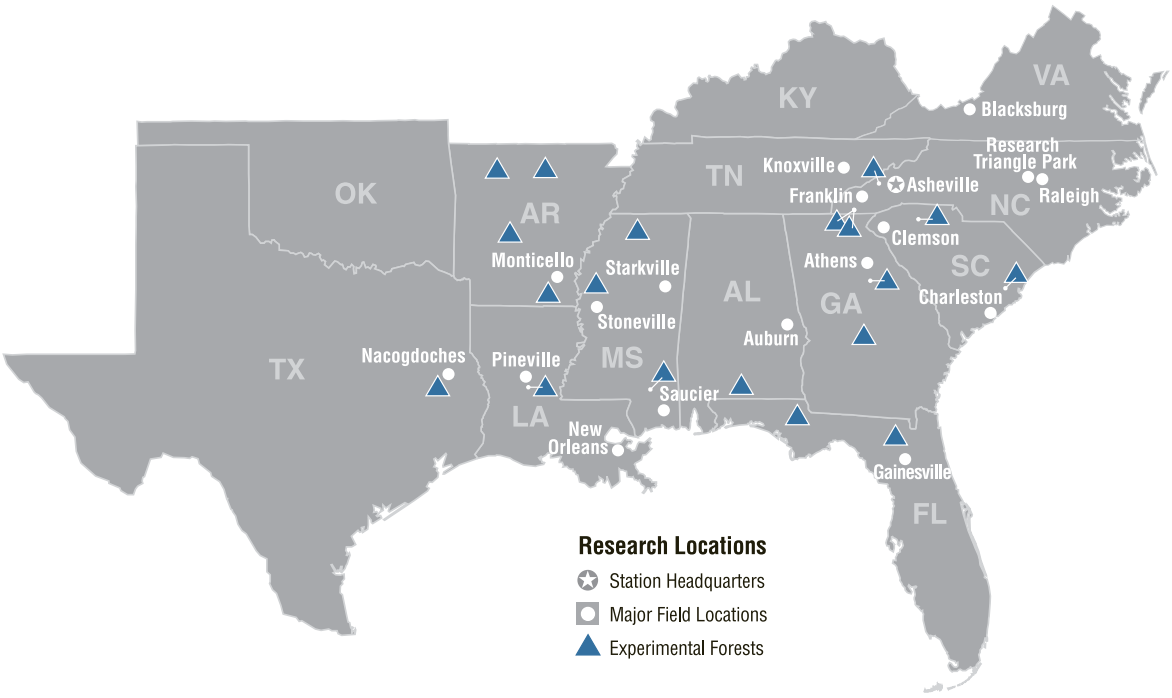
Forest Service

Southern Research Station

Science Update
SRS-007

Southern Research Station

Our mission is to create the science and technology needed to sustain and enhance southern forest ecosystems and the benefits they provide.



Cover: Prescribed fire is a useful tool for preserving the health of longleaf pine stands, one of many unique forest ecosystems in the South.
USDA Forest Service photo

2004

Forest Science in the South

Southern Research Station

USDA Forest Service
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February 2005

Caring for the Land and Serving People

FY04 Accomplishment Summary

October 2003 – September 2004

Research work units	26
Publications	997
Refereed publications	381
Publications (SRS) online	3,818
Publication requests filled	
Hard copy	38,000
Electronic	3,300,000
Patents	4
Site tours	240
Presentations	507
To scientific and professional societies	180
To lay organizations	327
International activities	94
Conservation Education Outreach Program contacts	2,000
Total Employees	423
Scientists	134
Budget (research funds only)	$ 46,288,000
Awards / Grants to States, universities, and other Federal agencies (all funds)	$15,259,224
External funding received from non-Federal Sources and other Federal agencies	$3,901,328
Collaborating organizations	112

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From the Director

It is with great pride that I provide you with this year's edition of *Forest Science in the South.*

This report highlights many accomplishments from this past fiscal year, October 2003 through September 2004 (FY04). In FY04 our budget remained steady, allowing our scientists to continue our successful efforts in meeting our mission.

The USDA Southern Research Station (SRS, the Station) contributes to quality of life in the South by providing the knowledge and technology needed to sustain and enjoy the benefits of the region's forests and waterways. Our scientific workforce collaborates with other scientists in the public and private sectors to produce research results that are useful to forest landowners and managers, commodity associations, conservation groups, educators, legislative bodies, and other agencies.

The Station was a partner in conducting a national forest health conference in Little Rock, AR on the President's Healthy Forest Initiative and the Healthy Forest Restoration Act. We will be active partners in applied research projects aimed to conduct and evaluate land management practices to reduce problems with the red oak borer and southern pine beetle. Patents this year included microsatellite DNA markers and uses thereof and the automated carbon efflux system.

The Station has kept a strong and steady focus on implementing the annualized forest inventory in accordance with the national Forest Inventory and Analysis (FIA) strategic plan. The FIA unit is now positioned to be on a sustained production schedule by the year's end. Originally commissioned for the southern Forest Inventory and Analysis field organization, the recently published *Nonnative Invasive Plants of Southern Forests*, is immensely popular with natural resource managers and concerned citizens.

These are just a few of our highlights from this past year; many more are briefly described in the following section. I encourage you to contact us with any questions you may have about the work that we do.

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PETER J. ROUSSOPOULOS
Director

Successes–

Our Major Accomplishments

2004

Large-Scale Assessment and Modeling

Second Generation Decision Support System for Sustainable Forest Management

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As natural resource management matures from a compartmentalized approach to one involving interactions among complex ecological and social components, powerful decision support system tools are needed to incorporate and strengthen the role of human judgment into the problem-solving process. With these tools, users are an integral part, providing critical judgment and values rather than merely "running" programs and analyzing outputs.

NED-2 is a new Windows-based, goal-driven decision support tool that integrates visual quality, ecology, and forest health into the treatment prescriptions, growth simulations, and alternative comparisons offered by previous versions of NED. It is adaptable for holdings of 85 to 6,000 acres and for private, public, or cooperative management across multiple ownerships. Its design ensures that all relevant goals as well as the character and condition of resource are considered, that the results of future management alternatives are simulated, and that the alternative selected achieves landowner goals. In addition, NED-2 can link to the NedLite package for collecting field data and to third-party applications.

The people who have benefited from NED-2 include John Spearman, a tree farmer in South Carolina who was named Southern Region Tree Farmer of the Year for 2004. Mr. Spearman reports that NED-2's step-by-step process is easy and naturally leads to thinking about interesting options that he would never have considered on his own. For example, NED-2 opened the possibility of managing his 1,080 acres for eco-tourism, an alternative that is becoming a reality on his land. ▲

Invasive Plants Guide "Flying off the Shelf"

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Combating nonnative invasive plants in the Southern region got much easier with the release of "Nonnative Invasive Plants of Southern Forests: a field guide for identification and control" in 2003, followed by a workshop that attracted several hundred participants. Because of unprecedented demand, the initial edition was soon followed by a second printing of 50,000 copies in 2004. Book versions in PDF and html formats were available online, along with supporting presentations from the workshop.

Practically all land management agencies, including the USDA Natural Resources Conservation Service and State extension services, helped to distribute the guidebook to land owners, managers, policy makers, and consultants. Copies were sent to throughout the Forest Service in response to prompting by the Chief, who cited it as an example of the effort needed to address his agenda for the Agency. The book contributed to the rapid formulation and adoption of the Agency's Invasive Species Strategic Plan for the South and will support initial survey and control efforts for southern national forests. It is being used for Federal, county, and city park eradication and restoration programs and continues to contribute to invasive plant survey of all southern forest ownerships—the first in the nation.

Universities and schools have requested copies of the guidebook and presentations for student training. Nature preserves, parks, and garden

clubs have built invasive awareness programs using these resources. Hundreds of customers have sent messages of appreciation, and plans are underway for a third printing in 2005. ▲

Native Plants Program Develops New Tools for Tribal Partners

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Interest in native plants is growing because of new threats from invasive species, demands of post-wildfire restoration, and attempts by tribal governments to restore the productivity of their lands.

Two popular periodicals, the Native Plants Journal and Forest Nursery Notes, provide information on the biology and propagation of native plants. Efforts to develop training programs for tribal members interested in native plant propagation and restoration have led to the formation of the Intertribal Nursery Council, which serves as a focus for several projects: (1) developing Container Plant Propagation Centers—the first of which will be installed at the Hopi Reservation next summer, (2) drafting a publication on propagating 300 species of interest, (3) publishing a directory of native plant nurseries, seed dealers, and product suppliers, (4) assembling a Tribal Nursery Manual—a propagation guide for general audiences. ▲

Predicting Smoke Movement and Dispersion

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Approximately 4 to 6 million acres of southern forest and agricultural land are subjected to prescribed fire each year. On rare occasions smoke mixes with fog after leaving the burn site and creates visibility hazards over roadways—mostly at night. When air flows over a complex terrain on a calm night, a 1 mile-per-hour wind can transport smoke 10 miles during a typical 10-hour period, enough to bring smoke across a roadway in most parts of the South.

PB-Piedmont is a wind/smoke model designed to help land managers predict where smoke will

The PB Piedmont wind/smoke model helps land managers predict how the smoke from prescribed burns will move across the landscape.

G. Achtemeier

go after a prescribed burn, using data from the Southern High-Resolution Modeling Consortium and the Georgia Forestry Commission.

The South Carolina Forestry Commission has adopted PB-Piedmont into their fire and smoke management system as a real time tool for assessing where post-burn smoke is likely to go and whether it will become a transportation hazard. ▲

New Models for Predicting the Effects of Alternative Breeding Strategies

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Because trees are now harvested at a younger age, there is renewed interest in selection and breeding for favorable wood properties, such as specific gravity and microfibril angle, without attendant losses in growth rate. Incorporating favorable traits into tree improvement programs requires selection indices that assign weights to each and allow breeders to select for a desired aggregate genotype. Computer simulation are available to predict the impacts of breeding strategies on gains, but most are limited to a single trait and therefore are unable to predict the impact that different indices have on component traits.

SRS geneticists recently completed Excel-based models that simulate the genetic improvement of up to three traits for five generations, employing a number of different breeding and selection strategies. In addition, plans are underway to incorporate the impact that different strategies have on forest end-product quality and economic gains.

Although these models have not yet been adapted for public distribution, the Western Gulf Forest Tree Improvement Program is already using them for specialty breeding, and other forest industry groups are eager to get copies as soon as they become available.

Eventually, breeders of other plant species will be able to use these models to test different selection strategies and to determine appropriate economic weights for commercially-important traits. ▲

Economics of Timber Salvage from Large Fires

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SRS forest economists completed analyses of timber salvage activities in support of post fire planning and management for the Bitterroot National Forest fires in Montana and the Biscuit fires in Oregon. Potential salvage levels from these events were large enough to generate market-level economic effects. In addition, administrative planning rules and legal challenges also had significant economic impacts on salvage programs.

The fires on the Bitterroot burned 300,000 acres in the summer of 2000, killing valuable timber. A decision to salvage about 15 percent of the burned area, containing 176 million board-feet, was challenged in court, resulting in a mediation plan that reduced salvage to 60 million board-feet. Administrative planning requirements delayed the salvage to 2003. Simulations show that the court settlement resulted in an $8.5 million loss to the U.S. Treasury and an $8.8 million (65 percent) loss in total net economic welfare. The delay in salvaging resulted in a $1.5 million (25 percent) loss to the U.S. Treasury and an equal loss in total welfare benefits.

The results of this analysis demonstrate that wildfires can have substantial timber market impacts, even in areas where timber values are relatively low. The size of these impacts indicates that Forest Service plans can have spill-over effects on private timber producers. This places the impetus on managers to clarify salvage plans as soon as possible. Delays can have economic impacts not only on returns to the U.S. Treasury but on other local market participants. ▲

Two Studies Offer Target Conservation in Developing Landscapes

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Ecological Forecasting. This study coupled forecasting methods with satellite imagery to define where forestland is most likely to become highly fragmented in the future. Estimates of interior forests within a county to the year 2010 were based on population and income forecasts.

When applied regionally, the new models showed differences by ecological section and province and by Metropolitan Statistical Areas (MSA's). Loss of interior forests is expected to be especially high in the Carolina piedmont, the prairies and marshes of the Texas gulf coast, and the Florida coastal lowlands. Sixty six percent of the loss will be in urban counties, highlighting the important role that fringes of urbanizing areas will play. Of the ten MSA's that will lose the most interior forest, seven are in Florida.

These forecasts will be useful in prioritizing and targeting areas for more detailed study and for conservation efforts.

Predicting use changes from land prices. This study evaluated the role of forestland prices in predicting future development and the potential effectiveness and costs of conservation activities. In well-functioning markets, price captures a wealth of information about forestland and its resources, including current uses and—because land prices are speculative by definition—anticipated uses. Spatial patterns of assessed forestland prices in Georgia showed rising nontimber values in certain locations, suggesting shifts in the future use. As expected, land prices anticipated future development at the fringes of urbanizing areas. In some rural counties, rising values of forestland traditionally used for timber production suggest that low-density residential growth and recreation are having a greater impact than previously thought.

Anticipated population and income growth could alter both timber supply and forestland condition in much of the South. These projections will be useful in identifying the counties in which investments in conservation would have the maximum effect on conservation goals. ▲

Models can help project water supply and demand in the South in relation to climate and population changes.

B. Lea

Predicting Changes in Water Supplies

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As the population of the South continues to grow, surface and ground water reserves will shrink and water limitation could become a reality in a region traditionally considered "water rich."

Regional water yield is mainly controlled by changes in climate, landuse / landcover patterns, and water consumption—factors that significantly affect the water availability-demand relationship at local and regional scales.

This study combined the Hadley climate change scenario, a hydrology model, census population projections, water flow and demand data, and landuse / landcover data to develop 20-year predictions of water supply / demand and impacts of eight scenarios. The results were scaled to the watershed level for the 13 Southern States. Long-term average, maximum, and minimum water yield and demand were examined across the region for all drainage areas.

