A coalition is forming to promote and coordinate restoration of a forest type that once covered vast areas from Virginia to Texas.

The first European settlers in what is now the southeastern United States were confronted with an upland forest that was dominated by one tree species—longleaf pine (*Pinus palustris*). They described these forests as open and grassy, with mature trees scattered across a fire-maintained landscape (Bartram, 1791). Stretching from the coastal plains of Virginia across a broad belt of the South Atlantic and Gulf Coasts into eastern Texas, longleaf historically occurred on nearly 36 million hectares (90 million acres) and is thought to have been predominant on over 24 million of those hectares (60 million acres) (Frost, 1991). Apparently, both lightning and Native Americans set fires that burned across large expanses of those uplands fairly frequently, stopping only at major rivers or the wettest of swamps, or during periods of wet weather and changing wind directions. Lightning-ignited fires were most frequent during the late spring and early summer, while there is evidence that Native Americans burned during the fall, late winter and early spring to open up the woods, control insect pests, and improve both wildlife habitat and hunting.

Early settlers adopted this practice for much the same reasons, and also to improve grazing for their livestock. These fire-maintained forest ecosystems were essentially two-layered, consisting of a high canopy dominated by mature longleaf pine and an understory of grasses and herbs. The forest was "gappy" as a result of fires of differing intensities and openings created by the deaths of one or several trees, which then seeded in with fire-tolerant longleaf seedlings in good seed years. The understory was occupied primarily by grasses and forbs, particularly wiregrass (*Aristida stricta*), bluestems, other grasses and a variety of legumes. Wildlife populations included most of today's game and non-game species, and species such as the panther, bear, and wolf, whose populations have disappeared or been greatly reduced since that time by habitat change and human pressure. Some species, such as the gopher tortoise and the red-cockaded woodpecker, uncommon to rare over most of their range today, were much more numerous when the landscape was covered with mature longleaf and an herbaceous understory (Means, 1996).

Native southeastern cultures had developed complex societies at the time of European exploration, with extensive agriculture creating a patchwork landscape of forest, fields, towns, trails, and forest edges on the most fertile lands. European diseases, for which these cultures had little resistance, decimated the native population, causing reductions in numbers some historians estimate at up to 90 percent. A dramatic decline in the southeastern native population occurred in the time between European discovery and settlement. As a result, many previously cleared lands reverted to forest. Some forest historians believe that the acreage in forest in the southeastern United States at the time of settlement was at the highest level it had been for several thousand years.

Settlement quickly changed that landscape. Over the next 250 years, the forest was cleared at a fitful but inexorable pace. Much of the decline of the longleaf forest and, subsequently, the longleaf eco-
system can be attributed to the familiar pattern of land clearing for human occupation, agriculture and other forms of resource exploitation, reflecting a lack of appreciation for the importance of a seemingly inexhaustible resource. In addition, in the case of the longleaf forest, both the tree species itself and the forest community fell victim to some system-specific agents. Free-ranging hogs prevented regeneration over large areas, apparently wiping out whole age cohorts in some areas. Misunderstanding of the role of fire in establishing and sustaining the longleaf forest led to poorly timed fires or total exclusion of fire from fire-dependent communities, setting back regeneration, retarding growth, allowing invasive hardwood ingrowth and degrading plant-community structure (Croker, 1987). Only remnants of the original forest survive. The largest stand of old-growth longleaf in existence today is located in southern Georgia and is only 80 hectares (200 acres) in area. The extinction of these forests closely parallels the fate of the forests of the western Great Lakes in both time and scale.

Management and Restoration

When forest management came to the South in the 1940s and 50s, its most aggressive manifestation was in the form of the pulp-and-paper industry. This industry created jobs and markets for timber, and played a vital role in the South's post-Depression economy. Unfortunately for the longleaf ecosystem, however, the emphasis of this industry was—and is—on wood-fiber production. Although the growth rates of longleaf are competitive with those of other southern pine species on most sites over periods of 30 years or more, the best return on forest investment for companies whose product requires only fiber comes from highly productive, short-rotation plantations—a kind of silviculture for which longleaf is not well suited. Tens of thousands of acres of abandoned cropland and cutover woodland were either deliberately reforested by planting slash or loblolly pine or naturally reseeded with these and other aggressive tree species such as sweetgum (Liquidambar styraciflua) and water oak (Quercus nigra). The plant community associated with the fire-maintained longleaf ecosystem could not be sustained under these conditions and gradually disappeared, much like the prairies and savannas of the Midwestern United States.

