



a strategic plan
for **forest research**
and development
in the south

U.S. Department
of Agriculture
Forest Service



**Southern Research
Station**

Science Update
SRS-015

October 2007

An aerial satellite photograph of a coastal region. The top half of the image shows a vast expanse of green land, likely a forest or agricultural area, with some brownish patches indicating cleared land or different vegetation types. The bottom half of the image shows a large body of blue water, possibly a bay or a large lake, with a dark blue center and lighter blue-green areas near the coast. The coastline is irregular, with several inlets and peninsulas. The overall scene is a natural landscape with a mix of land and water.

acknowledgements

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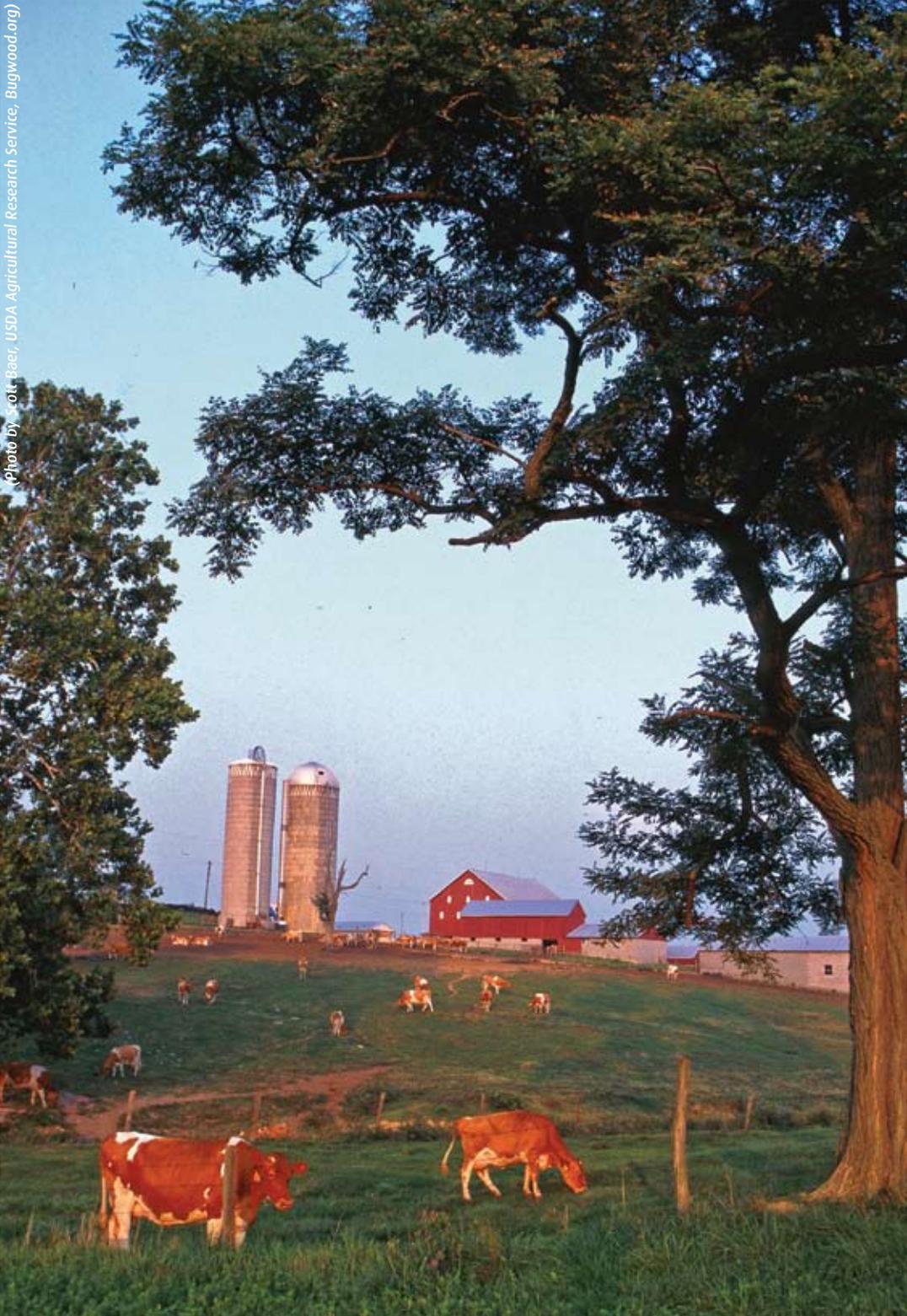
(Photo courtesy of NASA)

In many ways, the southern region of the United States is our nation's best kept secret. Although each is unique, the 13 southern States from Virginia to Texas share several important attributes: long growing seasons and plentiful water, close-knit communities with strong ties to the land, terrains ranging from lush wetlands to rolling hills to sheltering

highlands, landscapes arranged in harmonious patchworks of farms and woodlands, and large reserves of privately owned and maintained forests.

Often referred to as America's wood basket, the South produces more timber than any other region of the country and, remarkably, more than any other single country in the world.

Photo by Scott Baer, USDA Agricultural Research Service, Bugwood.org



four generations of service

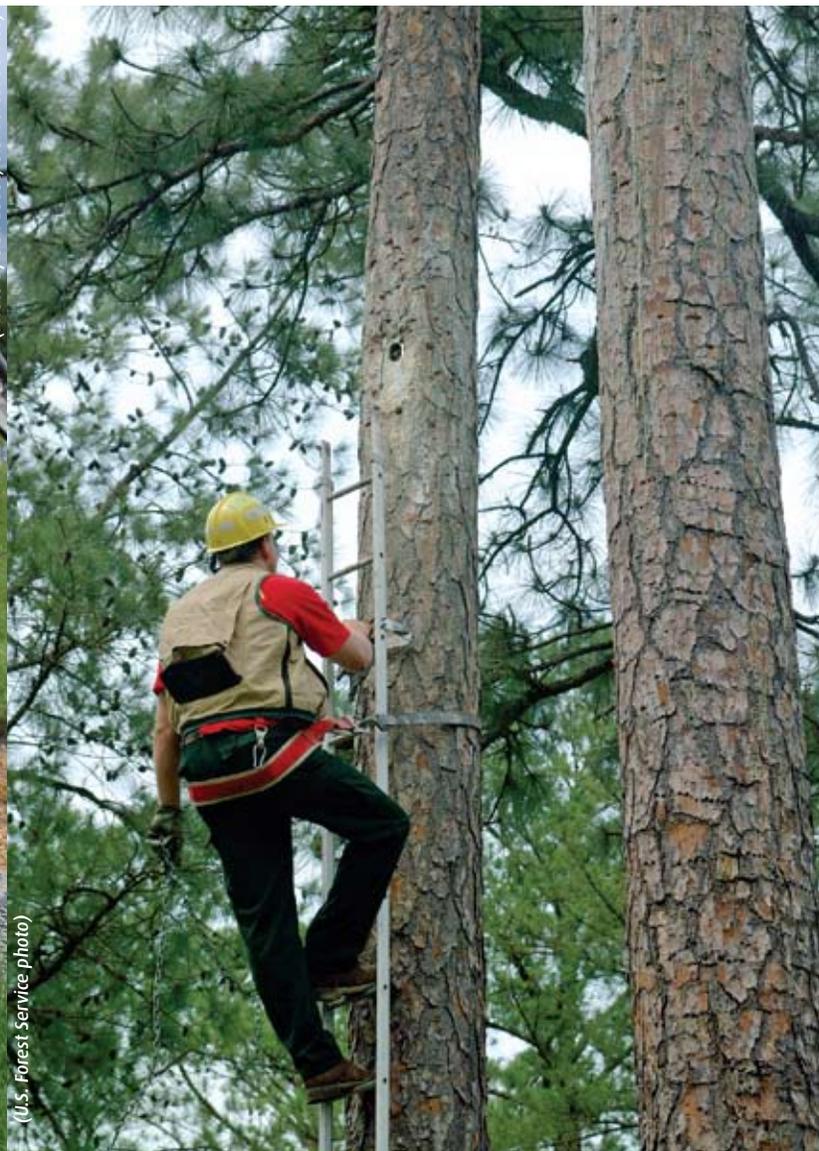
At the Southern Research Station, one of six regional research institutions in the U.S. Department of Agriculture-Forest Service, we have deep roots in the region that go back to the early 1900s. Working in a network of laboratories and experimental forests distributed throughout the region, our earliest scientists served by accumulating data on forest and watershed conditions and delivering tools and guidance that helped establish a second forest from the ill-formed trees and eroded soils left behind by irresponsible logging, open-pit mining, and subsistence farming.

