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Longleaf Pine and Wiregrass: Keystone Components of an Endangered Ecosystem

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Endangered ecosystems always have been of central interest to natural areas professionals. But until recently, we have lacked objective ways to determine when an ecosystem is endangered, and what might be done about it. Interesting natural areas are, almost by definition, rare and therefore at least potentially endangered. Our science of ecology is just beginning to grapple with questions of how big or extensive an ecosystem must be, and in what ways it should or should not be disturbed, to avoid endangerment. Rarity is now seen as just one factor in the endangerment of an ecosystem (or a species). Some ecosystem types never have been common, yet are not especially prone to further decline. Others once dominated entire physiographic regions, but are now pitiful remnants of their former glory.

Such is the story of the longleaf pine-wiregrass ecosystem of the Southeastern Coastal Plain (Figure 1). This "ecosystem" was really a regional landscape, composed of many plant associations featuring longleaf pine (*Pinus palustris*) and, usually, wiregrass (*Aristida stricta*). This landscape contained multiple environmental gradients, along which plant species responded to different soil, moisture, and fire conditions. Over most of the region, longleaf pine-wiregrass communities composed the matrix in the vegetation mosaic, dominating sites ranging from xeric sandhills to abrupt borders with shrub swamps. In the western part of the Gulf Coastal Plain, other grasses replaced wiregrass in the groundcover (Bridges and Orzell this issue).

The papers in this special issue of the *Natural Areas Journal* are devoted to two ecologically pivotal ("keystone") species of the Southern and Southeastern Coastal Plain, their ecological associates, and the management and conservation of their ecosystems. Three of the papers (Hall, Clewell, Hardin and White) were delivered at a Wiregrass Symposium held at Valdosta State College, October 13,

1988, which was organized by Linda Duever and myself at KBN Engineering and Applied Sciences and cosponsored by the Natural Areas Association, the Gopher Tortoise Council, and the Coastal Plains Institute. The fourth paper (Bridges and Orzell) was submitted separately.

There are many sound and compelling reasons to consider the Coastal Plain landscape as a whole in conservation strategy (Noss 1988). But complementary to this approach is a close look at the life histories of keystone species, upon which the diversity of a large segment of the ecosystem depends. The focus on two plant species as indicators of a much broader array of biodiversity is appropriate here. Longleaf pines, as Platt et al. (1988) have noted, convert local lightning strikes into ground fires. The dense and flammable wiregrass groundcover, sprinkled with pine duff, once let those fires roar across whole landscapes. These fires not only maintained the dominance of these two species, but at the same time fostered one of the most diverse herbaceous floras on Earth. The rich, open but patchy habitat maintained by frequent ground fires also promoted an abundance of wildlife and a fauna distinctive to the region. The gopher tortoise (*Gopherus polyphemus*) is a keystone animal species of longleaf pine-wiregrass sandhills, and, by a recent count, some 362 species of commensal invertebrates and vertebrates have been found in its burrows (D. Jackson pers. comm.).

A scientific and conservation emphasis on the longleaf pine-wiregrass landscape is overdue, for this is one of the most endangered ecosystems in the world. Estimates of presettlement longleaf pine cover range from 24 to 35 million ha, but the present extent is no more than 2 million ha, with much of it in poor condition due to fire suppression, site preparation, and other forms of mismanagement. Thus, longleaf pine ecosystems have declined as much as 98 percent since pre-