Overall, the models showed that the South will have approximately six times more water yield than water demand, and all the scenarios suggested that future water yield will increase. However, for some areas that are experiencing significant shortages due to high population density, these shortages will intensify. Although population will have greater impact at the local level, climate and vegetative cover will have a larger impact regionally. ▲

Measuring Below-ground Carbon Releases

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Of all the carbon taken up by a forest via photosynthesis, more is lost by the respiration of roots and soil organisms than is gained in tree biomass or respired out of tree organs. Quantifying soil respiration—or soil carbon dioxide efflux—is a critical step in quantifying a forest's carbon budget. Understanding the factors that control soil carbon dioxide efflux is the first step in storing, or sequestering, more carbon in tree biomass or soil.

Many methods are available to measure soil carbon dioxide efflux, each with its own costs and accuracy, but no clear method has been developed to calibrate them. Therefore, results among studies were difficult to impossible to compare.

The newly patented Automated Carbon Efflux System (ACES, U.S. Patent 6,692,970) greatly increases the precision of measurements. When tested against other methodologies with laboratory apparatus in conjunction with field comparisons, ACES provided highly repeatable measurements that appeared to reflect true soil carbon dioxide efflux rates.

ACES was a featured topic at the National Institute for Global Change workshop on biological production and measurement of soil flux. The Duke Forest, the oldest running free air carbon enrichment study in which entire stands are exposed to elevated carbon dioxide, has undertaken a major restructuring to take advantage of increased precision offered by ACES. In addition, forest industry is using ACES protocols and approaches to better manage carbon sequestration and improve forest productivity. ▲

Many methods have been used to measure soil carbon efflux, including labor-intensive studies of root systems.

J. Butnor

Assessing Effects of Global Change on Wetland Soils

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Soils, particularly those in wetlands, are the largest terrestrial reservoir of carbon from plants. Maintaining the soil carbon balance is important to sustained productivity through fertility and moisture release as well as to the conservation of carbon reservoirs.

Understanding global warming and managing greenhouse gases require knowledge of how soil carbon responds to land management and restoration and to global change. Forest management typically does not cause the large long-term losses of soil carbon that accompany conversion to agriculture. Other direct stressors may include altered temperature and water regimes, nitrogen deposition, elevated carbon dioxide and ozone. Predicting the effects of a single stressor is difficult because of the complex interactions among the biological, chemical, and physical factors that govern the soil carbon cycle.

None of the widely-used models for assessing the potential affects of land management practices or climate change apply to wetlands because they fail to account for anaerobic biological and chemical reactions. Since wetland forest soils are such an important component of the global carbon pool, and management of soil carbon is one of the few viable short-term mitigation strategies for increased atmospheric carbon dioxide, having a model that accurately simulates the biological and chemical processes is essential.

A newly developed soil carbon model, Wetland-DNDC, will help researchers, managers, and analysts assess soil carbon effects across upland and wetland forests. The model has been tested in a variety of climatic regimes from Florida to Finland. In addition to considering the chemical and physical factors that affect the carbon cycle, the model incorporates assessments of management practices. Work is underway to expand the model's spatial scale to entire watersheds or regions. ▲

A new carbon soil model, WETLAND-DNDC, will help researchers assess the soil carbon balance in wetland forests. B. Lea

Other Significant Accomplishments

- Developed a unique method to quantify the allocation of current photosynthate by chilling the phloem of large trees—producing valuable data for parameterizing process models that will be useful for predicting tree growth and forest carbon sequestration

- Developed and tested equations for estimating pine stand leaf area—a major determinant of stand productivity and expensive and difficult to empirically measure—using single point-in-time estimates

- Served as associate editor of the European Journal of Soil Science and associate editor of the Canadian Journal of Forest Research

- Visited the Institute of Botany, Chinese Academy of Sciences, Beijing China, to prepare for the development of the U.S.-China Carbon Consortium and select field sites for water and carbon studies

- Presented a seminar on carbon and water responses to management and climate change at Beijing Forestry University and four seminars on forest evapotranspiration research at Beijing Forestry University, Chinese Academy of Forestry, Fudan University, and the Liaoning Research Institute of Meterological Science

- Hosted a visit by the deputy director of the Southern China Institute of Botany, Chinese Academy of Sciences

- Developed an econometric model to determine the effect of exchange rates on southern pine product exports

- Analyzed small landowner perceptions and practices related to the southern pine beetle and showed how collective action can contribute to the health and management of southern pine forests

- Assessed community benefits from land management activities on the national forests

- Examined the social structure of family and farm forestry in Alabama

- Presented papers on a national wildfire mitigation database and on wildland-urban interface wildfire protection at a fire economics symposium in Spain

- Completed a comprehensive analysis of timber price dynamics in the South

- Completed a cost benefit analysis of ecosystem restoration projects in the Southern Appalachian highlands

- Completed a study of the economic impacts of changes in harvest levels on national forests

- Completed book on the economics of agroforestry projects

- Continuing research on optimal design of mechanical and prescribed burn treatments to mitigate future fire damages ▲

Urban Forestry and Wildland Urban Interface

U.S. Department of Agriculture
Forest Service
Southern Research Station

Wildland-Urban Interface and Wildfire Program Technology Transfer Tools

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Policymakers, natural resource professionals, and citizens need scientific information and tools to address risks due to changes from urbanization and other human influences on forest ecosystems. The Southern Center for Wildland-Urban Interface Research and Information, Gainesville, FL, (www.interfacesouth.org), engaged in several technology transfer activities in FY04. The primary focus was on National Fire Plan related publications and Web-based products that highlight important southern interface fire issues. The highlighted technology transfer projects for this year are:

"Fire in the Interface" fact sheet series and other fire-related publications: 1) Considering fire in Florida's ecosystems; 2) Understanding fire behavior; 3) Selecting and maintaining firewise plants for landscaping; 4) Fuel mitigation techniques for private landowners; 5) Reducing wildfire risk while achieving other landscaping goals; 6) Preparing a firewise landscape list.

InterfaceSouth Update — Electronic, biweekly bulletin about critical wildland-urban interface issues.

The wildland-urban interface: where forests meet cities.

USDA Forest Service photo

Firewise Retrofit House Online Module – Demonstrates the process of retrofitting a Florida home and the surrounding yard to make it Firewise.

Wildfire Risk Assessment Guide for Homeowners — To help protect homes from catastrophic fires, a fire risk assessment guide was developed for homeowners. The guide uses previously published research to identify different hazard ratings based on ecosystem type, structural components of the home and the extent of defensible space. Through a scoring system, homeowners can evaluate their homes with respect to fire risk and identify opportunities to reduce this risk. The publication has been distributed throughout the South. The application of the guide by homeowners could reduce property losses and costs to fight fires in the interface.

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To facilitate broader dissemination of ideas, a central World Wide Web location was developed by the Tax and Economics unit in New Orleans that describes wildfire protection programs that communities across the country have adopted: www.wildfireprograms.usda.gov. The database provides a clearinghouse of information where fire protection officials can learn about the strategies other communities are implementing to reduce wildfire risk. The Web site can be searched by program objective or by administrative jurisdiction. Descriptive profiles include purpose and goals, implementation methods, funding mechanisms, collaborating agencies and organizations, and highlights of the programs' most significant activities. The profiles include contact information and links to Web sites related to the program. As officials seek new strategies to reduce wildfire risk, information about existing programs can greatly enhance planning efforts, while reducing time and cost to implement new programs. ▲

Current Information on Outdoor Recreation Trends and Public Environmental Values

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A book on outdoor recreation trends, using original data, *Outdoor Recreation for 21st Century America*, was published. The primary purpose of the book, subtitled *A Report to the Nation: The National Survey on Recreation and the Environment*, is to provide planners and managers with a resource describing trends and contemporary Americans' participation in outdoor recreation.

The Nation's Report on Sustainable Forest Management describes the status of the forests of the United States as part of the international Montreal Process. Data, analysis and interpretation were generated for recreation indicators including forestland available, forest-based recreation facilities, and management and use of forests for recreation. Social values indicators include area of land managed to protect noncommodity values and social, cultural and spiritual values of forest lands. Findings show that:

Nationally, there are an estimated 747 million acres of forest, about 33 percent of the total U. S. land area. Of total forest area, 610.7 million acres or 81.8 percent is available for outdoor recreation. Across the United States there are approximately 2.17 acres of forest land available for recreation per person.

In the more arid and less treed Rocky Mountain / Great Plains Region it appears that roughly 20 percent of camping facilities are associated with forested settings. In the Pacific Coast Region, 40 to 50 percent of camping facilities are associated with forested settings. The Pacific Coast Region has the greatest number of areas with hiking facilities. Areas with picnicking facilities range from 98 in the South to 125 in the Rocky Mountain and Great Plains Regions. Eastern owners of private forest provide a much greater number of miles of maintained trails (85 percent of the national total).

Across the United States, there are approximately 21.7 acres of forest available for recreation per person.
USDA Forest Service photo

Clean air and water were identified as most important by the highest percentage of respondents, above scenic beauty, heritage or wood products. For private forest management, clean air and water were identified as most important by significantly smaller percentages of respondents than selected this value as most important for public forest management.

This work is important to understanding how well this country is doing at managing public and private forest lands for noncommodity uses and values over time. These results are of interest to all categories of forestry interests, professional and citizens. They are being used in classrooms, as background for management decisions on public lands, and as the overall context for considering forest policy. ▲

Ethnic Differentiation of Value of the National Wilderness Preservation System

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Little is known about the values immigrant groups or U.S.-born racial and ethnic minorities attribute to wilderness. However, the views of these groups are important to wilderness preservation because of increasing diversity along ethnic, cultural, and racial lines in the United States. Scientists examined the proposition that wilderness is a social construction, valued primarily by U.S.-born whites, by comparing wilderness values for immigrants and U.S.-born minority respondents to whites. Results from ten wilderness value items show immigrants are significantly less likely to indicate on-site use value. Among U.S.-born racial / ethnic groups, black respondents were least likely to indicate

values associated with visitation and off-site use but as likely as whites to indicate a value for continued existence of wilderness. U.S.-born Asians and Latinos were also less likely than whites to indicate values relating to wilderness on-site use.

This research broadens the general knowledge base of studies focusing on ethnic and racial differences in natural resource interpretation and involvement. This research suggests that there are few differences in how various ethnic / cultural groups perceive of passive wilderness benefits. Although researchers found ethnic minorities less likely to visit wilderness, fewer practical differences were found for off-site uses. Results suggest that although some groups have less physical contact with the resource, they do appreciate the many benefits provided by wilderness and that the continued existence of wilderness is important. Wilderness advocates and managers can use this information to develop strategies to reach out to a more diverse group of potential users and supporters. ▲

Urban Forestry South Content Management System (CMS)

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The Southern Center for Urban Forestry Research & Information has redesigned the Urban Forestry South Web site to disseminate research information to urban forest managers in the southern States. The site is being developed with a state-of-the-art content management system to be more user-friendly, accessible, and relevant so that customers can easily find information and services that they need. The primary audience for Urban Forestry South is described as the "professional" urban forestry community including Urban and Community Forest coordinators, other forestry staff, researchers, extension agents, municipal arborists, and nongovernment organizations.

Examples of research and technology transfer products developed from USDA Forest Service research include:

Benefits of Urban Trees: an update of a popular technology transfer publication designed for the nonprofessional audience.

The Large Tree Argument: a publication developed cooperatively with the Center for Urban Forest Research in Davis, CA on the benefits provided by large stature trees (such as live oak) as compared to small stature trees (such as crape myrtle).

Trees, Parking and Green Law: Strategies for Sustainability: a look at the range of green laws (tree and landscape ordinances) that deal with parking lots.

Research on Business Visitors' Behavior: Trees and Commerce in Athens, Georgia: a Fact Sheet based on a contingent behavior study conducted to evaluate visitor reactions in a familiar retail setting having established urban forest canopy. The visitors of Athens business district indicated a strong preference for the presence of trees, and specified how the presence of a streetscape canopy influences their shopping activities.

Trees and Development: A collection of technology transfer products based on USDA Forest Service funding and research. They include research-based products that discuss protection of trees on development sites, establishment, and care of trees. ▲

National Forest Visitation Monitoring

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A major gap in the knowledge of identifying the links between recreation and amenity resources and the economic and social quality of life in southern communities is the current volume of recreation visitation to National Forest System (NFS) lands. Through the National Visitor Use Monitoring program, this gap is being addressed.

During FY04, data were analyzed to estimate recreation and wilderness visitation on the Chattahoochee-Oconee, Alabama, and Texas national forests. These data complete the set of

visitation estimates for all southern national forests. Visitation estimates for the complete set of southern forests was accomplished. These data are the first comprehensive analysis of the role of national forests in serving the recreation needs of rural populations in the South. Incorporation of these results into forest plan revisions is already underway.