As the southern economy began to turn from large-scale agriculture to industry in the middle of the 20th century, our focus shifted to helping forest industry and other holders of large tracts of land build a third forest on abandoned cropland. On public forestland, which has never comprised more than 10 percent of the total forested land in the South, our scientists focused on developing the knowledge needed to enhance the value of these forests for recreation and as a refuge for declining plant and animal populations.

Through reorganizations, shifting politics in Washington, and fluctuations in budget priorities, the Southern Research Station has continued a broad-based research program. Our scientists have been recognized as world leaders in forest research and monitoring. Our strength has been in our long-term databases, in the “living laboratories” that our experimental forests have become, and in our partnerships with the broader community of dedicated forestry professionals and forest land owners.



(Photo by Dan Leduc, U.S. Forest Service)



(U.S. Forest Service photo)



(Photo by Hans Riekerik, University of Florida)



(Photo by Johnny Boggs, U.S. Forest Service)

best kept secret is out

We are again at a critical juncture. The South is changing and at a rate that can only be compared to the early days of exploitation. The “culprits” this time are not farming, logging, and mining, but rather population growth, urbanization, fragmentation, and global competition. To serve in this new environment the Southern Research Station must provide tools to help political leaders and regulators make decisions that safeguard natural resources and serve both their urban and rural constituencies. We must recognize and address the impacts of an increasingly heavy human footprint on the land. And we must help a new generation of landowners understand and adopt sustainability measures on their increasingly shrinking holdings. All this while maintaining a diverse workforce capable of producing credible,

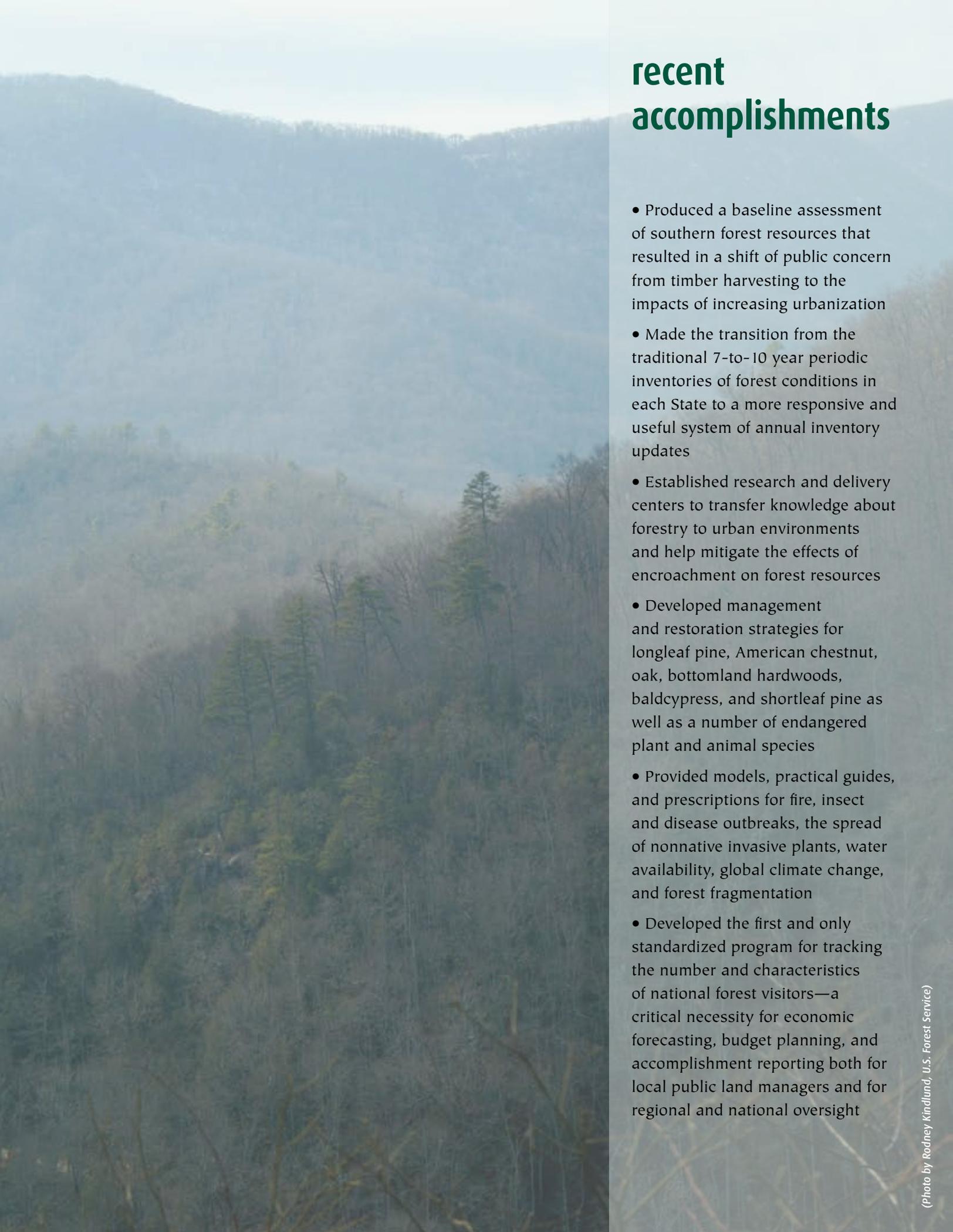
relevant, and accessible science information in an era of shrinking budgets and rising administrative costs.

In early 2006, we began analyses in three critical areas: our research program, our science delivery process, and our own cultural environment as it affects our increasingly diverse workforce and customers. The research program analysis resulted in a major reorientation of our science focus and the reorganization of our research and support staffs. The science delivery analysis produced an increase in our efforts to demonstrate the relevance of our research and to ensure that our findings are adopted by a growing and increasingly diverse customer base. Finally the cultural analysis showed the importance of a diverse workforce in accomplishing our

mission and reaching all parts of the society we serve. With that recognition, we have renewed our commitment to a diverse organization and our resolve to remove barriers and foster ethical practices that leverage the spectrum of perspectives that our employees bring to the job at hand.

our strategic framework

These reassessments of our research, science delivery, and diversity programs have resulted in the new strategic framework for the Southern Research Station described in the following sections. We start with the changing conditions in the South, followed by our strategy for aligning our resources to meet the sustainability challenges of the future. A final section describes our specific commitments to ourselves, our region, and the nation.



recent accomplishments

- Produced a baseline assessment of southern forest resources that resulted in a shift of public concern from timber harvesting to the impacts of increasing urbanization
- Made the transition from the traditional 7-to-10 year periodic inventories of forest conditions in each State to a more responsive and useful system of annual inventory updates
- Established research and delivery centers to transfer knowledge about forestry to urban environments and help mitigate the effects of encroachment on forest resources
- Developed management and restoration strategies for longleaf pine, American chestnut, oak, bottomland hardwoods, baldcypress, and shortleaf pine as well as a number of endangered plant and animal species
- Provided models, practical guides, and prescriptions for fire, insect and disease outbreaks, the spread of nonnative invasive plants, water availability, global climate change, and forest fragmentation
- Developed the first and only standardized program for tracking the number and characteristics of national forest visitors—a critical necessity for economic forecasting, budget planning, and accomplishment reporting both for local public land managers and for regional and national oversight

