

LONGLEAF PINE ECOSYSTEM RESTORATION: THE ROLE OF THE USDA FOREST SERVICE

C.K. McMahon¹, D.J. Tomczak² and R.M. Jeffers², USDA Forest Service; Southern Research Station¹, Auburn, AL; and Southern Region², Atlanta, GA

ABSTRACT: The greater longleaf pine ecosystem once occupied over 90 million acres from southeastern Virginia, south to central Florida, and west to eastern Texas. Today less than 3 million acres remain, with much of the remaining understory communities in an unhealthy state. A number of public and private conservation organizations are conducting collaborative longleaf pine ecosystem restoration activities throughout the South. The USDA Forest Service has three roles or program areas which are contributing to a regional restoration/conservation strategy for the longleaf pine ecosystem including: (1) expansion of the longleaf pine Forest Type and fire dependent understory communities on the National Forests of the South; (2) providing voluntary, non-regulatory incentives through State and Private Forestry programs; and (3) expansion of collaborative research programs.

INTRODUCTION

The greater longleaf pine (LLP) (*Pinus palustris* Mill.) ecosystem once occupied over 90 million acres from southeastern VA south to central FL, and west to eastern TX (Frost 1993). Much of the LLP ecosystem is distinguished by open, park-like "pine barrens," which are composed of even-aged and multi-aged mosaics of forests, woodlands, and savannas, with a diverse groundcover dominated by bunch grasses and usually free of understory hardwoods and brush (Landers, et al. 1995). Despite the visual dominance of the LLP overstory, this ecosystem contains some of the most diverse understory plant communities in the temperate zone. For example, a floristic classification of the LLP ecosystem (east of the Mississippi River) identified four major series of LLP dominated vegetation. The series were primarily differentiated with respect to soil moisture gradient (xeric, subxeric, mesic, and seasonally wet). These series were divided into twenty three communities which correspond to geographic position and physiographic province (Peet and Allard 1993). Extreme habitat reduction is the main reason for the precarious state of at least 191 taxa of vascular plants (Hardin and White 1989, Walker 1993) and key wildlife such as the red-cockaded woodpecker (RCW), gopher tortoise, and southern fox squirrel. The longleaf pine - wiregrass ecosystem is home to 27 federally listed endangered species and nearly 100 candidate species (Noss et al. 1995). Numerous fire-dependent LLP communities dominated the mesic and xeric uplands of the region, but also occurred on the low, wet flatlands along the coast, and on dry mountain slopes and ridges. Today, less than 3 million acres remain, with over two-thirds of the remaining acres on private lands (Outcalt and Sheffield 1996). LLP ecosystems represent significant components of the Southern Region's cultural heritage, and provide essential habitat for many animal and plant communities. At the same time, LLP forests have many attributes that provide a variety of forest management options suitable for private landowners (Franklin 1997). LLP can be managed in an ecologically sensitive manner and still generate a satisfactory income (Landers et al. 1990). A number of public and private organizations are conducting collaborative LLP restoration and management activities throughout the South. This work at multiple sites and multiple scales is needed to provide guidelines for managing existing LLP ecosystems, and where appropriate, for restoring degraded ecosystems to some of its former range. The USDA Forest Service has three roles or program areas which are contributing to a regional conservation strategy for LLP ecosystem restoration and management including: 1) a land and natural resource management role; 2) an outreach and partnership role; and 3) a research role.

THREE ROLES OF THE USDA FOREST SERVICE

1. LAND & NATURAL RESOURCE MANAGEMENT ROLE: THE NATIONAL FORESTS IN THE SOUTHERN REGION

The National Forests located in the 13 states of the USDA Forest Service, Southern Region include more than 12 million acres of land stretching from Virginia, south to Florida, and west to eastern Texas. National Forests can be found in seven states within the historical range of the LLP ecosystem. This includes significant acres of LLP in NC, SC, FL, AL, MS, LA, and TX. The National Forest System's continuous inventory of stand conditions (CISC) data base, for 1997 reports 762,000 acres as the longleaf pine "Forest Type" or current acres, and 1,115,000 acres as longleaf pine "Management Type" or desired acres, (Table 1). Management Type is a term used to describe a Forest Type that could be produced (restored) on the site to best meet the goals of the Forest Plan. LLP Forest Type and Management Type acres have been increasing on the southern region National Forests in recent years according to the CISC Survey (Table 2). At the same time, LLP Forest Type acres continue to decline dramatically

on private lands (Outcalt and Sheffield 1996). In addition, the health of the understory plant communities on many of the remaining acres is in poor condition, due to the exclusion or infrequent occurrence of fire (Outcalt, pers. comm.).