Research is continuing to identify the nature and strength of relationships between resource condition, population characteristics, recreation visitation, and related economic activity. This research provides credible information on the volume of visitation and provides a system for monitoring future changes for natural resource planners and managers. Benefits include forest-level descriptions of visitor characteristics and activity patterns, wilderness use, and customer satisfaction. Linking visitation and spending-profile information provides greatly improved estimates of job and income effects of recreation on NFS lands. ▲

Trout fishing in the Nantahala National Forest.
USDA Forest Service photo

Species Composition and Structure in an Urban Landscape

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In urbanizing landscapes, numerous factors such as air pollution, altered disturbances, and introduction of exotic species affect forests. These effects alter ecosystem composition and structure. Previous research focused on remnant forest patches only. In this study we examined reforested sites to gain a greater understanding of vegetation dynamics across the range of forest patch types. The study revealed that reforested sites were different from remnant patches with respect to species composition, but had similar structures. Reforested patches which were less than 50 years old, had more exotic species than remnant forested patches. These species grew rapidly thus yielding basal areas similar to forested patches which were100 years old. The results suggested that vegetation dynamics on reforested plots differed from that observed on remnant patches. The work was conducted in a northern temperate forest and needs to be duplicated in the different physiographic provinces in the South. The work

has application to the wildland-urban interface as it implies that land cleared for urban land use will yield forest types different from sites cleared for forest land use. As cleared-forest patches reforest, they will be composed of different species than previously occupying the sites. The new species composition of reforested patches may or may not yield the same ecosystem goods and services as remnant forest patches. This finding suggests that different management scenarios may be needed for reforested patches in urbanizing landscapes to meet societal needs. ▲

Homeowners benefit from Forest Service termiticide testing program

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There is a need for new and alternative treatments for effective protection against damage caused by subterranean termites. Termiticides are one of only two types of insecticides that require product performance (efficacy) data for Federal and State registration. The Forest Service has been the primary provider of these data for decades and, in fact, has tested all termiticides ever registered in the United States. Tests are conducted on repellent and nonrepellent termiticides, chemically impregnated barriers, and other termite control products. Products typically undergo 24 months of laboratory screening and five years of field testing at sites in Arizona, Florida, Mississippi, and South Carolina. Hundreds of products have been evaluated over the decades, most failing the registration process and never making it to market. In 2004, we had 37 agreements with product manufactures to screen six products in the laboratory, install six products in the field, and read 26 products as part of ongoing studies. Working with Federal and State regulators, we reviewed EPA's draft Product Performance Guideline for Termite Baits (OPPTS 810.3800), reviewed several new and revised product labels as part of a label review committee of ASPCRO, and provided data review to the Florida Bureau of Pesticides on termiticides undergoing evaluation under their new Termiticide Efficacy Rule (5E-2.0311, FAC). Results of this research have contributed to the registration of the termiticides Termidor® (BASF) in 1999 and Phantom® (BASF) in 2002 and the first chemically-impregnated barrier Impasse® (Syngenta) in 2003. ▲

Survey of Wood-Decay Fungi from Forest Habitats Promotes Additional Research

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Wood-decay fungi are intimately associated with termites in southern forests, and some fungi can elicit or inhibit termite colonization, foraging, and / or feeding. The first of a three-phase project was completed dealing with the associations of fungi and termites in forests of northeastern Mississippi. Samples from branches and logs containing and devoid of termites were collected from the forest floor in upland and bottomland hardwoods and pines. Fungi were cultured, isolated, and identified from the 160 samples yielding 754 unique fungal isolates, 59% identified to genus level. Four phyla, six classes, 10 orders, 14 families, and 45 genera were recovered. Hyphomycetes was the largest class containing three orders, three families, and 26 genera. Some fungi were associated with samples that either contained or were devoid of termites from selected habitats. For example, the Ascomycete, *Xylaria*, was more common in samples without termites from upland habitats, making it a potential candidate that repels termites.

The large number of fungi produced by the survey will be used to examine termite responses under Phase II of the project. Identifying fungi that serve as termite attractants / repellants or feeding stimulants / inhibitors will improve our understandings of habitat associations of termites in natural ecosystems. For example, because the Formosan subterranean termite (FST) is an introduced species, its responses to native wood-decay fungi may be different from those of native termites. These interactions may promote or

inhibit FST ability to exploit forests in the southeast. These studies will also support the development of improved treatment tactics by identifying compounds that can be used in termite baits. ▲

Other Significant Accomplishments

- Extended racial / ethnic research on natural resource use to include immigrants' populations
- Completed data collection and analysis for societal knowledge, attitudes and preferences related to wildfire and wildfire management
- Completed a re-inventory of outdoor recreation supply in the United States across government sectors and private for profit and non-profit sectors
- Determined that catnip oil does not have commercial value for controlling termites in structures because of the high dosage needed, and the oil's short half-life in the soil ▲

Awards

Ed Macie and **Annie Hermansen-Baez** were awarded the 2003 Regional Forester's Excellence in Technology Transfer Honor Award by the USDA Forest Service, Region 8.

Annie Hermansen-Baez was awarded the 2004 Florida Association of Natural Resource Extension Professionals (FANREP) Natural Resource Program Partner of the Year Award.

The Southern Center for Wildland-Urban Interface Research and Information was awarded the 2004 Wildfire Education Award by the Federal Alliance for Safe Homes (FLASH) as a team member of a multiagency effort to retrofit a Florida home to make it Firewise. Specifically the Center was recognized for the "commitment and dedication to strengthening homes and safeguarding families from the threat of wildfire." ▲

B. Lea

Inventory and Monitoring

FOREST INVENTORY AND ANALYSIS

Resource Inventory Sampling and Data Compilation Continues in the South

John F. Kelly (828-257-4309) jkelly@fs.fed.us

All states in the Southern Region, except Oklahoma and Mississippi, are implementing annual inventory using the National Field Guide version 2.0, including West Texas. Southern Research Station (SRS), Forest Inventory and Analysis (FIA) provided training to 11 States on current data collection protocols for Phase 2 and Phase 3 variables. Additionally, in 2004, SRS Federal crews performed Phase 3 data collection in seven states, while four states continued collecting Phase 3 data using State crews.

Phase 1 area estimation work included National sample design implementation and stabilization of the Phase 2 and Phase 3 plot lists. FIA checked all plots in 6 states to ensure meeting the rule of one plot per hexagon grid cell by digitizing all plot locations. Research and implementation began with a new methodology for Phase 1 estimates in both Virginia and South Carolina using digital photos to collect data, and incorporating the use of satellite imagery for change detection when the next iteration of area estimation occurs in those states.

Data collection and analysis included ozone plot variables entered into the field data recorder program (NaTally). Personnel participated as members of national technical bands making changes and modifications to the national Phase 3 variables to improve overall Phase2 / Phase 3 data collection protocols.

Under a cooperative agreement with the University of Tennessee (UT), FIA completed a pilot study of the Phase 3 vegetation diversity and structure indicator on P3 plots in St. John, U.S. Virgin Islands. In addition, to supplement the sample, we initiated further vegetation pilot study work in Tennessee during the summer of 2004.

FIA field crew gathers data during forest survey process.

USDA Forest Service photo

Forest inventories began on Puerto Rico and the US Virgin Islands in 2004. T. Brandeis

The training section helped develop a plan and participated in a Regional P3 Pre-training session in Arizona, followed by four separate P3 training sessions across the Region for eleven States, Puerto Rico and the Virgin Islands. Seven separate training sessions for the P3 Ozone indicator were given throughout the Region in FY 2004.

Data were processed and provided to State Foresters in Alabama, Arkansas, Georgia, Kentucky, Louisiana, Tennessee, and Texas. Annual inventory data were released to the public for 6 states (Alabama, Arkansas, Kentucky, Louisiana, Tennessee, and Texas) and periodic data were released for North Carolina. The forest inventory data processed included traditional forest inventory statistics and trends, forest productivity, impacts of forest management activities on scenic beauty, insect and disease impacts on the Region's forests, the growing problems of invasive, nonnative plant species, stand structure and species diversity analyses, and tropical island forest inventory procedures and subsequent assessments. ▲

Partnering to Develop New Methods and Techniques for Annual Forest Inventory

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The FIA unit is cooperated with scientists at RWU-4702, Tree Quality, Processing, and Recycling, who are developing a video camera based on an optical dendrometer for operational use in special forest studies for the FIA program.

New cooperative ventures in 2004 included funding to the State of Virginia for application of aerial photography for Phase 1 area estimates and to Virginia Polytechnic Institute on a cooperative agreement *Improving the economical and statistical efficiency of FIA Phase 1 Estimates.* In addition, FIA has continued cooperative ventures with university scientists and other stations including the University of Georgia on a study titled An Assessment of Timberland Loss and Fragmentation Associated with Urbanization in Georgia; Virginia Polytechnic Institute, the North Central Station, and the National Council of the Paper Industry for Air and Stream Improvement, Inc. on a study titled Satellite Remote Sensing for FIA Forest Area

Estimation; Michigan Technical University and the Rocky Mountain Research Station on a study titled FIA Model Licenses Agreement.

One FIA scientist served as leader of the national remote sensing band. ▲

Reliable Information Continues on Resource Use and Timber Product Output

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In 2004, the Resource Use Section published five State Timber Product Output (TPO) Assessments and the Southern Pulpwood Production report from 2002. Individual TPO reports were published for the calendar year 2001 for Georgia, Kentucky, North Carolina, South Carolina, and Tennessee. Results from these reports showed that most states experienced significant declines in product output for 2001, especially in pulpwood production. The Southern Pulpwood report for 2002 showed pulpwood production stabilizing at about 2001 levels, which is a departure from the major declines seen over the past 3 years. In addition to these published reports, a TPO assessment was completed for Virginia for 2001 and the report for the Texas Harvest and Utilization study was completed. Utilization data for Georgia were also collected.▲

FOREST HEALTH MONITORING

New Procedures Developed to Improve Existing Systems

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A nationally consistent sampling design has paved the way for nationally consistent estimation and processing procedures. In 2004, several members of Forest Health Monitoring (FHM) continued to collaborate with FIA statisticians to develop nationally consistent estimation procedures. Forest Health Monitoring Unit is currently consulting with FIA and FHM Information Management specialists on the development of a National Information Management System (NIMS) based on the specified estimation procedures developed by unit scientists.

Timber harvesting on non-Federal lands.
USDA Forest Service photo

This research helps FIA meet goals established by two blue ribbon panels on FIA, and deliver a national data base based on consistent sampling and estimation methods. The result provides seamless estimation of our nation's forest resources, and provides tools to produce changes in forest resources on an annual basis.

Cooperators involved were Dr. Alan Ek, Head of the Department of Forestry at the Univ. of Minnesota and Jim Alegria, USDA Forest Service in Portland, OR. ▲

Protocols Developed to Integrate Data, Models, and Interpretation Techniques to Assess Forest Health and Conduct Risk Analyses at Multiple Scales

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Crown conditions have been used extensively as indicators of forest health. The Forest Health Monitoring (FHM) and FIA have been rating multiple parameters related to tree crowns since 1990. Results from these crown ratings have been reported separately for each crown parameter. Interactions among these parameters and adjustments for stand-level conditions have largely been ignored, reducing the interpretive value of the results. In 2004, members of Forest Health Monitoring devised new methods and models to estimate three-dimensional attributes of a tree crown to better improve the interpretability of the composite nature of multiple crown attributes. Composite crown indicators are useful analytical models for the identification of a variety of potential forest health issues. A composite model provides a more straight-forward method for evaluating unusually good or poor crown that the use of a series of individual crown attribute models. These models are being used for detection monitoring to evaluate tree crown nationally, and have resulted in the establishment of one monitoring site in South Carolina.

Cooperators involved were Stan Zarnoch, SRS biometrician in Asheville, NC and Mike Schomaker from the State of Colorado in Fort Collins, CO. ▲

USDA Forest Service photo

Protocols Developed to Utilize Spatial Analyses and Principles of Landscape Ecology in Forest Health Monitoring and Assessment

Ken Stolte (919-549-4022) kstolte@fs.fed.us

Pursuant to the Santiago Declaration and the Montreal Process, indicators of forest fragmentation are needed to assess the biodiversity criterion and progress towards sustainable forest management. Using land-cover maps derived from circa 1992 satellite imagery for the 48 conterminous States, several assessments were completed for the United States 2003 National Report on Sustainable Forests (Montreal Process Liason Office 2000; USDA Forest Service 2003) and the State of the Nation's Ecosystems report (Heinz Center 2002). It is currently possible to assess forest fragmentation in a consistent fashion nationwide. Most forestland in the US is well connected over large regions, yet fragmentation is so pervasive that edge effects potentially influence up to half of the total forestland area. Key research problems include

accounting for natural fragmentation, moving from patch-based forest diversity models to pattern-based landscape integrity models, developing techniques for multiple-scale analyses, localizing the national statistics, and harmonizing indices for endpoints other than biodiversity.

The work involved one cooperator from US Environmental Protection Agency, Dr. Jim Wickham in Research Triangle Park, NC. ▲

Protocols Developed to Utilize Data from Long-Term Comprehensive Monitoring of Key Ecosystem Processes and Components in Forest Health Assessments

Ken Stolte (919-549-4022) kstolte@fs.fed.us

Resource management agencies often seek a holistic approach to ecosystem management, but few agencies have the resources to support multi-component ecosystem-level research. Much of the information collected by any one agency is often fragmentary and incompatible because of the lack of resources to design and collect multi-resource data (terrestrial, aquatic, atmospheric, etc.) at multiple scales.

One solution is to develop a concept for "virtual" integration of the capabilities of diverse agencies to address environmental problems in a holistic manner. By supplementing and / or adjusting existing monitoring and research strategies, collaborating programs could continue to meet specific agency missions while also contributing to multi-scale, multi-resource inventory and monitoring systems. In 1998, the Collaborative Environmental Monitoring and Research Initiative was formed between the USDA Forest Service, the National Park Service, and U.S. Geological Survey. Models were developed to combine process-level information with landscape-scale information in an effort to model the response of forest and aquatic processes to changes in the landscape. These methods and models are being applied on a pilot basis to the study of urban land dynamics.

Cooperators involved were Pete Murdoch from the Water Resource Division of the U.S. Geological Survey in Troy, NY and Richard Birdsey from the Northeast Research Station of the USDA Forest Service in Newtown Square, PA. ▲

Urbanization threatens estuary habitats as fragmentation continues. B. Lea

Kudzu in South Carolina.

J. Asher, USDI Bureau of Land Management, www.forestryimages.org

Forest Health and Sustainability Reports Improve for National and International Assessments

Greg Reams (919-549-4010) greams@fs.fed.us

A national Forest Health Monitoring (FHM) program was initiated in 1990 to evaluate status and trends in the ecological condition of the nation's forests. Over the intervening year, several thousand plots have been established on a statistically based grid network across the United States. The general purpose of this study was to investigate the use of data from the FHM program to detect changes over time in forest health indicators as an early warning system for changes in forest condition. The program currently addresses in forest health and condition due to biotic and abiotic factors. For example we specifically address changes in conditions due to drought, insect and disease, air pollution, soils, natural stand dynamics, fire, and potential effect of forest fragmentation.

The National reporting is used by Forest Health Monitoring and Forest Health Protection to identify areas of degraded or emerging issues in forest health nationwide. The report is used in a detection monitoring phase to determine areas where the Forest Service will conduct evaluation monitoring.

