CONSERVATION ISSUES

Remnant Old-Growth Longleaf Pine (*Pinus palustris* Mill.) Savannas and Forests of the Southeastern USA: Status and Threats

J. Morgan Varner, III[1]
School of Natural Resources & Environment
University of Florida
Gainesville, FL 32611 USA

John S. Kush
School of Forestry and Wildlife Sciences
Auburn University, AL 36849 USA

[1] Corresponding author:
Box 118526, University of Florida,
Gainesville, FL 32611-8526 USA;
352-392-1891; fax: 352-392-3993;
jmvarner@botany.ufl.edu

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ABSTRACT: Old-growth savannas and forests dominated by longleaf pine (*Pinus palustris* Mill.) are of great conservation and research interest. Comprehensive inventories of old-growth communities, however, are lacking for most of longleaf pine's natural range. We searched the literature, interviewed regional experts, queried email discussion lists and newsletters, and made on-site inspections to compile a revised list of old-growth longleaf pine stands, their acreage and status. We found 15 old-growth longleaf pine stands covering 5095 ha in only four of the nine states in the natural range of longleaf pine. Our area estimate represents 0.004% of extant acreage and 0.00014% of the presettlement extent. Further, some community types (e.g., Piedmont, West Gulf Coastal Plain provinces) have no extant old-growth longleaf pine reference sites. Old-growth stand ownerships are diverse, with large tracts (> 400 ha) in both public and private ownerships. Half of the remnants face serious management threats, most due to difficulty in managing fire in the contemporary southeastern landscape and tenuous land tenure. In light of the shrinking nature of this resource, statewide searches, restoration, and conservation should continue in earnest.

Index terms: conservation, fire exclusion, old-growth forests, *Pinus palustris*, restoration

INTRODUCTION

Ecosystems dominated by longleaf pine (*Pinus palustris* Mill.) blanketed a wide range of landscapes within the Atlantic and Gulf Coastal Plains, Piedmont, Ridge and Valley, Cumberland Plateau, and Blue Ridge Physiographic Provinces of the southeastern USA, perhaps covering as much as 37 million ha prior to European settlement (Frost 1993). Pristine longleaf savannas and forests (hereafter "pinelands") were dominated by an open to closed (basal area ranged from 12 to 35 m^2 ha^{-1}; stand density ranged from 130 to 400 trees ha^{-1}), patchily distributed, uneven-aged longleaf pine canopy (Figure 1; Reed 1905, Schwarz 1907, Chapman 1909, Forbes 1930, Wahlenberg 1946). The overstory of virgin longleaf pinelands consisted of individual pines with diameters up to 100 cm, and heights up to 40 m (Reed 1905, Chapman 1909). Large snags averaged 15 ha^{-1} (Schwarz 1907), and downed large coarse woody debris averaged 5.7 ha^{-1} (Hermann 1993). These conditions were maintained by low-intensity, low-severity surface fires occurring every one to five years (Chapman 1932).

Old-growth longleaf pinelands have several characteristics distinguishing them from mature pinelands. Old-growth stands contain many large pines (> 50 cm dbh) with only a few primary branches and substantial percentages of woody biomass in heartwood (Wahlenberg 1946). Stands consist of persistent large snags and large downed woody debris (Schwarz 1907, Hermann 1993, Landers and Boyer 1999, Varner et al. 2003b). The structure of old-growth pinelands is typified locally by patchiness and, at larger scales, by an inverse exponential diameter distribution (Figure 2; Reed 1905, Schwarz 1907, Forbes 1930, Wahlenberg 1946, Platt et al. 1988, Varner et al. 2003b). Old-growth pinelands contain many age classes, with peaks of individuals exceeding 200 y (Platt et al. 1988, Platt and Rathbun 1993, Varner et al. 2003b).

Old-growth characteristics provide researchers and managers with: 1) benchmarks for natural area management (Noel et al. 1998); 2) valuable data to reconstruct climatic and disturbance events (West et al. 1993, Meldahl et al. 1999, Varner et al. 2003b); 3) among the highest quality habitats for native flora and fauna in existence (Engstrom 1993, Engstrom and Sanders 1997, Varner et al. 2003a, Hermann et al. In press); and 4) valued aesthetic and cultural resources. To the degree researchers and managers understand these characteristics, we are limited in our management, research, and conservation of all pinelands landscapes (*sensu* Swanson and Franklin 1992).