The USDA Forest Service is now making the restoration of the LLP ecosystem a high priority issue as many of the southern region National Forests revise their land and resource management plans. Forest Land and Resource Management Plans (Forest Plans) are required by the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended by the National Forest Management Act of 1976. These plans are to be revised when conditions have significantly changed, or at least every 15 years. The Forest Plan establishes a framework for future decision making by outlining a broad, general program for achieving goals and objectives. A Forest Plan does not direct specific management activities for specific locations, nor does it dictate day to day activities. However, it does significantly influence the design, execution and monitoring of site-specific activities. Public involvement is a key part of the process. The environmental impact statement which normally accompanies a new Forest Plan provides analytical data that discloses environmental consequences of all the alternative management strategies. It also discloses the effects of these alternatives and how they respond to public issues and concerns. To illustrate how this process can impact restoration of LLP ecosystems on a National Forest, we can look at the recently revised Forest Plan for the Francis Marion National Forest (USDA Forest Service 1996).

The Francis Marion National Forest is located in the heart of the LLP range in southeastern South Carolina. This 250,000 acre National Forest was devastated by Hurricane Hugo in 1989. As a result, an early revision to the 1985 Forest Plan became necessary. In announcing the release of the revised Forest Plan in March 1996, the Forest Supervisor touched on a number of important issues and areas of emphasis, to be addressed over the next 10 to 15 years. Including... "Reversing the decline of the LLP ecosystem through the expansion of the LLP Forest Type and the expanded use of growing season burns..." Specifically, the Francis Marion Forest Plan calls for expanding the LLP Forest Type from approximately 37,000 acres to 44,700 acres over the next 10 years, and to 53,500 acres in the long term. This expansion will primarily occur by converting approximately 16,500 acres of off-site loblolly pine to LLP over the next 90 years. In addition, the plan calls for an increase of growing season prescribed fires from a current 1,800 acres annually up to 4,000 acres annually over the next 10 years, and to 10,000 acres annually for the future, to aid in the expansion of fire dependent native plant and animal communities.

Clearly restoration can and often will be a very slow process. No one in the conservation community is suggesting that the longleaf pine ecosystem should be restored to the full range of conditions and sites which existed prior to European settlement. Instead, in this highly developed region of mixed forest ownerships, LLP restoration must be viewed as a continuum of management options and actions (Walker and Boyer 1994). The options and actions will depend on the current conditions and characteristics of the site, the management objectives of the ownerships, and the patterns of ownership and development that surround a given site or landscape. Thus, a dynamic restoration continuum could include everything from sites on which the LLP overstory has been artificially regenerated for a range of commodity options, to sites where the full functions and processes associated with a naturally occurring longleaf pine ecosystem are restored. A regional approach to longleaf ecosystem restoration requires a balancing of the ecological imperatives with the social and economic forces that are now a part of the southern region reality.

2. OUTREACH AND PARTNERSHIP ROLE: THE USDA FOREST SERVICE STATE AND PRIVATE FORESTRY (S&PF) PROGRAMS

In 1978, Congress passed the Cooperative Forest Assistance Act which consolidated previous laws dealing with S&PF and reaffirmed the Federal role in assisting private forest landowners and communities through voluntary, non-regulatory technical and financial assistance programs, to promote management of the Nation's forest resources. The Headquarters for the USDA Forest Service's S&PF program in the South is located in Atlanta, GA. It is an integral part of the USDA Forest Service's Southern Region which also administers the National Forests in the South.

The S&PF mission includes a set of specific programs, an approach to doing business, and sets a high priority on collaborative working relationships. The cooperative programs include: cooperative fire management with state and local governments; forest insect and disease prevention; cooperative assistance to states and private forest landowners; technical and financial assistance to non-industrial private landowners, and to communities on

forest management; and economic assistance to communities dependent upon natural resources. All of the program activities on non-Federal lands are voluntary, non-regulatory in nature, and most are delivered by state forestry agencies, local governments, and by the private sector. In the South, the state foresters are the key partners in meeting S&PF program objectives. Cooperative programs which provide technical and financial assistance to non-industrial private forest landowners (who own 67% of the forest lands of the South) is a high priority program area.

