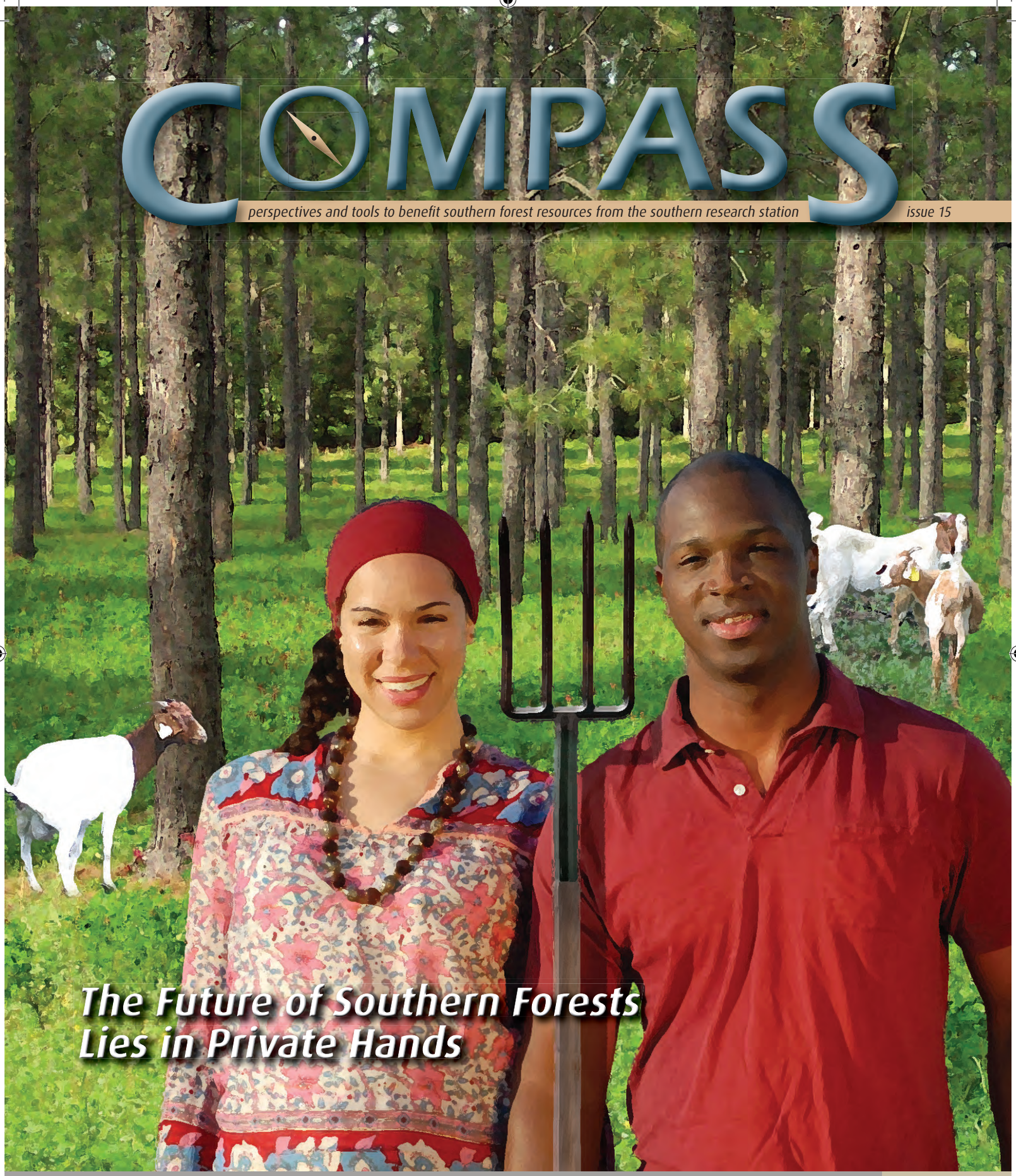
COMPASS

perspectives and tools to benefit southern forest resources from the southern research station

issue 15



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On the cover: In the South, private forest land is held in relatively small plots by a wide diversity of individuals. (Image by Robert Pace, Allen Wayne, Ltd.)

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COMPASS

Science You Can Use!

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perspectives and tools to benefit southern forest resources

COMPASS is published by the Science Delivery Group (SDG) of the Southern Research Station (SRS), Forest Service, U.S. Department of Agriculture. As part of the Nation's largest forestry research organization—Forest Service Research and Development—SRS serves 13 southern states and beyond. The Station's 130 scientists work at more than 20 units located across the region at Federal laboratories, universities, and experimental forests.

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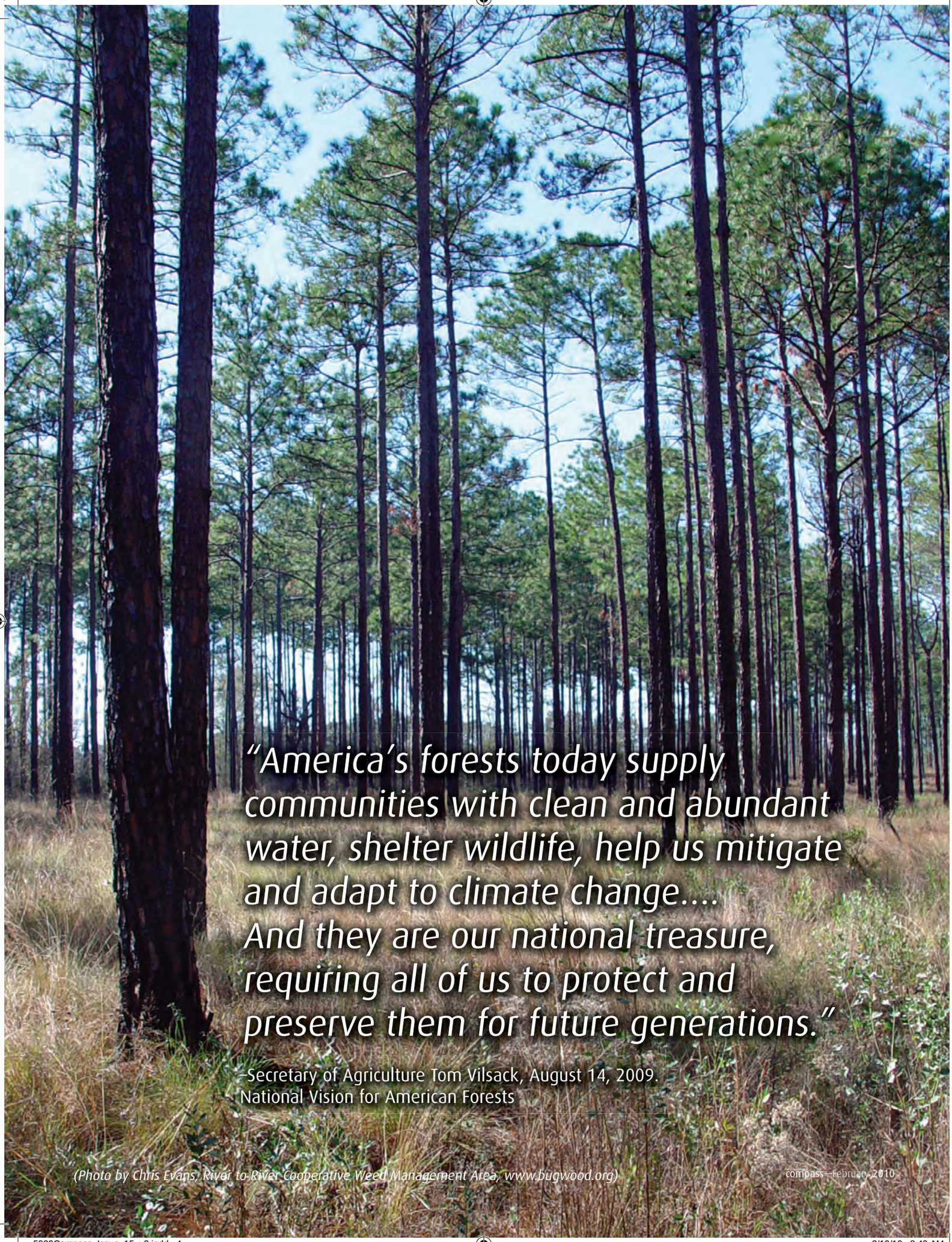

"America's forests today supply communities with clean and abundant water, shelter wildlife, help us mitigate and adapt to climate change....
And they are our national treasure, requiring all of us to protect and preserve them for future generations."

–Secretary of Agriculture Tom Vilsack, August 14, 2009.
National Vision for American Forests

(Photo by Chris Evans, River to River Cooperative Weed Management Area, www.bugwood.org)

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Sustaining Forests Across All Lands

The future of America's forests lies in private hands

by Zoë Hoyle

American forests are set to undergo huge changes over the next decade—and not just because of climate change, fire, and insects and diseases. Over half of U.S. forest land, some 421 million acres, is owned by individuals, the majority of whom are 55 or older. The next big change has to do with the transfer of millions of acres of forest land to a new generation of owners. Though this is a continuous process, the decisions present-day owners and their heirs make over the next few decades will affect us all.

When Secretary of Agriculture **Tom Vilsack** introduced his *National Vision for American Forests* in August 2009, he noted that forests provide an estimated 87 percent of the surface supplies of America's drinking water as well as other "ecosystem services" such as habitat, biodiversity, wood and nonwood products, bioenergy, and recreation. The forests that supply these essential services stretch across different ownerships—Federal, state, nongovernmental, industry, and private. Of these, privately owned forests are already being lost to development at a rate that rivals the great timber rush of the 19th century. What will happen as privately held forest land is transferred to heirs who may have little interest in managing it?

Vilsack and others have put out the call for an "all lands approach" that would involve helping everyone who owns forested acres understand how important the decisions they make now and later are to America's future. This cross-boundary approach is particularly important in the South, where national lands comprise only 9 percent of forested land—and where almost half of U.S. private forest landowners live.

"There are over 11 million private forest owners in the United States who collectively own 421 million acres or 56 percent of the forest land in the United States. The fate of much of the Nation's forests lies in the hands of this diverse and dynamic group of people and organizations." –*Brett Butler, National Woodland Owner Survey*

Most, if not all, of the issues pressuring southern forests do not recognize human property lines. Obvious examples include southern pine beetle, degradation of water quality, invasive plants, disappearing habitat for threatened and endangered species, and the often conflating effects of climate change. In fact, there are very few issues whose solutions *don't* involve working across ownerships and boundaries.

Over the last decade, Forest Service researchers and state foresters have surveyed private forest land and landowners, looking at demographics, perceptions, and needs. Findings from three different sources—the **National Woodland Owner Survey** (NWOS), the **Southern Roundtable for Sustainable Forestry**, and the **Southern Forest Futures Project**—provide a compellingly consistent context for looking more closely at how intergenerational land transfers might affect the forests of the South over the next few decades.

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The National Woodland Owner Survey

The National Woodland Owner Survey (NWOS) is the official census of forest landowners in the United States. The Forest Service **Forest Inventory and Analysis** program conducts the NWOS on an annual basis, contacting a random sample of owners to ask questions about their demographics, ownership objectives, forest use, management practices, sources of information, concerns and issues, and intentions for the future of their forests.

Brett Butler, research scientist with the **Northern Research Station**, coordinates the NWOS. Results of the survey are being used by groups such as the **Sustaining Family Forests Initiative** (SFFI), a partnership of the Forest Service, state forestry agencies, university extension specialists, and landowners' groups working to better understand who family forest members are and how to communicate with them.

For more information:

NWOS: www.fia.fs.fed.us/nwos

SFFI: sustainingfamilyforests.org

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Sustaining Forests

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Who Will Own the Woods in 20 Years?

The Forest Service **Forest Inventory and Analysis** (FIA) program conducts the NWOS annually, collecting data about demographics, ownership objectives, and landowner concerns. For the purposes of the survey, anyone who owns an acre or more of land with trees is considered a forest landowner.

Data released in late 2008 shows that 56 percent of U.S. forest land is privately owned—62 percent by families and individuals in "family forests." The majority of these lands are owned by someone 55 or older, 34 percent by someone 65 or older, and 15 percent by someone 75 years or older.

"Nationally, one in every 5 acres is held by someone who is at least 75 years old," says **Brett Butler**, research scientist at the Forest Service **Northern Research Station** who coordinates the NWOS. "Compared to the general population, a larger proportion of family forest owners are white, male, more educated, wealthier—and older."

The 2008 NWOS data also show that 14 percent of family forest landowners plan to sell or transfer land in the next 5 years, but with a third of the owners 65 or older, some analysts expect an even more dramatic change in the next decade as land is passed on to heirs.

One of the main effects of intergenerational land transfers is the parcelization of holdings. When land passes to multiple heirs, large tracts of forest land are often broken into smaller parcels. This leads to an increase in the number of small landowners, but also to the increased possibility of development and loss of forest.

"Though parcelization has a potential positive effect of putting more people on the land, smaller holdings mean fewer opportunities for traditional forestry, the collection of nontimber forest products, and recreation," says Butler. "More parcels owned by multiple owners can also mean increased vulnerability to invasive species, wildfires, development and other challenges unless landowners can learn to work, at least to some degree, across boundaries."

Uncertain Heirs

In 2005, the nonprofit **Pinchot Institute for Conservation** and the Forest Service conducted telephone interviews with 300 forest landowners and their children. The researchers found that although most landowners were concerned about the future of their land, most did not know whether their children wanted to take over management of the land—and many had not even discussed it with them.

Of the children interviewed, most had little if any involvement in managing their parents' forest land, and many had little interest in becoming more involved. Many of the heirs surveyed worked in professional fields making relatively high salaries, did not live near family forests, and had no plans to move closer.

But nothing is set in stone when it comes to families. Most of the children surveyed also said they knew that their parents wanted to keep their forests in the family and that they themselves would probably become forest owners within the next 10 to 20 years. They wanted to inherit and keep their land in trees, but they did not want to manage their woods. And if owning the land became inconvenient, they would be open to subdividing or selling. Like their parents before them, heirs cited high taxes as a main deterrent to keeping family land.

In the South, Worries about Taxes

Citing the latest FIA data, the 2002 **Southern Forest Resource Assessment (SFRA)** estimated total forest land in the South at over 214 million acres, with very little change in this total since the 1970s. The region is heavily wooded, with forests covering more than 60 percent of most of the 13 states. Though much of the forest in the region has been converted to urban uses, this has been largely offset by the conversion of farm lands to forests through natural

The Southern Forest Futures Project (SFFP)

The SFFP focuses on analyzing and forecasting potential changes in the forests of the U.S. South and implications for their sustainability. The SFFP builds on the **Southern Forest Resource Assessment,** which provides a baseline of knowledge for evaluating future changes. The overall goal of the SFFP is to inform management choices, policy discussions, and science programs with the clearest possible understanding of the potential long-term implications of changes in southern forests.

For more information:
www.srs.fs.usda.gov/futures

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Florida landowner George Owens proactively manages his forest land for silvopasture. (Photo by Mediassociates, courtesy of Auburn University)

seeding and tree planting. Though acres continue to be converted to forests, SFRA estimated that the South could lose about 12 million forest acres to urbanization between 1992 and 2020, with an additional 19 million acres projected to be developed between 2020 and 2040.