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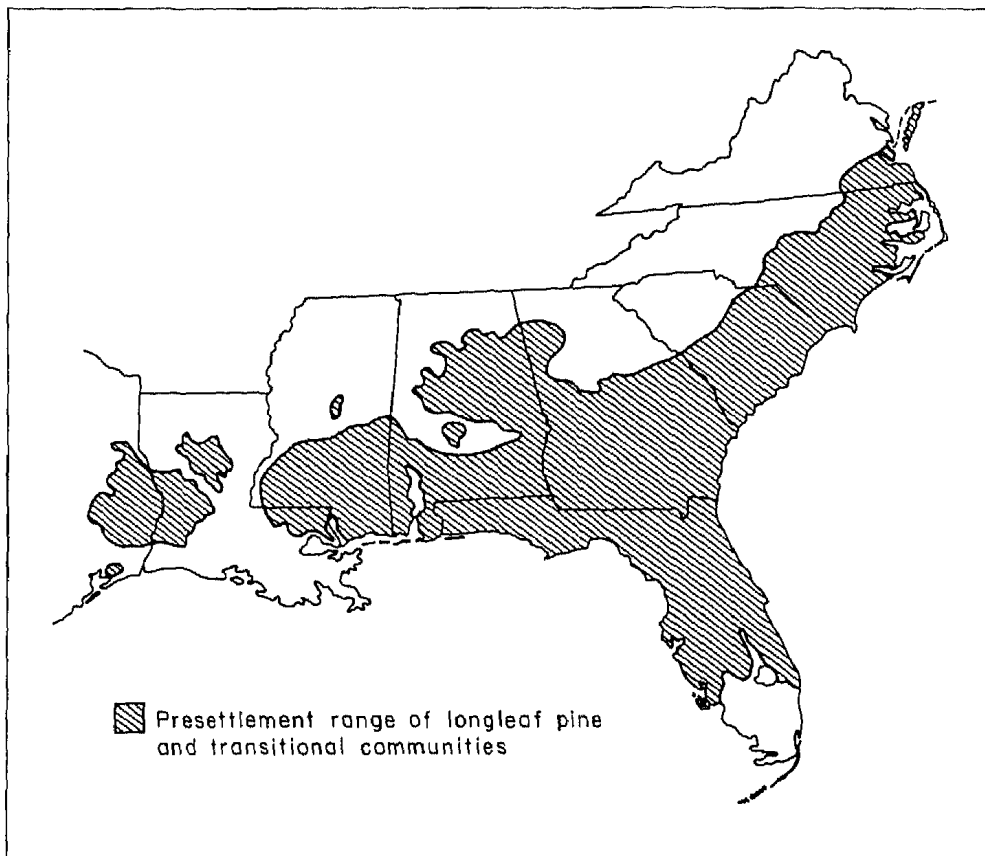


FIGURE 1. Presettlement range of longleaf pine (after Ware et al. in press). Wiregrass occurred as a codominant with longleaf pine over most of this range but became increasingly less important from the western Florida panhandle westward, and did not occur west of Mississippi. However, wiregrass did occur south of longleaf pine to the tip of the Florida peninsula, where it usually was associated with south Florida slash pine (*Pinus elliotii* var. *densa*).

settlement time (Ware et al. in press), which is comparable to or exceeds the loss of the North American tallgrass prairie, the moist coastal forests of southeastern Brazil, and the dry forests along the Pacific coast of Central America (World Resources Institute 1989). The reduction of longleaf pine ecosystems far exceeds the loss of wetlands in the Southeast (Figure 2), yet environmentalists generally have been more concerned with the latter.

Work by Clewell (this issue) and others suggests that the longleaf pine-wiregrass ecosystem is somewhat forgiving and can be restored by proper management such as frequent summer burning—as long as the wiregrass groundcover remains intact. But this is the crux of the problem. Once destroyed by clearing for development, plowing for agriculture, or mechanical site preparation for silvicultural

management, wiregrass seldom, if ever, returns. With it go many of its characteristic rare plant associates (Hardin and White this issue). But as Bridges and Orzell (this issue) describe, longleaf pine communities of the West Gulf Coastal Plain lack wiregrass but nevertheless are quite rich floristically. Clearly there is a pressing need to find ways to restore wiregrass to sites from which it has been eliminated. But even more imperative is the need to manage sites where longleaf pine and a native groundcover of whatever composition still exist, in such a way as to maintain the species composition, pattern, structure, and processes of the ecosystem.

I cannot part this introduction without editorializing a bit more on the importance of conserving this magnificent ecosystem. Because opportunities to protect representative examples of longleaf pine-

wiregrass communities through acquisition of private lands are disappearing rapidly, more effort should be directed toward improving management of existing public lands, in particular our national forests. Excellent stands of longleaf pine-wiregrass remain on national forests in Florida, but they are being converted to tree farms (except, perhaps, on those sites managed for the red-cockaded woodpecker, *Picoides borealis*).