According to a survey by Outcalt and Sheffield (1996), 51% of the remaining LLP Forest Type acres are owned by non-industrial private owners, 18% by forest industry, and 31% by public agencies. This mix of ownerships underscores the important role of private landowners in an effective LLP regional restoration strategy. As noted by Landers et al. (1995):

“...Restoration of small fragmented stands of longleaf pine is helpful but will not suffice to sustain a functioning ecosystem. The challenge is to restore this ecosystem in an economically viable way so that private landowners can be voluntary partners who benefit in the process. Existing disincentives and longstanding biases must be overcome and incentives added, so that landowners are encouraged to regenerate and manage longleaf pine using methods that simulate historical processes...”

S&PF landowner assistance programs can be used to facilitate private sector involvement in LLP ecosystem recovery. The Forest Stewardship Program which is modeled after Alabama's 23-year-old Treasure Forest Program seeks to encourage long-term stewardship of non-industrial private forest lands. To participate in Forest Stewardship, a landowner is required to have a forest stewardship plan prepared by a professional resource manager and approved by a state forester. The plan identifies actions compatible with the landowners objectives that address management and protection of multiple forest resources such as timber, soil, water, range, fish and wildlife, recreation and aesthetics.

Building upon the Forest Stewardship Program, Congress has authorized the Stewardship Incentives Program (SIP) which provides cost/share assistance to private landowners with stewardship plans. SIP assists landowners in actively implementing goals and objectives identified in their plan. Cost/share assistance is available to eligible landowners for activities identified and approved by a state stewardship advisory committee. SIP is similar to the Forestry Incentives Program (FIP) which was established in 1974. The goal of FIP has been to assist private landowners in managing their forest lands for timber production; SIP's goal is to assist landowners in management of their forest lands for multiple resources, which may or may not include timber production as a primary objective.

A new voluntary conservation easement program, the Forest Legacy Program was established in 1990 to help protect environmentally sensitive forest lands from conversion to alternative uses. Private forest lands with significant environmental values or threatened by present or future conversion to non-forest uses are eligible. Compensation to the landowner would be the fair market value of the real property. The landowner would also be eligible to participate in the SIP program.

In November 1995, the Southern State Foresters, encouraged by public & private groups interested in LLP ecosystems, adopted a joint resolution for a “regional LLP initiative.” The resolution recognized the ecological, economic, cultural and historic value of the LLP Forest Type and encouraged... “the voluntary restoration, regeneration, and management where appropriate to meet landowners objectives”... They also endorsed the formation of a regional Longleaf Alliance which was being organized at that same time. The State Foresters recognized the pivotal role of partnerships, outreach, and coordination efforts in the recovery of the LLP Forest Type.

The Longleaf Alliance which formed in 1995, is a partnership of private landowners, forest industries, state and federal agencies, conservation groups, university researchers, outreach personnel and others interested in promoting a region-wide recovery of LLP forests for their ecological and economic benefits. The Longleaf Alliance serves as a clearinghouse for a broad range of information on regenerating, restoring and managing LLP. A major focus is providing economically viable and voluntary options for recovery of LLP on private lands where most of the LLP losses are occurring. The Alliance Headquarters is located at the Solon Dixon Forestry Education Center near Andalusia, Alabama. The Center, which is a unit of the Auburn University School of Forestry, includes nearly

5,000 acres of forest land. Much of the land is well-managed LLP. It has served as a site for LLP research, demonstration, and management since its establishment in 1979. Through the Alliance, landowners and managers will be connected regionally with peers or other public and private organizations who have successfully addressed similar problems, or with researchers with similar interests and questions. The Alliance will help facilitate communication among research institutions and between researchers and managers, and build networks among landowners, managers, consultants, industries, researchers, and LLP proponents. The Alliance is now supported by the joint efforts and membership of over 200 individuals and institutions.

Clearly there is very strong interest across the region to restore and manage LLP ecosystems. While much information is already available to get started, there remains a number of information and research gaps that need to be addressed through cooperative research and demonstrations.

3. **RESEARCH ROLE: THE USDA FOREST SERVICE, SOUTHERN RESEARCH STATION, RESEARCH PROGRAMS**

For over 75 years the USDA Forest Service has conducted research in support of the Southern Region's forest and natural resource needs. Until recently, the work was organized under two research stations: the Southern Forest Experiment Station, with headquarters in New Orleans, LA; and the Southeastern Forest Experiment Station, with headquarters in Asheville, NC. In 1995, the two Stations were consolidated into the Southern Research Station (SRS) with headquarters in Asheville, NC. The new station continues to operate as a highly decentralized research organization with over 100 scientists located at field laboratories and experimental forests in 10 of the 13 states defined as the USDA Forest Service, Southern Region (Figure 1).