"Private land dominates the southern landscape, and land use is determined by the decisions of individuals and firms as they attempt to put land to profitable and satisfying uses," says **David Wear**, SRS economist who coedited SFRA. "Though southern landowners cite satisfying uses that range from the aesthetic to timber income, they'll make their decisions about subdividing or selling based on profitability."

In 2006, with funding from the **Southern Roundtable for Sustainable Forestry**, the **Southern Group of State Foresters (SGSF)** convened focus groups of private nonindustrial forest landowners to discuss and respond to key questions about forest ownership, especially the role of various incentives in motivating landowners to keep and manage their forests.

For the overwhelming majority of participants in the focus groups (87 percent), the pressures to convert their land to nonforest uses within the next 5 years came from taxes, including estate, property, and income taxes. Other pressures included the increased market value of forest land for other purposes, urbanization, natural disasters, and diminishing markets for forest products.

"The impact of tax policy, actual or potential, on forest land ownership is significant," says **Fred Allen**, SRS liaison with the SGSF. "Landowners are apprehensive about increasing property taxes as well as Federal estate and income tax issues. In addition, property tax concerns are closely associated with rising land values influenced by urbanization and development."

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Southern Roundtable on Sustainable Forests

The long-term goals of the **Southern Roundtable on Sustainable Forests** are to foster a sustainable resources ethic in the South, to establish measures of forest resources sustainability in the South, and to stimulate on-the-ground action that promotes forest sustainability.

For more information:

www.sustainableforests.net

Sustaining Forests

(continued from page 3)

In 2008, in partnership with SGSF and the Forest Service **Southern Region**, SRS researchers led by David Wear started the first phase of a new assessment—the **Southern Forest Futures Project**—by holding a series of face-to-face public meetings at 14 sites across the South. The futures project is a multiyear effort which will use technical forecasts and expert analysis to provide forest managers, policymakers, and science leaders with the clearest possible understanding of the consequences of potential land use and other changes to southern forests. The 2008 meetings were intended to "set the stage" by identifying the major issues of public concern that the project will address by constructing a series of future scenarios.

Among the seven metaissues identified from public meetings and comments were forest ownership changes and taxes. Participants were specifically concerned about the intergenerational land transfers projected for the next decade and how these will affect recreational opportunities. This last point is not trivial in the South; of an estimated 153 million acres available for recreation in the region, almost 105 million are classified as nonindustrial private. Other top concerns included the future effects of forest fragmentation from land parcelization on forest health and ecosystem resilience.

Taxes—inheritance, income, and property—were cited frequently as one of the most important institutional issues by participants in the public meetings. "Designing tax code and other policies in a way that encourages conservation and retention of our natural infrastructure ultimately affects the long run sustainability of forests," says Wear. "Current-use property tax treatment can help, and a rethinking of the tax treatment of conservation easements is now being debated."

No one knows how the next generation will react to inheriting family forests; many people may well decide to return to their roots and learn to manage their forests. We do know that the decisions made by large numbers of small private landowners over the next decade can lead to the further degradation of our natural resources—or to their restoration and sustainability. How private landowners manage their forests, especially in the South, will affect the availability of the vital ecosystem services provided by those forests—clean water and air, biodiversity, recreation opportunities—to us all.

For more information:

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David Wear at 919–549–4011
or dwear@fs.fed.us

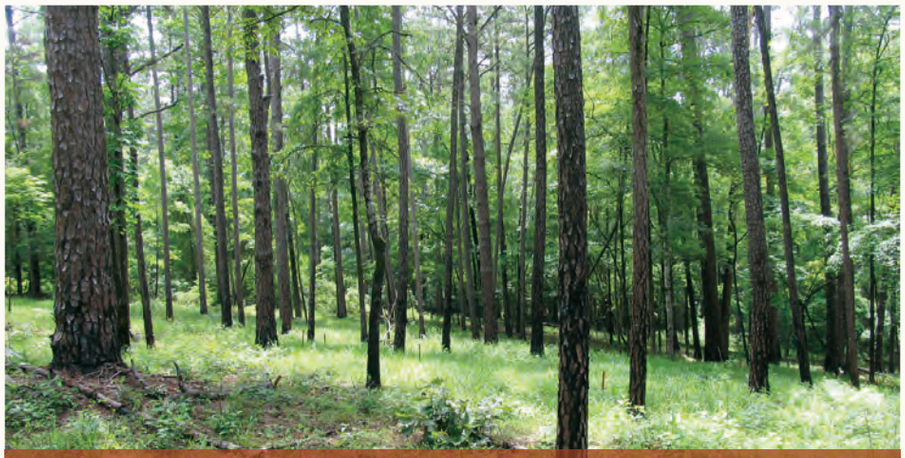
Recommended reading:

Butler, B.J. 2008. **Family forest owners of the United States, 2006**. Gen. Tech. Rep. NRS–27. Newtown Square, PA: U.S. Department of Agriculture Forest Service, Northern Research Station. 72 p.

Southern Roundtable for Sustainable Forestry. 2007. **Non-industrial private landowners and incentives**. Phase 1. Report from phase II-compilation and analysis workshop. 13 p. Available online: www.southernforests.org.

Wear, D.N.; Greis, J.G. 2002. **Southern Forest Resource Assessment – summary report**. Gen. Tech. Rep. SRS–54. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 103 p.

Wear, D.N.; Greis, J.G.; Walters, N. 2009. **The Southern Forest Futures Project: using public input to define the issues**. Gen. Tech. Rep. SRS–115. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 17 p.



The decisions private landowners make today will help determine the future of the South's forests. (U.S. Forest Service photo)

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Help With Estate Planning for Forest Landowners

"Many forest owners may be unaware of the full value of their holdings, and have failed to take advantage of estate planning opportunities available to them. Nonindustrial private forest owners are many more times likely than other taxpayers to incur the Federal estate tax."

Although some family forest owners use consulting foresters or extension agents for advice or assistance, most remain unprepared for the technical details of land management, especially estate planning. Poor estate planning may force a sale or division of the land which in turn can lead to subdivision and development. But many family forest owners are unaware that their estates may incur taxes and may not have even thought about estate planning. A new SRS resource provides a comprehensive guide to estate planning specifically designed for forest landowners.

"Over the past decade, demographic, social, and market trends have converged to increase the effects of the Federal estate tax on the estates of nonindustrial private forest owners and other rural landowners," says **John Greene**, research forester from the **SRS Forest Economics and Policy** unit based in Research Triangle Park, NC. "Although the minimum for paying estate taxes may seem high to most people, gentrification and urban expansion have driven up rural land values steeply. Many forest owners may be unaware of the full value of their holdings, and have failed to take advantage of estate planning opportunities available to them. Nonindustrial private forest owners are many more times likely than other taxpayers to incur the Federal estate tax."

In 2009, Greene and coauthors **William Siegel** and **Harry Haney** completed *Estate Planning for Forest Landowners,* an SRS publication designed to provide guidelines and assistance on applying estate planning to forest properties. The guide, which is available free of charge from SRS, is designed for use by both private landowners and the advisers—legal, financial, insurance, and forestry professionals—who help them with estate planning. The guide presents a working knowledge of the Federal estate and gift tax law as it relates to forest properties.

For more information:

John Greene at 919–549–4093 or jgreene01@fs.fed.us

Recommended reading:

Greene, J.L.; Bullard, S.H.; Cushing, T.L.; Beauvais, T. 2006. **Effect of Federal estate tax on nonindustrial private forest holdings**. Journal of Forestry. 1: 15–20.

Siegel, W.C.; Haney, H.L.; Greene, J.L. 2009. **Estate planning for forest landowners: what will become of your timberland?** Gen. Tech. Rep. SRS–112. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 180 p.

Family Forest Owners' Top Ten Lists

Reasons for Owning Family Forests

1. Beauty and scenery
2. Family heritage
3. Privacy
4. Nature protection
5. Connected to home or cabin
6. Investment
7. Hunting or fishing
8. Part of farm or ranch
9. Hiking and other recreation
10. Timber production

Issues or Concerns

1. Insects or diseases
2. Keeping land intact for future generations
3. Wildfire
4. Trespassing
5. High property taxes
6. Vandalism or illegal dumping
7. Wind or ice storms
8. Air or water pollution
9. Undesirable plants and weeds
10. Development of nearby lands

Recommended reading:

U.S. Department of Agriculture. 2008. **Who owns America's forests?** NRS–INF–06–08. Newtown Square, PA: U.S. Department of Agriculture Forest Service, Northern Research Station. 7 p.

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When All Things Are Not Equal

Communicating better with minority landowners

by Zoë Hoyle

Findings from the Forest Service **National Woodland Owner Survey** (NWOS) show that a large proportion of private forest landowners in the United States are older white males with more education and more money than most of the general population. It's only natural that communication about managing family forests has been largely focused on mainstream messages conveyed by methods such as printed materials, Web sites, and now, blogs and tweets.

But when you start looking closer, forest land in the South is held in relatively small plots by a wide diversity of individuals, many with limited resources that may make it difficult for their heirs to hang on to family forests in the coming years. For an all-lands approach to work, communication efforts need to be tailored to many different types of landowners.

It's only very recently that natural resource scientists and managers have begun to pay attention to even the most basic social dimensions of race and ethnicity, class, and gender in relationship to communicating about the management of natural resources.

"The usual, rather narrow perspective is to focus on the interplay between landowner, extension agent, forester, and programs available," says **John Schelhas**, SRS research forester based at **Tuskeegee University** in Tuskeegee, AL. "If we are to provide benefits and services to people across all segments of society in a South where demographics are changing rapidly, we have to start looking at patterns of relationship, social structures, and communities along with individuals."

Minority landowners in the Black Belt of Alabama share forest management knowledge primarily through social networking. (Photo by John Schelhas, U.S. Forest Service)

Though public programs, including communication and incentive efforts, are designed to influence private landowners to make decisions that affect us all, there is limited use of these programs by landowners in general—and even less use by minority landowners.

Maybe it's a problem of focus, or even of cultural myopia. Recent data from the NWOS show that African Americans make up only 4.2 percent of family forest landowners in the South, down over 4 percent from a 1978 survey, but there is evidence of a return to the South of African Americans whose families left generations ago for better opportunities. The growth of Hispanic populations across the South may also presage a rise in land ownership in a group whose perceptions about forests

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and cultural practices in general are largely unknown to most Americans.

"As researchers and program managers, we tend to consider how our own society is structured as normal," says Schelhas. "It is only when we make an effort to understand other social and cultural groups that we realize how differently other people may think about and do things. We will be better able to reach minority landowners if we learn more about their social structure—social groups, institutions, processes, and relationships as well as cultural values associated with land and forests."

A Case Study: The Alabama Black Belt

There are many people, even in the South, who've never even heard of the "Black Belt." The term originally referred to the thin layer of rich (but dry), black topsoil that developed millennia ago atop a geological formation that stretches from Maryland to Texas. By the mid-1800s, the Black Belt had become the land of cotton plantations and slavery. Though many of the African Americans freed after the Civil War left the area, some stayed on and built up family and community holdings in the Black Belt. At one point, African Americans owned over 15 million acres of land in the South; this has since declined to 2.3 million acres, many of these in the Black Belt.

The Alabama Black Belt consists of 18 counties that snake across the south central part of the state, and includes some of the poorest counties in the United States. An area of rich land and poor people, the Black Belt of Alabama is made up of small holdings of around 80 acres each that, added together, make up half of the forested acres in Alabama.

With Tuskegee University researcher and rural development coordinator **Robert Zabawa**, Schelhas started looking at Black Belt social structure by examining data from two different Alabama counties. Macon County lies in the heart of the Black Belt; the majority of its population is African-American with a farming background, as well as a history of migrations out of the land and back.

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SRS studies have shown that women landowners have been underserved by traditional methods for communicating information about forest management. (Photo by John Schelhas, U.S. Forest Service)

Alabama Consortium on Forestry Education and Research

The **Alabama Consortium on Forestry Education and Research** was established in 1992 as a collaborative effort of the university forestry programs of **Tuskegee University**, **Alabama A&M University**, and **Auburn University**; two branches of the Forest Service—SRS and the **National Forests in Alabama**; and the **Alabama Forestry Commission**.

One of the primary goals of the consortium has been to establish a program of social and economic research on minority and limited resource landowners. Research focuses on three areas:

- Understanding the characteristics and needs of minority and limited resource landowners, including descriptive and spatial data on land ownership, forest uses, and forest values; the relationships between national forests and adjacent communities; landowner participation in conservation extension programs and financial assistance programs; and the social and economic importance of forest industries.
- Understanding the changing role of southern forests in farming systems and rural economies in a globalizing economy, and developing new strategies for forest-related rural development.
- Understanding how changes in national forest management affect minority and limited resource communities and landowners.

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Not Equal

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Escambia County lies in the southwest part of the state, in the heart of longleaf pine country; the population is mostly white, with an African-American minority who moved to the county to work in forest industry.

The researchers used a structural approach—one that looks at social dimensions such as marriage, inheritance, gender, race, social network, and legacy—to compare family forestry in the two counties. They found that gender and race not only influence land holding practices, but also management objectives and access to information and technical support. In line with other studies about minority landowners, their studies show that African Americans were less aware of and participated less in cost-share programs than whites. Both African Americans and females expressed desire for more information, but were less specific about how it should be delivered. Both African Americans and females were also constrained by not knowing who to trust for forest management information, this distrust in part the legacy of exploitive practices, land grabs, and violence that date back to the Reconstruction years.

"Understanding how different landowners use, relate to, and value forests is essential if we are to provide benefits and services to people across all segments of society," says Schelhas. "Members of different social groups have different histories and life experiences that shape unique natural resource uses and values. One-size-fits-all management strategies, communication methods, and policies just don't work for providing benefits for all segments—or for ensuring forest health across a landscape owned by multiple and diverse individuals."

Getting the Message Across

That traditional communication methods haven't worked well with all segments of society becomes apparent when you look at who

The Federation of Southern Cooperatives
Community forestry through social networking

SRS researcher **John Schelhas** has worked with another partner, **Rory Fraser**, to look at the relationship between land tenure and well-being in the Black Belt. Fraser directs the **Center for Forest Ecosystem Assessment** at **Alabama A&M University** in Huntsville, AL. He has long been interested in community forestry and in identifying and addressing the needs of minority landowners.

In 2008, Fraser and **Amadou Diop**, then forestry program director for the **Federation of Southern Cooperatives** (the Federation), published a conference paper on their study of the formation of the Federation as a way to practice community-based forestry through social networking in the Black Belt.

"This region is characterized by a history of slavery and share-cropping, denial of rights, disruption of social, economic and political structures, and the erosion of community and collective action," they wrote. "Over the past 150 years, African American experience with forests gradually changed from intimacy to dissociation."

Fraser and Diop cite studies that show that minority landowners generally own smaller acreages, have diverse ownership objectives, and have been historically underserved by extension and assistance in the South. They point to the Federation as a model for outreach and assistance for minority landowners.