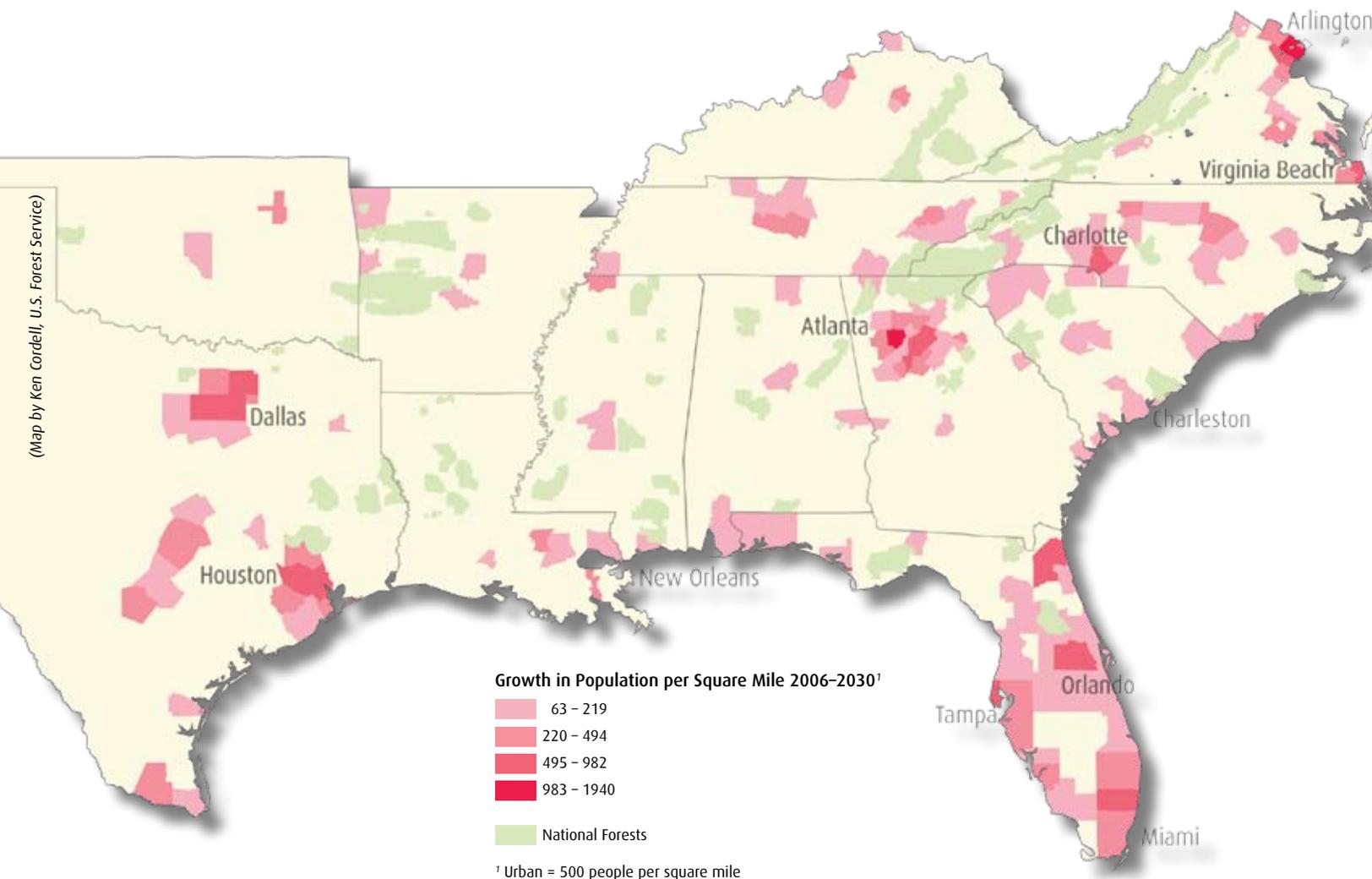
changing conditions in the south

The last half of the 20th century has seen a continuing rise in the population of the Southern United States—a trend that is expected to continue into the 21st century generating forces that profoundly affect forest ecosystems directly and indirectly. Increasing population is accompanied by cultural and ethnic diversification, increases in urbanization, forest fragmentation, new forest land owners with new management goals, increasing severity and

distribution of native forest insects, escalating nonnative species introductions and impacts, and growing demands for water resources. Simultaneously, shifting local and global markets for forest products are also altering management of southern forests by drawing attention to potential alternative fuel sources and other nontimber goods provided by forests.

Producing science-based solutions to relevant problems requires that

we recognize and understand the forces that are altering the face of the Southern United States. These forces are a mix of ecological and management changes, threats to forest health, socioeconomic pressures, and alterations in water yield and quality. They do not act in isolation, but rather interact with each other in complex ways to drive the transformations in southern forests that we are witnessing and greatly influence the solutions we develop to address the challenges we face.





(Photo by Rodney Kindlund, U.S. Forest Service)



(Photo by Bill Lea, U.S. Forest Service, retired)



(Photo by Bill Lea, U.S. Forest Service, retired)



(Photo by Matthew Winn, U.S. Forest Service)

ecological changes call for new management approaches

The factors introduced above present real challenges for restoring and maintaining forest ecosystems that are capable of providing a broad range of both extractive and nonextractive benefits. Within a forest land area of 214 million acres, southern forest ecosystems continue to evolve as forest land is lost to urban and agricultural uses in the eastern parts of the south. Simultaneously, agricultural land is being converted to forest land in the western parts of the South. The resultant shifting mosaic of forest and nonforest ecosystems must be continually inventoried and analyzed to keep up with changing land-use patterns.

A broad range of landowner goals, from intensive industrial forest production to restoration and maintenance of native forest ecosystems, creates challenges for maintaining adequate biological diversity, desirable recreational activities, and soil-site fertility. The South can expect increased pressure on timber resources as traditional forest products continue to be developed to meet consumer demands for the 5,000-plus wood products that contribute to the quality of life. At the same time, the public has clear expectations about environmental quality and availability of resources. As parts of society become more affluent, they also become more interested in conserving and enhancing forest resources. For example, many concerns about southern wildlife and plant species focus on rare forest communities some of which have lost 98 percent of their

habitat since European settlement. Preserving that habitat and expanding it through restoration efforts is an important challenge.

With mounting concerns over global climate change exacerbated by fossil fuel consumption and a decline in pulp and paper demand, opportunities are in place for expanded use of new forest products such as small diameter trees, logging residues, and biomass for engineered wood products, bioenergy and bio-based products. Producing biomass energy products could mean a large market in the future for southern forest landowners. Most of these pressures will fall on private lands in the South because of the large amount of southern forests held by private interests.

Public lands will likely come under different pressures because they are in larger, more contiguous tracts, and have forests that are more mature than are generally found in the private sector. With increasing emphasis on the forest as an appreciative resource (rather than mostly extractive) and decreasing tolerance for active management, the public will expect more nonconsumptive goods and services from national forests, including more recreation usage such as off highway vehicle access, aesthetics, and nontimber forest products (herbs, mushrooms, berries).

With all these pressures, there is growing concern—both among forestry professionals and users—about the region's ability to sustainably manage southern forest ecosystems for this broad range of multiple benefits.

a host of threats to forests

The health of southern forest ecosystems is affected by a broad range of pressures. Native plant diseases and insects represent major economic and sustainability challenges to the health of many southern forests. Introduced diseases, insects, and invasive plants also significantly alter southern forest ecosystems. Many southern forest types, such as longleaf pine communities, are fire adapted; the exclusion of fire has altered both their species composition and flammability characteristics. Despite a desire to return fire to fire-based southern forest communities, prescribed burns are very difficult to employ primarily because of increased population density in rural areas. Hurricanes and ice storms can have periodically devastating effects on some forest ecosystems both at the local and broader regional scales. How to forecast the incidence and impact of forest health threats is a challenging research question that has not yet been adequately solved.

people and landscapes falling out of harmony

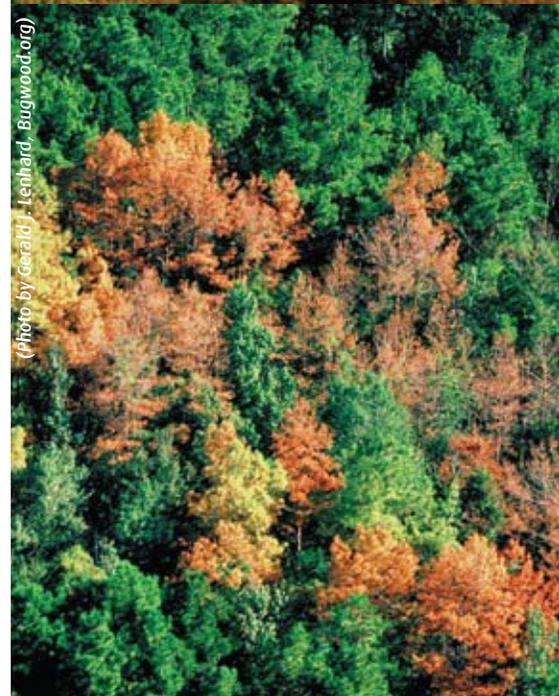
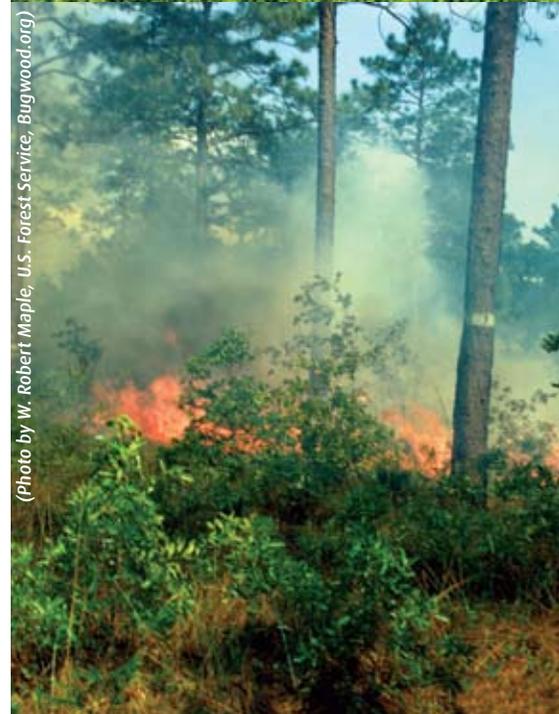
A direct consequence of population pressure on the region's natural resource base is the marked increase of urbanization throughout the South. Between 1982 and 1992, roughly 13 million acres of rural land in the United States were converted to urban uses. Almost half of this acreage was in the South. This expansion is expected to continue into the foreseeable future, with more than 30 million acres of forests projected

to be converted to developed uses between 1992 and 2040. Lost in this conversion will be the myriad of ecosystems services that forests provide to the region.