For many years the research efforts at these locations, as well as other locations which have since been closed, were focused on natural resource issues related to silviculture, pathology, genetics, entomology, fire science, soil science, economic and social sciences, wildlife ecology, forest engineering, etc. Research related to one or more components, functions or processes of the LLP ecosystem could be found embedded in the core research program of several projects across the region. From 1947 to 1975 one project, located in southern Alabama (Brewton) was devoted entirely to LLP research. The Brewton project developed the successful shelterwood system for natural regeneration of LLP on the nearby Escambia Experimental Forest, which recently celebrated its 50th Anniversary, (Boyer et al. 1997). In 1975, the Brewton project was closed. A portion of the LLP mission along with administration of the Escambia Experimental Forest, was transferred to a SRS project located on the campus of Auburn University in Auburn, AL. In 1994, a LLP growth and yield project was transferred from Starkville, MS to the Auburn, AL project. This included the responsibility to continue a study known as the "Regional Longleaf Growth Study." This long-term study, initiated in 1964, continues on 305 plots in 5 states (MS, AL, GA, FL and NC). It is one of several long-term (30+ years) LLP studies which remain active in the Southern Research Station. Others related to LLP regeneration, fire ecology, genetics and flower/cone/seed production also continue.

The consolidation of USDA Forest Service research in the South was taking place at a time when there was a growing national dialogue about the need to address natural resource issues in a more holistic, ecosystem context. This national dialogue eventually led to the formation and funding of numerous, "Ecosystem Management" research programs throughout the Forest Service research community. Included were five SRS programs in the southern region. In 1993, the Longleaf Pine Ecosystem Restoration Program was established as one of these programs. Initial planning involved the joint effort of 17 Forest Service scientists representing 14 disciplines in SRS projects located in 8 southern states. Key features of this multi-disciplinary program include processes which will:

- Promote internal teamwork and collaboration within the SRS.
- Unify key issues and needs, and clarify science questions.
- Develop a regional and landscape perspective.
- Facilitate building external partnerships.
- Provide seed financing for initiating new LLP ecosystem research studies.
- Expand or add value to existing studies.

In the first year, program activities focused on compiling "state of the art" information including: 1) an updated LLP bibliography (Kush et al. 1996); 2) a list of on-going LLP research and management activities in the South (Outcalt and Outcalt 1994); and 3) an assessment of current LLP forest conditions (Outcalt and Sheffield

1996). In addition, a strategic planning workshop was held in Atlanta, in October, 1994. The workshop brought together 130 forest managers, researchers, conservationists and other interested publics. The goal was to identify information needs, and to develop a regional strategy for LLP ecosystem restoration. The workshop produced a ranked list of 64 information needs (Walker 1995). The top 15 information needs identified by participants were placed in the following categories:

1. More information needed on growing season burns - fire ecology,
2. Defining LLP ecosystem health,
3. Improved guidelines/techniques for LLP regeneration,
4. Natural disturbance impacts,
5. Improved models of LLP systems.
6. Natural history, structure, dynamics and function,
7. Public knowledge and attitudes about the LLP ecosystem,
8. Economical ground cover restoration methods,
9. Effects of various site preparation techniques on understory communities,
10. Expected production (quantity and values) for specific management alternatives, especially all-aged management,
11. Why is LLP more important than other Southern pine species,
12. Patterns of genetic variation,
13. LLP and aquifers/drainage/wetlands,
14. Impact of herbicides on native ground cover, and
15. Measures of system integrity.

Workshop participants also strongly supported the establishment of a "regional longleaf entity" to act as an information clearing-house for LLP ecosystem activities. As noted earlier, the regional entity became known as The Longleaf Alliance and was established in 1995.

Initial plans for the program considered the installation of integrated, multi-disciplinary LLP community and landscape studies on three national forests and one experimental forest. However, due to funding limitations, work at this scale was not initiated. Instead "seed funding" was provided (via an internal Southern Research Station competitive process), to proposals which addressed the top ten needs identified at the 1994 Atlanta workshop. Twenty-eight proposals were received and twelve received limited financial support. In most cases, monies were used to leverage support from other sources and to extend or expand on-going work.

The 12 studies currently receiving program support are addressing the following key questions:

1. What is the role of fire in maintaining the structure, diversity and functions of natural LLP forests, and how can fire be most effectively used to meet restoration objectives?
2. What factors influence cone and seed production in LLP across the region? How is the genetic diversity of LLP distributed? How can this knowledge be applied to increase the likelihood of successful re-introduction of LLP?
3. How do current management guidelines, most notably guidelines developed for the recovery of the red cockaded woodpecker, contribute to or interfere with restoring LLP communities and landscapes?