The Federation was founded in 1967 to develop cooperatives and to protect and expand the landholdings of African-American farmers in the South. The Federation's **Black Belt Legacy Forestry Program** is one of 13 **Ford Foundation** funded community-based forestry demonstration projects in the United States. Key activities include education and technical assistance, demonstration, cooperative development, and outreach.

The Federation actively encourages the development of social networks and the involvement in landowner associations such as the **Alabama TREASURE Forest Association** and the **Alabama Forestry Commission Minority Advisory Council**.

For more information:
www.federationsoutherncoop.com

Recommended reading:
Diop, A.; Fraser, R. 2009. **A community-based forestry approach to poverty alleviation in Alabama's Black Belt region**. International Forestry Review II. (2): 186–196.

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SRS researcher John Schelhas meets with landowners in Macon County, AL. (U.S. Forest Service photo)

makes use of available financial and technical assistance in the Alabama counties studied by Schelhas and his colleagues. "It's clear that there's been a significant difference between African Americans and whites in this arena," says Schelhas. "Almost 70 percent of the whites we surveyed were aware of cost-share programs, and 45 percent made use of them, while only 36 percent of African Americans were aware of cost-share programs, and only 20 percent of them made use of financial assistance."

Schelhas and Zabawa also found that whites commonly got technical information from independent, county, and state foresters, while African Americans were more likely to seek and receive technical help from university extension personnel and family members. "Research on forest landowners' social networks has the potential to teach us a great deal about how forestry information, technology, and values are spread and implemented," says Schelhas. "This, in turn, could point the way to new forestry outreach and extension approaches that could reach many more landowners."

For more information:

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Recommended reading:

Fraser,R; Gyawalli, B; Schelhas, J. 2005. **Blacks in space: land tenure and well-being in Perry County, Alabama.** Small Scale Forest Economics, Management and Policy. 4(1): 21-33.

Schelhas, J.; Zabawa, R.; Molnar, J. 2003. **New opportunities for social research on forest landowners in the South**. Southern Rural Sociology. 19(1): 60-69.

Schelhas, J.; Zabawa, R. 2004. **The social structure of family and farm forestry in Alabama. Proceedings of the IUFRO symposium: Human Dimensions of Family and Farm Forestry**. Washington State University Extension Bulletin MISC0526, Pullman, WA: WSU Extension Press. [Pages unknown].

Schelhas, J.; Zabawa, R.; Zhang, Y.; Zheng, B. 2009. **Exploring family forest landowner diversity: place, race, and gender in Alabama**. Unpublished manuscript.

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Alleviating Poverty Through Longleaf Pine Restoration

A recently released report by the **National Wildlife Federation** makes a strong case for restoring longleaf pine forests to their native range in preparation for global climate change. The restoration of this ecosystem, which once covered much of the South, would not only build resilience in forests, but improve economies in rural area such as the counties of the Alabama Black Belt, which continue to have some of the highest poverty rates in the United States. The following excerpt from the report speaks eloquently to the issue:

"Despite being endowed with rich natural resources, many parts of the rural south are characterized by inadequate education programs, poor health care and high levels of crime and unemployment. For example, Alabama is home to highly profitable forestry operations, yet the poverty rate among residents of the Black Belt counties, who are predominantly African American, is nearly 35 percent. Building wealth is a core strategy for alleviating poverty and creating economic and social opportunity in a region blessed with valuable natural resources.

Restoration of longleaf pine forests can create long-term assets for rural landowners. A significant portion of forested land in the Alabama Black Belt region is owned by African Americans, representing an important and often under-utilized source of wealth. The National Wildlife Federation is working with African American groups to teach rural landowners how to regenerate longleaf pine forests and to build wealth through recreation receipts, payments for carbon sequestration, recreation and ecosystem services, and forest certification.

Working with small, private landowners who have limited resources presents a number of challenges. Contemporary logging operations are designed to harvest large tracts, leaving smaller landowners with few options for harvesting and marketing their timber. Some of the same constraints may apply to harvesting pine straw. At the same time, many African Americans lack trust in public agencies and do not always fully participate in the forest stewardship programs they offer, partly resulting from a legacy of discriminatory practices at the U.S. Department of Agriculture. Community-based forestry strategies that focus on education and technical assistance, coalition building, networking and cooperative development have shown some success in addressing these challenges."

The National Wildlife Federation is working with rural African American groups to help restore longleaf pine forests in the South. (Photo by Zoë Hoyle, U.S. Forest Service)

Recommended reading:

National Wildlife Federation. 2009. **Standing tall: how restoring longleaf pine can help prepare the Southeast for global warming.** Atlanta: National Wildlife Federation. 21 p. www.nwf.org/longleafpine [Date accessed: 12/15/2009].

SRS scientists Dale Brockway and Kurt Johnsen participated as subject experts and reviewers for the National Wildlife Federation report.

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Pastures of Plenty in Alabama

Silvopasture means more income for private landowners

The SRS National Agroforestry Center online handbook provides landowners the specific information they need to establish and manage silvopasture systems for southern pine forests. (Photo by Mediassociates, courtesy of Auburn University)

In Alabama, private landowners have started grazing cows and goats in their pine plantations to ensure income in times when timber markets are volatile and uncertain. They're combining trees, forage plants, and livestock on the same acres in a practice known as silvopasture.

Silvopasture probably dates back to when humans first started burning and thinning forests to promote forage for the animals they relied on for food. Used extensively in tropical areas, the practice is increasingly popular in the South as a way to supplement timber income on small pine plantations. Trees provide longer term returns from saw logs for lumber, while livestock in a rotational grazing system provides steady annual income. In the South, the trees used in silvopasture systems—loblolly, slash, or longleaf pine—are planted at wider spacings than normal to allow more sunlight to reach forage plants in the understory. Livestock for silvopasture systems include cows, goats, and sheep. Other potential choices include horses, turkeys, chickens, ostriches, emus, or game animals such as bison, deer, or elk.

Silvopasture is not a matter of just turning cows or goats loose in the woodlot. It's important, both economically and environmentally, that landowners know the best, science-based practices for spacing and planting trees and the right number of livestock to graze per acre. The **SRS National Agroforestry Center** (NAC), through strategic partnering and Web-based learning technologies, reaches out to private landowners where they live with the latest information on how to make the most out of agroforestry practices such as silvopasture.

Making it Work in the Black Belt

Landowners in Alabama and surrounding states have expressed increasing interest in raising goats in silvopasture systems. As Hispanic populations in the region grow, there have been more requests for goat meat; there are also a small but growing number of dairies producing goat milk and artisan goat cheeses. Goats have different forage preferences than cows; over the last decade, NAC researchers have worked with local partners to develop guidelines for the best forage and tree mix for goat silvopasture systems and to demonstrate what they've learned from research and early-adopter landowners.

In the Black Belt of southeast Alabama, limited resource minority farmers and forest landowners often struggle to make enough income from traditional forestry and farming. In Epes, AL, NAC has partnered with the **Alabama Forestry Commission**, the **Federation of Southern Cooperatives** (the Federation), and three university partners to convert a

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Pastures of Plenty

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loblolly pine stand at the Federation's **Rural Training and Research Center** into a goat silvopasture research and demonstration site for limited resource landowners. In 2006, study partners thinned the 7-year-old loblolly pine stands on the site from 600 to 150 trees per acre, established three different species of forage in the understory, and created paddocks to test the effects of different stocking rates (0 to 8 goats per acre) on the soil. Preliminary results suggest that grazing goats will, over a relatively short time, eliminate the need for fertilizer, making the silvopasture system both economically and environmentally sustainable. One university partner, **Alabama A&M University** researcher **Ermson Nyakatawa**, is also looking at the effects of goat silvopasture management on soil carbon levels in response to current interest in carbon credit incentives to offset the rising levels of atmospheric carbon dioxide that contribute to global warming.

The Federation regularly hosts trainings for landowners from local and nearby communities; the project also provides hands-on training for limited resource farmers housed at the Federation research and training center every year. A recent 2-day goat silvopasture workshop by the Federation included 28 forest landowners, 22 of whom were African American. The workshop included site visits to three successfully run operations within the community. Federation specialists reported that the owners of the operations were very excited to share their knowledge with the visiting landowners and create the links and networks that will facilitate change within a community with historically limited resources.

Restoring Longleaf Pine

NAC is also working with the Alabama Forestry Commission, **Auburn University**, and other SRS researchers to convert half of the **Hauss State Forestry Nursery** near Atmore, AL, into a silvopasture research site. The nursery has long been a major source for seedlings

Top Ten Reasons Landowners Adopt Silvopasture Methods

1. Diversify on-farm income.
2. Increase access for salvage in the event of damage from storms or fire.
3. Reduce wildfire risk by decreasing understory fuel load.
4. Control insects. Bark beetles, for example, are attracted to dense stands.
5. Minimize the impact of low pulp market prices by eliminating the need for pulp tree thinning.
6. Increase biological diversity, help protect water quality, reduce soil erosion, and improve the water holding capacity of the land.
7. Provide wildlife habitat. Silvopastures create structure and plant diversity attractive to many wildlife species.
8. Provide shade for livestock.
9. Improve forage quality. The partial shade created by trees lengthens the growing season, creating higher quality forage.
10. Boost the opportunity for recreational activities.

Adapted from: National Agroforestry Center. 2007. Inside Agroforestry. 16(3): 10.

Silvopasture—a system made up of trees, forage, and animals—can provide extra income for private forest landowners. (U.S. Forest Service photo)

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SRS assistant director Greg Ruark (left) meets with landowners. (U.S. Forest Service photo)

used in efforts to restore longleaf pine to an original range that once extended some 90 million acres across the South. The silvopasture project, which includes the investigation of native grasses as forage for cows, does double duty as a study site on restoring habitat for native wildlife such as bobwhite quail. Project leader **Kris Connor** and others from the **SRS Restoring and Managing Longleaf Pine Ecosystems** unit in Auburn, AL, are involved in the system design, including the selection of native grasses for restoration.

Longleaf pines also have the advantage of showing greater resilience than loblolly and slash pines to threats that range from southern pine beetles, to ice storms and the increased storm and hurricane action expected under climate change. "Longleaf pine silvopasture systems have the potential to provide landowners with a strategy to reestablish pines that are less susceptible to wind damage, while providing an annual revenue stream from grazing that would diversify their income and lessen the overall risk of economic loss from catastrophic events," says **Greg Ruark**, NAC center director and SRS assistant director of research.

Silvopasture Information: Where to Start?

To practice silvopasture effectively, landowners need specific information about tree species, spacing, stand density, site preparation, herbicides, pruning, and canopy management. They also need to know about the animals they want to graze, fencing and gates, and forage. These information needs alone may seem daunting.

"The landowner also needs to explore the economics before establishing a silvopasture system," says **Rich Straight**, NAC lead forester. "They also need to look at local zoning, land use and cost-share program requirements, and tax regulations."

As part of an extensive suite of Web-based agroforestry tools, NAC has developed an online handbook on establishing and managing silvopasture systems for pine forests in the Southeastern United States. The handbook provides the basics for getting started as well as contacts with local extension agents and centers such as those operated in Epes, AL, by the Federation.

As a companion to the handbook, NAC has partnered with the **University**

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The National Agroforestry Center (NAC)

NAC had its origins in the 1990 Farm Bill and was set up in 1992 in Lincoln, NE as a Forest Service Research & Development and State & Private Forestry Technology Transfer effort. In 1995, the effort expanded into a formal partnership with the **Natural Resources Conservation Service**.

NAC develops and delivers technology on a broad suite of agroforestry practices and associated technologies to improve their economic, environmental, and social benefits and increase the use of agroforestry in the United States. The primary audience is the more than 8,000 natural resource professionals who work with farmers, ranchers, and communities throughout the Nation.

For more information:
www.unl.edu/nac

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Pastures of Plenty

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of Georgia Bugwood Network to develop an online silvopasture course intended as a self-directed learning resource for private landowners, agency resource personnel, and others interested in silvopasture. "The course is organized into modules that cover specific topics related to silvopasture," says Straight. "By progressing through each of the modules, course participants can become familiar on a practical level with silvopasture as a viable alternative land-management strategy."

In cooperation with NAC, **Becky Barlow**, **Auburn University Extension**, recently produced a video highlighting 30 years of silvopasture experience and research. The video presents the basic science and practical aspects of silvopasture management through interviews with **Cliff Lewis**, an early Forest Service silvopasture researcher and **George** and **Pat Owens**, an Alabama couple who have been managing their silvopastures since the early 1980s.

Online silvopasture course:

www.silvopasture.org

For more information:

Rich Straight at 402–437–5178, x4024 or rstraight@fs.fed.us

Recommended reading:

Hamilton, J., ed. 2008. **Silvopasture: establishment and management principles for pine forests in the Southeastern United States.** Lincoln, NE: U.S. Department of Agriculture, National Agroforestry Center. 72 p. www.unl.edu/nac/morepublications/silvopasturehandbook.pdf. [Date accessed: 12/15/09].

Schoeneberger, M.M. 2008. **Agroforestry: working trees for sequestering carbon on agricultural lands.** Agroforestry Systems. 75: 27–37.

What is agroforestry?

Working Trees planted in the right place for the right reason...

Agroforestry intentionally combines agriculture and forestry to create integrated and sustainable land use systems. In the United States, agroforestry is commonly divided into five main practices:

Windbreaks—A single row or multiple rows of trees or shrubs are planted for one or more environmental purposes. An example is single rows of honey locust trees planted 300 feet apart in a field to help reduce soil erosion in the spring and distribute snow across the field in the winter.

Alley Cropping—An annual or perennial crop is grown with a long-term tree crop. The agricultural crop generates annual income, while the longer-term tree crop matures. An example is growing soybeans in the alley between rows of high-value black walnut trees.

Silvopasture—Timber and forage production are combined on the same acres. Trees provide longer-term returns, while livestock generate an annual income.

Riparian Forest Buffers—Natural or planted woodlands are established between crop fields and water bodies. These living buffers are designed with trees, shrubs, and grasses to protect water resources by filtering nonpoint-source pollution from agricultural fields.

Forest Farming—Forest lands are intentionally manipulated to capitalize on plant interactions in order to produce specific nontimber products. Potential forest farming crops include herbal plants, fruits and nuts, decorative products, and specialty wood products.

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Forest Farming

Ramps, Walking Sticks, and Ginseng

People have gathered and marketed herbs, vines, mushrooms—even lichen—from forests since long before the European settlement of America. Today these nontimber forest products hold great promise as an additional income source for private forest landowners. As many of these plants become increasingly hard to find in their native habitats, gathering and raising "alternative products" in family forests brings the added benefit of helping to restore biological diversity across southern lands.

Nontimber forest products can be defined as plants, parts of plants, and other biological materials harvested from natural, manipulated, or disturbed forests. Southern forests are rich in these traditionally used materials; more than 50 plant species collected for nutritional, medicinal, or culinary uses grow in the understory of southern pine and hardwood forests.

Take, for example, ramps.