Cooperators involved were Barb Conkling, John Coulston, and Mark Ambrose from the Department of Forestry at North Carolina State University in Raleigh, NC. ▲

Other Significant Accomplishments:

- Produced 29 publications
- One FIA scientist is a member of the Regional Advisory Board for the International Biometric Society – Eastern North American Region
- Continued implementation and monitoring of a highly active Health and Safety Program
- One FIA employee was elected chair of the Station Civil Rights Committee
- Installed the first Forest Service Network Attached Storage (NAS) Server to provide over 2 terabytes of online photography for all 13 Southern States

Inventory and Monitoring

- Implemented a Pix Firewall and screening router with a logging server to provide tightened Internet security and visibility where FIA Internet data is accessed
- Developed and tested a moving average module, for which data is being analyzed prior to regional implementation across all States
- Filled 154 customer special / custom data requests (54 government, 12 internal, 30 industry, 28 University, 12 environmental groups, and 16 other)
- Continued to develop enhanced internet based query systems and tools to track the progress of annual State inventories
- Developed a regional workstation for customers to access FIA data and develop summaries by appointment with FIA staff
- Completed a growth and yield query website for the Southern States through a research grant to the University of Georgia
- Developed SOLE (Southern On-line Estimator) cooperatively through an agreement with NCASI – a web-based interface to analyze annual FIA data
- Developed protocols to implement the interim privacy policy on FIA data in accordance with the Food Security Act of 1985; amendment of 1999 for FIA, which prevents the release or use of confidential data
- Completed a multi-scale evaluation of watershed health in the Delaware River Basin
- Completed a study on an alternative method for measuring tree crown class
- Completed a regional assessment of ozone sensitive tree species using bioindicator plants
- Demonstrated the use of the enhanced FIA program for assessing sustainability
- Produced a crown assessment of urban street trees using ground-based digital imaging
- Modeled the effects of FIA blurred plot coordinates on modeling forest biomass
- Developed a risk-based approach to rapid detection of exotic insects and diseases

T. Brandeis

Inventory and Monitoring

Detection of gypsy moth in the Southeast is an integral part of the forest health monitoring program.

William E. Ciesla, Forest Health Management International, www.forestryimages.org

- Quantified and assessed recent patterns of forest health indicators across the U.S.
- Initiated a case study to evaluate poor crown conditions in South Carolina
- Developed a sampling design for FIA's use nationally to solve panel creep
- Developed new methods to quantify forest fragmentation ▲

Awards:

Francis A. Roesch was awarded the Director's Award for FIA Excellence by the Washington Office, Research and Development, Science Policy, Planning, Inventory, and Information for collaborating on the manuscript "The Enhanced Forest Inventory And Analysis Program—National Sampling Design And Estimation Procedures." FIA's first externally peer reviewed publication of nationally consistent sampling and estimation procedures.

Helen Beresford was awarded honorable mention for the Director's Award for FIA Excellence by the Washington Office, Research and Development, Science Policy, Planning, Inventory, and Information for Development of outstanding internet based tools for FIA annual state inventory and TPO data delivery.

Jason Meade was awarded honorable mention for the Director's Award for FIA Excellence by the Washington Office, Research and Development, Science Policy, Planning, Inventory, and Information for excellence in providing exceptional internet and annual State inventory panel tracking tools to FIA and State coordinators.

Bill Bechtold, **Bill Smith**, and **Greg Reams** were awarded the SPPII Directors award for FIA Excellence for producing, *"The enhanced forest inventory and analysis program—National Sampling Design and Estimation Procedures. FIA's first externally peer reviewed publication of nationally consistent sampling and estimation procedures."*

Kurt Riitters and **Ken Stolte** were awarded the Deputy Chief's award from State & Private Forestry for their contributions to the development of the 2003 Report on Sustainable Forest Management. ▲

INTERNATIONAL ACTIVITIES:

Greg Reams sponsored and hosted a Polish researcher at the RTP Lab, which benefitted in the dissemination of FHM research methods to Poland and Development of joint research.

Kurt Riitters sponsored and hosted a French researcher at the RTP Lab, which benefitted in the dissemination of FHM research methods to France and development of joint research.

Kurt Riitters sponsored and hosted an Italian researcher at the RTP Lab, which benefitted in the dissemination of FHM research methods to Italy and development of joint research.

Kurt Riitters attended conferences in Lecce, Italy and Darwin, Australia, which benefitted in the dissemination of fragmentation methods and application for internation research and assessment of national and global metric of fragmentation and development of joint research. ▲

Wetlands, Bottomlands, and Streams

Restoring Forested Wetlands

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The Southern Forest Resource Assessment identified the need to understand how land use changes alter functions of the landscape. Urbanization affects wetland properties and activities, sustainable fiber production of hardwoods and softwoods, water quality, and fragmentation. Challenges include finding ways to sustain clean water and other ecosystem functions as the proportion of developed land increases.

Successful restoration results in a self-sustaining, resilient ecosystem capable of supporting wetland-dependent plant and animal communities and performing ecological functions. Wetlands can act as viable alternatives to traditional clean-up approaches when water quality has been impaired.

Measuring effective restoration of wetland and riparian ecosystems within wetland landscapes requires:

- new or improved technologies
- reference systems models
- reliable indicators of and ecosystem health

Reference wetlands include the natural attributes of intact, functional sites. Knowing the conditions that contribute to the sustainability of wetlands helps scientists and managers determine protocols when working to reestablish a degraded site. Shape, size, water table, and soil characteristics help define a wetland type. Vegetation depends on a number of ecological factors and is an important component for assessing wetland status, conservation objectives,

Salt marsh, South Tibwin, Frances Marion National Forest. B. Lea

Wetlands, Bottomlands, and Streams

Pocotaligo River, SC.
B. Lea

and restoration performance. Establishing a wetlands reference system provides a benchmark for the different types of wetlands, how they function, and their location.

Wetland types include:

- freshwater emergent marsh
- open-water pond
- depression
- closed forest
- flat
- riverine

Restoration of forested wetlands presents special challenges because long periods are needed to establish dominant trees and to evaluate success. Using a reference system gives us the advantage of working toward the wetland characteristics best suited for a specific area.

Scientists at the Center are researching innovative approaches for managing riparian zones, restoring degraded lands, sustaining and

Salt marsh and estuary, Francis Marion National Forest.
B. Lea

Elizabeth Bennett weaving a sweetgrass basket at her stand along U.S. Highway 17 North outside Mount Pleasant.
Mic Smith, Charleston *Post and Courier*

enhancing site productivity, and maintaining biodiversity. Benefits to society include:

- improving the means for achieving no net loss of the Nation's wetlands
- enhancing wetland biodiversity
- assuring long-term sustainable wetland productivity ▲

Restoring Sweetgrass

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The South Carolina Lowcountry is home to the Gullah community that makes coiled baskets fashioned from sweetgrass (*Muhlenbergia filipes*). This coastal, nontimber forest product ranges from North Carolina southwestward to Texas, but habitat destruction, habitat limitation, and private ownership of the resource threatens the supply that supports Charleston basket makers. Ecologist Marianne Burke works with local artisans to determine the most significant challenges and potential solutions to preserving a community's historical economic livelihood and one of Charleston's signature art forms.

Coiled sweetgrass basketry is a traditional African art form that was utilitarian on plantations during the antebellum period and subsequently became an important source of income for impoverished and isolated communities of African Americans. Through the process of harvesting sweetgrass, basketmakers and their families maintained a linkage to the land. Once abundant

Elizabeth Bennett making a sweetgrass basket at her home. Mic Smith, Charleston *Post and Courier*

Leaves of the federally endangered pondberry (*Lindera melissifolia*)

T. Leininger

in South Carolina, urbanization has reduced both the amount of sweetgrass habitat and access to remaining habitat in exclusive subdivisions. Today the basketmakers tend to purchase the grass from commercial collectors who bring the raw material to Charleston from out of State. This change has reduced the income basketmakers can generate, further threatened an important part of the Gullah culture, and eroded the connection to the land and sense of place for some of the oldest families in the Charleston area.

The Center's research on sweetgrass involves finding solutions for the scarcity of sweetgrass and learning how to involve the public in making decisions about managing natural resources. Basket makers are stakeholders who have contributed in the development of a long-term management plan for sweetgrass. This plan has identified:

- alternatives for sustainable management of sweetgrass, including setting aside accessible public land for managing sweetgrass
- education of stakeholders in how to manage the resource
- communication between basket makers and landowners where sweetgrass grows but access is restricted ▲

Discovering Pondberry

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Several research projects at the Center for Bottomland Hardwoods Research (CBHR) involve pondberry (*Lindera melissifolia*), a federally listed endangered plant that grows in seasonally flooded wetlands and on the

Pondberry (*Lindera melissifolia*) plants growing in the Stoneville, MS greenhouse.

T. Leininger

edges of sinks and ponds only in six States. Scientists are just beginning to understand the biology and ecology of pondberry and its importance within bottomland hardwood forest ecosystems. A recent study documented the hermit thrush as a likely disperser of pondberry seeds over short distances. The CBHR built a greenhouse in Stoneville in which to conduct controlled experiments examining the growth responses of pondberry to variables such as flooding and light availability. Other studies of the physiological and growth responses of pondberry to the interactive influences of flooding and light availability are being conducted in an outdoor, large-scale flooding facility about an hour's drive south of the Southern Hardwoods Laboratory. These studies are part of a multi-year project funded by the U.S. Army Corps of Engineers to learn as much as possible about the ecology, ecophysiology, population genetics, pathology, and seed biology of pondberry. Interest in this endangered species has been brought on by concern over its continued viability in the face of ongoing flood control measures in the lower Mississippi Delta. ▲

Discerning Aromas with the Electronic Nose

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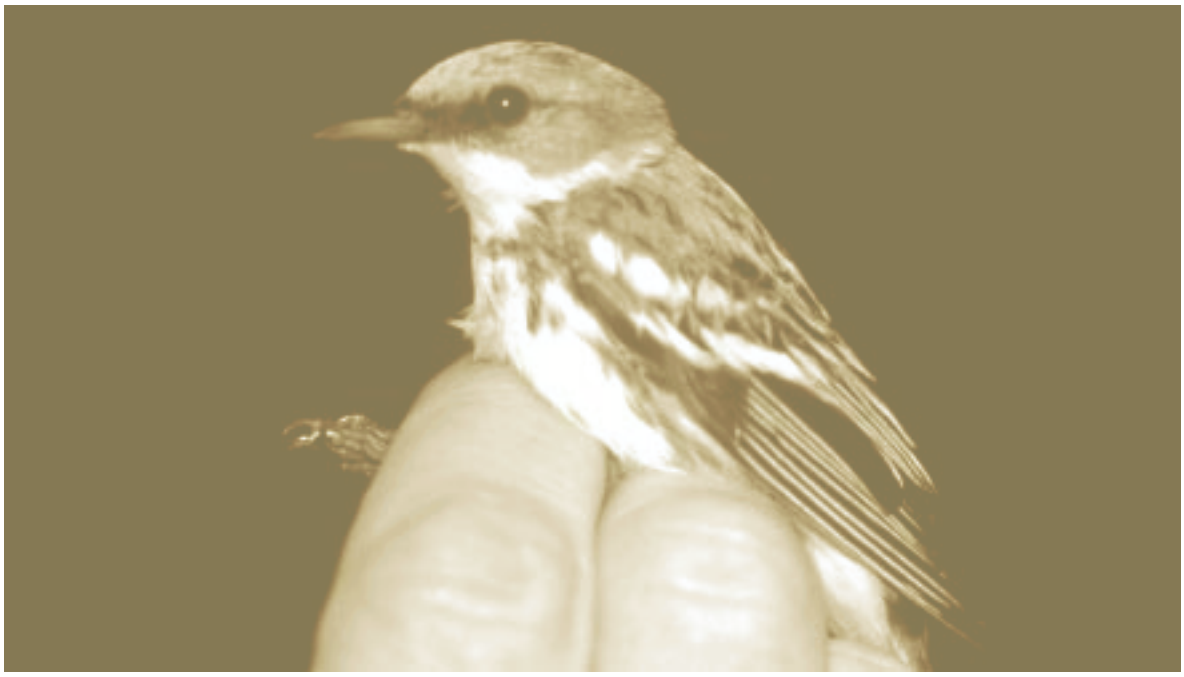
The electronic nose is a device containing aroma-reactive sensors capable of obtaining a digital fingerprint (aroma signature) of chemicals released from any source. The instrument can distinguish a wide range of diverse sample mixtures by their unique smells which identify the source. Most previous applications have been in industrial food production, processing, and manufacturing. For example, potato chip factories began using this electronic aroma detection (EAD) technology in the mid-1990s for quality control to maintain the unique aroma that defined their chips. Wineries have also used the electronic nose to analyze, perfect, and maintain the aroma bouquet of their wines. Southern Research Station plant pathologist A. Dan Wilson and colleagues Charisse Oberle and Dan Lester modified the electronic nose's architecture (plumbing) to detect much lower concentrations of aromas produced by microorganisms. As explained in *Development of Conductive Polymer Analysis for the Rapid Detection and Identification of Phytopathogenic Microbes*, the electronic nose accumulates a reference library of aromas using an artificial neural network, a 32-sensor array, and digital pattern-recognition software to record them as electronic aroma signature patterns (EASPs). This article reports on the development of conductive polymer analysis (CPA) for the rapid identification and discrimination of phytopathogenic microbes based on their production of unique mixtures of volatile metabolites recorded as diagnostic EASPs. It sounds like *Star Trek's* Commander Data has stepped off the *Enterprise* into the 21st century.