The specific science question addressed by each of the sponsored studies and general location of the study include the following:

<u>Study #</u>	<u>Question/Location</u>
95-1	How do fire effects on vegetation in LLP forests vary with season of fire (spring vs winter), landform, and soil? (LA)
95-2	How does the genetic diversity of LLP vary within and among natural LLP stands and LLP orchards across the geographic range of the species? (Regional)
95-3	How do the vegetation and soil microbes in a fire-suppressed virgin LLP stand respond to hardwood removal and prescribed burning? (AL)

- 95-4 What is the effect of 22 years of prescribed fire regimes coupled with selected understory treatments on LLP forest vegetation? (AL)
- 95-5 What is the effect of prescribed fire regimes (7 treatments) on populations of sparse species and on species reintroductions into LLP communities? (SC)
- 95-6 Do population or meta-population dynamics of reptiles and amphibians differ in landscapes with fire compared to fire-suppressed landscapes? (FL)
- 95-7 How can video technology be used to study pollinators of rare plants in LLP ecosystems. (GA)
- 95-8 What is the current condition of the understory of LLP stands in a randomly selected sample distributed in FL, SC, NC, and GA?
- 95-9 Can LLP cone and seed production be predicted from weather, site, and stand structure data? (Regional)
- 95-10 How do management guidelines for the red cockaded woodpecker relate to southern pine beetle infestation of active cavity trees and surrounding habitat? (LA)
- 95-11 What is the relationship of cone production to climatic variation across the LLP region? (Regional)
- 96-1 What is the effect of season of prescribed fire on terrestrial vertebrate abundance, productivity, and community structure in LLP forests in the NC sandhills? (NC)

Current plans for the program call for a workshop in 1998 to review progress, integrate findings where possible, and prepare a revised set of key research questions. It should be noted that the work described here as the SRS "Longleaf Pine Ecosystem Restoration Program" represents the recently expanded portion of LLP research at the SRS. Other LLP related research and monitoring studies continue in various projects across the station, including studies related to:

1. Wildlife habitat/silviculture relationships. (Nacogdoches, TX)
2. Artificial regeneration, seedling physiology, growth and yield, prescribed fire ecology, forest pest (insect) relationships. (Pineville, LA)
3. Economic factors related to restoration and management. (New Orleans, LA)
4. Genetic relationships in forest ecosystems. (Saucier, MS)
5. Natural regeneration, management alternatives, modeling of complex systems, prescribed fire ecology. (Auburn, AL)
6. Prescribed fire ecology, forest pest (disease) relationships, wood quality. (Athens, GA)
7. Threatened, endangered species/forest community relationships. (Clemson, SC)
8. Inventory and monitoring of forest resources. (Starkville, MS and Asheville, NC)

For more information on the Southern Research Station, Longleaf Pine Ecosystem Restoration Program contact, Charles K. McMahon, 334-826-8700, (mcmahon@forestry.auburn.edu). For more information on other SRS projects refer to <http://www.srsfia.usfs.msstate.edu/srs/srs.htm>, or contact SRS Public Affairs at 704-257-4840.

LITERATURE CITED

1. Boyer, W.D., G.A. Ward, and J.S. Kush 1997. The Escambia Experimental Forest: Fifty years of research on the ecology and management of longleaf pine. *Southern Journal of Applied Forestry*. 21(1):47.
2. Franklin, R.M. 1997. Stewardship of Longleaf Pine Forests: A Guide for Landowners. Longleaf Alliance Report No. 2. Longleaf Alliance, Solon Dixon Forestry Education Center, Andalusia, AL. 44 p.
3. Frost, C.C. 1993. Four centuries of changing landscape patterns in the longleaf pine ecosystem. *Proceedings, Tall Timbers Fire Ecology Conference 18: 17-43*, Tallahassee, FL: Tall Timbers.
4. Hardin, E.D., and D.L. White. 1989. Rare vascular plant taxa associated with wiregrass (*Aristida stricta*) in the southeastern United States. *Natural Areas J.* 9:234-245.
5. Kush, J.S., R.S. Meldahl, W.D. Boyer and C.K. McMahon 1996. Longleaf pine: an updated bibliography. Forestry Departmental Series No. 15, Alabama Agricultural Experiment Station, School of Forestry, Auburn University, AL. 35 p.
6. Landers, J.L., N.A. Byrd, and R. Komarek. 1990. A holistic approach to managing longleaf pine communities. In *Proceedings of the Symposium on the Management of Longleaf Pine*, ed. R.M. Farrar Jr. General Technical Report SO-75. New Orleans: USDA Forest Service, Southeastern Forest Experiment Station.
7. Landers, J.L.; Van Lear, D.H.; Boyer, W.D. 1995. The longleaf pine forests of the Southeast: Requiem or Renaissance? *Journal of Forestry* 93(11): 39-44.