One of the most important of the Southeast's culinary products, ramps emerge from the understory of mountain forests in the early spring. With a long history of use as a spring tonic, ramps—known for their very pungent onion-garlic flavor—have long been the mainstay of fundraisers for rural fire departments and other services. Over the past few decades, a growing market for ramps has opened up as their appeal has broadened.

"When Martha Stewart started cooking with ramps in the mid-1990s, the media attention she got stirred up a new market," says **Jim Chamberlain**, forest products technologist with the **SRS National Agroforestry Center**. "I know of one forest landowner who started out about 6 years ago delivering ramps he gathered from his woodlot to local restaurants. That first year he made $15,000; last year he made about $30,000."

One of the first edible plants to emerge from the forest floor in the Southern Appalachian spring, ramps support many rural fundraising efforts. (Photo by Zoë Hoyle, U.S. Forest Service)

Other commonly gathered nontimber forest products include wild mushrooms, berries, ferns, tree boughs, cones, moss, maple syrup, honey, and medicinal products such as black cohosh, goldenseal, and ginseng. Even though there are still no reliable systems for tracking the

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Forest Farming

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combined value of these products, analysts estimate the industry annually contributes billions of dollars to the U.S. economy.

Extra Income from the Forest Understory

In the South, where most parcels of privately owned forest land are 15 acres or less, forest farming—raising rather than just gathering nontimber forest products—is especially attractive. Landowners can start out on a small scale, planting and harvesting in what are typically off-seasons for timber management. If they find local markets for their products, they can limit overhead and transportation costs.

But it's not just a matter of going out in the forest and planting some roots or seeds. Landowners need to know which plants to grow, where to grow them, how to propagate new plants, and how to harvest and prepare products for the market.

Plant choices vary with the region, climate, and other factors, some still mysterious. Establishing medicinal plants in the woods, for example, is a complex process, and there are many who claim that "farmed" medicinal products such as ginseng lack a certain something when compared to those "wild harvested" from the woods. Research on how cultivation affects the bioactive elements in medicinal plants is still in its infancy.

Agroforestry production systems have been designed to support the cultivation of a few nontimber forest products such as ginseng, but little is currently known about cultivating others such as black cohosh or ramps.

"To realize the potential of these products, landowners need to have a clear understanding of what nontimber forest products already can be found in their forests," says Chamberlain. "Without an inventory, there's no way to know what is available, how much can be harvested, or when to harvest—let alone what can be planted."

Even if plants native to the area are no longer found on a landowner's tract, the land may still have the forest and soil types traditionally associated with the plants and may be a viable location for forest farming.

Chamberlain and collaborators recently set up a forest farming network of about 12 landowners in southwest Virginia to look at whether forest farming 5 medicinal plants native to the area—American ginseng, goldenseal, black cohosh, false unicorn, and Virginia snakeroot—could provide a good alternative income source for landowners.

"We selected these plants because they are all wild-harvested and have ready markets," says Chamberlain. "We'll use our research plots to test forest farming methods and estimate how much can be produced per year. This will help landowners evaluate whether forest farming could work for them."

Market, What Market?

Before landowners decide which plants to grow for extra or alternative income, they need to know how and where to market their products. Formal and informal markets for nontimber forest products have been around since the first years of European exploration, but most private forest landowners are totally unaware of them.

"Though the markets for many nontimber forest products are well-established, and have formal channels through which the products flow, they're a complete mystery to many forest landowners," says Chamberlain. "Understanding the market environment and trends is important when considering alternative forest products."

Though consumer demand indicates that these markets will continue to grow, there have been both "boom" and "bust" years in specific medicinal products over the past few years. "Perhaps the greatest challenge for the forest landowner is to figure out appropriate market entry points," says Chamberlain. "It's essential to identify where and to whom the products will be sold and to understand current and projected demand."

Without this knowledge, the landowner could harvest products without a market, or invest time and energy into cultivating products only to have the market decline or disappear at harvest time.

Connecting Landowners to Information

To realize the full benefits from harvesting or forest farming nontimber forest products, landowners need high-quality and timely information about both production and marketing. Forest managers and extension agents lack knowledge about nontimber forest products and usually cannot serve the needs of landowners with small tracts looking at forest farming for alternative income.

"In addition, with the diversity of products and markets, stakeholder training needs differ greatly, even across the South," says Chamberlain. "People interested in growing nontimber forest products are also likely to be geographically spread out, often living and working in remote, rural areas."

In 1997, SRS started collaborating with the Department of Wood Science

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and Forest Products at **Virginia Polytechnic Institute and State University**, and **Top of the Ozarks Resource Conservation and Development** in Missouri to develop one of the first Web sites devoted to sharing information on nontimber forest products and markets among harvesters and growers, marketers, processors, and endusers.

To help landowners and entrepreneurs assess nontimber forest product production and marketing opportunities, Web site coordinators designed a series of tutorials that provide accessible information about economics, production, and conservation. The Web site also provides access to lists of organizations, markets, and vendors, as well as a schedule of locally based face-to-face trainings.

To learn more about the uses and markets for nontimber forest products: www.sfp.forprod.vt.edu.

For more information:

Jim Chamberlain at 540–231–3611 or jchamberlain@fs.fed.us

Recommended reading:

Chamberlain, J.; Mitchell, D.; Brigham, T.; Hobby, T. [and others]. 2009. **Forest farming practices**. In: Garrett, H.E., ed. North American agroforestry: an integrated science and practice. 2d ed. Madison, WI: American Society of Agronomy. 219–256.

Chamberlain, J.; Winn, M.; Hammett, A. 2009. **Connecting non-timber forest products stakeholders to information and knowledge: a case study of an Internet Web site**. Gen. Tech. Rep. SRS–116. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 87–94.

Chamberlain, J.; Winn, M.; Hammett, A. 2009. **Finding effective ways to provide knowledge to forest managers about non-timber forest products: a case-study of distance learning approaches.** Gen. Tech. Rep. SRS–116. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 215–222.

Nontimber Forest Products

From walking sticks to herbal medicines

Jim Chamberlain, forest products technologist with the **SRS National Agroforestry Center**, and other collaborators have organized nontimber forest products into four categories:

Edible and culinary products harvested from the forest include mushrooms, ferns, and the fruits, leaves, and roots of many plant species. Edibles commonly gathered and sold throughout the Southeast include ramps, fiddleheads, poke salat, black walnuts, blueberries, raspberries, blackberries, persimmons, and acorns.

Raspberries. (U.S. Forest Service photo)

Specialty woody products are considered nontimber if they are produced from woody vines, saplings, or parts of trees, but not from sawn wood. Examples include carvings and turnings, utensils, and containers. Also included are walking sticks made from branches, furniture made from branches and vines, and musical instruments made from wood not sawn from logs.

Floral and decorative products include the crooked wood gathered in Florida forests for dried flower arrangements, grapevine and smoke vine used to make wreaths and baskets, and galax leaves gathered for national and international floral markets. Several species of log moss and hanging Spanish moss harvested from southern hardwood forests are also used in the floral industry.

Fine art sculpture and photo by Gary Goodman.

Medicinal and dietary supplements are major products for the Southeast, particularly the Appalachian hardwood region, where Chamberlain has identified more than 50 plants with medicinal value. American ginseng, the most popular of these, is collected from 7 of the region's 13 states. Other medicinal plants collected from the Southeast include black cohosh, bloodroot, and goldenseal.

Goldenseal. (Photo by Lew Diehl, www.bugwood.org)

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Building Markets for Nontimber Forest Products

Tom Elmore harvests shiitake mushrooms on his farm in western North Carolina. (Photo by Steve Dixon, Asheville Citizen-Times)

In western North Carolina, funding from the **American Recovery and Reinvestment Act** (ARRA) is providing the means for local producers to develop markets for regional timber and nontimber forest products.

On November 16, 2009, SRS awarded the **Land-of-Sky Regional Council** (LOSRC), a local government planning and development organization based in western North Carolina, a grant to manage $1.9 million in ARRA funds awarded to SRS by **Secretary of Agriculture Tom Vilsack** to create a cooperative marketing network for regional timber and nontimber forest products.

"SRS is proud to help implement the ARRA and to play a role in building the networks that will position forest landowners for more prosperity," says **Jim Reaves**, SRS director. "The project will create employment opportunities for people working with timber and nontimber forest products as well as marketing specialists, community organizers, and forest products advisors."

LOSRC, which has over 30 years experience providing natural resource planning, economic development, and land management services to the region, proposed several projects, based on their experience working locally, to help build the capacity of local forest producers and create a sustainable marketing network for the region.

Projects focused on timber production include developing a small-diameter wood market, marketing high-value wood for crafters and custom builders, and supporting certified and other green-label timber production. Proposals also include supporting the local production of woodland herbs and herb products and producing and marketing forest-based foods such as mushrooms and ramps.

LOSRC will help grow the local economy through the grant administration process itself. They will use western North Carolina organizations to manage the project, staff the project with local forest producers, and use a "bottom-up" planning and economic development approach.

"We propose to assemble groups of forest producers to help them to be more efficient as demand for their products returns," says **Ron Townley**, the LOSRC project manager who will be responsible for oversight of the new project. "We hope to solve the production and marketing problems that forest producers identify, particularly in the areas of more efficient production, more profitable products, and better marketing."

Land-of-Sky Regional Council:
www.landofsky.org

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Easy Access to Incentive Programs

There are a wide range of cost-share, tax, and other financial incentive programs available to nonindustrial private forest landowners, but the specifics of these programs sometimes vary from state to state.

John Greene, research forester with the **SRS Forest Economics and Policy** unit, worked with **Steve Daniels** (Duke University), **Mike Jacobson** (Pennsylvania State University), and **Tom Straka** (Clemson University) to produce an online guide where landowners can easily access information and links to the Federal, state, and private programs available in their specific states.

Federal programs include:

Conservation Reserve Program (CRP)—Established in 1985, this program promotes conversion of highly erodible farmland and other environmentally sensitive land to a long-term resource-conserving cover. Participating landowners receive annual payments for 10 to 15 years based on the converted land's agricultural rental value. They can also receive a cost share of up to 50 percent of the cost of establishing the resource-conserving cover. Administered by the USDA Farm Service Agency (FSA).

Environmental Quality Incentives Program (EQIP)—Established in 1996, EQIP combines features of four earlier programs, with the objective of helping farm and ranch owners address practices that pose a significant threat to soil or water resources. Participating owners receive technical assistance, cost share, and incentive payments to implement conservation practices. Administered cooperatively by the USDA Natural Resources Conservation Service (NRCS) and FSA.

Landowner Incentive Program (LIP)—Established in 2003, this program helps private landowners protect and restore habitat for at-risk plant and animal species. LIP also provides funding for states to offer technical assistance and grants to participating owners to develop and implement habitat management plans. To participate, the states must provide a minimum 25 percent non-Federal match for Federal funding. Administered by the U.S. Department of the Interior Fish and Wildlife Service in cooperation with state wildlife agencies.

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Tax Incentives

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Wetlands Reserve Program (WRP)—Established in 1985, this program encourages conservation of wetlands on privately owned land. Participating owners receive financial assistance to implement practices. All costs are reimbursed if the owner accepts a permanent easement; 75 percent of costs are reimbursed if the owner opts for a 30-year easement or cost-share agreement. Administered cooperatively by the NRCS and FSA.

Wildlife Habitat Incentives Program (WHIP)—This program was established in 1996 to encourage the development and improvement of wildlife habitat on private land. Participating owners receive technical assistance to develop a wildlife habitat management plan, plus cost-share payments under an agreement lasting 5 to 10 years. Cost shares cannot exceed 75 percent of the cost of the practices performed. Administered by the NRCS.

Financial incentives by state:

www.srs.fs.usda.gov/econ/data/forestincentives

Recommended reading:

Jacobson, M.G.; Greene, J.L. [and others]. 2009. **Influence and effectiveness of financial incentive programs in promoting sustainable forestry in the South.** Southern Journal of Applied Forestry. 33(1): 35–41.

Forest Service Landowner Incentive Programs

The **Forest Service Cooperative Forestry** staff works with states, private landowners, and other partners through programs and partnerships that help private landowners and rural communities care for their forests, strengthen local economies, and maintain a high quality of life. Programs managed by Cooperative Forestry include the **Forest Stewardship**, **Forest Land Enhancement**, and **Forest Legacy Programs**.

Forest Stewardship Program

The Forest Stewardship Program (FSP) helps landowners lay out strategies for achieving unique objectives and sustaining forest health and vigor. FSP plans motivate landowners to become more active in planning and managing their forests, greatly increasing the likelihood that their forests will remain intact, productive, and healthy, and that the social, economic, and environmental benefits of these lands will be sustained for future generations. Since its establishment in 1991, FSP has produced more than 270,000 multiresource management plans encompassing more than 31 million acres of nonindustrial private forest land.

Participation in the FSP is open to nonindustrial private forest landowners who will commit to the active management and stewardship of their forested properties for at least 10 years. The FSP is not a cost-share program, though cost-share assistance for plan implementation may be available through other programs such as the Forest Land Enhancement Program.

FSP also assists state forestry agencies with a variety of programs to further support private forest landowner planning and management efforts, including tree improvement and seedling production, and landowner education programs. The Rural Forestry Assistance component of the FSP also provides for tree planting and timber stand improvement projects on non-Federal forest land and the development of discrete, resource targeted management prescriptions or practice plans for landowners.

Forest Land Enhancement Program

The Forest Land Enhancement Program (FLEP) was part of Title VIII of the 2002 Farm Bill. A voluntary program for nonindustrial private forest landowners, FLEP is optional in each state and provides for technical, educational, and cost-share assistance to promote the sustainability of the nonindustrial private forest landowner forests.

FLEP is available for all nonindustrial private forest landowners; landowners are required to have a forest management plan to be eligible for cost share. Cost-share practices are limited to the treatment of 1,000 acres per year with an aggregate payment not to exceed $100,000 for the life of this farm bill. A waiver, granted through the state forester and approved by the regional forester, for the treatment of up to 5,000 acres is available if significant public benefit is shown. There is no limit to the amount of forest land owned by an individual as long as the person qualifies as a nonindustrial private forest landowner.

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Forest Legacy Program

The Forest Legacy Program (FLP), a Federal partnership with states, supports state efforts to protect environmentally sensitive forest lands. Designed to encourage the protection of privately owned forest lands, FLP is an entirely voluntary program. To maximize the public benefits it achieves, the program focuses on the acquisition of partial interests in privately owned forest lands. FLP helps states develop and carry out their forest conservation plans; it encourages and supports acquisition of conservation easements, legally binding agreements transferring a negotiated set of property rights from one party to another, without removing the property from private ownership. Most FLP conservation easements restrict development, require sustainable forestry practices, and protect other values.

Participation in FLP is limited to private forest landowners. To qualify, landowners are required to prepare a multiple resource management plan as part of a conservation easement acquisition. The Federal Government may fund up to 75 percent of project costs, with at least 25 percent coming from private, state, or local sources. In addition to gains associated with the sale or donation of property rights, many landowners also benefit from reduced taxes associated with limits placed on land use.