Today, less than 4 percent of the original longleaf acreage, about 1.2 million of the original 36 million hectares (3 million of the original 90 million acres), still supports the original species, and considerably less represents an intact, functioning longleaf ecosystem. Interestingly, a significant portion of what remains has been conserved out of consideration for another natural resource of the longleaf ecosystem—bobwhite quail. Large quail-hunting reserves across the South began to use fire to manage the forest for that species in the late 1930s and continue that use today (Neel, 1991). As a result, some of the best remaining examples of the longleaf/wiregrass community exist on quail plantations.

Reversing this 250-year history of decline will be difficult, but many groups and individuals are currently attempting to do just that. State and federal agencies, research institutions, non-government organizations, and private landowners have a renewed interest in the species and the ecosystem, and are working separately and cooperatively across the region to encourage their maintenance and restoration. Better appreciation of the ecological and historical significance of the longleaf forest has spurred some of this interest, as has the realization that its decline is so precipitous and its potential demise a reality. The listing and subsequent protection of several species endemic to the longleaf ecosystem through the Endangered Species Act certainly spurred activity by state and federal agencies charged with the recovery of those species on public lands.

Developing technology for the reforestation and management of longleaf and a new look at possible economic returns have also made investments in longleaf more promising for all landowners, especially private, non-industrial landowners. Federal land-managing entities that feature longleaf on their properties include the U.S. Forest Service, the U.S. Fish & Wildlife Service, and the military installations of the Department of Defense. Key regional installations include Fort Stewart and Fort Benning, Georgia; Fort Bragg and Camp LeJeune, North Carolina; Fort Jackson, South Carolina; Fort McClellan, Alabama; and Whiting and Eglin Air Force Bases, Florida. These posts contain a significant portion of the remaining longleaf forest, and management at the ecosystem level within the constraints of the military mission, although challenging, is both extensive and ground breaking.

Nearly 400,000 hectares (one million acres) of longleaf-vegetation type is currently under management on these bases, with other posts across the Southeast managing lesser amounts of longleaf. Eglin Air Force Base alone contains nearly 1,900 square kilometers (724 square miles) of forest land, much of it in upland and capable of supporting a longleaf ecosystem. Restoration and management of that community has been undertaken on a landscape scale on the post, one of the first to embrace ecosystem management formally (Seiber and Hoskins, 1996). An ecosystem-management education program was developed using data gathered on Eglin and targeting the half-million neighboring citizens and 10,000 recreational users of the base's resources (Jacobson, et al., 1996).

Like all federal lands, the national forests and national wildlife refuges are managed for multiple resources, and are further charged with promoting the recovery of threatened and endangered species. Management for these purposes often requires restoration of longleaf and the longleaf ecosystem. In addition, the research and outreach branches of those agencies are important sources of longleaf research, research support and information transfer for the natural resource community at large.

State natural resource agencies across the longleaf region have also become interested and involved in the effort to restore the species. Cost-share programs, technical assistance, and information and education are all mechanisms these agencies employ to assist landowners and managers in their efforts to establish and/or manage longleaf on their lands. State-owned forest lands, in many instances, support some of the best examples of longleaf ecosystems, and these serve as demonstration areas, seed sources, biological reserves, and models for restoration projects. Several state agencies, including those in Flor-
Recovering sandhill community after four prescribed fires in 11 years. “The goal of a functioning sandhill community will not be reached for decades, but we are convinced that we are on the right track.” Photo by Greg Seamon

ida, Mississippi, Louisiana, North Carolina, South Carolina, and Alabama, have offered training in the establishment and management of longleaf forests to employees, landowners, and other natural resource professionals in the past several years.