8. Noss, R.F., LaRoe III, E.T., and Scott, J.M. 1995. Endangered Ecosystems of the United States: A Preliminary Assessment of Loss and Degradation. U.S. Dept. of Interior, Nat. Biol. Serv. Biological Report #28, 58p.
9. Outcalt, K.W. and Outcalt, P.A. (compilers) 1994. The Longleaf Pine Ecosystem: A Research Assessment. USDA Forest Service, Southern Research Station, Athens, GA. 110 pages (Internal Report).
10. Outcalt, K.W.; and R.M. Sheffield. 1996. The longleaf pine forest: Trends and current conditions. Resource Bulletin SRS-9, USDA For. Serv., Asheville, NC 23p.
11. Outcalt, K.W. 1997. Personal communication.
12. Peet, R.K., and Allard, D.J. 1993. Longleaf Pine Vegetation of the Southern Atlantic and Eastern Gulf Coast Regions: A Preliminary Classification. Proceedings, Tall Timbers Fire Ecology Conference 18: 45-81, Tallahassee, FL: Tall Timbers.
13. United States Department of Agriculture 1996. Revised Land and Resource Management Plan. Forest Service, Southern Region, Francis Marion National Forest, South Carolina. March 1996.
14. Walker, J.L. 1993. Rare vascular plant taxa associated with the longleaf pine ecosystem. Tall Timbers Fire Ecology Conf. 18: 105-127. Tall Timbers Research Station, Tallahassee, FL.
15. Walker, J.L. and Boyer, W.D. 1994. An Ecological Model and Information Needs Assessment for Longleaf Pine Ecosystem Restoration. Gen. Tech. Rep. SE-88, USDA For. Serv., Asheville, NC: 138-147.
16. Walker, J.L. 1995. Report to participants, Longleaf Pine Ecosystem Restoration: Toward a Regional Strategy - a working meeting for Land Managers and Researchers. October 3-5, 1994. Atlanta, GA. USDA Forest Service, Southern Research Station, Clemson, S.C. 42p.

TABLE 1. ACRES OF LONGLEAF PINE AND LONGLEAF PINE-HARDWOODS ON NATIONAL FORESTS IN THE SOUTHERN REGION

National Forests	Forest Type (current longleaf acres)			Management Type (desired longleaf acres)		
	LL ⁽¹⁾	LL-H ⁽²⁾	Total	LL ⁽¹⁾	LL-H ⁽²⁾	Total
<u>Virginia</u>						
George Washington NF	27	0	27	27	0	27
<u>North Carolina</u>						
NFs in N. Carolina	14,938	0	14,938	17,815	0	17,815
<u>South Carolina</u>						
Francis Marion-Sumter NFs	33,940	0	33,940	52,544	175	52,719
<u>Georgia</u>						
Chattahoochee NF	0	0	0	400	0	400
<u>Florida</u>						
NFs in Florida	201,371	2,189	203,560	211,307	2,033	213,340
<u>Alabama</u>						
NFs in Alabama	153,020	1,077	154,097	269,254	191	269,445
<u>Mississippi</u>						
NFs in Mississippi	206,068	653	206,721	268,793	0	268,793
<u>Louisiana</u>						
Kisatchie NF	122,489	0	122,489	183,118	0	183,118
<u>Texas</u>						
NFs in Texas	26,168	170	26,338	109,938	141	110,079
Total National Forests	758,021	4,089	762,110	1,113,196	2,540	1,115,736

⁽¹⁾stands in which at least 70% of dominant and codominant basal area is longleaf pine.

⁽²⁾stands in which 51-69% of dominant and codominant basal area is longleaf pine and the remainder hardwoods.