For more information on these programs and links to tax information and state foresters: www.fs.fed.us/spf/coop/programs/loa/index.shtml

Landowners' Guides

by Gary Kuhlmann

Private landowners hold the key to providing healthy forests for generations to come. With proper stewardship, these forests will provide many benefits we simply cannot live without, including clean water and air, wildlife habitat, recreational resources, and timber supplies.

Proper stewardship means implementing conservation measures on your land. At the same time, you don't have to abandon your financial objectives. Through best management practices, you can still shape your forest to meet your goals.

Sound overwhelming? It's a rare forest landowner who can do all that needs to be done without help from others. There are a number of online guides that offer ideas and resources to forest landowners, as well as technical information on using best management practices.

One of the most extensive online resources for forest landowners is the **Southern Regional Extension Forestry** Web site at sref.info. The site offers a rich mix of information and tools on a long list of issues and opportunities facing forest landowners, including timber markets, property rights, urban/wildland and forest fragmentation, forest health, sustainable forestry, and alternative forest land enterprises, among many others.

State forestry commissions offer extensive online localized guides for private forest landowners. (U.S. Forest Service photo)

The Web site for the **Southern Group of State Foresters** at www.southernforests.org includes links to each of the state forestry commission Web sites, which, in turn, include state-specific recommendations on the same range of management issues.

The **Urban Forestry Index (UFind)** at www.urbanforestryindex.net provides a comprehensive index of resources from a wide variety of organizations—in all types of formats, including manuals and fact sheets, PowerPoint presentations, videos, tool kits, newsletter articles, and peer-reviewed journal articles.

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The Forest Inventory and Analysis Program:

What's In It for Landowners?

by Richard A. Harper

For today's forest landowner, knowledge is power. Obtaining that base of power means knowing where to find the most reliable information. One such source is the **SRS Forest Inventory and Analysis (FIA)** program, headquartered in Knoxville, TN.

From the beginning, private forest landowners have been an integral part of the FIA program. FIA field crews started collecting data in the 1930s, and for more than 75 years, have revisited FIA plots on both private and public forest lands, gathering a wide range of data on timber supply as well as forest health and future risks to forests. The integration of this data with historical trends and socioeconomic data provides researchers with a cache from which to develop models and projection tools for anticipating and assessing future trends in land use, forest health, and timber volume.

How does all this data help the individual forest landowner? The more than 50 variables collected on a plot can produce an infinite array of output data and tables. Traditionally, the data have been used by forest industry managers and consultants to conduct wood supply plans.

More than 11 million private forest landowners manage timber in the United States and are responsible for about 92 percent of the wood used to make houses, furniture, paper, and other wood products. These private forest landowners consider FIA data when planning mill operations, using the information to determine

Timber from private forest land is the primary source of the Nation's wood supply. (U.S. Forest Service photo)

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mill locations, start-ups, and mill expansions and to develop strategic plans. Recently, the **Southern Group of State Foresters** turned to FIA data to support their argument regarding proposed energy legislation that severely restricts timberland available for woody biomass supply, an important source of additional income for the private forest landowner.

Barometer on Primary Forest Products

Another piece of the FIA information pie comes from primary forest industry mill surveys collected and compiled as **Timber Product Output (TPO)** reports. This is how FIA tracks logs moving from the forest to the primary wood mills. TPO reports are based on questionnaires sent to all primary wood-using mills in each state, usually every 2 years in the South.

TPO reports disclose the volume of wood delivered to each mill by product (pulpwood, saw logs, veneer logs, poles, other), species groups, and county of origin for the survey year. The reports also provide data on mill residues—such as saw dust, bark, and chips—and on how residues are used.

In conjunction with FIA plot data, TPO data are useful for mill wood supply plans and strategies, mill expansion assessments, new mill location, wood flow by county and across state lines, residue usage, harvesting and economic research, and mill directory updates by state agencies.

All About the Private Landowner

Timber from private forest land is the primary source of the Nation's wood supply and comprises over half of the forest cover. Under this canopy are environmental protection, wildlife habitat, water quality, outdoor recreation, family legacy, and economic security.

The Forest Inventory and Analysis knowledge base depends on access to privately owned forest land. (U.S. Forest Service photo)

FIA data would not have near the appeal nor influence without the data collected on private forest land. The depth of the FIA data is dependent on access to all forest land; in the South, the bulk of FIA data and information comes as a result of access to private forest land where most of the harvesting, land trading, tree planting, and other development take place.

The FIA knowledge base depends on the cooperation and contributions of private forest landowners. Confidential questionnaires take time from other duties or personal time from landowners and mill operators. But the results pay dividends through better-informed policymakers, landowner assistance programs, and media articles grounded in fact and sound science.

To learn more about FIA:

srsfia1.fia.srs.fs.fed.us

Richard Harper is a forester with the SRS FIA program in Knoxville, TN.

This article was adapted from a version first published in the July/August 2009 issue of Forest Landowner. The full text of the longer article is available from the SRS Web site at www.srs.fs.usda.gov/pubs/33967.

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Threats Landowners Face

by Teresa Jackson

Every year, southern forests face numerous environmental threats and stresses including insect pests, invasive plants, diseases, fire, drought, catastrophic storms, and climate change. Individually, and in combination, these forces can result in long-term environmental, social, and economic damage.

WILDFIRES

In an undisturbed forest ecosystem, natural forces such as fire regulate the number of trees in the forest. Over the past 100 years, this natural balance has been disturbed by fire protection policies that have allowed trees to grow unchecked and has yielded a dense, overstocked forest that has become not only an unacceptable fire risk, but also threatens the future of the forest itself.

Fire in a longleaf pine forest. (U.S. Forest Service photo)

NONNATIVE INVASIVE PLANTS

Chinese tallowtree is one of the fastest spreading nonnative plants invading forests in the South. (Photo by Jim Miller, U.S. Forest Service, www.bugwood.org)

Cogongrass, tallowtree, tree-of-heaven, and Japanese climbing fern are among the fastest spreading and most destructive nonnative plant species challenging southern landowners. "All four species present serious financial and ecological threats to the South and its forests," states **Jim Miller**, research ecologist with the **SRS Insects, Diseases, and Invasive Plants** unit.

According to Miller, one of the foremost authorities on nonnative invasive plants in the South, nonnative species out-compete native forest plants and degrade forest productivity, wildlife habitat, recreational values, and water quality.

"Nonnative plants are introduced and spread by wildlife and through other natural means," states Miller. "Landowners unknowingly spread invasive species by planting them in gardens and yards, unaware that seeds hitchhike on their clothes. Simple things like cleaning tractors and mowers that are used in multiple locations after each use can help prevent the spread of nonnative invasive plants."

In an effort to inform forest managers, landowners, and others about where the most threatening invasive plants are in the South and to help prepare for these threats, Miller collaborated with **SRS Forest Inventory and Analysis** scientists to develop maps showing the spread, county-by-county, across the Southeast of more than 30 of the most serious nonnative plant species.

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WEATHER EVENTS

Hurricanes, tornadoes, and ice storms strike somewhere in the South almost every year. They cause extensive forest damage by uprooting, wounding, bending, and breaking trees. Trees downed or weakened by hurricanes or other major storms are hazardous to people, communities, buildings, and power lines. All trees damaged during a major storm should be assessed for risk as soon as possible after the storm.

Storm damage in a Coastal Plain forest. (U.S. Forest Service photo)

INSECTS AND DISEASES

Prompt identification and treatment of destructive insects and diseases may mean the difference between losing or saving a valuable shade tree or hundreds of acres of forest.

Fusiform rust

Fusiform rust, one of the most damaging diseases of southern pine forests, affects both the quantity and quality of timber produced. Occurring in a band across the heart of the South, the disease is prevalent in the most productive loblolly pine stands and slash pine plantations, and is one of the most damaging forest tree diseases in the South.

Hemlock woolly adelgid

Hemlock woolly adelgid, a native to Japan and possibly China, has been found from northern Georgia, north along the Appalachian Mountains to southern New England. A sign of infestation is the presence of what appears to be the tips of cotton swabs on the bases of hemlock needles. Heavy infestations have killed trees in as little as 4 years.

Fusiform rust on oak leaves. (Photo by Robert Anderson, U.S. Forest Service, www.bugwood.org) Hemlock woolly adelgid infestation. (U.S. Forest Service photo)

Laurel wilt

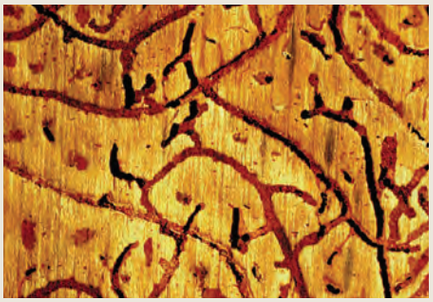
Laurel wilt is a deadly disease of redbay and other species in the laurel family. The disease is caused by a fungus that is introduced into host trees by a nonnative insect, the redbay ambrosia beetle, and can be spread far distances by transporting firewood. The fungus plugs the water-conducting cells of an affected tree and causes it to wilt. Laurel wilt has caused widespread and severe levels of redbay mortality in the Southeastern coastal regions.

Staining caused by laurel wilt. (Photo by Bud Mayfield, Florida Department of Agriculture and Consumer Services, www.bugwood.org)

Southern pine beetle

Southern pine beetle is one of the most destructive pests of pines in the Southern United States, Mexico, and Central America. The beetle occurs from Pennsylvania to Texas and from New Mexico and Arizona to Honduras. It attacks and can kill all species of pines, but prefers loblolly, shortleaf, Virginia, pond, and pitch pines.

The first indication of tree mortality is discoloration of the foliage. Needles become yellowish, change to a red color, and finally turn brown. Trees may be killed singly or in groups, ranging from a few trees to several hundred acres. Natural enemies, such as diseases, parasites, predators and weather, help maintain beetle populations at low levels and bring cyclic outbreaks under control. However, the most effective method of preventing losses is good forest management.



Galleries formed by southern pine beetle. (Photo by Ronald Billings, Texas Forest Service, www.bugwood.org)

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Southern Pine Beetle: Help for Small Landowners

The southern pine beetle is the most destructive forest pest in the South, damaging more than a million acres over the last decade, with economic losses estimated at $1.5 billion. Although all pines serve as hosts for the beetle, loblolly pine and shortleaf pine are considered most susceptible. With pine covering 60 percent of the 212 million acres of land in the South, more losses lie ahead.

In addition to impacts to tourism and wood-based industry, southern pine beetle destroys forests that serve as habitat for threatened and endangered species such as the red-cockaded woodpecker. The dead and downed pines from large infestations also provide fuel for wildfires and pose public safety threats.

"Even though southern pine beetle populations have declined since 2003, we estimate that 8.4 million acres of pines are still at moderate to high risk for infestation," says **John Nowak**, the **Forest Health Protection** entomologist who heads up the **Southern Pine Beetle Prevention Initiative** initiated by the Forest Service in 2003. The program focuses on on-the-ground accomplishments, landowner education, and research and development.

The prevention part of the program represents a shift away from a reactive stance—suppressing beetle attacks as they arise—towards preventing attacks by applying forest management practices to existing stands. Restoration addresses areas impacted by infestation and consists of removing trees killed by southern pine beetle and replanting to restore the forest.

Southern pine beetle prevention billboard on I-75 in Florida. (Photo by Bud Mayfield, Florida Department of Agriculture and Consumer Services, www.bugwood.org)

The program works closely with the **SRS Insects, Diseases, and Invasive Plants** unit in Pineville, LA, which conducts basic and applied research on the southern pine beetle and other invasive insects. Pineville scientists have active projects addressing the risk and costs of southern pine beetle infestations, preventing and controlling outbreaks, and recovery from outbreaks.

Since 2003, the southern pine beetle prevention program has distributed almost $75 million to state forestry agencies and national forests across the Southeast, which has led to thinning and hazard reduction on over 800,000 acres across the South. State forestry agency funds are used to manage nonindustrial private forests and state-owned land, and to educate landowners.

Educating landowners is a major component of the program. "Many landowners in the South, especially those with small parcels, are unaware of southern pine beetles as a source of timber loss, or have little interest in limiting impacts of beetle infestations," says Nowak. "Surveys have shown that most small landowners do not have management plans and don't know where to get help managing for southern pine beetle and other issues."

As part of their southern pine beetle prevention programs, a number of the 13 southern state forestry agencies now have well-developed landowner education programs. A second major focus is providing funding to private landowners through cost-share for on-the-ground prevention and restoration work. Information about cost-share programs is available from individual state forestry commission Web sites.

Links to all state forestry agencies can be found on the **Southern Group of State Foresters** Web site at www.southernforests.org/index.htm.

Example from Georgia of cost-share program available to private landowners in 2009: www.gfc.state.ga.us/forestmanagement/spb.cfm

For more information:

John Nowak at 828-257-4326 or jnowak@fs.fed.us

Recommended reading:

Nowak, J.; Asaro, C.; Klepzig, K.; Billings, R. 2008. **The southern pine beetle prevention initiative: working for healthier forests**. Journal of Forestry. 106(5): 261–267.

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Recycling Outside the Box

by Nathan T. Brown

Andrew Cantrell sets one of the research traps he built from recycled materials. (Photo by Nathan Brown, U.S. Forest Service)

Alabama A&M University graduate student **Andrew Cantrell** has developed a clever green way to build the funnel traps researchers use to trap the reptiles and amphibians they study. Cantrell's project, which is part of a larger project conducted by research forester **Callie Schweitzer** from the **SRS Upland Hardwood Ecology and Management** unit, focuses on the effects silvicultural treatments in Cumberland Plateau oak stands have on local mammals, reptiles, and amphibians in southeast Tennessee.

While the live traps used to capture small mammals are widely available and provided by the Forest Service for research, traps for herpetofauna—reptiles and amphibians—are routinely built from scratch. Most researchers start with a trip to the hardware store to purchase lumber, screws, and hardware cloth, which all together can cost thousands of dollars depending on the size of the project. Being an environmentalist, Cantrell began by searching for alternate building materials and designs.

Cantrell went to his father, **Robert Cantrell**, to discuss potential alternatives to standard trap designs and materials. He credits his father with the idea of using corrugated plastic, commonly referred to by its trademark name Coroplast™, as the primary material for the traps. Used primarily for outdoor advertising, Coroplast™ is also the standard material for printing political campaign signs. The younger Cantrell went to sign manufacturers in Huntsville, AL, where he found an abundant supply of misprints, test runs, and used signs ready for disposal. The businesses happily donated them. While some of the Coroplast™ would normally have been recycled, most would have eventually found its way to a landfill.

Cantrell literally picked up wood from the sides of roads or got local donations to frame the traps. After purchasing screws, paint, and hardware cloth, the total material cost of the 160 traps Cantrell constructed was about $1,000, with most of the cost in hardware cloth. Since he used Coroplast™ to construct the trap tops and funnel openings on each end, Cantrell estimates that he used about half the amount of hardware cloth he would have originally needed. This also benefited the animals captured by providing protection from the elements and reducing the airflow through the traps. The latter helps to prevent the skin of vulnerable animals such as frogs and salamanders from drying out. Cantrell painted the funnel ends black, citing previous research that has shown that black pitfall traps capture more animals than those painted white. While the paint was wet, he added sand to the bottom floor of the funnel to aid animal entry when wet.