Conversion of forestland to urban uses is especially apparent in rural areas with amenity-rich natural and cultural resources. Indeed, the desire for ready access to recreation and leisure services is a harbinger of rural land development. Plentiful acreage, little traffic congestion and few close neighbors are among the reasons people move to rural areas. Amenity developments in the South include ski resorts in the Southern Appalachians, golf resorts throughout the region, beach resorts in Florida and other coastal areas, and camping and lodging located throughout the region's highlands. As these areas become more well-known, increasing numbers of people seek them as either seasonal retreats or permanent homes.

Population increase is also contributing to forest fragmentation, which can have serious consequences for resource sustainability and ecosystem services in particular. While some wildlife may be less impacted or even benefited by fragmentation, it is of more serious consequence to large mammals that require larger contiguous roaming areas and to songbirds that may require the solitude of interior forests. Fragmentation has increased in recent decades, in part due to large landowners selling portions of their lands to those wishing to construct homes in rural areas.

Not only is the population of the South increasing, but it is



(Photo by Bill Hea, U.S. Forest Service, retired)

(Photo by W. Robert Maple, U.S. Forest Service, Bugwood.org)

(Photo by Gerald J. Lenhard, Bugwood.org)

becoming increasingly culturally and ethnically diversified. For much of its colonized history, the South's population (other than Texas and Florida) has been split into "White" and "African American" sub-populations. Immigration and migration are altering these stratifications. For instance, Hispanics have either migrated or immigrated to the South in unprecedented numbers in recent years. In the 10-year period from 1990 to 2000, the Hispanic population increased four-fold in Georgia and five-fold in North Carolina. Hispanics and other migrant/immigrant groups are attracted by the region's relatively strong economy and the high demand for service and agricultural workers, including laborers in the forest industry. These population dynamics are evident in large cities like Atlanta and Charlotte but are also apparent in many small rural towns, whose characters have been transformed by migrated and immigrated groups. Such changes in cultural and ethnic diversification have significant implications for

land use and environmental values, which in turn can be expected to affect our research and science delivery programs.

New types of forest landowners are adding another dimension to change. Nearly all of the South's forestland is privately owned, with only about 11 percent in public ownership—including the 6 percent that comprises national forests. Forest products companies own about 17 percent of the region's 214 million acres of forest land. By far the largest type of ownership (almost 60 percent) is nonindustrial private forest landowners (NIPF). NIPF owners have diverse objectives which may include farming, timber production, recreation, or long-term investment (either for profit or for resource conservation).

The investment-focused NIPF group accounts for almost 12 percent of the South's timberland. These owners include Timber Investment Management Organizations (TIMOs), Real Estate Investment Trusts (REITs), professionals investing in forestland, small-group

investors or families that have formed a corporate ownership to limit liabilities of ownership, and nongovernment organizations (NGOs) such as land conservation and nonprofit groups. Unlike traditional forest industry, which managed timberland for mill wood supply, TIMOs and REITs are organized to provide a diversified portfolio of land uses to investors. In addition to timber production, these newer corporations – now the fastest growing and least predictable collection of forest owners in the South—may also convert a portion of forest land to commercial, residential, or other uses. The result is further fragmenting of forest lands. NGO's have another set of management goals or no management at all that represent the views of their contributing members. They are more focused on protecting the landscape from influences of urban expansion and managing the land to meet sustainability and biological diversity objectives.



(Photo © Mike S. Nicholas)

(Photo by Bill Lee, U.S. Forest Service, retired)

quality no longer the only issue for water resources

Water shortages have not been typical concerns for most Southerners, but recent droughts and continued urban expansion have begun to strain water supplies. As forest land is converted to residential and commercial uses, more rainfall runs off of impervious surfaces like rooftops, parking lots, and streets rather than soaking into the ground and recharging the water table. In addition, this accelerated runoff erodes stream channels, pollutes surface waters, and degrades aquatic habitats in downstream

neighboring communities and rural areas. Development patterns also impact water resources by altering streamside riparian areas; in many instances, this means the complete removal of trees adjacent to streams and other water bodies during construction. Losses of forested wetlands, originally to agriculture and more recently to development, have become widespread.

Increased groundwater extractions and/or diversions from watersheds also impact the region's aquatic organisms. The South contains some of the most diverse populations of fish and other freshwater organisms in the world, but threats to water resources jeopardize this natural diversity.

Many aquatic species of concern have narrow and very specific habitat requirements. The effects of development and management activities on such species may be disproportionately large—leading to local extinction—for the small areas they occupy. Restoring and protecting these unique but spatially small habitats is often possible.

All these forces of change, taken individually and together, provide the relevant context in which decisions about the Station's research program, dedication to valuing and leveraging diversity within our workforce, and commitment to science delivery must be considered.



(Photo by Carol Whitlock, U.S. Forest Service)



(Photo by Bill Lea, U.S. Forest Service, retired)

a brief history of the south

The 13 States of the South contain a wide diversity of climates, landscapes, and forest types. Temperatures range from subtropical on the coast to cool and humid in the Appalachian Mountains. The 60 forest types fall into eight physiographic regions: Coastal Plains, Piedmont, mountains, flood plains, Great Plains, sandstone uplands, limestone uplands, and southwestern arid areas.

In the 1500s, a mosaic of fire-influenced forests stretched from the Atlantic Coast to the plains of central Texas and Oklahoma. Wildfires and fires set by American Indians created open savannahs and maintained balds. There were longleaf and slash pine on the Coastal Plain; loblolly and shortleaf pine and oak on the Piedmont; oak, hickory, and chestnut in the mountains; and oak, gum, and cypress in the bottomlands.

As European and other immigrants settled the South, the forests provided timber for building homes, shelter for grazing livestock, and habitat for game. As they pushed

inland from the coast, the settlers cleared forests for farmland, towns, and roads. They brought with them invasive “hitchhikers” like the chestnut blight, which virtually eliminated the American chestnut, until then the dominant species of the Southern Appalachians. Chestnut death left large gaps to be filled by trees that were less desirable from an economic, ecological, and esthetic perspective. By the early 1920s, when the agricultural boom had died down, large areas of cropland and pasture became idle, especially in the Piedmont, where poor cultivation practices produced severe erosion, depletion of soil nutrients, and eventual abandonment.

As a result of uncontrolled fires and the lack of forestry programs, only part of the idle cropland came back to forests. Where trees did regenerate, they became the forest that supplied the wood for the expansion of the pulp and paper industry in the 1930s through the 1960s.

Effective forest practices discovered through research are now in

place to increase productivity and enhance forest diversity. These forest management practices have resulted in an increase in more available wood volume—an increase of almost 73 percent in standing tree volume in the last 50 years—while forestland area across the South has experienced little change. Further increases are possible in stands that are still in poor productive condition. More recently, the South met an unprecedented increase in timber production pressures, especially on private lands when this demand was coupled with recent reductions in timber harvest on public lands in the West.

Part of the economic strength of the South comes from its history of contributing forest products to the Nation and the world. Worldwide demand for forest products in the form of affordable construction materials, paper products, fuelwood, wood-based chemicals, and pharmaceutical products is expected to intensify with growing populations and increasing economic activity.

However, as world trade has expanded and importation of lumber and wood products has increased, so have impacts from global competition on domestic production. These same global markets are bringing invasive plants such as oriental bittersweet, nonnative insects, such as European woodwasps, and other pests which alter forest dynamics and are becoming a major factor in forest economics. These issues coupled with growing urban areas, and the fragmentation and parcelization of forest land continue to impact the forests of the South.