While many imperiled ecosystems have been inventoried (Davis 1996), old-growth longleaf pine acreage, until recently, has been unknown. Means (1996) conducted a survey of managers, scientists, and conservationists and found 14 stands, covering ca. 3902 ha. For all longleaf pinelands, approximately 97% is lost (Outcalt and

Figure 1. Typical historical photograph of a park-like virgin stand of longleaf pine on Great Southern Lumber Company land near Lake Ponchartrain, Louisiana, ca. 1920. Pinelands like these were intensively utilized for lumber, naval stores, grazing, and agriculture following European settlement. Photograph with permission from the George Jason Streator Papers, Department of Special Collections and Archives, Kent State University Libraries.

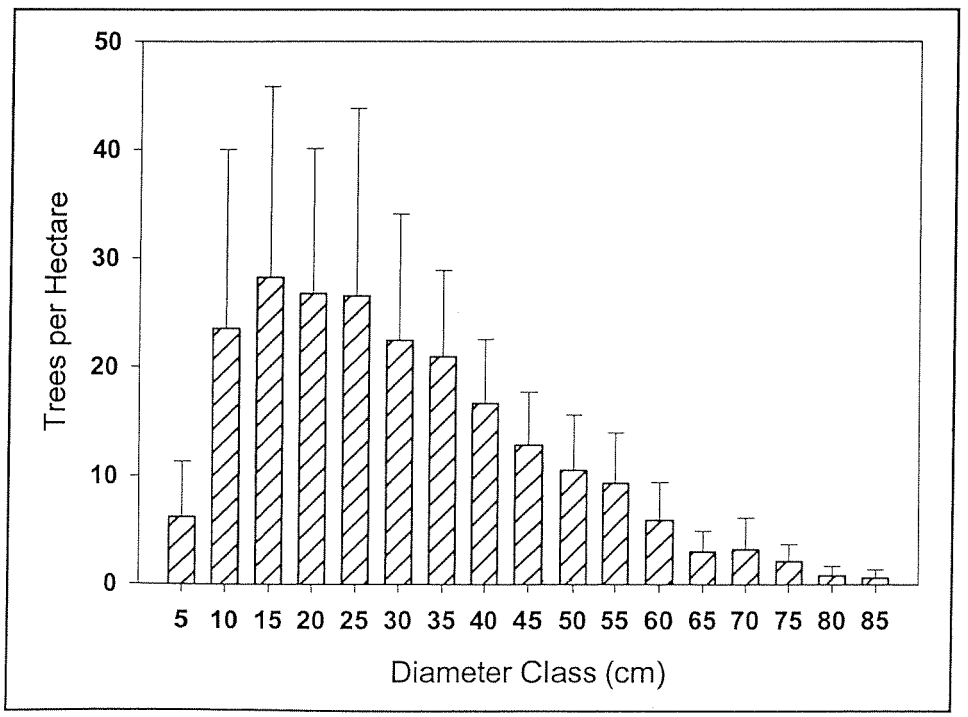

Figure 2. Diameter distributions (+/- 95% confidence intervals) of 14 old-growth longleaf pine stands taken from published data in Schwarz 1907, Forbes 1930, Varner et al. 1999, and Varner et al. 2003b. Old-growth longleaf pinelands contain many large pines (> 50 cm DBH) and many age classes, with peaks of individuals exceeding 200 years old.

Sheffield 1996) and 99.99% is no longer old-growth. These results, added to already dismal reports of pinelands decline, prompted Noss and others (1995) to list longleaf pine ecosystems as the second most endangered ecosystem in the United States. This information helped promote efforts in both conservation and investigation of the extant old-growth longleaf pine stands.

Longleaf pinelands are significant and increasingly rare elements of southeastern USA biodiversity. Pineland floral species richness is unparalleled outside of the tropics, and includes many rare, endemic, and carnivorous species (Folkerts 1982, Hardin and White 1989, Peet and Allard 1993). Pinelands fauna includes a high diversity of reptiles and amphibians (Guyer and Bailey 1993), avian species (Engstrom 1993), and greater than 5000 invertebrate species (Folkerts et al. 1993). These facts, and their role in propagating fire across many fire-dependent plant communities, have lead many to consider longleaf pinelands as a regional landscape keystone (Noss 1989, Means 1996). The decline and subsequent rarity of longleaf pinelands began with 18th century turpentining, logging, burning cessation, development, and site conversion (Croker 1987, Frost 1993). Far from diminishing, longleaf pinelands decline was > 27% over the most recent decade (1985 to 1995) of federal inventory (Outcalt and Sheffield 1996).

Rationale

In 1997, we conducted informal visits to the old-growth longleaf pine stands listed in Means (1996). Several sites listed by Means were either in serious management predicaments, not old, or had since been logged. Because the list compiled by Means was brief and informal, we were encouraged to gather more information from regional managers and scientists and visit known and potential old-growth stands. We initiated this project to address these shortcomings and to assess management dilemmas in all extant old-growth longleaf pinelands.