"As a researcher I feel it is important to derive new ideas that may better the way we conduct our work," says Cantrell. "The ways we can use recycled materials is really up to the limits of our imagination. This 'thinking outside the box' strategy not only benefited my research, but also the project budget—and most importantly the environment."

"Incorporating herpetofaunal research into large-scale silviculture studies greatly enhances our potential to influence management decisions," says Schweitzer. "Andrew's innovative work serves as a model for all of us to reach 'outside the box'."

Based in Huntsville, AL, Nathan T. Brown is a forestry technician with the SRS Upland Hardwood Ecology and Management unit.

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science

You Can Use!

Tax Incentives Available to You as Private Forest Owners

by John Greene

The Federal tax code contains several provisions than can help you and other private forest owners keep your land in forest and practice good stewardship. Some are general business provisions available to all taxpayers who hold property or other assets to produce income, while others are specifically for forest owners. Among the most beneficial general provisions are:

Long-term capital gain treatment of qualifying income—Income from the sale of timber that you have held for over 12 months can qualify as a "long-term capital gain." The maximum capital gain tax rate for individuals is 15 percent, compared to 35 percent for ordinary income. Through the end of 2009, the tax rate is 0 percent for long-term capital gains which, when added to your ordinary income, fit under the ceiling for the 15-percent bracket for ordinary income ($67,900 for married taxpayers filing jointly in 2009).

Depletion deductions—When you sell timber, you can also recover your investment in the trees sold by taking a depletion deduction. The deduction is equal to your basis (investment) in each unit of timber sold.

Annual deduction of management costs—You can deduct "ordinary and necessary" forest management costs you incur each year. This doesn't include reforestation costs—which have their own provisions—but does include such costs as a timber cruise, brush control, midrotation fertilization, timber stand improvement, or protecting your forest from fire, insects, or disease. For investors these costs are "miscellaneous itemized deductions," which combined with other such expenses, are deductible only to the extent they exceed 2 percent of adjusted gross income.

The Federal income tax provisions specifically for forest owners are:

Reforestation incentives—You can deduct outright up to $10,000 per year of qualifying reforestation costs and amortize any additional amount over 8 tax years. The reforestation tax credit has been eliminated.

Special treatment of qualifying government cost-share payments—You can elect to exclude from your gross income a calculated part of payments from qualifying government cost-share programs. Payments under all of the Federal cost-share programs listed below, as well as some state programs, qualify for exclusion. Because of the way the excludable portion is calculated, it is likely you will be able to exclude the full amount of a cost-share payment if the treated area was harvested in the past 3 years, but only part of the payment if it was not harvested.

John Greene is a research forester with the SRS Forest Economics and Policy unit in Research Triangle Park, NC.

Recommended reading:

Haney, H.L., Jr.; Hoover, W.L.; Siegel, W.C.; Greene, J.L. 2001. **Forest landowners' guide to the Federal income tax.** Agric. Handb. 718. Washington, DC: U.S. Department of Agriculture Forest Service. 157 p. [Update to be available in 2010].

Wang, L.; Greene, J.L. 2009. **Tax tips for forest landowners for the 2009 tax year.** Manage. Bull. R8–MB 134. Atlanta: U.S. Department of Agriculture Forest Service, Southern Region. 2 p.

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around the STATION...

Experimental Forests

1	Bent Creek	NC
2	Blue Valley	NC
3	Coweeta	NC
4	John C. Calhoun	SC
5	Santee	SC
6	Scull Shoals	GA
7	Hitchiti	GA
8	Olustee	FL
9	Chipola	FL
10	Escambia	AL
11	Tallahatchee	MS
12	Delta	MS
13	Harrison	MS
14	Palustris	LA
15	Stephen F. Austin	TX
16	Crossett	AR
17	Alum Creek	AR
18	Sylamore	AR
19	Henry F. Koen	AR

Awards

SRS Assistant Director **Kier Klepzig** was one of eight to receive the 2009 Regional Forester's Natural Resource Leadership Award for his work with the **Southern Pine Beetle Prevention and Restoration Program.** The program is administered by **Region 8 Forest Health Protection** and is implemented by its primary partners including 12 national forests and 13 southern states.

James (Jim) Hanula, research entomologist with the **SRS Insects, Diseases, and Invasive Plants** unit in Athens, GA, was the keynote speaker at this year's annual Southern Forest Insect Work Conference held July 2009 in Gulfport, MS. Hanula gave the address as the winner of the A.D. Hopkins Award for 2008, the most distinguished prize given to a forest entomologist in the South.

Coweeta Hydrologic Laboratory Celebrates 75 Years

The **SRS Coweeta Hydrologic Laboratory** located in Otto, NC, celebrated 75 years of watershed research during a 2-day symposium held in Dillard, GA, in November 2009. In attendance were Forest Service Deputy Chief for Research and Development **Ann Bartuska**, SRS Director **Jim Reaves**, and other Federal officials, scientists, and Coweeta partners. The symposium featured discussions of the development of watershed science and the role of watershed research in addressing the challenges of the 21st century.

EFETAC Hosts International Conference

The **Eastern Forest Environmental Threat Assessment Center** (EFETAC) **Southern Global Change Program** hosted the Second International Conference on Forests and Water in a Changing Environment held in Raleigh, NC, in September 2009. The conference was cosponsored by the **SRS Coweeta Hydrologic Laboratory** and a variety of other stakeholders in academia, government, and business. The theme was the integral role of science-based forest management in regulating water supplies amid multiple stressors. The conference was attended by 140 scientists and students from 8 countries.

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Southern Research Station headquarters in spring 2007. (Photo by Rodney Kindlund, U.S. Forest Service)

NEW PRODUCTS *from the Southern Research Station...*

Natural Resources Inventory and Monitoring

1 Cooper, Jason; Becker, Charles. 2009. **Virginia's timber industry—an assessment of timber product output and use, 2007.** Resour. Bull. SRS–155. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 33 p.

In 2007, roundwood output from Virginia's forests decreased 8 percent to 464 million cubic feet. Mill byproducts generated from primary manufacturers totaled 175 million cubic feet, 3 percent less than in 2005. Seventy-five percent of the plant residues were used primarily for fuel and fiber products. Saw logs were the leading roundwood product at 219 million cubic feet; pulpwood ranked second at 162 million cubic feet; composite panels were third at 54 million cubic feet. The number of primary processing plants declined from 196 in 2005 to 179 in 2007. Total receipts decreased 7 percent to 480 million cubic feet.

2 Cooper, Jason; Mann, Michael. 2009. **North Carolina's timber industry—an assessment of timber product output and use, 2007.** Resour. Bull. SRS–156. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 33 p.

In 2007, industrial roundwood output from North Carolina's forests totaled 728 million cubic feet, 7 percent less than in 2005. Mill byproducts generated from primary manufacturers declined 4 percent to 294 million cubic feet. Almost all plant residues were used primarily for fuel and fiber products. Saw logs were the leading roundwood product at 348 million cubic feet; pulpwood ranked second at 280 million cubic feet; veneer logs were third at 50 million cubic feet. The number of primary processing plants declined from 180 in 2005 to 163 in 2007. Total receipts decreased by 37 million cubic feet to 714 million cubic feet.

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3 Howell, Michael; Johnson, Tony. 2009. **Mississippi's timber industry—an assessment of timber product output and use, 2007.** Resour. Bull. SRS–157. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 31 p.

In 2007, industrial roundwood output from Mississippi's forests totaled 894 million cubic feet, 13 percent less than in 2005. Mill byproducts generated from primary manufacturers decreased 18 percent to 316 million cubic feet. Almost all plant residues were used primarily for fuel and fiber products. Pulpwood was the leading roundwood product at 401 million cubic feet; saw logs ranked second at 379 million cubic feet; veneer logs were third at 76 million cubic feet. There was a total of 84 primary processing plants in 2007, a loss of 32 since 2005. Total receipts decreased 18 percent to 746 million cubic feet.

4 Johnson, Tony; Nowak, Jarek; Mathison, Rhonda. 2009. **Florida's timber industry—an assessment of timber product output and use, 2007.** Resour. Bull. SRS–153. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 31 p.

In 2007, volume of industrial roundwood output from Florida's forests totaled 491 million cubic feet, 10 percent more than in 2005. Mill byproducts generated from primary manufacturers increased to 167 million cubic feet. Almost all plant residues were used primarily for fuel and fiber products. Pulpwood was the leading roundwood product at 237 million cubic feet; saw logs ranked second at 177 million cubic feet; composite panel production was third at 30 million cubic feet. Total receipts were up 10 percent to 506 million cubic feet. The number of primary processing plants totaled 69 in 2007 compared to 93 in 2005.

5 Mathison, Rhonda; Nevins, Christopher. 2009. **Kentucky's timber industry—an assessment of timber product output and use, 2007.** Resour. Bull. SRS–154. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 31 p.

In 2007, roundwood output from Kentucky's forests totaled 186 million cubic feet, 3 percent less than in 2005. Mill byproducts generated from primary manufacturers decreased 5 percent to 90 million cubic feet. Seventy-seven percent of plant residues were used, primarily for fuel, miscellaneous, and fiber products. Saw logs were the leading roundwood product at 144 million cubic feet; pulpwood ranked a distant second at 25 million cubic feet; composite panels were third at 9 million cubic feet. The number of primary processing plants declined from 292 in 2005 to 253 in 2007. Total receipts declined 7 percent to 200 million cubic feet.

6 Mathison, Rhonda M.; Bentley, James W.; Johnson, Tony G. 2009. **East Texas harvest and utilization study, 2008.** Resour. Bull. SRS–160. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 26 p.

In 2008, a harvest and utilization study was conducted on 80 operations throughout eastern Texas. There were 2,024 total trees measured: 1,335 or 66 percent were softwood, while 689 or 34 percent were hardwood. Results from this study showed that 86 percent of the total softwood volume measured was utilized for a product, and 14 percent was left as logging residue. Seventy-five percent of the hardwood volume measured was utilized for a product, while 25 percent was left as logging residue.

7 Mathison, Rhonda M.; Schnabel, Doug. 2009. **Tennessee's timber industry—an assessment of timber product output and use, 2007.** Resour. Bull. SRS–152. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 29 p.

In 2007, roundwood output from Tennessee's forests was 297 million cubic feet. Mill byproducts generated from primary manufacturers totaled 114 million cubic feet. Seventy percent of the plant residues were used primarily for fuel and fiber products. Saw logs were the leading roundwood product at 166 million cubic feet; pulpwood ranked second at 117 million cubic feet; other industrial products were third at 12 million cubic feet. There were 329 primary processing plants operating in Tennessee in 2007. Total receipts amounted to 327 million cubic feet.

8 Rose, Anita K. 2009. **Virginia's forests, 2007.** Resour. Bull. SRS–159. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 77 p.

Between 2002 and 2007, the Forest Service's Forest Inventory and Analysis Program conducted the eighth inventory of the forests of Virginia. About 15.7 million acres, or 62 percent, of Virginia was forested. The majority (12.4 million acres) of Virginia's forest land was in nonindustrial private forest ownership. Public ownership and forest industry ranked second and third, with 2.8 and 0.6 million acres, respectively. Red maple dominated the number of live stems; loblolly pine was second. While yellow-poplar was the most dominate species for live-tree volume as a genus, oaks accounted for 33 percent of the live-tree volume. Biomass of coarse woody debris on forest health plots averaged 2.9 tons per acre for the state.

9 Schiller, James R.; McClure, Nathan; Risher, Willard. 2009. **Georgia's timber industry—an assessment of timber product output and use, 2007.** Resour. Bull. SRS–161. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 35 p.

In 2007, industrial roundwood output from Georgia's forests totaled 1.21 billion cubic feet, 4 percent more than in 2005. Mill byproducts generated from primary manufacturers decreased 5.6 percent to 413 million cubic feet. Almost all plant residues were used primarily for fuel and fiber products. Pulpwood was the leading roundwood product at 611 million cubic feet; saw logs ranked second at 412 million cubic feet; composite panels third at 98 million cubic feet. The number of primary processing plants was down from 181 in 2005 to 168 in 2007. Total receipts increased slightly from 1.21 billion cubic feet in 2005 to 1.22 billion cubic feet in 2007.

Forest Ecosystem Restoration and Management

10 Bragg, Don C.; Shelton, Michael G.; Guldin, James M. 2009. **Restoring old-growth southern pine ecosystems: strategic lessons from long-term silvicultural research.** In: Deal, R.L., tech. ed. Integrated restoration of forested ecosystems to achieve multiresource benefits: Proceedings

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of the 2007 national silvicultural workshop. Gen. Tech. Rep. PNW–GTR–733. Portland, OR: U.S. Department of Agriculture Forest Service, Pacific Northwest Research Station: 211–224.

The successful restoration of old-growth-like loblolly *(Pinus taeda)* and shortleaf *(P. echinata)* pine-dominated forests requires the integration of ecological information with long-term silvicultural research from places such as the Crossett Experimental Forest (CEF). Conventional management practices such as timber harvesting or competition control have supplied us with the tools for restoration efforts. For example, the CEF's Good and Poor Farm Forestry Forties have been under uneven-aged silvicultural prescriptions for 70 years. Monitoring these demonstration areas has provided insights on pine regeneration, structural and compositional stability, endangered species management, and sustainability capable of guiding prescriptions for old-growth-like pine forests.

11 Brockway, Dale G.; Outcalt, Kenneth W.; Estes, Becky L.; Rummer, Robert B. 2009. **Vegetation response to midstory mulching and prescribed burning for wildfire hazard reduction and longleaf pine *(Pinus palustris* Mill.*)* ecosystem restoration.** Forestry. 8(3): 299–314.

In forests where high-density midstories developed during long periods of fire exclusion, the effectiveness of mechanical mulching alone and mulching followed by prescribed burning during winter, spring, and summer were examined as approaches for reducing the risk of wildfire and developing stand structures better suited for the reintroduction of periodic surface fire. Although mulching did improve stand structure by eliminating midstory "fuel ladder," the rapid regrowth of hardwoods indicated that prompt follow-up burning with prescribed fire is necessary to curtail the redevelopment of the dense midstory. Although mechanical mulching can be useful as a one-time treatment for reducing stand density, it needs to be followed with periodic surface fire to maintain forest structure and improve upon initial gains observed for understory plants.

12 Butnor, John R.; Pruyn, M.L.; Shaw, D.C. [and others]. 2009. **Detecting defects in conifers with ground penetrating radar: applications and challenges.** Forest Pathology. 39: 309–322.

This study was designed to determine if ground penetrating radar (GPR) could be used to nondestructively estimate decay in living conifers common in the Northwest United States. Near-surface decay, air-filled hollows, and desiccated boles have unique electromagnetic signatures, which could be separated from other defects. However, separation of mild to severe decay from benign reflectors, e.g., moisture gradient between sapwood and heartwood, in conifers was much less diagnostic than in hardwood species. A limited assessment of sugar maple showed that GPR has potential to detect decay in hardwoods; however, more research is needed to outline the full range of detectable defects.