Reflecting the interest in longleaf by both traditional funding sources and the general public, academic researchers across the South have renewed their interest in the economic and ecological value of the species, and the number and variety of ongoing studies is larger than at any time in the recent past. Private research institutions such as the Tall Timbers Research Station near Tallahassee and the Jones Ecological Research Center in southwestern Georgia are conducting seminal research into multiple facets of the ecosystem, studying the form and function of both natural and managed longleaf forests. The Nature Conservancy is cooperating with state and federal agencies, military installations, and private entities on projects to catalog, manage, and conserve the longleaf resource. Their network of researchers and managers is both extensive and effective.

Alliance

The forest industry has been supportive of the longleaf-restoration effort, even when the species is not best suited to its own specific resource needs. For instance, the pulp-and-paper industry cannot supply its mills with sufficient fiber profitably by using longleaf. However, many of those corporations have invested time and money in longleaf research. Several of these companies plant or have planted longleaf on sites where it is best suited, and have sold the products on the open market profitably. Some regional industries never lost interest in longleaf and are now among the most knowledgeable and able practitioners of longleaf management. T.R. Miller Mill Company, a family-owned company headquartered in Brewton, Alabama that pioneered and perfected the planting of longleaf, continues to grow and harvest it profitably on their 84,000 hectares (210,000 acres) of forest land. They use the longleaf to manufacture high-quality lumber and utility poles. In addition, the company entered into a 99-year agreement with the U.S. Forest Service in 1947 that made 1,200 hectares (3,000 acres) of their land available for longleaf research. That land became the Escambia Experimental Forest, where a number of scientific advances in the management of longleaf forests have been made. Researchers like Bill Boyer, Tom Croker, and Bob Farrar, all familiar to longleaf enthusiasts, carried out long-term projects there, some of which are still ongoing after nearly 50 years (Boyer, Ward, and Kush, 1996).

The industry’s recognition of the economic value of the species is invaluable in the effort to convince private landowners that longleaf is a viable choice for their lands. A growing number of private landowners, encouraged by improved knowledge about establishment and management of the species, and bolstered by evidence that longleaf is a sound economic investment (Boyer, 1996; Busby, 1996; Outcalt, 1993), are making that choice today.

A relatively new organization, The Longleaf Alliance, was established in 1995 with the express purpose of coordinating efforts to restore longleaf and its accompanying ecosystem on forest land across its historical range, where longleaf is compatible with the objectives of the landowner. The vast majority of forest acreage in the Southeast is privately owned (for example, nearly 95 percent in Alabama). Consequently, the Alliance directors felt that the greatest opportunity to significantly re-establish longleaf forests was on private lands. The restoration of a fully functioning longleaf ecosystem appeals to landowners in varying degrees. Recognizing that intact longleaf forest ecosystems are not likely ever again to dominate the Southeastern landscape, the Alliance has adopted the philosophy that “better is better.” We believe that longleaf in any form is better than a cotton field; that longleaf and wiregrass are better than longleaf alone, that longleaf, wiregrass, and gopher tortoises are better than longleaf and wiregrass alone. This initiative resulted from the recognition that interest in the longleaf ecosystem and the tree itself was growing rapidly. Ecologists, foresters, wildlife
biologists, land owners and land managers were searching for information or for an outlet to distribute what they knew. A growing body of anecdotal information, personal experience, and scientific data was being passed on fitfully, and many groups were not being reached.

The Longleaf Alliance was formed in an attempt to catalog and coordinate all of the initiatives currently underway and to serve as a clearinghouse for information on longleaf and longleaf forests for the general public. The Longleaf Alliance is based at Auburn University's Solon Dixon Forestry Education Center in southern Alabama, in the heart of the largest longleaf concentration left in the country (Outcalt, 1996). It is a nonprofit, collaborative effort incorporating a broad community of similar interests. Its structure is simple, its goals direct—the establishment of a functional longleaf forest ecosystem to the extent feasible in today's Southern forest environment.