Forestry and plant pathology applications for the electronic nose include identifying bacterial wetwood in hardwoods and diagnosing oak wilt. The electronic nose, which resembles a sophisticated hotel-room refrigerator in appearance, can identify microbes in culture and in plant tissues. Previously, most fungi have been identified by their sexual stage. Now the e-nose can complete the analysis within 10 minutes. The addition of CPA technology by Wilson and his team offers considerable potential for a wide range of applications in plant pathology from disease diagnosis and pathogen and host identification in vitro to detection and identification of plant pathogens in vivo (within plant tissues), as well as mixed infections, toxic metabolites (toxins), and pesticides. The authors developed methods for the application of CPA as a new diagnostic tool for the detection and identification of diseases caused by plant-pathogenic bacteria and fungi. CPA also offers the potential for discriminating specific mixtures of pathogens and specific host-microbe combinations within host tissues. Finally, the rapid analysis possible with this technology could prove useful in the detection of plant and human pathogens for homeland security applications as real-time identifications become feasible using portable EAD devices. ▲



A cerulean warbler. M. Welton

Tracking the Cerulean Warbler

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The USDA Forest Service participates in an international effort to maintain viable populations of the cerulean warbler—a forest songbird once common in the Eastern United States, now rarely seen. Paul Hamel, research wildlife biologist with the Center for Bottomland Hardwoods Research, provides an overview of the status of the small blue bird in *How We Can Learn More About the Cerulean Warbler (Dendroica cerulea)*. The article details the formation of the Cerulean Warbler Technical Group (CWTG) and its efforts to focus research and use the results to conserve the species. Migrating to the lower slopes of the Andes in August, cerulean warblers return in April or May to build nests in the upper canopy of forests in the Southeastern United States. Since 1966, populations of the species have declined an estimated 70 percent, with the precipitous drop being tied to fragmentation and destruction of habitat in both breeding and winter ranges. For its breeding range, the cerulean warbler needs large areas of mature deciduous forest, often along streams; in the Southeastern United States, much of this habitat has been lost to agriculture or development. In its winter range in South America, forests are also being lost to agriculture.

Hamel summarizes what is currently known about the biology of the cerulean warbler and the research questions that remain to be answered. "Cerulean warblers are very difficult to study in the field because they nest and forage in the high canopy," he says. "Fortunately, we have learned a few tricks, such as surveying from canoes and using carved wooden decoys to attract the males. We have also developed genetic tools to help us track the movement of specific populations. We are seeing a dramatic shift in range. Land use change is certainly one cause, but climate change—either short- or long-term—may also be a factor."

Surprisingly little is known about the behavior and population ecology of the cerulean warbler, mostly due to the difficulty of catching females, locating nests, and observing the young. "Most glaring is our ignorance of the cerulean warbler during the non-breeding season," says Hamel. "So far, we only have two published studies from South America."

Hamel has been instrumental in the CWTG, an international collaboration formed to develop a proactive, broad-based strategy to conserve the cerulean warbler. "We followed the example of other ad hoc conservation groups, such as the Louisiana Black Bear Conservation Committee,

in our basic philosophy of including as many partners as possible," says Hamel. "We agree to leave agendas at the door, and to keep the focus on identifying meaningful solutions through sound science, clear communication, and trust. Our hope is that this group can serve as a model for other efforts to conserve forest bird species." The partnership includes industry, State and Federal governments, nongovernmental organizations, and universities in North and South America. CWTG operates approximately around the breeding and non-breeding seasons. The breeding season group is developing a research design to document the effect of land use change and to determine which forest management methods benefit the species. The non-breeding season group, El Grupo Ceruleo, is gathering information on the winter range of the cerulean warbler by developing a network of observers and conducting an analysis of habitat in South America.

In March 2003, El Grupo Ceruleo, which includes scientists from both the breeding and non-breeding ranges, met in Ecuador to discuss the conservation of the cerulean warbler and other migratory and resident Neotropical birds and to outline research needs. The USDA Forest Service and the Nature Conservancy provided funding for South American biologists to conduct new research on cerulean warblers in winter 2003 and winter 2004.

Research findings in North America confirm habitat loss as the main reason for the decline of cerulean warbler populations. Studies also found a growth in populations of cerulean warblers in areas where forests are regenerating. "We have some evidence that we can regenerate and manage forests to create or improve habitat for the cerulean warbler," says Hamel, "but we need to act quickly and throughout the bird's range." ▲

Awards

John Vozzo was awarded the Secretary of Agriculture Honor Award (Plow Award) by the U.S. Department of Agriculture in Washington, DC for Heroism and Emergency Response (Afghanistan Reconstruction Team) as senior advisor for U.S. Army in Afghanistan.

Aquatic and Terrestrial Fauna Team (all staff) was awarded the Station Director's Award, 2003, Maintaining and Enhancing Natural Resources for their work on the biology and ecology of aquatic and terrestrial animals, especially warm water fish, freshwater mussels, and neotropical birds. Their work has resulted in a number of peer-viewed publications.

Linda Gayle Henderson was awarded the Director's Excellence in Business Operation Support Award by the Southern Research Station for developing, implementing, and the continuing expansion of a Distributed Budget Management Computer System used by the Center for Bottomland Hardwoods Research, Stoneville, MS to track budget allocations and unit expenditures, as well as manage soft money accounts. ▲

Prescribed Burning in Southern Appalachian Ecosystems

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Land managers in the Southern Appalachian region increasingly use prescribed fire to reduce fuel loads and restore ecosystem structure and function. Some studies suggest that fire regenerates hardwoods and enhances biological diversity when applied to certain forest cover types. While these limited studies provide evidence of the potential benefits of fire, little information is available on the long-term use of fire in Southern Appalachian ecosystems.The SRS unit at the Coweeta Long-Term Ecological Research Site has started a long-term study on the history of fire in the region by conducting experiments on how fire affects current ecosystems and gathering information from Native Americans on their past use of fire to shape the Southern Appalachian landscape.

During the winter season, SRS researchers set fires on three distinctly different sites to look at the effects of a single dormant season fire on key ecosystem components. They took measurements to evaluate the effects of prescribed fire on carbon and nutrient cycling, water quality, and vegetation dynamics. Results showed more benefits than detriments from the one-time burning. In shortleaf pine / mixed-oak forests, for example,

There is very little information about the use of prescribed burning in the Southern Appalachian Mountains before the arrival of the European settlers.

USDA Forest Service photo

prescribed burning resulted in no changes to soil solution chemical, stream chemical, or stream sediment concentrations. There was no significant change in the diversity of trees and other plants in the different levels of the forest after the prescribed fire. Although fire reduced the overall amount of woody species in the midstory, researchers found a higher density of fire-sensitive hardwoods, which sprouted prolifically after the burn.

To develop reference points for prescribed burning, the unit documented both historical and contemporary information on Native American fire regimes. The Eastern Band of the Cherokee, the remaining Native American inhabitants of the area studied, has maintained historical knowledge through oral history or "traditional ecological knowledge," so the first task was to interview Cherokee tribe members about traditional land practices. Interview participants spoke at length about Cherokee burning practices, revealing significant historical uses of fire.

A second initiative examined a wide range of State and Federal records of fire events in the Southern Appalachian region. Sources for the period from 1880 to present included the 10th United States Census (1880), National Forest Service records, the J.S. Holmes surveys (1909 to1912)%as well as the first published study to focus specifically on forest fires in North Carolina, written by W.W. Ashe in 1895. SRS researchers also compiled a record of 15,000 fire events that occurred on State and federal lands of the region during the 80-year period from 1920 to 2000. The records and other accounts reveal the period from 1880 to 1911 as one of comprehensive political reform that, coupled with the rise of regional railroad service and heavy timber harvesting, completely transformed the southern Appalachian fire regime. ▲

How Prescribed Burning Affects Small Wildlife

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Common fuel reduction practices such as thinning and prescribed burning have definite effects on forest wildlife habitat. Changes

SRS is part of a national study on how fuel reduction practices affect bird, reptile, amphibian, and rodent communities.

USDA Forest Service photo

in the amounts of standing and fallen trees, leaf litter, tree canopy cover, and in the height and cover of shrubs and small trees all have the potential to affect wildlife populations and community composition.

The Green River Gamelands located in Polk County, NC, is one of 13 study sites for a national study on how fuel reduction practices—prescribed fire, mechanical thinning, and thinning combined with burning—affect bird, reptile, amphibian, and rodent communities. From 2001 to 2004, researchers from the Bent Creek unit studied wildlife response to fuel reduction treatments on three Green River sites. Each site was divided into four 25-acre sections—one section for each of the three fuel reduction treatments and one section left undisturbed as a control.

Wildlife studies on the Gamelands revealed no significant effects on rodents, reptiles, and amphibians. Researchers trapped, counted, and released a total of 1,037 rodent individuals of eight species and 13 species of reptiles and amphibians. Birds were inventoried using point counts conducted from 2001 to 2004. Total bird abundance was not significantly affected by the fuel reduction treatments, but the number of species increased in sites that had been thinned and burned. Each species of bird responded differently to the treatments, though most were similarly abundant in all of the treatments. Others such as worm-eating warblers and hooded warblers tended to decrease in sites that had been burned, whereas indigo buntings increased in thinned plus burned sites, where many trees had been killed by hotter fires. ▲

Monitoring Forest Bats in the Southeast

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Reliable data on wildlife composition and population trends are essential for managers to assess the effectiveness of conservation activities or to detect actions that may cause population declines. Reliable data, in turn, depends on accurate and efficient inventory and monitoring programs. Long-term inventory and monitoring programs have been established for most North American game species and songbirds, but not for other wildlife groups such as forest bats.

Interest in the conservation and management of forest bats has grown quickly over the past two decades, along with an increasing awareness of the importance of bats to healthy forest ecosystems and concern about the status of North American bat populations. Biologists have been monitoring bat species that roost together in large numbers in permanent structures%such as gray bats and Indiana bats—for decades, but inventory and monitoring programs for solitary or small-group forming bats that roost in trees have not been developed.

The monitoring program on the Sumter National Forest in upstate South Carolina has documented the presence of the Eastern small-footed bat, a species of special concern.

USDA Forest Service photo

In 2002, researchers at the Clemson, SC, unit began testing an inventory and monitoring program for the bats of the Andrew Pickens District of the Sumter National Forest in upstate South Carolina. Mist-netting documented the presence of nine species of bats during the summer maternity season, including two species of special concern (Rafinesque's big-eared bat and the Eastern small-footed bat). To monitor habitat use and activity over time, researchers are placing bat detectors at permanently marked points in over 100 stands representing seven forest types of four age classes. Over the next few years, the unit will sample each point a number of times to determine the minimum number of sites that must be sampled and the minimum number of sampling occasions required—two critical issues for any monitoring program.

Results of this study will be used to design a long-term bat monitoring program for the Andrew Pickens District that could serve as a model for bat monitoring on national forests throughout Region 8. Data from these monitoring programs will help managers determine both the positive and negative impacts of their management on forest bat populations. ▲

Forest Health Conference Held in Arkansas

In June 2004, the USDA Forest Service hosted a summit in Little Rock, AR, where Ann Veneman, secretary of the U.S. Department of Agriculture and other Federal officials announced plans to further the Healthy Forests Initiative in the Southern United States. In two landscape-scale projects on the Ozark-St. Francis National Forest, the SRS upland forest ecosystems unit will partner with universities and State forestry agencies to address infestations of the southern pine beetle and the red oak borer. Another agreement with the National Association of Conservation Districts (NACD) will help reduce wildland fire risks by promoting biomass utilization projects and informing citizens and private landowners about what they can do to protect forests, rangelands, and communities at risk of severe wildfire. ▲

The Forest Health summit held in Little Rock, Arkansas announced new projects on the Ozark-St. Francis National Forest.

USDA Forest Service photo

Two major symposium proceedings edited by SRS researchers were published just before the summit and made available to participants.

R. Kindlund

Upland Oak Ecology

Upland oak ecology symposium: history, current conditions, and sustainability, edited by Martin Spetich

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Drought, oak decline, and red oak borer infestations have precipitated the loss of oaks in the upland forests of the interior highlands of Oklahoma and Arkansas. This loss, combined with the failure of oak to regenerate in many areas, sparked concern among forest scientists about the sustainability of the upland oak ecology in general. The proceedings are the result of a symposium convened in fall 2002 to examine the past, present, and future of upland oak ecosystems. The proceedings provide land managers and research scientists with state-of-the-art information on the ecology, dynamics, development, management, and sustainability of oak forests in the interior highlands. ▲

Ecosystem Management in the Ouachita and Ozark Mountains

Ouachita and Ozark Mountains symposium: ecosystem management research, edited by James Guldin

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In the early 1990s, when the Ouachita National Forest shifted away from the clearcut and plant strategy—historically the pine regeneration system used by the Forest Service—there was very little research on how to naturally regenerate the shortleaf pine native to the Interior Highlands. To fill that need, scientists and land managers established what became known as the Ouachita Ecosystem Management Project, a three-phase research program that included demonstration case studies, replicated stand-level studies, and landscape studies at the watershed scale. In November 1999, a symposium was held in Hot Springs Arkansas, where early results were presented on the development of shortleaf pine and pine-hardwood stands, effects on wildlife species and habitat, management economics, visual quality, arthropod and microbial communities and effects on the water, soil, and cultural resources.

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Researchers from the Nacogdoches, TX, unit and their cooperators authored twelve of the wildlife papers published in the Ouachita symposium. The papers presented early findings on studies conducted as part of Phases II and III of the Ouachita Ecosystem Management Project. During the second phase of the project, researchers monitored breeding bird and small mammal communities and habitat conditions on four untreated pine-hardwood stands and four stands under different pine regeneration treatments. For the third phase, researchers collected data on breeding birds, amphibians, and reptiles and habitat data to develop models that can be used to predict species occurrences using a mix of stand- and landscape-level habitat conditions. ▲

Researchers at the Blacksburg unit helped set up a pallet-to-flooring operation with Oaks Unlimited of Waynesville, NC.

R. Kindlund

Pallets Recycled to Flooring

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Pallets, used by almost every industry to move materials, are made from hardwoods%oak, walnut, and maple%harvested from U.S. forests. Until recycling efforts started about a decade ago, most used pallets ended up in landfills after one use. Nationally, pallets still make up 2 percent of all municipal solid waste and 3 percent of construction and demolition landfill waste.