(U.S. Forest Service photo)

research strategy and implementation

The awareness and understanding of the changing ecological and socioeconomic environment in the South motivated the impact analyses focusing on the Southern Station research program, science delivery functions, and diversity challenges. These impact analyses in conjunction with our overarching long term goal of sustainability of forest health, diversity, and productivity informed the Southern Station research strategy and implementation presented in this section.

new research program

Since the late 1990s, the capacity of the Station to continue its productive history has been threatened by many of the forces faced by other public research institutions in the United States, including declining budgets, questions about research relevance and accountability, and shifts in customers and their expectations for research products. “Flat” budgets have meant lower “purchasing power” with salaries and fixed costs rising while funding remains constant. Costs have been reduced through attrition of personnel, forcing some units

to become smaller and more specialized, sometimes with only one or two research scientists. Business processes must continue to be conducted for shrinking units, increasing administrative burdens and cutting productivity for the research personnel who remain. The result has been a decreasing percentage of resources for research.

At the same time, organization structures that once clearly reflected our capabilities and the uniqueness of the Southern landscape began to lose relevance when applied to the emerging issues of the 21st century, such as urbanization and invasions of insects and nonnative plants. Compared with the research questions of the past, today’s resource problems increasingly demand research with a broader scope and scale. Fire, global climate change, and other disturbances are replacing a single species or single forest type as a research focus, while the impacts of development and land parcelization on natural resource sustainability often far exceed the impacts of all forest management options. These research problems require insights

from multiple disciplines and therefore a more highly integrated research program.

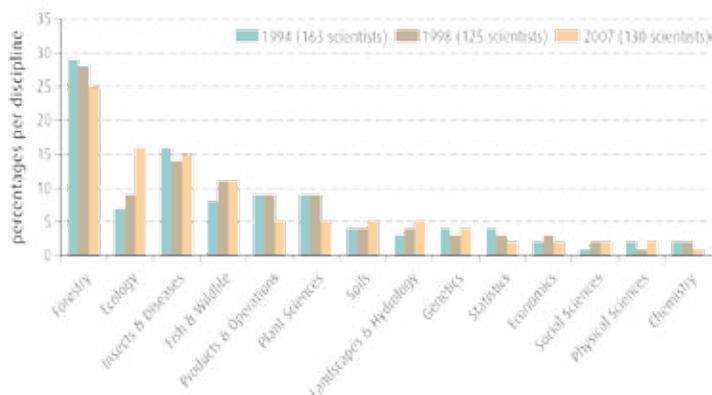
Recognizing the need to transform our organization, we set out to improve our ability to conduct integrated research and broaden our customer base without losing the supporting networks and communications portals that our research units have developed. The goal of the new plan was to keep the focus on sustainability and provide greater efficiencies in research planning and administration.

Our new organization consists of five science areas representing the historical, contemporary, and likely future core strengths of our research program:

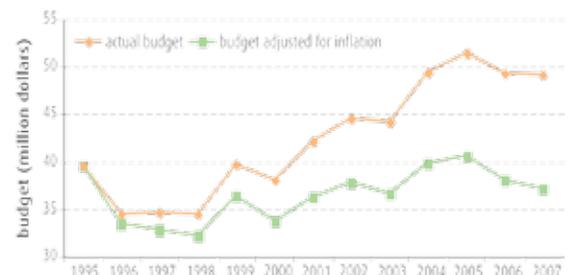
- Natural resource inventory and monitoring
- Forest ecosystem restoration and management
- Threats to forest health
- Forest watershed science
- Forest values, uses, and policies

We recognize that these science areas are multifaceted and overlapping. They are synthesized from the current collection of capabilities of the research units, which have been consolidated from

Research disciplines, comparing 1994, 1998, and 2007



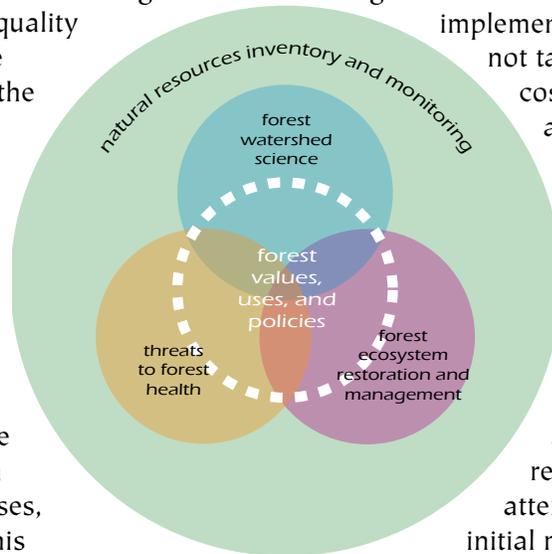
SRS research funding 1995-2007



28 to 15 to increase administrative efficiency. Science planning and research selection will be elevated from the research unit to the science area level—a strategy that will allow stakeholders to provide more meaningful input and position us to deliver research results that are more relevant and consequential. It is at the science area level and above that the Station-wide research program will be evaluated for cohesiveness and effectiveness. This evaluation will occur in part through engagement with a broad range of research users in defining and addressing the appropriate research response to the changing conditions in the South.

The natural resources inventory and monitoring science area provides the factual foundation for understanding what resources we have and how

they are changing. Three science areas concentrate on understanding ecosystem structure, function, and processes and ensuring environmental quality and sustainable productivity in the realms of forest watershed science, forest environmental threats, and resource restoration and management. The fifth science area focuses on forest values, uses, and policies. This science area is depicted schematically to overlap all of the other four science areas in recognition that humans are an



integral and inextricable part of all southern forest ecosystems and that management policies and strategies cannot be successfully implemented if they do not take into account costs, benefits, and impacts on people. Each of the science areas described below has identified the initial major problem areas that will receive research attention. These initial major problem areas are subject to adjustment after review and input from partners, customers, and other researchers.



(Photo by Rodney Kindlund, U.S. Forest Service)

sustainability

The concept of sustainability offers a solution to the dichotomy between the South's immediate need for forest benefits and the emerging public realization that we must sustain the systems that support us into the future. It is a concept that places value on forest health, diversity, and productivity—the components needed to meet the demands of present and future generations—a basic tenet of the Forest Service mission. The Forest Service is committed to the goal of sustainability, defined by the World Commission on Environment and Development as meeting “the needs of the present without compromising the ability of future generations to meet their own needs” (1987).

Inherent in the concept of sustainability is the principle that forests are an important contributor to quality of life in the South and that significant loss of forest acreage to other land uses would degrade the cultural and personal amenities that southerners have come to expect. If southern landowners are to keep forest acreage in some form of forestry, they will need new incentives from government and/or market sources. And they will need new tools that supplement traditional forest resource revenues with new “product lines” that provide energy, environmental, and societal values.

Sustainability is the concept that brings focus to the Southern Station research program. To achieve sustainability we must understand how to define, maintain, enhance, and restore ecosystem integrity and function. We must understand the needs and expectations of the public. And we must measure,

evaluate, predict, and manage the impact of human actions and environmental disturbances on ecosystem structure, function, health, and productivity. The goals developed in this Strategic Framework constitute an approach to providing the answers for these important issues.

Our research program incorporates the effects of human influences and the importance of socioeconomic factors in recognition that:

First, humans are an integral and inextricable part of southern forest ecosystems. Second, resource issues are often the direct results of fundamental changes in social systems. Third, management policies and strategies cannot be successfully implemented if they do not take into account costs, benefits, and impacts on people and ecosystems. Fourth, sustainable forest management ensures that societal needs for forest benefits can be met now and in the future.

Simply stated, the questions underlying our research program are:

societal question

What do we have?

How does it work?

How can we use it sustainably?