Modern southeastern foresters speak with disdain of their predecessors in the late nineteenth and early twentieth century—the “cut and run” loggers who pilaged the landscape of timber and left little behind but “wolf trees” (usually diseased or damaged pines), which slowly receded the abandoned sites. It should be noted that we have little record of how this cutting and regeneration actually occurred and where the refugia were for longleaf-dependent species such as the red-cockaded woodpecker. Today, “scientific” silviculture creates smaller (usually no more than 16 ha), cleaner clearcuts, which then are intensively site-prepared through chopping, disking, and often bedding. Pines are artificially regenerated (planted, often with slash pine, *Pinus elliotii*, although U.S. Forest Service policy now calls for replacing longleaf pines on sites on which they formerly occurred) and the ground, now largely devoid of wiregrass and other plants native to the site, is taken over by weeds. Moreover, the forest landscape of today is riddled with roads, which prevent the natural spread of wildfires and provide easy access to log trucks and bear poachers alike.

In the cut and run days, the groundcover was little disturbed. The ecosystem was able to recover, and today many second-growth stands show old-growth characteristics and a collection of herbaceous plants comparable to untouched stands. With modern forestry methods, although longleaf pine trees may be replaced in some cases, the community is not. And given the glacial speed at which wiregrass reproduces sexually or vegetatively (if at all), restoration is unlikely. The cut

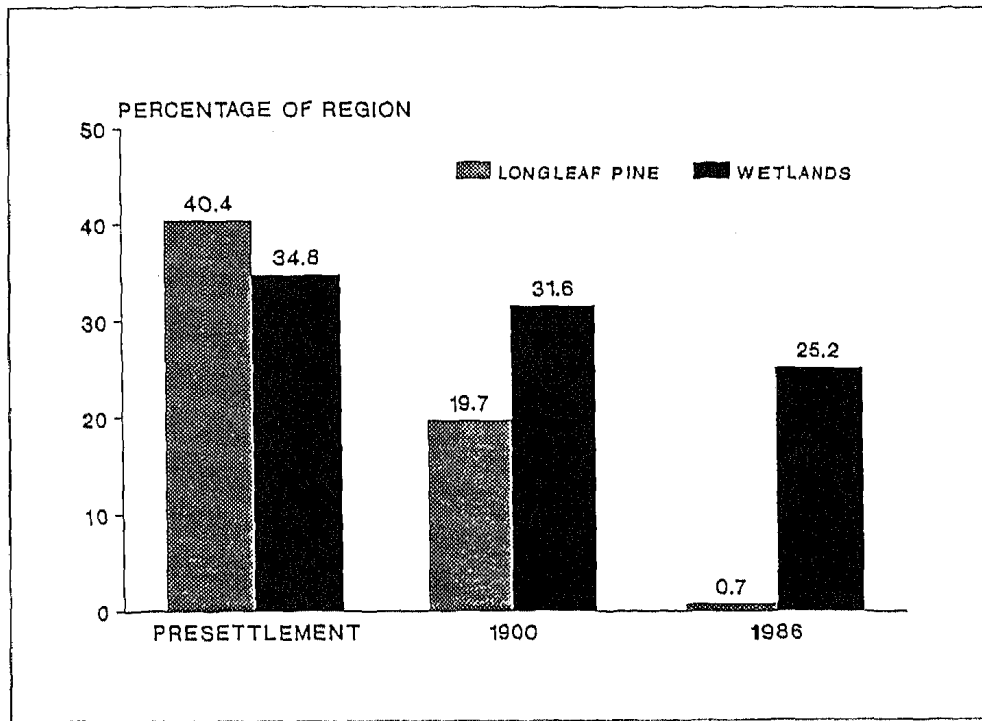


FIGURE 2. Percentage of the Southern Mixed Hardwood Forest Region (roughly equivalent to the Southeastern Coastal Plain) comprised of longleaf pine and various wetland communities in presettlement time (pre-1880), 1900, and 1986 (adapted from tabular data in Ware et al. in press).

and run loggers may have been ignorant of ecology, but as the articles in this issue make painfully clear, their impacts pale in comparison with those of modern silviculture. No one would suggest we go back to the old days of massive, abandoned clearcuts. What is needed is not a return to past abuses, but rather a new vision for the future—a future where

silviculture effectively mimics natural processes, and where native biodiversity is both the primary goal and the organizing paradigm of land management. This new vision suggests to me that all remaining longleaf pine and wiregrass communities be preserved, and that we get busy trying to restore what we can.

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