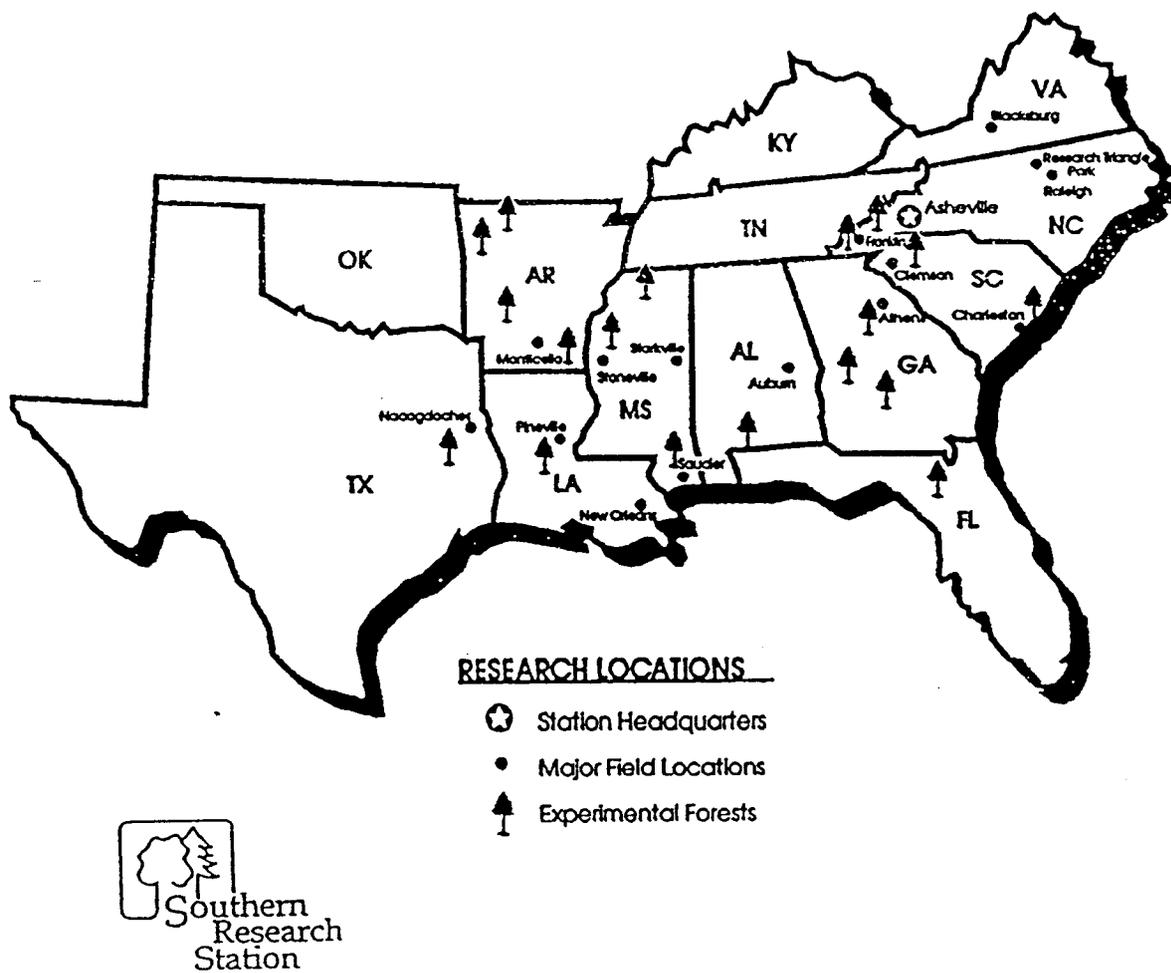
Source: USDA Forest Service, Southern Region, continuous inventory of stand conditions (CISC) data base (1997).

Table 2. LONGLEAF PINE ON THE NATIONAL FORESTS IN THE SOUTHERN REGION - RECENT TRENDS

<u>Year</u>	<u>Forest Type</u> (actual longleaf acres)	<u>Management Type</u> (desired longleaf acres)
1988	634,000	698,000
1993	742,000	973,000
1997	762,000 (20% increase since 1988)	1,116,000 (60% increase since 1988)

Source: USDA Forest Service, Southern Region, CISC data base.