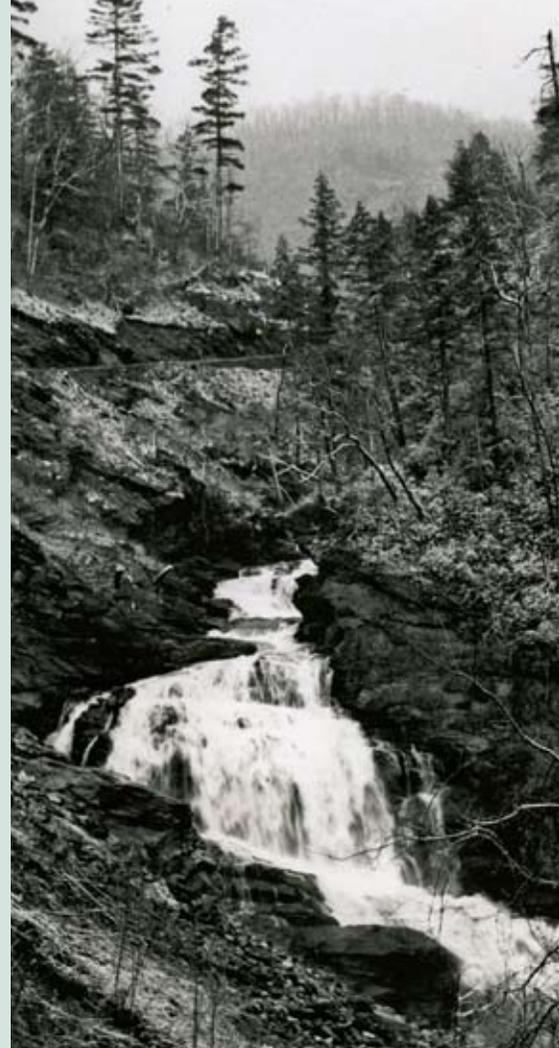
research priority

Measuring, monitoring, and modeling forest resources

Understanding integrated ecosystem structure, function, and processes

Solving problems, providing effective tools, and identifying future impacts before they occur to ensure environmental quality, sustainable productivity, and continued investment in southern forests (ecosystem services)

(U.S. Forest Service photo)





(Photo by Bill Lea, U.S. Forest Service, retired)

(U.S. Forest Service photo)

natural resource inventory and monitoring

The **mission** of this science area is to make and keep current a comprehensive inventory and analysis of the present and prospective conditions of and requirements for the renewable resources of the forest and rangelands of the southern United States within the context of a national program.

Major focus. The Forest Inventory and Analysis (FIA) program has been in continuous operation since 1930. The original focus was forest area and volume but grew to include growth, removals and mortality. Passage of the 1998 Farm Bill led to a nationally consistent

approach, which included new sample and plot designs, annual systematic measurement of a proportion of permanent plots, data summaries within 12 months of collection, and State inventory reports every 5 years. In addition, measures relating to forest ecosystem function, condition, and health were added. A final component was the partnership with State forestry agencies in implementing annual inventories and collecting data.

The southern FIA program conducts the continuous forest census for 13 States, Puerto Rico, and the U.S. Virgin Islands. Continuous assessment of forest status,

condition, health, and trends is critical to State Foresters, forest industries, nonindustrial private landowners, Federal agencies, and nongovernmental organizations because wood-using industries and forest values are critical to the southern economy and culture.

The Station's FIA Program is a major component of the Inventory and Monitoring Science Area. A major product of FIA is forest inventory information in electronic and paper forms. The success of FIA is judged by the timely delivery of FIA information, a requirement that structures our efforts.

Areas of FIA activity focus on



(Photo by Angie Rowe, U.S. Forest Service)



(Photo by Tom Brandeis, U.S. Forest Service)

forest inventory information including area of forest land, volume, components of change (growth-removals-mortality), and regeneration. Within the area of forest ecosystems function, condition, and health, FIA collects information on tree crown condition, down-woody material, soils productivity and erosion, vegetation structure and diversity, and invasive plant distribution. All of this information is critical for accurate descriptions of forest conditions, status, distribution, and health. In addition to the above information, FIA collects information on: (1) timber product

output on the composition, size, and location of wood-using facilities; their use of logs by species, product, and location; and the generation and disposition of mill residues; (2) logging data on sites logged, trees cut, products taken, and residues; and (3) land ownership (through the National Woodland Owners Survey) to characterize southern forest owners, and to determine their objectives, management practices, and future intentions.

Research approach. A major challenge is to make FIA information readily accessible because it provides the data

background for much of the work in the other science areas. Some information is available through the National FIA Web site and the National FIA database. FIA is currently holding workshops to give users training on accessing and using FIA data. In addition, FIA is examining methods to develop joint studies with researchers from other science areas and general users of FIA information to further extract useful information from the FIA data. Some of these studies may lead to additional measures collected on FIA plots across the South.



(Photo by Lance Kress, U.S. Forest Service)



(Photo by Rodney Kindland, U.S. Forest Service)

forest ecosystem restoration and management

The **mission** of this science area is to provide forest landowners and managers with improved knowledge and technology needed to restore and manage forest ecosystems in the South for a variety of benefits.

Major focus. Growing human populations and shifting land ownership trends are producing rapid changes in southern forests. While public lands remain a fraction of the forest land base, they represent the larger parcels, providing unique habitats and recreational opportunities and protecting landscape-scale vistas from development. Public lands dominate the southern forest ownership, providing a large share of forest products and other forest

resources amenable to intensive use. Yet, private forest lands are currently at greater risk to changes of ownership, degradation through unmanaged exploitation, and conversion to nonforest uses.

Forest landowners and users are changing as well, bringing a diversity of ideas on what is wanted from forest lands and forest experiences. A wide range of goals from restoration to intensive forest management are desired by the diversity of private forest landowners and public forest users. Some are interested in the amenity values of their land and have an interest in restoring their forests to a forest-type and condition that existed previously. However, many

continue to want revenue from their forests. In addition to the traditional revenue sources of timber and pulp, forest landowners are increasingly looking for alternative sources, such as carbon sequestration, wildlife habitat, agroforestry, and biofuels production. Still others do not manage their land at all, and do not know where to turn for advice even if they sought to do so. These shifting goals of forest landowners in the South and shifting desires of public forest users have raised new questions regarding how to manage southern forests for a wide array of benefits and uncertain futures.

We will focus our efforts on providing new and improved tools and technologies needed to



(Photo by Charles Dachelet, U.S. Forest Service)



(Photo by Charles Dachelet, U.S. Forest Service)

successfully restore and manage ecosystems in this changing environment. We have initially identified five focal areas for our multi-disciplinary and integrated research program of the future: (1) predicting forest ecosystem response to natural disturbances, (2) managing southern forest ecosystems for multiple benefits, (3) maintaining the biodiversity of southern forest ecosystems, (4) restoring ecosystem structures, processes, and functions, and (5) making use of forest biomass for bioenergy.

Research approach. Our researchers will work with our partners in academia, State agencies, forest industry, and

nongovernmental organizations to conceive and carry out research studies and development applications for restoring and managing forest ecosystems in a changing environment. The outcome of our research will be increased awareness and ability to produce a wide array of economic, ecological, and societal benefits. Our research products will be communicated to a wide range of customers in a variety of ways, taking advantage of new technologies to provide this information in easy to understand language and formats. Our goal is to provide tools and technologies to: (1) sustain healthy, productive forests that provide forest products,

wildlife, biodiversity, and recreation benefits; (2) restore and manage southern forest ecosystems in times of increasing environmental change; (3) reduce the impact of global climate change by using forest ecosystems to sequester carbon and reduce net greenhouse gas emissions; (4) understand the roles of genetics, physiology, ecology, silviculture, and their interactions to more effectively manage and restore southern forest ecosystems; and (5) give forest landowners and managers easy access to the scientific information they need to inform and support their decisions.

threats to forest health

The **mission** of this science area is to identify, manage, and mitigate the natural and human-caused threats to the health of the South's forested ecosystems

Major focus. Natural and human activities will continue to shape the South's 214 million acres of forest cover. Native pests, such as the southern pine beetle, play a key role in southern forest health. Introduced pests, such as the balsam and hemlock woolly adelgids, threaten the existence of some forest types. Invasive plants, such as kudzu and cogongrass are altering the southern landscape. Natural forces such as hurricanes and ice storms can alter forest conditions over wide areas in a matter of hours. All of these forces play out against a back drop of altered fire regimes, variability in climate, and urban development. The roles of these individual stresses, their evolution over time, and how multiple stresses interact, all need additional study.