Over the last decade, the Blacksburg unit has worked with a wide range of cooperators, notably researchers from Virginia Tech University, to demonstrate how pallets can be repaired for reuse or made into new products. Through the electronic Pallet Design System, the unit's research on the strength properties of used pallet parts, repaired pallets, and remanufactured pallets can now be used by the over 200 companies that rebuild pallets from used materials.

Recent SRS work with the Land-of-Sky Regional Council in Asheville, NC, and North Carolina State University takes recycling a step further. Using pallets from landfills and pallet recycling businesses, the cooperators helped set up a pallet-to-flooring operation with Oaks Unlimited of Waynesville, NC. The imperfections of the used wood, which give the flooring a rustic look and show that it is really a recycled product, have actually become a drawing point for designers and homeowners. The pallet product is comparable to any other high-end flooring and can be sold at around $5 a foot, adding $1 to $2 to the price for pallets used for repair. The labor and capital costs for setting up a pallet-to-flooring business are relatively low, and production costs comparable with other high-end flooring. ▲

Mountain biker at Bent Creek Experimental Forest.
USDA Forest Service photo

Oriental bittersweet (*Celastrus orbiculatus*), an Asian native introduced to the United States in the mid-1880s, can overrun native plants and trees in much the same way as kudzu.
Z. Hoyle

This summer, individuals and volunteers from a wide range of organizations helped to remove oriental bittersweet from experimental plots on the Bent Creek Experimental Forest.
Z. Hoyle

Other Significant Accomplishments:

- Worked with mountain bikers to clarify which trails on experimental forest are open for recreation use; developed maps and other information resources

- Worked with community and agency volunteers to remove oriental bittersweet from study sites on experimental forest

- Developed regional map of ecological zones using geographic information system that is a realistic depiction useful to resource managers for assessment and project planning

- Published a summary of regeneration potential as assessed by a multispecies model for selected forested stands on the Cumberland Plateau of north Alabama

- Published findings from the southeastern Piedmont as part of the National Fire and Fire Surrogate Study ▲

Ecosystem Restoration, Longleaf Pine, and Fire Effects in Florida

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Florida's wildfires in 1998 painfully illustrated a serious problem that has been occurring throughout the South. Forest fuel accumulations and just the right set of conditions wreaked havoc on thousands of acres of public, private, and commercial land. Timber losses alone that summer exceeded $300 million and the cost of fire suppression was over $130 million. For more than 2 months Interstate and other highways were closed. Massive evacuations disrupted the lives of residents across northeast and east-central Florida.

But those wildfires brought an almost unprecedented opportunity for study of the effects of widespread, catastrophic fire. It was long assumed that fuel treatments would have little effect in reducing fire severity or tree mortality. Fire scientists with the Forest Service worked with a wide range of cooperators in a study to test the effectiveness of a regular prescribed burning program in reducing mortality of southern pines when wildfire burns through those forests. They also looked at the efficacy of herbicide treatments in reducing tree mortality from wildfires and at the effects of select-cut salvage harvest.

The 25,000-acre wildfire on Florida's Osceola National Forest caused considerable mortality, affecting all trees in those areas where wildfire occurred under the most extreme conditions. No areas in any of the study's sampled stands were unburned, so this was not a case of random areas escaping the wildfire. Areas that had been treated with prescribed fire before that summer suffered losses less than 40 percent overall, and mortality

Prescribed burning reduces the size of wildfires.
USDA Forest Service photo

rates declined even more in areas that had been more recently treated. On the Tiger Bay State Forest, tree mortality was 55 percent in plantations that had not been burned for 6 years, and 61 percent in natural stands where the last burn occurred from 3 to 6 years prior. The scientists concluded that a regular prescribed burning program will not only reduce the risk of wildfire but also tree mortality when wildfire does occur.

Conversely, on the Lake Butler Forest, where prescribed fire had not been used, mortality averaged 89 percent in plantations. Those stands had been treated with herbicides not quite 2 years before, but such treatment only removes the woody understory fuels—and then only after a couple of years. Needles and other fine fuels remain on the forest floor, and under severe drought conditions high mortality results from root and cambial damage. This research showed that while herbicides may be an efficacious substitute for prescribed burning most years, significantly higher tree mortality in areas so treated is likely during a year of severe drought.

Land managers have long known that prescribed burning reduces the size of wildfires by facilitating their rapid control. Rigorous monitoring of tree-crown mortality and its effect on survival has brought additional knowledge of fire's effects. Research conducted in Florida has made it clear that losses of timber and wildlife habitat can be significantly reduced by treating landscapes regularly with prescribed burns—even after severe wildfires have occurred. The research also has provided guidance for selecting trees for salvage harvest, and for retention of those trees as a viable element of wildlife habitat.

In addition, research efforts in Florida have allowed communities and public land managers to explore and consider the value of restoring and maintaining longleaf pine ecosystems, which in pre-Colonial times extended throughout the southern Coastal Plain. Natural resource professionals now will be better able to design a prescribed burning program that will most efficiently and cost effectively move forests toward desire future conditions, in some areas restoring the longleaf pine ecosystem. The knowledge gained in these flatwoods systems will enable managers to conduct a regular prescribed burning program—on a 3- or 4-year cycle—that will help keep fuel loads at a level allowing most stands to survive severe wildfire.

In pre-Colonial times, stands of longleaf pine extended throughout the southern Coastal Plain.
USDA Forest Service photo

Research on the restoration of longleaf pine ecosystem also has continued in other areas across the South. At Fort Benning, Georgia, preliminary observations suggest that mechanical methods are effective means for rapidly altering forest stand structure to minimize midstory "fire ladders" and transform this vegetation layer into woody debris on the forest floor that can be safely burned by ground fires without excessively endangering overstory trees. The relatively rapid regrowth of mechanically-treated understory vegetation indicates that repeated periodic burning will be necessary to maintain the generally open structure of such rehabilitated forests and lessen the wildfire hazard posed by midstory growth.

In the Fire and Fire Surrogates Study at Myakka River State Park, Florida, initial observations indicate that saw-palmetto, the principal and most dangerous understory and midstory fuel in this ecosystem, cannot be effectively reduced by fire-only treatments. Rather, prescribed burning must be followed by some type of mechanical treatment and / or other vegetation management treatments to achieve any substantial reduction in palmetto dominance, and thus wildfire risk abatement.

On the Escambia Experimental Forest near Brewton, Alabama, as well as the Blackwater River State Forest (Crestview, Florida) and Goethe State Forest (Gainesville, Florida), a study is underway to present an operational-scale demonstration of various silvicultural methods for effectively regenerating and sustaining longleaf pine forests. The Florida Division of Forestry has funded the work in its State. Researchers report that the study will provide forest managers with information crucial to the successful short-term and long-term management of longleaf pine ecosystems. ▲

Pathogens

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Bark beetles are the most destructive biological force in North American forests. They carry fungi capable of killing or damaging trees, but landowners and managers have had little knowledge of the roles these fungi play in beetle biology.

Earlier research has shown that wasps parasitize southern pine beetles, and that they are attracted to the smell of the fungi carried by these beetles. Fungi competing with southern pine beetle for tree tissue contribute to the collapse of beetle populations. Fungi that benefit southern pine beetles compete with fungi that harm the beetles, and this is affected by the water status of the tree. Root beetles associated with loblolly pine decline produce more offspring when they carry pathogenic fungi into the roots with them. And finally, less-aggressive bark beetles are also affected by the fungi they carry. This research contributes directly to the issue of sustainable southern pine ecosystems and native invasive insects. Non-native insects likely have similar interactions with fungi.

Research is underway to improve models of bark beetle population growth and decline, which will help managers control this costly pest.

USDA Forest Service photo

Forest pathogens take a heavy toll in southern forests.

USDA Forest Service photo

Ongoing research is now and will continue to be key to improving models of bark beetle population growth and decline. These models should give forest managers more accurate means for predicting beetle activity and the need for management practices. In addition, work on loblolly pine decline based on this research is producing spatially explicit models of risk of this important disease and leading to better informed, on the ground management decisions. ▲

Habitat

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The red-cockaded woodpecker is a cooperative breeder that excavates cavities in live pines for nesting and roosting. Cavities are a rare resource because they take a long time to excavate. Often there are few suitable pines available, and understanding the characteristics necessary will be necessary for the recovery of this endangered species. Sustaining the productivity of southern pine ecosystems will require understanding of factors influencing cavity selection by red-cockaded woodpeckers because this species creates cavities used by a host of other species inhabiting southern pine forests.

The accumulated resin flow from cavities trees used by red-cockaded woodpeckers creates a barrier that prevents rat snake predation on eggs and nestlings.

USDA Forest Service photo

Diterpene acids in active natural-cavity trees (selected by red-cockaded woodpeckers) were roughly 20 percent greater than in reference pines, or in pines where biologists had installed artificial cavities.

USDA Forest Service photo

Researchers have been studying characteristics of pine resin in red-cockaded woodpecker cavity trees for about 15 years. In cooperation with the National Forests and Grasslands in Texas, the Division of Science, Medaille College in New York, and the Arthur Temple College of Forestry, Stephen F. Austin State University, Forest Service scientists in Nagadoches, Texas, examined resin chemistry in loblolly and shortleaf pines selected as cavity trees by red-cockaded woodpeckers. The bird pecks small wounds on cavity trees from which fresh resin flows, and the accumulated resin flow creates a barrier that prevents rat snake predation on eggs and nestlings. The researchers

wanted to determine whether pines with special resin chemistries are important to the woodpecker. They sampled resin from (1) pines selected by red-cockaded woodpeckers, in which naturally excavated cavities were in use; (2) pines selected by forest biologists, in which artificial cavity inserts had been placed and where red-cockaded woodpeckers resided; and (3) reference pines of similar age and appearance to both kinds of active cavity trees.

If woodpeckers are causing a change in resin chemistry by excavating resin wells, this change should appear in active cavity trees, whether selected by woodpeckers or by biologists, but not in control pines. If woodpeckers are selecting pines that have specific resin chemistry, concentrations of some resin components in active cavity trees selected by the woodpeckers for natural cavity excavation should be different from both control pines and pines selected by biologists. The scientists found that diterpene acids in active natural-cavity trees (selected by woodpeckers) were roughly 20 percent greater than reference pines and pines wherein biologists had installed artificial cavities. This finding indicated that the woodpeckers are selecting pines with special resin chemistries. The pecking of resin wells by red-cockaded woodpeckers did not affect the composition of cavity tree resin.

Scientists also examined the effects of forest management, habitat fragmentation, and road systems on snakes and other herpetofauna, as well as threatened, endangered, and sensitive species. More specifically, on the Davy Crockett National Forest and Stephen F. Austin Experimental Forest they conducted experiments to determine the effect of climate on anuran (frog and toad) communities.

In ecological communities, breeding activity can be influenced by abiotic factors, such as rain and temperature, although each species will respond in its own way. Because there are similarities and differences among species, there may be patterns among groups of species that determine the makeup of assemblages breeding at the same place and time. Some species may be highly correlated to abiotic conditions while others may be more generalized. Abiotic mechanisms that regulate breeding activity were examined in a community of 13 anuran species in eastern Texas.

Initially, seasonal patterns of anuran calling behavior were explored using automated recording devices, termed frogloggers. Each species in the assemblage was assigned to one of five functional groups or breeding strategy categories based on their calling phenology and response to environmental variables.

Enormous variation was found among species in calling activity and response to changes in weather and season, and research results were highlighted in feature articles appearing in a couple of important local periodical publications. Because climate change is a topic of increasing concern within the scientific community, this unique long-term dataset may be of particular interest to both scientists and land managers. For example, these data can be used as the basis for models that can predict effects of global climate change on anuran and other natural communities to meet theoretical as well as applied objectives. ▲

Utilization

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Ever-increasing human populations and the resulting demand for wood in the form of lumber and timbers, have resulted in a scarcity of tree-length logs suitable for transmission and distribution poles. The trend has intensified in recent years by the emphasis of shorter-rotation timber management practices involving plantation forests. With the increase in small diameter trees being harvested from plantation forests and increasing proportions of juvenile wood, the wood-pole industry faces rising costs and diminishing market share. Power and communications companies have tried to find satisfactory substitutes for preservative-treated solid wood poles in recent years, and the result has been objective research to provide a viable alternative.

Over the last 40 years a number of developments have shown that wood laminated composite poles (LCP) could provide one of the best solutions. The LCP is light and offers a desirable strength performance. However, concerns over the long-term service durability and structural stability persist. So far, the performance / cost factor has not yet discouraged commercialization. Nonetheless, interest in research to further improve LCP production has continued. In cooperation with Auburn University and Louisiana State University, a Forest Service scientist in Pineville, Louisiana, is focusing on biomimicry to produce bamboo structural features in a durable product form.

The research entails soaking pine lumber in a 15-percent concentration of isocyanate in acetone solution for 30 minutes under atmosphere pressure, and then hot-pressing it at 180 °C for 10 minutes—a process that is used to investigate the effect of surface compression on strength properties. The bending strength and stiffness of southern pine lumber increased more than 31 percent and 19 percent, respectively; and at 17 percent compression they increased more than 47 percent and 31 percent, respectively, over the same qualities in control lumber. The scientist reports that resin impregnation and surface compression may be the most suitable methods for reinforcing the product—a hollow wood composite pole (HWCP). Further investigation has produced information that may be very useful in determining experimental parameters and improving product development and manufacturing processes.