Figure 1. USDA FOREST SERVICE, SOUTHERN RESEARCH STATION
 (Same geographic boundaries as the USDA Forest Service, Southern Region)



USDA Forest Service • Southern Research Station

Table 3. SOUTHERN RESEARCH STATION LOCATIONS

Southern Research Station
 P.O. Box 2680, Asheville, NC 28802
 200 Weaver Boulevard, Asheville, NC 28804
 Tel. 704-257-4300
 Forest Inventory & Analysis
 (RWU-4801) Tel. 704-257-4350

FIELD LOCATIONS

Bent Creek Research Forest,
 1577 Brevard Road, Asheville, NC 28806
 Southern Appalachian Hardwood Forests
 (RWU-4101) Tel. 704-667-5261

Forestry Sciences Laboratory,
 320 Green Street, Athens, GA 30602-2044
 Insects & Diseases of Southern Forests
 (RWU-4505) Tel. 706-546-2455

Outdoor Recreation & Wilderness Assessment
 (RWU-4901) Tel. 706-546-2451

Management & Properties of SE Species
 (RWU-4104) Tel. 706-546-2441

GW Andrews Forestry Sciences Laboratory,
 Devall Drive, Auburn University, AL 36849
 Vegetation Management & Longleaf Pine
 (RWU-4105) Tel. 334-826-8700

Biological/Engineering Systems & Technologies
 (RWU-4703) Tel. 334-826-8700

Virginia Polytechnic Institute & State
 University, Department of Fisheries &
 Wildlife Sciences, Blacksburg, VA 24601
 Trout Productivity in Southern Appalachian
 Streams (RWU-4202) Tel. 540-231-4864

Virginia Polytechnic Institute & State
 University, Brooks Forest Products Center,
 1650 Ramble Road, Blacksburg, VA 24061
 Primary Hardwood Processing/Products/Recycling
 (RWU-4702) Tel. 540-231-5341

Center for Forested Wetlands Research,
 2730 Savannah Hwy, Charleston, SC 29414
 Forested Wetlands Ecosystems
 (RWU-4103) Tel. 803-727-4271

Clemson University, Department of Forest
 Resources, Clemson, SC 29634-1003
 Endangered Wildlife & Plants in Southern Forests
 (RWU-4201) Tel. 864-656-3284

Wildlife Habitat & Silvicultural Laboratory
 Box 7600, SFA Station, 506 Hayter Street
 Nacogdoches, TX 75961
 Wildlife Habitat and Silvicultural Laboratory
 (RWU-4251) Tel. 409-569-7981

Legal, Tax, & Economic Influences,
 T-10034, U.S. Postal Building,
 701 Loyola Avenue, New Orleans, LA 70113
 Legal, Tax and Economic Influences
 (RWU-4802) Tel. 504-589-6652

Coweeta Hydrologic Laboratory,
 3160 Coweeta Lab Road, Otto, NC 28763
 Watershed Responses to Disturbances
 (RWU-4351) Tel. 704-524-2128

Alexandria Forestry Center,
 2500 Shreveport Highway, Pineville, LA 71360
 Even-Aged Southern Pine Forests
 (RWU-4111) Tel. 318-473-7216

Southern Pine Beetle (RWU-4501) Tel. 318-473-7232

Utilization of Southern Forest Resources
 (RWU-4701) Tel. 318-473-7268

Southern Global Change Program,
 1509 Varsity Drive, Raleigh, NC 27606
 Southern Global Change Program
 (RWU-4852) Tel. 919-515-7040

Forest Sciences Laboratory,
 3041 Cornwallis Road, P.O. Box 12254,
 Research Triangle Park, NC 27709
 Biological Foundations of Southern Forest Productivity
 and Sustainability (RWU-4154) Tel. 919-549-4061

Economics of Forest Protection and Management
 (RWU-4851) Tel. 919-549-4093

Forest Health Monitoring
 (RWU-4803) Tel. 919-549-4020

Harrison Experimental Forest,
 23332 Highway 67, Saucier, MS 39574-9344
 Southern Institute of Forest Genetics
 (RWU-4153) Tel. 601-832-2747

Table 3 (continued). SOUTHERN RESEARCH STATION LOCATIONS

University of Arkansas at Monticello,
P.O. Box 3516, Rm 211, Forest Resources
Building, Monticello, AR 71656-3516
Upland Forest Ecosystems in the Midsouth
(RWU-4106) Tel. 501-367-3464
Hot Springs, AR Tel. 501-623-1174

Forestry Sciences Laboratory, P.O. Box 928,
201 Lincoln Green, Starkville, MS 39759
Forest Inventory & Analysis, Midsouth States
(RWU-4801) Tel. 601-338-3100
Wood Products Insect Research (RWU-4502)
Tel. 601-325-0199

Southern Hardwoods Laboratory,
P.O. Box 227, Stoneville, MS 38776
Center for Bottomlands Hardwood Research
(RWU-4155) Tel. 601-686-3154

Oxford, MS Tel. 601-234-2744

Starkville, MS Tel. 601-325-6549