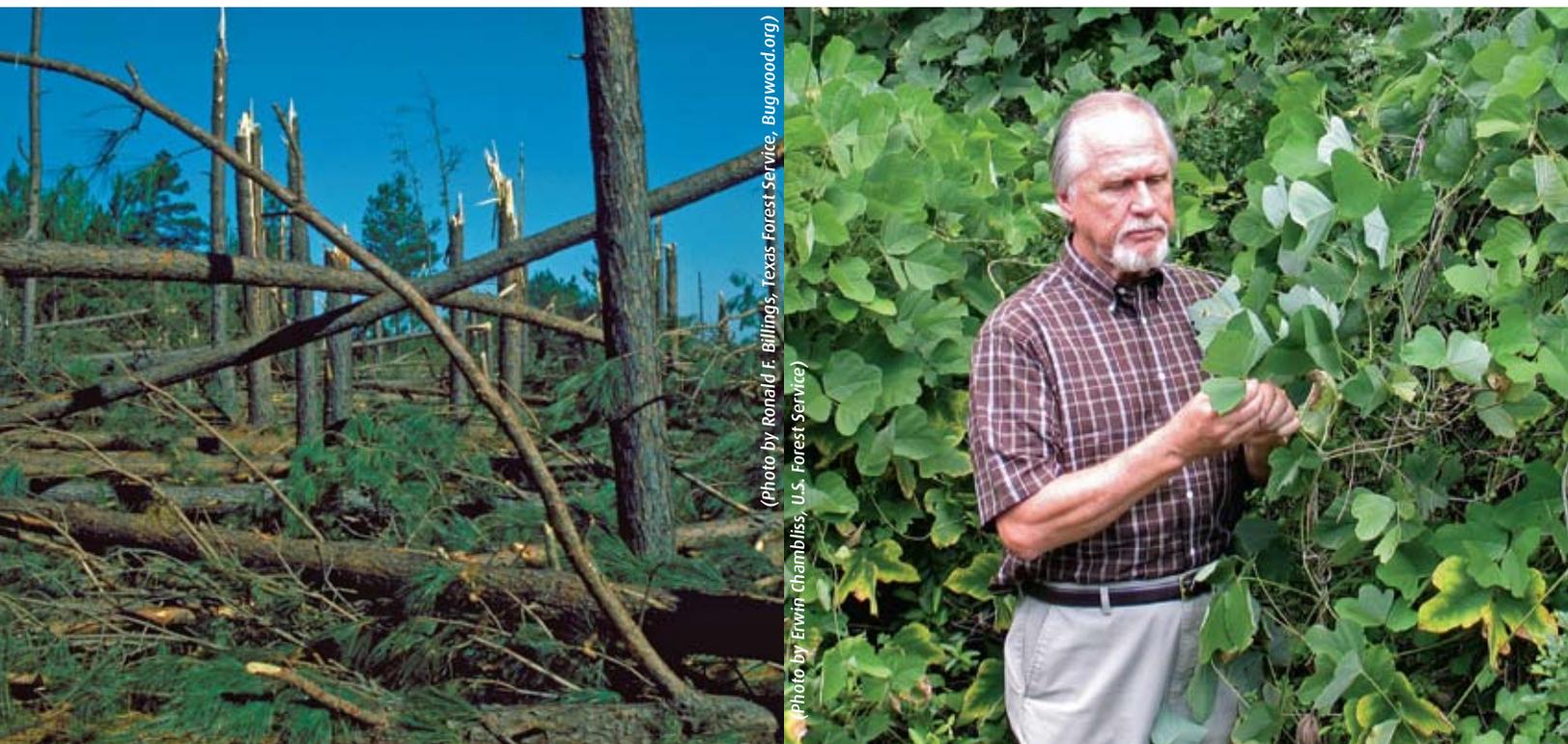
The Threats to Forest Health Science Area is divided into three main focus areas: (1) insects, diseases, and invasive plants, (2) threat assessment, and (3) disturbance ecology.

Research approach. The insect, disease, and invasive-plant research unit combines the work previously done in the Station's southern pine beetle, termite, and insect and disease units. This unit continues to deal with the work traditionally associated with these older programs, but will look more comprehensively at native and nonnative pests that are affecting the South. An emphasis will continue on the identification and mitigation of all invasive species. New invasive species and variations in the behavior patterns of older ones will be a primary focus.

The disturbance ecology unit will continue to be the principal repository of fire research capacity for the Station. Emphasis will be

on the ecological effects of fire, fire as both a fuels and ecosystem management tool, and smoke modeling and other related atmospheric sciences.

The threat assessment unit combines the work of the forest health monitoring, global climate change, and threat assessment. All of these programs have strong identities that will continue under the new unit. The forest health monitoring team and threat assessment unit have National and East-wide charters that give them responsibilities beyond the Station's boundaries. These charters will continue in effect, but the programs will be used in an integrated way with other units to provide a more comprehensive approach to addressing research issues. For example, expertise in global climate change and landscape ecology could be combined with entomology or plant pathology to predict the movement of invasive insects or diseases over time.



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(Photo by Erwin Chambliss, U.S. Forest Service)



(Photo by Rodney Kindlund, U.S. Forest Service)



(Photo by Wendell Haag, U.S. Forest Service)

forest watershed science

The **mission** of this science area is to provide landowners, land managers, policy makers, and society with the knowledge and technology to integrate the management of forests at the watershed scale to provide a sustainable balance of social, economic, and environmental benefits.

Major focus. Because most forest land in the South is privately held, sustainability of water and other forest resources will depend in part on efforts to improve the economics for forest landowners. Compounding the effects of converting forests to residential and commercial uses is the tendency toward intensive farming on agricultural land, with row cropping often extending to the stream's edge. Riparian forests that once protected water quality and stabilized stream banks have been removed. Layered onto this dynamically changing landscape are global climate change, episodic

disturbances, and invasive species; all of which can dramatically affect water resources.

We will focus our efforts on four initially identified areas: (1) the impacts of land conversion on water supply and quality and on cold and warm water fisheries; (2) how water resources may be affected by global climate change—either directly through alterations in precipitation amounts, intervals between rain events, and temperature averages/ extremes, or indirectly through shifts in tree species composition, increased wildfires, and increased frequency and severity of hurricanes and other extreme weather events, (3) the unintended and undesirable consequences on forests, water resources, and aquatic life of nonnative and/or invasive plant and animal species that have been either intentionally or inadvertently introduced to the region; (4) water-friendly ways to help landowners improve their profitability through

investments in growing short rotation woody crops for bioenergy, land management alternatives like agroforestry, and nontimber forest products such as medicinal understory plants that already have strong economic markets.

Research approach. Research in this science area will be highly integrated at the watershed and landscape scales. Models will be developed to help manage and conserve water as it moves from the mountains and piedmont, through the coastal plains, and to the sea. Studies will focus on how the management or demise of existing forests affects water quality and quantity, as well as how the restoration of bottomland hardwood forests, riparian forest on agricultural lands, and wetlands can help reestablish ecological functions and connections in the landscape. Efforts will be made to better couple the influences of rural and urban activities on water resources.

forest values, uses, and policies

The **mission** of this science area is to develop and deliver the knowledge that allows people to manage forest environments for economic, social, and ecological benefits.

Major focus. Population growth, shifting demographics, urbanization, forest parcelization, increasing problems with invasive species, global climate change, increasing attention to ecosystem services and how they are provided, and many other issues all contribute to an increasing need for research relating to forest values, uses and policies. One challenge for research is to evaluate the impact of human activity on the natural environment; and conversely, the influence of the natural environment on human values, beliefs, and actions. Another challenge is to address fluctuations in landowner demographics and markets. Traditional landowners and

markets are changing in a way that was not predicted a decade ago, making many of the assumptions regarding forest management no longer valid. Markets are affected by globalization of trade and manufacturing; landowners are additionally affected by institutional factors stemming from new laws and policies.

Major problems have been initially identified for forest values research, but are subject to revision after review and input from partners, customers, and researchers. The problems initially identified are: (1) quantify economic, social, and ecological values for the entire wildland-urban gradient, and how these change with changing land uses and ownerships; (2) identify how communities and management of natural resources change with changes in land use and resource management policies; (3) develop information to manage diverse resources to provide revenues to forest landowners; (4) develop

knowledge and technology to use woody biomass for biofuels and bioenergy.

Research approach. Research for this science area includes the entire gradient from rural to urban, and the wildland-urban interface. Specific elements are values and benefits, management and policy options, social acceptance of policies, and effects of new technology use, resource fluctuations, and other changes. The Forest Values, Uses, and Policies science area provides the knowledge and technology for landowners and land managers to translate plans into practice on their lands, to apply sustainable management principles to forests in a manner that is economically feasible. Part of this task includes ensuring adequate markets for goods and services from their lands. The science area also provides critical information on the value of forest benefits, including rural forests, urban forests, and the rural-urban gradient.



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(U.S. Forest Service photo)



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delivering our results

Ensuring research findings are adopted means developing and distributing timely, credible, and pertinent science products that contribute to forest sustainability in the South. Delivering scientific knowledge to a diverse audience has always been a challenge. New knowledge is typically produced by forest scientists using the time-honored scientific method and subjected to rigorous peer review leading to publication in scientific journals. The primary audience for these peer reviewed scientific journal articles are other scientists.