Recognizing and emphasizing the importance of both the economic and ecological value of the longleaf forest broadens the appeal of the Alliance and gives it credibility with both the scientific and private communities. Members include researchers, outreach providers, landowners and managers, tree nurseries, state and federal natural-resource agencies, forestry and wildlife consultants, forest industries, and forestry-service providers. The effort and the organization are regional in scope, and the Alliance now has members from every state in the longleaf region. The Alliance maintains and constantly updates databases on current longleaf-related research, longleaf-seedling nurseries, forestry and wildlife consultants with longleaf expertise, and pertinent research and demonstration sites.

The Alliance's first regional meeting was held in Mobile, Alabama in 1996 and was attended by over 250 longleaf enthusiasts from across the region representing virtually every Southeastern natural resource perspective. A second regional meeting will be held in Charleston, South Carolina in November 1998. Publications produced by the Alliance to date have included a proceedings from the first meeting, a landowner's guide to management of longleaf forests, several research notes, and a newsletter. Representatives of the Alliance organized and moderated a session on longleaf forests at the Society of Ecological Restoration conference held recently in Ft. Lauderdale in November 1997.

The goals of The Longleaf Alliance are twofold. The first—retention of existing longleaf forests and restoration of natural plant and animal communities—is ongoing and is being addressed by the Alliance and partners such as the Department of Defense, the U.S. Forest Service, various state Natural Heritage Programs, The Nature Conservancy, Tall Timbers, the Jones Ecological Research Center, and others. The other major objective is the recreation of the longleaf forest where it no longer exists. Alliance research efforts include studies of seedling production and quality, planting techniques, vegetation management, economic and ecological productivity, and techniques for re-establishing the larger forest community. These efforts mirror and/or complement similar efforts by researchers and practitioners across the South. For instance, techniques for retaining wiregrass on sites where relic populations still exist are available, but techniques for reintroducing wiregrass to a site on which it has been lost are unreliable and extremely expensive. Research into ways of increasing effectiveness and reducing those costs is of much interest to the Alliance. Excellent studies are currently underway at Tall Timbers, the Jones Ecological Research Center, Francis Marion National Forest and several other locations.

The Alliance strives to track and report results of these and other research efforts on an ongoing basis, facilitating exchange of information and technology as it becomes available. Other researchers study the role of fire and legumes in nutrient budgets, the effects of fire on system diversity, the role of gopher tortoises and pocket gophers in total plant-community diversity, and a host of other matters. Research topics range from the control of brown spot needle blight to the genetic diversity within the species, from the ecology of the red-cockaded woodpecker to the incidence of poles in thinned and unthinned stands. Restoration efforts are underway on military installations, national forests, and other federal lands across the South. The

Joseph W. Jones Ecological Research Center, located on Ichauway Plantation in southwestern Georgia, is conducting seminal research in restoration ecology, examining a range of management intensities and their effects on the entire forest community. The Nature Conservancy, Champion International, Auburn University and the Longleaf Alliance are working together to restore the last remaining intact stand of old-growth longleaf in Alabama to a semblance of the pre-settlement longleaf forest.

The list is long and interest is growing every day. Seedling sales are skyrocketing. The Alliance has monitored a substantial increase in the numbers of longleaf seedlings being grown in the Southeast over the past three years. This year, for the third consecutive year, all available seedlings were sold. Favorable treatment for landowners planting longleaf in various state and federal cost-share programs suggests that planting of the species on private lands is likely to continue to increase. Halting and reversing the decline of longleaf acreage should be achieved soon. The effort to restore the full forest community is less successful, but the fight continues. Better understanding of how this ecosystem functions coupled with more dependable and affordable techniques for restoring the key components will boost that effort.

The Longleaf Alliance is currently funded through donations, memberships, and grants. Further information on the Alliance is available by writing The Longleaf Alliance, Rt. 7, Box 131, Andalusia, AL 36420, telephone 334/222-7779, fax 334/222-7779, and e-mail addresses:

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There is also a home page at http://www.forestry.auburn.edu/coops/la/la.html and a longleaf list server that can be accessed by sending a message to:

listproc@mail.auburn.edu.

(Leave the subject line blank and in the body of the message include the following line: subscribe longleaf Your Name.) Interested readers are invited to participate in the Longleaf Alliance and share in the recovery of this once magnificent resource.
REFERENCES


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