13 Haywood, James D. 2009. **Influence of pine straw harvesting, prescribed fire, and fertilization on a Louisiana longleaf pine site.** Southern Journal of Applied Forestry. 33(3): 115–121.

The author studied a 34-year-old, direct-seeded stand of longleaf pine *(Pinus palustris* Mill.*)* to examine how pine straw management practices affect the growth of the longleaf pine overstory and the yield of pine straw. A randomized design tested two levels of fertilization, overstory thinning, prescribed fire over several years, and pine straw harvest. Fertilization did not affect longleaf pine growth over the 15-year study. The management treatments also did not influence longleaf pine growth, possibly because the adverse effects of competition, repeated prescribed burning, and litter removal could not be separated. Fertilization did not directly affect pine straw yields; however, it appeared that pine straw yields decreased over time.

14 Loeb, Susan C.; Post, Christopher J.; Hall, Steven T. 2009. **Relationship between urbanization and bat community structure in national parks of the Southeastern U.S.** Urban Ecosystems. 12(2): 197–214.

Urbanization and development are predicted to increase considerably in the United States over the next several decades, resulting in large-scale loss of wildlife species and making natural parks and preserves increasingly important for the conservation of biodiversity. We determined the number of bat species and their evenness (number of individuals per species) in 10 national parks in North Carolina, South Carolina, and Georgia to test the effects of urbanization and development on bat species in the Southeast. We found that urban parks had a similar number of bat species as rural parks and, thus, may serve as important refuges. However, the bat communities in urban parks were highly dominated by one species, the big brown bat. This suggests that some bats may be more susceptible to the effects of urbanization and may be extirpated over time. Thus, management of urban as well as rural parks should strive to conserve as much bat roosting and foraging habitat as possible.

15 Johnsen, Kurt H.; Butnor, John R.; Kush, John S. [and others]. 2009. **Hurricane Katrina winds damaged longleaf pine less than loblolly pine.** Southern Journal of Applied Forestry. 33(4): 178–181.

Some evidence suggests that longleaf pine *(Pinus palustris)* might be more tolerant of high winds than either slash pine *(P. elliottii)* or loblolly pine *(P. taeda)*. We studied wind damage to these three pine species in a common garden experiment in southeast Mississippi following Hurricane Katrina, a category 3 hurricane that directly affected the stand in August 2005. The experiment included 120 plots of 100 trees each; the stand was established in 1960. Following the hurricane, each tree was rated with respect to mortality from wind damage. Longleaf pine suffered less mortality (7 percent) than the other two species (slash pine, 14 percent; loblolly pine, 26 percent), although the differences in mortality were statistically significant only between longleaf pine and loblolly pine. Longleaf pine lost significantly fewer stems per hectare and less basal area than the two other species. Differences in mortality among species were not a function of mean plot tree height or plot density. Our analyses indicate that longleaf pine is more resistant to wind damage than loblolly pine.

16 Perry, Roger W.; Rudolph, D. Craig; Thill, Ronald E. 2009. **Reptile and amphibian responses to restoration**

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of fire-maintained pine woodlands. Restoration Ecology. 7(6): 917–927.

Fire-maintained woodlands and savannas are being restored by forest managers, but little information exists on herpetofaunal responses to this restoration in areas dominated by shortleaf pine *(Pinus echinata)*. We compared habitat characteristics and herpetofaunal communities in restored pine woodlands to relatively unmanaged, second-growth forests in the Ouachita Mountains of western Arkansas. We found woodland restoration with periodic burning affected species differently; some species benefited, some species appeared negatively affected, but most species did not respond clearly either way. Overall reptile captures were significantly greater in pine-woodlands than in unrestored forest. Among anurans, we found no significant difference in captures between woodlands and unrestored forests for any species. Among salamanders, we captured western slimy salamanders *(Plethodon albagula)* almost exclusively in unrestored forest, but captures of other species did not differ between the two treatments. Historically, the Ouachita region likely consisted of a mosaic that included both fire-maintained habitats and areas of denser forest on mesic sites that were less likely to burn. Consequently, landscapes that retain both open woodlands and denser, less-intensely burned forest would likely promote and maintain a greater diversity of herpetofauna.

17 Rhoades, Chuck; Loftis, David; Lewis, Jeffrey; Clark, Stacy. 2009. **The influence of silvicultural treatments and site conditions on American chestnut (*Castanea dentata*) seedling establishment in eastern Kentucky, USA.** Forest Ecology and Management. 258: 1211–1218.

After more than 50 years of research and selective breeding, blight-resistant American chestnut *(Castanea dentata)* trees will soon be available for planting into the species' preblight range. Increased understanding of the regeneration requirements of pure American chestnut will increase the success of future efforts to establish blight-resistant chestnut. We quantified survival and initial growth of bare-root American chestnut seedlings at five locations in eastern Kentucky. Seedling survival was 57 percent and seedling height averaged 94 cm following two growing seasons. Chestnut seedlings grew best in shelterwood overstory treatment areas on mesic sites. The high-light environment created by shelterwood overstory removal resulted in better initial seedling growth, but the moderate light of the midstory removal treatment may ultimately provide chestnut seedlings a greater advantage over competing vegetation.

18 Spetich, Martin A.; Dey, Daniel; Johnson, Paul. 2009. **Shelterwood-planted northern red oaks: integrated costs and options.** Journal of Applied Forestry. 33(4): 182–186.

Tree biology, environmental site conditions, relative monetary costs, management options, and the competitive struggle between planted trees and other vegetation were integrated when underplanting northern red oak *(Quercus rubra)* seedlings in Boston Mountain shelterwoods. This analysis is partly based on previous research that determined the competitive capacity of more than 4,000 seedlings planted under shelterwood overstories. Using these probabilities in our simple accounting of cost, the cost of obtaining one competitively successful tree was calculated under various combinations of environmental variables, silvicultural treatments, and seedling sizes. A successful tree was defined as one predicted to survive and attain dominance or codominance 11 years after planting. The cost of trees that were not likely to survive or reach a dominant or codominant position was added to the cost of obtaining a successful tree. Results provide a practical tool for evaluating various planting options

Ferns in southern forest understory. (U.S. Forest Service photo)

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in relation to both associated costs and the expected biological success of alternative planting prescriptions.

19 Sword Sayer, Mary Anne; Haywood, James D.; Sung, Shi-Jean Susana. 2009. **Cavity size and copper root pruning affect production and establishment of container-grown longleaf pine seedlings.** Forest Science. 55(5): 377–389.

We tested the effects of cavity size and copper root pruning on longleaf pine seedling morphology and root system development in a greenhouse and 1 year postplanting. Seedling size was increased by root pruning in small, but not larger cavities. Before planting, root pruning increased taproot and secondary lateral root weights, decreased primary lateral root weight, and increased root growth potential in the top 5 cm of the plug. Root pruning did not affect the morphology of 1-year-old seedlings. However, of the lateral root weight that elongated after planting, 33 percent more occurred in the upper 5 cm with root pruning.

Forest Values, Uses, and Policies

20 Abt, Karen L.; Prestemon, Jeffrey P.; Gebert, Krista M. 2009. **Wildfire suppression cost forecasts for the US Forest Service.** Journal of Forestry. 107(4): 173–178.

The U.S. Forest Service (FS) and other land management agencies seek better tools for anticipating future expenditures for wildfire suppression. We developed regression models for forecasting FS suppression spending at 1-, 2-, and 3-year lead times. We compared these models to another readily available forecast model, the 10-year moving average model, and found that the regression models do a better job of forecasting the expenditures for all three time horizons. When evaluated against the historical data, our models were particularly better at forecasting the more recent years (2000 to 2007) than the less sophisticated models. The regression models also allowed us to generate, using simulation methods, forecast statistics such as the means, medians, and confidence intervals of costs. These additional statistics provide policymakers, wildfire managers, and planners more information than a single forecast value.

21 Eberhardt, Thomas L.; So, Chi-Leung; Protti, Andrea; So, Po-Wah. 2009. **Gadolinium chloride as a contrast agent for imaging wood composite components by magnetic resonance.** Holzforschung. 63: 75–79.

Contrast agents have an established track record for use in medical magnetic resonance imaging (MRI). To evaluate contrast agent applicability for MRI for wood composites, plywood panels were fabricated with untreated and gadolinium-chloride-treated wood veneers. Signal dropout for the treated veneer demonstrated the first successful use of a contrast agent to manipulate the signal intensity of a wood component within a composite structure. This technique shows promise for nondestructive two- and three-dimensional assessments of wood component, e.g., veneers, flakes, and particles, distributions and orientations in wood composites.

22 Grace, Johnny M.; Clinton, Barton D. 2009. **Protecting soil and water in forest road management.** American Society of Agriculture and Biological Engineers. 50(5): 1579–1584.

The article provides an overview of issues involved in managing the Nation's public forest roads for the protection of soil and water, exploring the benefits and efficacies of erosion mitigation, sediment control, and road Best Management Practices in protecting soil and water. The pattern of use of national forest roads for recreation has increased dramatically since the late 1940s and is expected to continue to increase. However, research over the past 60 years clearly presents forest roads as a major source of sediment and soil erosion from forest watersheds. Road management is an important component in preserving and maintaining healthy forests throughout the Nation.

23 Greene, John L.; Bullard, Steven H.; Cushing, Tamara L.; Beauvais, Theodore. 2006. **Effect of the Federal estate tax on nonindustrial private forest holdings.** Journal of Forestry. 104(1): 15–20.

Using a questionnaire mailed to randomly selected members of two forest owner organizations, the authors determined that 38 percent of forest estates owed Federal estate tax, a rate many times higher than nonforest estates. In 28 percent of the cases where estate tax was due, timber or land was sold because other assets were not adequate to pay the tax. In 29 percent of the cases where land was sold, it was converted to a more developed use. These results were generally consistent with similar data collected from rural landowners.

24 Jacobson, Michael G.; Greene, John L.; Straka, Thomas J. [and others]. 2009. **Influence and effectiveness of financial incentive programs in promoting sustainable forestry in the South.** Southern Journal of Applied Forestry. 33(1): 35–42.

State forestry officials responsible for forestry incentive programs in each of the 13 southern states were surveyed about financial incentive programs available to nonindustrial private forest owners. They were asked to name and describe the public and private programs available in their state, assess forest owners' awareness of each program, its appeal among the owners aware of it, its effectiveness in encouraging sustainable forestry and enabling owners to meet their objectives, and the percent of program practices that remain in place and enrolled acres that remain in forest over time.

25 Perkins, Brian; Smith, Bob; Araman, Philip. 2008. **Analyzing the feasibility of utilizing small diameter hardwood timber for solid wood products and residues.** Gen. Tech. Rep. SRS–111. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 12 p.

The eastern hardwood forest contains small-diameter timber that is often of lower quality and lower value than larger sawtimber. This small-diameter hardwood timber has traditionally been utilized for pulpwood, but it can also be used for lumber and residue production. In order to increase the utilization of this resource by sawmills, a number of analyses need to be conducted. These analyses include a resource analysis, yield analysis, economic analysis, and finally a market analysis. This report gives detailed instructions for conducting

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each of these analyses. The successful completion of these analyses will help hardwood lumber companies determine if using small-diameter hardwood timber is a good decision for their company.

26 Wang, Linda; Greene, John L. 2009. **Tax tips for forest landowners for the 2009 tax year.** Manage. Bull. R8–MB 134. Atlanta: U.S. Department of Agriculture Forest Service, Southern Region. 2 p.

This bulletin summarizes Federal income tax information useful to woodland owners in preparing their 2009 tax returns.

Threats to Forest Health

27 Hanula, James L.; Wade, Dale D.; O'Brien, Joseph; Loeb, Susan C. 2009. **Ground-dwelling arthropod association with coarse woody debris following long-term dormant season prescribed burning in the longleaf pine flatwoods of north Florida.** Florida Entomologist. 92(2): 229–242.

A 5-year study of long-term (40 years) study plots was conducted on the Osceola National Forest in northern Florida to determine how dormant-season fire frequency (annual, biennial, quadrennial, or unburned) affects ground-dwelling macroarthropod use of coarse woody debris in longleaf pine *(Pinus palustris)* forests. Pitfall traps near logs or metal drift fences of equal lengths were used to sample arthropods. Samples were identified to genus or the lowest practical taxonomic level. Overall, significantly more arthropods and more arthropod biomass were captured near drift fences than near logs. Similarity of arthropods captured near logs or drift fences ranged from 64.4 percent in annually burned plots to 69.2 percent in quadrennially burned plots, with no significant differences noted.

28 Hargrove, William W.; Spruce, Joseph P.; Gasser, Gerald E.; Hoffman, Forrest M. 2009. **Toward a national early warning system for forest disturbances using remotely sensed canopy phenology.** Photogrammetric Engineering & Remote Sensing. 75: 1150–1156.

Imagine a national system with the ability to quickly identify forested areas under attack from insects or diseas. Moderate resolution (ca. 500 m) remote sensing repeated at frequent (ca. weekly) intervals could power such a monitoring system that would respond in near realtime. An ideal warning system would be national in scope, automated, able to improve its prognostic ability with experience, and would provide regular map updates online in familiar and accessible formats.

29 Liu, Yongquiang; Goodrick, Scott; Achtemeier, Gary. 2009. **Smoke incursions into urban areas: simulation of a Georgia prescribed burn.** International Journal of Wildland Fire. 18: 336–348.

This study investigates smoke incursion into urban areas by examining a prescribed burn in central Georgia on February 28, 2007. Simulations were conducted with a regional modeling framework to understand transport, dispersion, and structure of smoke plumes; the air quality effects; sensitivity to emissions; and the roles of burn management strategy in mitigating the effects. The results indicate that smoke plumes first went west, but turned northwest at noon owing to a shift in wind direction. The smoke then invaded Metropolitan Atlanta during the evening rush hour, causing severe air quality problems.

30 Nowak, John; Asaro, Christopher; Klepzig, Kier; Billings, Ronald. 2008. **The southern pine beetle prevention initiative: working for healthier forests.** Journal of Forestry. 106(5): 261–267.

The southern pine beetle (SPB) is the most destructive forest pest in the South. After a recent SPB outbreak, the U.S. Forest Service [Forest Health Protection and Southern Research Station (SRS)] received SPB Initiative (SPBI) funding to focus more resources on proactive SPB prevention work. This funding is being used for on-the-ground accomplishments, landowner education, and research and development. Since 2003, on-the-ground accomplishments have totaled over 500,000 acres of thinning and restoration work on State, private, and national forest land. The SRS has worked, internally and externally, on projects addressing (1) the risks and costs of SPB, (2) preventing and controlling SPB outbreaks, and (3) recovery from SPB outbreaks.

31 Qi, S.; Sun, G.; Wang, Y. [and others]. 2009. **Streamflow response to climate and landuse changes in a coastal watershed in North Carolina.** American Society of Agricultural and Biological Engineers. 52(3): 739–749.