Nonscientific audiences need different and diverse science information products. For this reason, we are developing an extensive outreach strategy in collaboration with professionals from Federal and State forestry agencies, universities, and the Cooperative Extension Service. Our focus will be on making better use of a large inventory of long-term research results, some from studies stretching back into the 1920s, and offering users an array

of media options for understanding, adopting, and using science discoveries.

Capacity building. In many of our research units, recognition of the importance of science delivery has been translated into a commitment to fund the communication of study results to a broad range of audiences. The resulting communication efforts take many forms such as workshops, computer software, field tours, self-guided trails, decision-support tools, and attractively printed handouts. At headquarters, a revamped Science Delivery Group has added capacity in marketing, Web presence, customer outreach, and design—mostly by reorienting priorities and redirecting resources freed up by retirements. These new Station investments have strengthened our Web-based science delivery with new products, for example, TreeSearch, the Urban Forestry South Web site, the Wildland-Urban Interface Web site, and the Forest Encyclopedia Network. They have also allowed

us to refocus our editorial and design efforts on new print-based synthesis products such as the quarterly science magazine, Compass.

Outreach. As a public institution, the Southern Station has responsibility for the adoption and use of our science knowledge by diverse audiences—including those for whom English is not the preferred language—whose actions will determine the sustainability of southern forest ecosystems. This requires continuous engagement by users and potential users in science planning, implementation, and delivery. We intend to ensure that all customers, including minority landowners and others who have been underserved, enjoy equal access and equal treatment in the delivery of Station products and services. Our goal is to create effective outreach methods, identify barriers to participation, and take affirmative steps to remove these barriers. Achieving this goal will entail a continuing coordinated assessment of target audiences,



(Photo by Rodney Kindlund, U.S. Forest Service)

(Photo by Dan Hicks, Moncton, New Brunswick, Canada)

identification of the most effective means of reaching them, and analyzing the degree to which our scientific knowledge penetrates various populations, again with special attention to underserved audiences.

Rapid response. Many of the answers to today's problems and issues can be found in the research findings of the past. What was missing in the past was the commitment to deploy the resources needed to form rapid responses, whether they take the form of answering landowner questions or organizing a multiagency effort to pull together information needed in an environmental crisis. Several region-wide efforts show the value of this approach, including the Southern Forest Resource Assessment completed in 2002 and the inventories and land-management guides undertaken immediately following Hurricanes Katrina and Rita. Web-based

science synthesis products such as the Forest Encyclopedia Network are likely to play a central role in the rapid-response delivery of scientific knowledge. A rapid-response project might start with an existing scientific synthesis in the Forest Encyclopedia Network and quickly update and expand that section to ensure that answers to current critical questions become available in a timely manner.

Industrial strength products.

Too often, researchers develop decision tools and other products that represent cutting-edge research but are difficult to use or are out of the mainstream in terms of software compatibility and support. The realignment into science areas enables science delivery professionals to work with researchers and their partners and stakeholders to identify products that have the potential to meet user needs or solve sustainability problems, and then invest the resources required to fully develop

their potential for accurate and clear usability. Users will be involved in reviewing our products for their relevance and their utility.

Credibility and branding.

The advent of the Internet has revolutionized access to information without providing any guidance as to the credibility of information sources. In this new environment, where statements of belief can have equal credibility with research results and where anyone can post a version of science findings that supports special interests, legitimate science organizations must guard against becoming just another voice in the cacophony. Consistent and disciplined branding will help Web customers to associate our research products with the credibility of our organization and partnerships as they wade through the welter of competing ideas and proposals in their search for answers to significant questions.

becoming an employer of choice

Tried and true models of hiring and managing employees are losing their effectiveness, especially when dealing with a younger generation that is more culturally and ethnically diverse. Many newer employees value immediate feedback over long-term security and, like all employees, they expect that their input and contributions to be recognized and valued. Similarly, in external contacts, there is a growing recognition that engaging the emerging mix of new customers and partners will require that we learn more about who they are, what their interests are, how they prefer to communicate, and how we can benefit from their perspectives. This effort requires investments of time, money, and creativity but will

undoubtedly improve our ability to provide relevant science and a more targeted science delivery.

The Southern Station commits itself to establishing and maintaining a workforce where all employees are treated equitably and are valued for their contributions. The goal is to provide a barrier-free environment in which inclusiveness and fairness are the norm for all who belong to and are served by our organization. To accomplish this we will implement the following policies:

- Select leaders whose people management and organizational skills are as highly developed as their professional skills
- Institute leadership development programs to hone individual

coaching and team building abilities

- Strengthen the organizational structures and mechanisms—roles of the civil rights director and civil rights committee, formal plans, procedures, and reporting relationships—that support and promote workforce equity
- Regularly conduct third party reviews of human resources practices (hiring, training, and incentives), identify inequities, and institute required changes
- Institute an accountability system for ensuring equity in hiring decisions and management practices



(U.S. Forest Service photo)



(U.S. Forest Service photo)



strategic framework—our commitment

The changing conditions in the South—increasing population, cultural and ethnic diversification, urbanization and forestland fragmentation, scarcity and impairment of water resources, new forestland ownerships, shifting demand for forest benefits—provide the relevant context in which decisions about the Station's research program, science delivery, and dedication to a diverse workforce must be considered. The five science areas that comprise our research program will address the ecological and social factors taking shape in the region. In addition, we

will endeavor to take our science to both traditional and emerging constituents. We also have the opportunity now to become more inclusive by expanding our outreach to the minority and limited resource groups who have traditionally been underserved. Finally, the Station's commitment to diversity responds to the dramatic sociocultural changes in the South and across the country. Station leadership recognizes the need for fairness at all grade levels in the Station as well as the need for more inclusive customer outreach. With these emphasis areas—a solid research program, effective science delivery, and a strong commitment to diversity—we hold ourselves accountable to both our region and the nation.



(Photo by Craig Rudolph, U.S. Forest Service)

Deeply rooted in proud traditions and heritages, we are ready for the challenges of the 21st Century. Building on our history of highly productive research, we have the people and the facilities to serve our customers' current and future needs. We will emphasize interdisciplinary research, the innovative development and delivery of technology, strong cooperation with our partners, and customer service. We will apply information about human expectations and data from long-term studies to national and international resource problems. Acquiring this knowledge and responding to these needs are the main features of a

continual process that requires communication, assessment, and modification. We pledge to:

Be responsive to issues and customers. We are committed to a science-driven program that emphasizes public involvement and generates information about natural resources and their users, produces user-friendly tools for sustainable management, and supports those tools throughout their life cycle. We believe that each customer group, whether in the traditional forestry fields or not, brings a unique perspective and we will strive to involve them in science planning, implementation, and delivery.

Improve research collaboration in the South. Individual researchers have always enjoyed excellent relationships with colleagues from other organizations. We intend to build on that history and engage our colleagues in setting priorities for the entire South, rather than concentrating on the goals of a particular organization or subregion.

Take an integrated, multidisciplinary approach to research. We will collectively define research problems, outputs, and responsibilities across research units and commit the resources



needed for the integration and assessment of multidisciplinary research.

Clearly define our unique capabilities. We intend to build capacity in long-term research while expanding efforts to include larger landscapes and a range of temporal scales. We will maintain our credibility as a science organization and clearly identify our products to engender user confidence and adoption.

Integrate human factors into all areas of our research program. Research on human needs and perceptions has become a prominent part of the work

we do on terrestrial and aquatic ecosystems. Understanding human expectations and demands for forest resources and benefits is integral to the work we do.

Provide science and technology supporting sustainable management. We will continue to develop the knowledge and technology needed to enhance and sustain productivity of southern forest ecosystems. Our focus will be on environmentally sound, ecologically based, and economically feasible forest management that benefits the people we serve. Our approach will be to “mine” results from our

80+ years of research excellence in addition to concentrating on current results.

Increase our effectiveness as a research organization. Wherever appropriate, we will continue revamping research units to achieve “critical mass” and foster integrated approaches to current issues. We are also revising our administrative processes to better support multidisciplinary, collaborative research.

Increase our effectiveness as an organization of choice. We will foster a barrier-free environment in which inclusiveness and fairness are the rule.



Science is our business. We are dedicated to scientific discovery, to developing and applying new techniques and technologies, and to meeting the needs of our customers. We believe that an emphasis on sustainability is the key to successful natural resource management and that human considerations are part of every resource issue and opportunity.



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