A theoretical model has also been developed to facilitate the manufacture, installation and maintenance of the HWCP. The fabrication of the final bamboo-like HWCP that has inserted reinforced disks distributed along it length axis (i.e., acting like the nodes in the bamboo), horizontal density variation via surface densification through heat and pressure, and the surface treated with resin impregnation are ongoing. It is expected that bamboo-like HWCP will be light-weight, which would reduce shipping costs and ease installation logistics. It would be variable in shape and dimension; able to utilize low-value raw materials; and highly efficient in the utilization of natural resources. By combining the advantages of both wood and bamboo, development of HWCP as a viable alternative to solid poles in the transmission and telecommunication markets may be possible—thereby reducing the harvest pressure on forests and improving the conservation of renewable natural resources. ▲

Other Significant Accomplishments

- Characterized within-tree variability of chemical, physical, and mechanical properties of loblolly pine
- Determined effect of various silvicultural treatments on important variable necessary for tree improvement programs
- Determined optimal refining level for various levels of mature and small-diameter loblolly pine for the manufacture of structural fiberboard products
- Determined the VOC's released during the kiln drying of softwood lumber
- Determined various chemical constituents for increased bark utilization for inner, outer, and whole bark fractions
- Developed a novel technique for the rapid assessment of material properties for clear wood and increment cores. Allow for the acquisition of vast amounts of data in a very short time. This is being used in conjunction with a tree improvement study
- Developed a field-portable rapid assessment technique for characterization of type and retention levels of preservative-treated wood
- Quantified resin distribution in and penetration of resin on individual wood fibers. This is useful for more efficient use of adhesive and for the production of superior structural fiberboard products
- Determined the effect of corona discharge on the surface properties of fibers

- Determined the effect of various surface modifications on finished composite products
- Used super-critical water extraction techniques to remove CCA from spent CCA-treated wood
- Helped to develop and characterize composites using a PMDI / UF resin system ▲

Awards

Chung Hse was awarded the Chief's Outstanding Scientist of the Year for his continued level of productive, relevant research for the entire USDA Forest Service.

Leslie Groom was awarded the L.J.Markwardt Wood Engineering Research Award by the Forest Products Society for his distinguished contribution to the knowledge of wood as an engineering material and to the enhancement of the efficient utilization of this renewable resource.

Dana Nelson and Nurul Faridi (with Dan Peterson, Mississippi State University) were the NSF Grant Awardees, Plant Genome Section by the National Science Foundation (NSF). They were awarded a $1.6 million, 3-year grant to investigate the genome structure of loblolly pine (*Pinus taeda*).

Craig Echt and Dana Nelson were awarded U.S. Patent No. 6,733,965 and New Zealand Patent No. 512941 by USPTO and New Zealand PTO for Microsatellite DNA Markers and Uses Thereof.

Jennifer Myszewski received PhD in Forest Genetics from Texas A&M University for her terminal research degree in forest genetics with dissertation title "A Comparison of Selection and Breeding Strategies for Incorporating Wood Properties into a Loblolly Pine (*Pinus taeda* L.) Elite Population Breeding Program." ▲

Appendix–

Budget and Work Units

2004

FY04 Initial Allocations to Resource Categories

Plant Science	$2,357,271
Silvicultural Applications	3,863,179
Quantitative Analysis	1,111,550
Forest and Ecology	6,151,432
Forest Operations Engineering	917,277
Insects / Diseases / Exotic Weeds	4,854,493
Fire Science	1,62,401
Terrestrial Wildlife	1,836,775
Aquatic Habitat	1,048,955
Watershed	1,413,634
Atmospheric Sciences	649,302
Economics	1,752,285
Riparian	950,823
Social / Cultural, Recreation, Wilderness	806,143
Urban Forestry	137,597
Forest Products, Utilization, and Processing	2,569,944
Forest Inventory and Analysis	14,105,000
Monitoring Methods / Applications	599,940
Total	$46,288,000

FY04 Initial Allocations to Research Work Units

4101	Southern Appalachian Forests, *Asheville, NC*	$1,771,000
4103	Center for Forested Wetlands, *Charleston, SC*	1,205,000
4104	Disturbance of Southern Pine Ecosystems, *Athens, GA*	1,814,000
4105	Vegetation Management and Longleaf Pine, *Auburn, AL*	1,169,000
4106	Upland Forest Ecosystems, *Monticello, AR*	1,768,000
4111	Even-aged Management of Southern Pines, *Pineville, LA*	1,639,000
4153	Southern Institute of Forest Genetics, *Saucier, MS*	1,785,000
4154	Biological Foundations of Sustainability, *Research Triangle Park, NC*	2,312,000
4155	Center for Bottomland Hardwoods, *Stoneville, MS*	3,640,000
4201	Endangered (TES) Species, *Clemson, SC*	615,000
4202	Coldwater Streams and Trout Habitat, *Blacksburg, VA*	586,000
4251	Wildlife Habitat and Timber Resource Integration, *Nacogdoches, TX*	1,125,000
4351	Watershed Responses to Disturbance, *Franklin, NC*	1,486,000
4501	Bark Beetles and Invasive Insects, *Pineville, LA*	1,004,000
4502	Wood Products Insect Research, *Starkville, MS*	1,035,000
4505	Insects and Diseases, *Athens, GA*	1,844,000
4701	Southern Forest Resource Utilization, *Pineville, LA*	1,226,000
4702	Tree Quality, Processing, and Recycling, *Blacksburg, VA*	495,000
4703	Forest Operations Research, *Auburn, AL*	1,246,000
4801	Forest Inventory and Analysis, *Asheville, NC, and Starkville, MS*	14,105,000
4802	Legal, Tax, and Economic Influences, *New Orleans, LA*	1,006,000
4803	Forest Health Monitoring, *Research Triangle Park, NC*	334,000
4851	Economics of Forest Resources, *Research Triangle Park, NC*	970,000
4852	Southern Global Change Program, *Raleigh, NC*	1,376,000
4901	Recreation, Urban Forests, and Human Dimensions, *Athens, GA*	732,000
4951	Southern Center for Wildland-Urban Interface, *Gainesville, FL*	0
	Total	$46,288,000

Collaborative Research

Collaborative research and development with universities, private corporations, nongovernmental organizations, and other Federal and State agencies is a cornerstone of the SRS program. These activities involve the funding of extramural studies under cooperative agreements, grants, and interagency agreements. Working with partners is an effective way to leverage our funding to conduct research efforts that benefit a wide range of research results users.

A total of $14,706,295 supported research studies under grants and other agreements in FY04 with the following:

Domestic non-Federal Agreements

Alabama A&M University
Alabama Forestry Commission
Arkansas Forestry Commission
University of Arkansas
Arkansas Tech University
Auburn University
College of Charleston
Clemson University
Duke University
Florida A&M University
Florida Department of Agriculture and Consumer Services
University of Florida
Forest History Society
Forest One, Inc.
Furman University
George Mason University
Georgia Forestry Commission
University of Georgia Research Foundation, Inc.
University of Georgia
Institute of Forest Biotechnology
Kentucky Division of Forestry
University of Kentucky Research Foundation
Louisiana Department of Agriculture
Louisiana State University
Louisiana Tech University
University of Maryland Biotechnology Institute
Michigan Technological University
University of Minnesota
Mississippi State University
University of Mississippi
University of Missouri
Montana Community Development Corporation
National Council for Air & Stream Improvement
University of Nevada
New Mexico State University
North Carolina Department of Environment, Health, and Natural Resources
North Carolina State University
University of North Carolina at Asheville
Northern Arizona University
Oklahoma State University
Oregon State University
Pinchot Institute for Conservation
Sherry Barrow Strategies
Society of American Foresters
South Carolina Forestry Commission
Southern Forest Research Partnership
Southern Illinois University
University of Southern Mississippi
Stephen F. Austin State University
Tennessee Department of Agriculture
University of Tennessee
Texas Agricultural Experiment Station
Texas Forest Service
University of Toledo
Tuskegee University
United States Biosphere Association
Virginia Department of Forestry
Virginia Polytechnic Institute & State University
Washington State University
Western Carolina University
Western Forestry and Conservation Nursery Association
University of Wisconsin

Collaborative Research

A total of $41,500 supported research studies under grants and cooperative agreements in FY04 with the following:

International

El Colegio de la Frontera Sur (ECOSUR)
Forest Research Institute
Research Institute of Forestry

Interagency Agreements

A total of $511,429 supported research studies under interagency agreements in FY04 with the following:

CASU, South Carolina
CASU, Atlanta
General Services Administration
U.S. Army Corps of Engineers
USDA Agricultural Research Service
USDA National Finance Center
U.S. Department of the Interior
USDI Fish and Wildlife
USDI Geological Survey
U.S. Office of Personnel Management

External Funding

Many research work units have agreements to receive external funding from other sources. The SRS received $3,901,328.20 from other Federal and non-Federal sources to support research and development projects designed to meet the missions of the cooperators involved.

Non-Federal Cooperators

University of Georgia
BASF Corporation
Michigan Functional Genomic Network
University of Arkansas Foundation
Syngenta
MACTEC
Southern Forest Resource Assessment Consortium
Dow AgroScience
National Council for Air and Stream Improvement Inc. (NCASI)
Dupont
Bayer Corporation
Louisiana National Guard
University of Vermont
Stephen F. Austin State University
Duke University
Canadian Forest Service
Florida Division of Forestry
Clemson University
Plum Creek Timber Company
International Paper
MeadWestvaco
Temple Inland
Louisiana Department of Wildlife and Fish
Gulf States
California Department of Parks and Recreation
Arvesta Corporation
FMC Corporation
Landis Corporation
Commonwealth of Virginia
Dartmouth
North Carolina State University
University of South Carolina
Wisconsin Department of Natural Resources
Control Solutions
Arkansas Fish and Game
United Phosphorus, Inc.

Federal Cooperators

USDI Fish and Wildlife
USDI National Park Service
U.S. Army Corps of Engineers
Strategic Environmental Research and Development Program (SERDP)
USDA Animal and Plant Health Inspection Service (APHIS)
USDI Bureau of Land Management
National Oceanic and Atmospheric Administration (NOAA)
U.S. Army Infantry, Fort Benning
Joint Readiness Center, Fort Polk
Department of Energy
USDI Geological Survey ▲

Research Work Unit Directory

SRS-4105, Vegetation Management and Longleaf Pine; and SRS-4703, Forest Operations Research, are located at:

G.W. Andrews Forestry Sciences Laboratory
520 Devall Drive
Auburn, AL 36849
334-826-8700
Web site for SRS-4105:
http://www.srs.fs.usda.gov/4105/index.html
Web site for SRS-4703:
http://www.srs.fs.usda.gov/forestops/

SRS-4106, Upland Forest Ecosystems, is located at:

Forest Resources Building, Room 114
University of Arkansas at Monticello
P.O. Box 3516, UAM Station
Monticello, AR 71656-3516
870-367-3464
Web site for SRS-4106:
http://www.srs.fs.usda.gov/4106/

SRS-4104, Disturbance of Southern Pine Ecosystems; SRS-4505, Insects and Diseases; and SRS-4901, Recreation, Wilderness, and Demographic Trends, are located at:

Forestry Sciences Laboratory
320 Green Street
Athens, GA 30602-2044
706-559-4222
Web site for SRS-4104:
http://www.srs.fs.fed.su/disturbance/
Web site for SRS-4505:
http://www.srs.fs.fed.su/4505/
Web site for SRS-4901:
http://www.srs.fs.usda.gov/trends/

SRS-4951, Center for Southern Wildland-Urban Interface Research and Information is located at:

Bldg 164 Mowry Road
University of Florida
P.O. Box 110806
Gainesville, FL 32611-0806
352-376-3213
Web site for SRS-4951:
http://www.interfacesouth.org/

SRS-4802, Legal, Tax, and Economic Influences, is located at:

701 Loyola Avenue; Rm 10034
New Orleans, LA 70113
504-589-6651
Web site for SRS-4802:
http://www.srs.fs.usda.gov/4802/

SRS-4111, Southern Pine Forests, SRS-4501; Bark Beetles and Invasive Insects; and SRS-4701, Southern Forest Resource Utilization, are located at:

Alexandria Forestry Center
2500 Shreveport Highway
Pineville, LA 71360
318-473-7216
Web site for SRS-4111:
http://www.srs.fs.usda.gov/4111/
Web site for SRS-4501:
http://www.srs.fs.usda.gov/4501/
Web site for SRS-4701:
http://www.srs.fs.usda.gov/4701/

SRS-4153, Southern Institute of Forest Genetics, is located at:

Harrison Experimental Forest
23332 Highway 67
Saucier, MS 39564
228-832-2747

SRS-4502, Wood Products Insect Research, is located at:

201 Lincoln Drive
Starkville, MS 39759
662-338-3100
Web site for SRS-4502:
http://www.srs.fs.usda.gov/termites/

Research Work Unit Directory

SRS-4155, Center for Bottomland Hardwoods, is located at:

Southern Hardwoods Laboratory
P.O. Box 227
Stoneville, MS 38776-0227
662-686-3178
SRS-4155 Web site:
http://www.srs.fs.usda.gov/cbhr

SRS-4101, Southern Appalachian Forests, is located at:

Bent Creek Experimental Forest
1577 Brevard Road
Asheville, NC 28806
828-667-5261
SRS-4101 Web site:
http://www.srs.fs.usda.gov/bentcreek/

SRS-4351, Watershed Responses to Disturbance, is located at:

Coweeta Hydrologic Laboratory
3160 Coweeta Lab Road
Otto, NC 28763
828-524-2128
SRS-4351 Web site:
http://coweeta.ecology.uga.edu/

SRS-4852, Southern Global Change Program, is located at:

920 Main Campus Drive
Venture Center II, Suite 300
Raleigh, NC 27606
919-515-9489
SRS-4852 Web site: http://www.sgcp.ncsu.edu/

SRS-4154 Biological Foundations of Sustainability; SRS-4803, Forest Health Monitoring; and SRS-4851, Economics of Forest Resources, are located at:

Forestry Sciences Laboratory
3041 E. Cornwallis Road
P.O. Box 12254
Research Triangle Park, NC 27709
919-549-4000
SRS-4154 Web site:
http://www.srs.fs.usda.gov/soils/soilhome.htm
SRS-4803 Web site:
http://srs.fs.usda.gov/4803/index.html
SRS-4851 Web site:
http://www.srs.fs.usda.gov/econ/

SRS-4103, Center for Forested Wetlands, is located at:

Center for Forested Wetlands Research
2730 Savannah Highway
Charleston, SC 29414
843-769-7000
SRS-4103 Web site:
http://www.srs.fs.usda.gov/charleston/

SRS-4201, Threatened and Endangered Species, is located at:

Department of Forest Resources
233 Lehotsky Hall
Clemson University
Clemson, SC 29634-1003
864-656-3284
SRS-4201 Web site:
http://www.srs.fs.usda.gov/4201/

SRS-4801, Forest Inventory and Analysis, is located at:

Southern Research Station
4700 Old Kingston Pike
Knoxville, TN 37919
865-862-2027
SRS-4801 Web site: http://srsfia2.fs.fed.us/

SRS-4251, Wildlife Habitat and Timber Resources Integration, is located at:

Wildlife Habitat and Silviculture Laboratory
Box 7600, SFA Station
506 Hayter Street
Nacogdoches, TX 75965
936-569-7981
SRS-4251 Web site:
http://www.srs.fs.usda.gov/wildlife/index.html

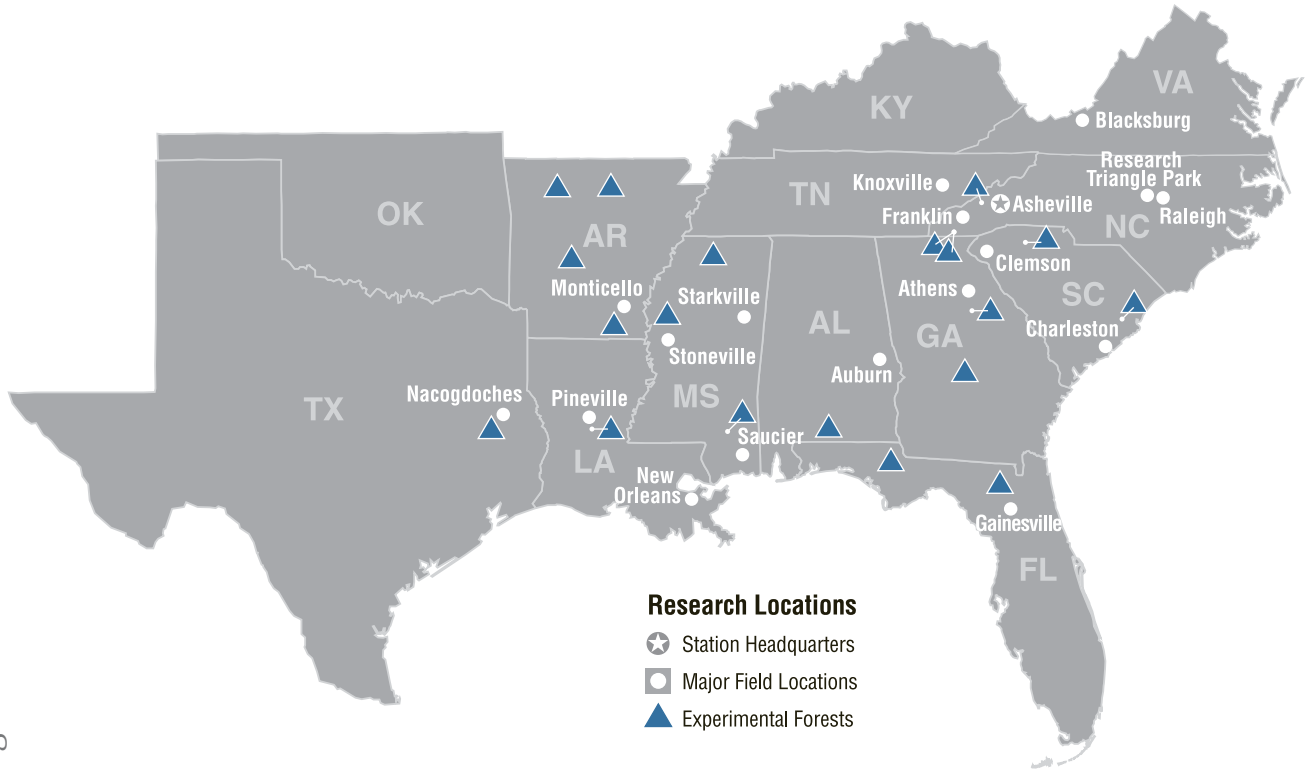
SRS-4202, Coldwater Streams and Trout Habitat; and SRS-4702, Tree Quality, Processing, and Recycling, are located at:

1650 Ramble Road
Blacksburg, VA 24060-0503
540-231-4016
SRS-4202 Web site:
http://www.trout.forprod.vt.edu/
SRS-4702 Web site:
http://www.srs4702.forprod.vt.edu/

Experimental Forests

The Station maintains 19 experimental forests located on or near National Forest System lands. Scientists use these as sites for their studies and demonstration projects in conjunction with the managing national forest unit. Experimental forests are designated to represent a specific ecosystem or forest type, and to present opportunities for the study of different approaches to sustaining forested ecosystems. Several of the experimental forests in the South were selected for their potential to demonstrate rehabilitation of deteriorated farm forests and soil resources that occurred during early European settlement and plantation farming of the region.

Among the experiments conducted on these forests are studies on stand management and regeneration; restoration of wildlife and plant populations; watershed management; fuels reduction; and the effects of pollution, climate change, and timber harvest. Many experimental forests also provide educational and nonmotorized recreation activities, including interpretation to enhance public understanding of forest management principles. Research on experimental forests plays a vital role in the conservation of America's natural resources.



Experimental Forests

State	Experimental Forest	National Forest	Acres	Date Established
Alabama	Escambia	(private)	3,000	06/14/61
Arkansas	Alum Creek	Ouachita	4,659	04/02/59
	Crossett	Ouachita	1,680	08/27/34
	Henry R. Koen	Ozark	720	09/17/51
	Sylamore	Ozark	4,292	03/28/34
Florida	Chipola	Federal/Leased	2,760	06/21/61
	Olustee	Osceola	3,500	03/28/34
Georgia	Hitchiti	Oconee	4,602	12/04/61
	Scull Shoals	Oconee	4,500	09/17/38
Louisiana	Palustris	Kisatchie	7,515	07/19/35
Mississippi	Delta	(private)	2,600	06/14/61
	Harrison	DeSoto	4,111	07/19/34
	Tallahatchie	Holly Springs	4,569	04/12/50
North Carolina	Bent Creek	Pisgah	5,242	06/25/27
	Blue Valley	Nantahala	1,200	06/23/64
	Coweeta	Nantahala	5,482	03/28/34
South Carolina	John C. Calhoun	Sumter	5,082	10/08/47
	Santee	Francis-Marion	6,000	07/06/37
Texas	Stephen F. Austin	Angelina	2,560	09/19/45

Administration

Civil Rights

The Southern Research Station Civil Rights principles are integrated into all aspects of Station operations, including Business Process Reengineering and the FS Strategy of Improving Organizational Effectiveness.

The Civil Rights Program operates on the premise that maintaining a healthy and respectful relationship with coworkers is a responsibility of each employee at every level within the Southern Research Station. This year the Station Director reinforced the Station's Human Rights Perspective—a statement of the values and principles he expects employees to hold regarding "the way we work" and "the way we treat each other." This Perspective is conveyed in pocket cards, posters, and the words and actions of Station Management, and has been especially important in the extremely sensitive environment surrounding the pending Agency organization changes.

The Station has made significant advances in service delivery to American Indians across the United States. A remarkably productive approach to bringing Native Americans in the West into the mainstream of reforestation and restoration technology was recognized by the Washington Office this year. And, Station leaders have recently held talks with leaders of the Poarch Creek Bank, the only Federally recognized tribe in Alabama, to develop a greenhouse facility to be used for training and education, and for production of longleaf pine and other native species of interest.

Full commitment to the Forest Service Procurement Preference Program goals continued in FY 2004. Substantial achievements were seen in Small Business contracts (91%), and goals in Small, Minority disadvantaged, Disabled Veteran-Owned Small business, and other categories were met. The SRS and Eastern Administration Zone partners contributed 15.5% of its contracting dollars to American Indian contractors during the first three quarters of FY 2004.

Multicultural Workforce Strategic Initiatives (MWSI)

FY04 was an exciting year for the Florida A&M University MWSI. Program highlights included 15 students employed at various locations throughout the Forest Service through the Student Career Employment Program and the Student Temporary Employment Program. Graduating senior Terry Baker was recognized at the University of Florida 2004 graduating ceremonies with numerous awards, including the Florida Society of American Foresters Graduating Senior Award; School of Forest Resources and Conservation Outstanding Student Award; Conde Memorial Award for his native plant study; and the Newins-Ziegler Leadership Award. Additionally, FAMU students attended several professional development conferences. Conference attendance included four Forestry students attending the Society of American Foresters meeting in Edmonton Alberta, Canada; five students attending the MANRRS Conference in Des Moines, IA; and one student attending the 58th Annual Conference of the Southern Association of Fish and Wildlife Agencies in Hilton Head, SC.

The MWSI Program at Alabama A & M University (AAMU) provided financial support to 25 students during FY04. While this USDA Forest Service Initiative primarily exists to attract and recruit high quality African-American students for the future agency workforce, young men and women from other cultural backgrounds – Hispanic and Native American — participated in the program. Even though forestry is viewed as a predominately male occupation, the AAMU program consisted of 10 young women. Students

successfully completed work assignments with the Forest Service in Alaska, California, Washington, Oregon, Wisconsin and several southern States – Alabama, Arkansas, Texas, and West Virginia.

We continued our efforts in Conservation Education this summer, providing orientation training for four teams of college interns. The SRS hosted one team working out of Tallahassee, FL. The CE team conducted environmental education activities at camps, schools, parks, and the Cherokee Reservation for urban and rural children who have little opportunity to experience outdoor activities in natural settings. The team visited over forty sites in seven states providing conservation education to over 2,000 kids. Of special note this year was the program the interns did at Camp ASCCA in Jackson Gap, AL which is a camp for kids with special needs. The day the team was there, the camp was hosting kids with MS. The four teams reach several thousand youngsters each year with messages of conservation and care for the land and resources, while having a fun experience. This intern program also is a source of diverse candidates for Federal natural resource jobs.

Acquisition and Property Management

Streamlined Systems and Processes

The Eastern Administrative Zone (EAZ) Acquisition Management collaborated with Station Engineering, National Forests (NFs) in North Carolina Engineering / Lands and Recreation staff areas, and the Francis Marion and Sumter NFs Engineering to establish Indefinite Delivery / Indefinite Quantity (IDIQ) construction contracts, using existing "best practices", resulting in considerable cost and time savings to Station and zone customers. The IDIQ Construction Contracts were the Agency's first approved contracts of their type, developed specifically for Forest Service work.
Impacts – the construction IDIQs have:

- Decreased acquisition pipeline time
- Enabled competitive awards of projects totaling $6 million on a "best value" basis
- Increased communication among internal stakeholders and interaction with industry partners
- Heightened stakeholder understanding of planning interdependencies and constraints
- Improved the quality of work delivered to the customer through benchmarking, market research,and past performance screening

Financial Accountability

- Revised the Internal Process Control Plan for the Eastern Administrative Zone to reflect compatibility and joint quality and service initiatives for both the Southern Region and the Southern Research Station. The plan will be the primary vehicle to ensure compliance with mandatory Federal, USDA, and Forest Service requirements and will improve internal controls across the requirements "spend chain"

- Supported WO AQM Internal Process Control functions by serving as a member on the team for the AQM oversight visit to Region 9. Supported this review allowed access and orientation to the new AQM review process that is being implemented for the Agency. The Review Guide has been referred to Region 8 AQM, and will be incorporated into the Southern Research Station Internal Process Control Plan for acquisition

- Provided full and immediate responses to multiple and ongoing audit processes, including numerous short turn-around requests for audit samples. Impact: This was a high visibility work

item for the Agency. However, it was a very high impact item on the group as the sheer volume of original and repeat requests for contract and property documentation was massive. Provided substantial contributions to the Agency's efforts to achieve a second consecutive year's clean financial opinion

• Provided Functional Assistance Visits to Ranger Districts including assessments of compliance with acquisition processes, e.g. purchase card and check writing, and providing "hands on" training and consultation to administrative support personnel at the Districts

• Accomplished Personal and Real Property Physical Inventory goals for both the SRS and NFsNC. Impact: Supported the ongoing real property physical inventory and condition assessment requirements. Supported the requirements for WO provided real property inventory training and certification for both the real and personal inventory procedures

Information Distribution

The Southern Research Station actively reaches out to a broad range of diverse audiences with information dissemination and conservation education efforts. Our Web presence (www.srs.fs.usda.gov) grows in strength continuously and features special sections designed to assist users from forest landowners to Members of Congress. We have developed a "one-stop shopping" approach, called "Treesearch," to provide publications from all the research Stations to users from one main Web page entry point. Currently, there are over 8,500 publications available on the system, which is a database developed by our Webmaster that is hosted on the SRS Web site. Our Web site "hits" now number about 4 million annually, with about half of those being publication requests.

We provide hard copy publications by mail for people who do not have Internet access, or prefer to receive them that way. More than 38,000 publications have been mailed out so far this year, largely due to the continuing interest in *Nonnative invasive plants of southern forests: a field guide for identification and control.* Our publications distribution staff also provide personal service to walk-in visitors and people who e-mail or call on the telephone; they provide information on a wide variety of topics to a wide range of customers: local residents, landowners, and scientists.

Publication Requests Filled

Fiscal Year	Hard Copy	Electronic Downloads
1998	70,000	25,000
1999	33,500	151,000
2000	22,000	200,000
2001	21,000	500,000
2002	26,700	1,000,000
2003	54,600	1,600,000
2004	38,000	3,300,000

Please contact us anytime you have questions or comments about the services of the Southern Research Station.

To receive our quarterly catalog of recent publications, the *Compass*, send us your name and address and we will be happy to add you to our mailing list. The catalog is also on our Web site and you can subscribe to a listserv to receive it by e-mail.

USDA Forest Service
Southern Research Station
200 W.T. Weaver Boulevard; P.O. Box 2680
Asheville, NC 28802
828-257-4832; TDD: 828-259-0503;
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Web site: http://www.srs.fs.usda.gov

February 2005

Caring for the Land and Serving People

Forest Science in the South – Southern Research Station – 2004

Spine