It is essential to examine the sensitivity of hydrologic responses to climate and land use change across different physiographic regions in order to formulate sound water management policies for local response to projected global change. This study used a simulation model to examine the potential impacts of climate and land use changes on streamflow of the Trent River basin in North Carolina. We predicted that streamflow of individual years could change from −93 percent to 238 percent under a changing climate. Streamflow was more sensitive to prescribed changes in precipitation than to air temperature. The likely impacts of urbanization will aggravate the impacts of climate change on water quantity and quality.

32 Riitters, Kurt H.; Wickham, James D.; Wade, Timothy G. 2009. **An indicator of forest dynamics using a shifting landscape mosaic.** Ecological Indicators. 9: 107–117.

The composition of a landscape is a fundamental indicator in landcover pattern assessments. The objective of this paper was to evaluate a landscape composition indicator called landscape mosaic as a framework for interpreting landcover dynamics over a 9-year period in a 360,000-km^2 study area in the Southern United States. The indicator classified a land parcel into 1 of 19 possible landscape mosaic classes according to the proportions of natural, developed, and agriculture landcover types in a surrounding 4.41-ha neighborhood.

33 Stanturf, J. 2009. **A stand-development approach to oak afforestation in the Lower Mississippi Alluvial Valley.** Southern Journal of Applied Forestry. 32: 120–129.

Oak afforestation in the Lower Mississippi Alluvial Valley has involved planting 1-year-old bare-root seedlings on a relatively wide spacing in single-species stands or planting light-seeded species with oaks to form mixed-

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Multi-flora rose. (Photo by Jim Miller, U.S. Forest Service, www.bugwood.org)

species stands. In the former case, the developing single-species stands have limited future management options because they do not provide structures that favor quality wildlife habitat or quality sawtimber production. In the latter case, species mixtures are being planted with little knowledge of subsequent stand development, leading to an inability to predict future stand composition for management purposes. In this article, we present a system to determine bottomland tree planting mixtures that will create single-cohort mixed-species stands with a component of high-quality bottomland oak.

Forest Watershed Science

34 Chamberlain, J.L.; Mitchell, D.; Brigham, T. [and others]. 2009. **Forest farming practices.** In: Garrett, H.E., ed. North American agroforestry: an integrated science and practice. 2d ed. Madison, WI: American Society of Agronomy: 219–256.

Forest farming in North America is becoming popular as a way for landowners to diversify income opportunities, improve management of forest resources, and increase biological diversity. People have been informally "farming the forests" for generations. Recently, however, attention has been directed at formalizing forest farming and improving it through research and development. This chapter presents historical and modern perspectives, as well as examples of contemporary practices, illustrating the abundant opportunities in forest farming. Most of the discussion focuses on the Southern United States and western Canada, but the principles described could be applied to farms throughout the country.

35 Haag, Wendell R. 2009. **Extreme longevity in freshwater mussels revisited: sources of bias in age estimates derived from mark-recapture experiments.** Freshwater Biology. 54: 1474–1486.

There may be bias associated with mark-recapture experiments used to estimate age and growth of freshwater mussels. Using subsets of a mark-recapture dataset for *Quadrula pustulosa*, I examined how age and growth parameter estimates are affected by (1) the range and skew of the data and (2) growth reduction due to

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handling. I compared predictions from von Bertalanffy growth models based on mark-recapture data with direct observation of mussel age and growth inferred from validated shell rings.

36 Hales, T.C.; Ford, C.R.; Hwang, T. [and others]. 2009. **Topographic and ecological controls on root reinforcement.** Journal of Geophysical Research. 114, F03013, doi:10.1029/2008JF001168. 17 p.

Shallow landslides are a significant hazard in steep, soil-mantled landscapes. While gradients can be estimated from digital elevation models, information on soil and root properties remains sparse. We investigated whether geomorphically controlled variations in ecology affect the spatial distribution of root cohesion by measuring the distribution and tensile strength of roots from soil pits dug downslope of 15 native trees in the Southern Appalachian Mountains, NC. Root tensile strengths from different hardwood tree species were similar and consistently higher than the only native shrub species measured *(Rhododendron maximum)*. Roots were stronger in trees found on noses relative to those in hollows. For all species, roots were concentrated close to the soil surface, with roots in hollows being more evenly distributed in the soil column than those on noses. Trees located on noses had higher mean root cohesion than those in hollows because of a higher root tensile force. *R. maximum* had the shallowest, weakest roots suggesting that recent expansion of this species due to fire suppression has likely lowered the root cohesion of some hollows.

37 Hamilton, Jim, ed. 2008. **Silvopasture: establishment and management principles for pine forests in the Southeastern United States.** Lincoln, NE: U.S. Department of Agriculture, National Agroforestry Center. 72 p.

This guidebook was created for use in silvopasture training sessions and to serve as a concise field companion when planning future silvopastures. Chapters include comprehensive information on planning, common tree patterns, tree spacing and density, site preparation, and animal grazing systems. Additional resources include a step-by-step example of silvopasture establishment and management and a guide to converting existing forest to a silvopasture system.

38 Hawkins, Tracy S.; Skojac, Daniel A.; Lockhart, Brian R. [and others]. 2009. **Bottomland forests in the Lower Mississippi Alluvial Valley associated with the endangered *Lindera melissifolia*.** Castanea. 74(2): 105–113.

Forest canopy and subcanopy data were collected from and compared among five disjunct bottomland hardwood forests in the Lower Mississippi Alluvial Valley, each with known occurrence of a population of the federally endangered shrub *Lindera melissifolia*. All study sites are cutover forests, underlain by hydric soils, and have a seasonal high water table. Forest composition and structure at each study site reflect hydrologic regime, topography, historical disturbance, and an absence of recent disturbance. Results of this study provide a quantitative description of bottomland forests that currently sustain *L. melissifolia* populations. This information may be used for development of forest management plans aimed at ensuring continued sustainability of existing *L. melissifolia* populations and assessing other bottomland hardwood forests for potential reintroduction of this endangered species.

39 Lockhart, Brian Roy; Gardiner, Emile S.; Leininger, Theodor D. [and others]. 2009. **Linking stakeholder research needs and the Federal data quality act: a case study of an endangered forest shrub in the Southeastern United States.** Forest Policy and Economics. 11: 539–547.

While the basic nature of scientific inquiry has not changed, now more than ever the credibility of scientific results is based on thorough planning, peer reviews of experimental designs and analytical approaches, and assurance that data are of the highest quality. Public interest in the quality and accuracy of Federal research rose to a level that resulted in the Data Quality Act of 2001. The act required the establishment of guidelines for Federal research organizations and cooperators. We present a case study of the U.S. Forest Service's policies for research quality assurance and quality control, including developing quality assurance statements and plans, as applied to comprehensive research on the federally listed, endangered forest shrub pondberry *(Lindera melissifolia)*.

40 Walker, John T.; Vose, James M.; Knoepp, Jennifer; Geron, Christopher D. 2009. **Recovery of nitrogen pools and processes in degraded riparian zones in the Southern Appalachians.** Journal of Environmental Quality. 38: 1391–1399.

Establishment of riparian buffers is an effective method for reducing nutrient input to streams. The objective of this 4-year study was to examine the effects of riparian zone restoration on soil nitrogen (N) cycling mechanisms in a mountain pasture previously degraded by cattle. Soil inorganic N pools, fluxes, and transformation mechanisms were compared across the following experimental treatments: (1) a restored area with vegetation regrowth; (2) a degraded riparian area with simulated effects of continued grazing by compaction, vegetation removal, and nutrient addition (+N); and (3) a degraded riparian area with simulated compaction and vegetation removal only (–N). Changes in soil nutrient cycling mechanisms following restoration of the degraded riparian zone were primarily driven by cessation of N inputs. The recovery rate, however, was influenced by the rate of vegetation regrowth.

41 Wilson, A.D.; Schiff, N.M.; Haugen, D.A.; Hoebeke, E.R. 2009. **First report of *Amylostereum areolatum* in pines in the United States.** Plant Disease. 93(1): 108.

This paper reports the first occurrence of a particular nonnative wood decay fungus *(Amylostereum areolatum)* in the United States. The fungus was discovered in 2005 within pines that were infested with recently introduced woodwasp larvae *(Sirex noctilio)* in a native pine forest in Oswego County, NY. *S. noctilio* is a major nonnative insect pest of pines, and has devastated pines native to the Southern United States. The woodwasp females carry *A. areaolatum* spores, which they inject into trees when they lay their eggs. This insect vector-wood decay fungus complex has a very high risk rating and threatens many pine species in North America, particularly in the Southern United States.

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Longleaf pine. (Photo by Zoë Hoyle, U.S. Forest Service)

Research Work Units

Location and project leader	Name and Web site	Phone
Athens, GA Ken Cordell	Pioneering Forestry Research on Emerging Societal Changes	706-559-4263
Forest Ecosystem Restoration and Management		
Asheville, NC Cathryn Greenberg	Upland Hardwood Ecology and Management www.srs.fs.usda.gov/bentcreek	828-667-5261
Auburn, AL Kris Connor	Restoring and Managing Longleaf Pine Ecosystems www.srs.fs.usda.gov/4111	334-826-8700
Monticello, AR James Guldin	Southern Pine Ecology and Management www.srs.fs.usda.gov/4106	870-367-3464
Saucier, MS Kurt Johnsen, acting	Forest Genetics and Ecosystems Biology www.srs.fs.usda.gov/organization/unit/mississippi.htm#SRS-4153	228-832-2747
Forest Values, Uses, and Policies		
Gainesville, FL Vacant	Integrating Human and Natural Systems www.srs.fs.usda.gov/trends	352-376-3213
Auburn, AL Bob Rummer	Forest Operations www.srs.fs.usda.gov/forestops/	334-826-8700
Pineville, LA Les Groom	Utilization of Southern Forest Resources www.srs.fs.usda.gov/4701	318-473-7268
Research Triangle Park, NC David Wear	Forest Economics and Policy www.srs.fs.usda.gov/econ	919-549-4093
Threats to Forest Health		
Asheville, NC Danny Lee	Eastern Forest Environmental Threat Assessment Center www. forestthreats.org	828-257-4854
Athens, GA John Stanturf	Center for Forest Disturbance Science www.srs.fs.usda.gov/disturbance	706-559-4316
Pineville, LA Doug Streett	Insects, Diseases, and Invasive Plants of Southern Forests www.srs.fs.usda.gov/4501	318-473-7232
Forest Watershed Science		
Franklin, NC Jim Vose	Center for Forest Watershed Research www.srs.fs.usda.gov/coweeta	828-524-2128
Lincoln, NE Michele Schoeneberger	National Agroforestry Center - Research www.nac.gov	402-437-5178
Stoneville, MS Ted Leininger	Center for Bottomland Hardwoods Research www.srs.fs.usda.gov/cbhr	662-686-3154
Natural Resources Inventory and Monitoring		
Knoxville, TN Bill Burkman	Forest Inventory and Analysis www.srsfia2.fs.fed.us	865-862-2000

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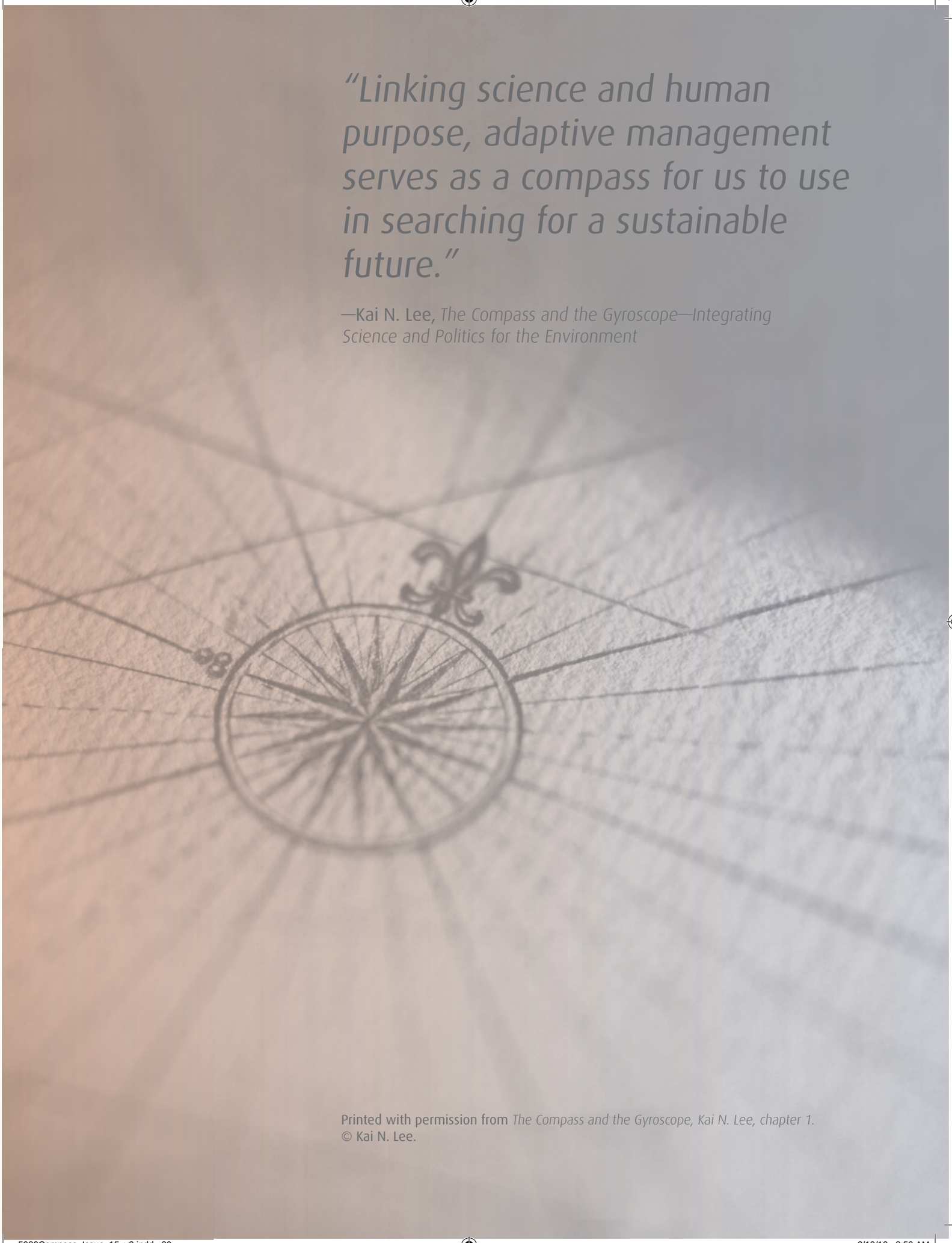
"Linking science and human purpose, adaptive management serves as a compass for us to use in searching for a sustainable future."

—Kai N. Lee, *The Compass and the Gyroscope—Integrating Science and Politics for the Environment*



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The last decade has also been one of rapid changes in industrial forest land ownership in the South, driven by changing markets and products. Land once owned and managed by traditional forest industry is now often held by management investment organizations. In the next issue of Compass, we will look at what these shifts in land ownership mean for SRS long-term research.

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Southern pine beetle salvage harvest in Georgia. (Photo by Terry Price, Georgia Forestry Commission, www.bugwood.org)

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