METHODS

We focused our survey in three areas: personal contacts, library research, and field visits. We contacted land managers, conservationists, landowners, and scientists via telephone, email, the Longleaf Alliance Forum <longleafalliance.org>, Longleaf Alliance Newsletter, and in person at various conferences and symposia throughout the longleaf pine and old-growth research community. We performed literature searches for citations regarding old-growth longleaf pine forests. Lastly, we visited sites reported to contain old or old-growth longleaf pine stands.

We considered stands to be old-growth if they contained two or more age classes (not individual trees) in excess of 150 y and individuals exceeding 200 y. These ages were used because: 1) the beginning of the 19th century is a good estimate of settlement in most southeastern landscapes, and 2) no evidence exists to suggest that longleaf pine changes structurally or ecologically beyond these ranges.

For each old-growth stand, we listed its location (county, state), tract size, ownership (public, private entity), management regime (harvesting, burning regime), and threats to site integrity. Biological and ecological characteristics were also listed for each stand, including significant species occurrences and ecosystem type. We divided pinelands ecosystems into five broad types based on soil moisture, soil texture, and landscape position (after Harcombe et al. 1993, Peet and Allard 1993, Goebel et al. 2001); we classified sites as sandhills, clayhill/loamhills, flatwoods, savannas, or mountain types.

Of particular interest in this survey were threats to each stand's integrity and continued conservation. Harvesting of old-growth longleaf pine stands continues, as does site conversion and development (Kush et al. 1999a). Wildland urban interface (WUI) issues (primarily smoke and flame sensitivity) threaten burning, the loss of which degrades protected stands. Another threat to existing stands is re-introducing fire into long-unburned pinelands. Smoldering fires often result from these restoration fires, killing large percentages of remnant pines (Kush et al. 1999b, Gordon and Varner 2002). These so-called "duff fires" are problems in other North American coniferous forests (e.g., Swezy and Agee 1991, Ryan and Frandsen 1991, Haase and Sackett 1998). Non-native species invasions also plague pinelands, degrading groundcover communities, and altering habitats and fuels.

RESULTS

From our surveys, we estimate that approximately 5095 ha of old-growth longleaf pinelands remain (Table 1; Figure 3), representing only 0.004% of extant acreage and 0.00014% of the presettlement extent. Since the last report (Means 1996), we removed four stands (all three Mississippi stands; the Silver Creek Tract in Alabama), revised acreage (several reductions and one addition) for most sites, and added four new sites (Platt Branch, Venus Flatwoods, and stands in Goethe State Forest in Florida; the mountain tracts in and adjacent to

Table 1. Remnant old-growth longleaf pine acreage in 2004. See text for discussion of each site, its threats, and significance.

Site Name, State	Size (ha)	Ecosystem Type(s)[a]	Ownership	Intact Flora	Intact Fauna	Protected Landscape	Fire Regime[b]
Flomaton Natural Area, AL	23	CLH	Private/ MOU				R
Mountain Longleaf NWR, AL	45	MT	Public/ NWR	X		X[c]	M,R
Big Pine Tract, FL	170	SH & CLH	Public			X	R
Eglin Air Force Base, FL	3650	SH & FW	Public	X	X	X	M,R
Goethe State Forest, FL	75	FW	Public	X	X	X	M
Platt Branch, FL	160	FW	Public	X	X	X	M
Venus Flatwoods, FL	40	FW	TNC	X			M
Greenwood Plantation, GA	200	CLH & SV	TNC	X	X	X	M
Moody Tract, GA	120	CLH & SH	TNC		X	X	R
Wade Tract, GA	83	CLH	Private (Easement)	X	X	X	M
Red Hills Plantations, GA	400	CLH	Private (Easements)	X	X	X	M,R
Bonnie Doone, NC	65	CLH	Public				?
Boyd Tract, NC	24	CLH & SH	Public				R
Camp Lejeune, NC	20	SH	Public	X	X	X	M
Croatan Sandhill, NC	20	SH	Public	X	X	X	M
Total old-growth longleaf pine acreage	**5095 ha**						

[a] Ecosystem types are as follows, CLH= clayhills & loamhills; SH = sandhills; FW = flatwoods; MT = mountains; SV = savannas.
[b] Fire regime values are as follows, R = restoration phase (reintroduction underway, severity irregular); M = maintenance phase (frequent regime, severity low).
[c] See text for discussion of the precarious protection status of Mountain Longleaf National Wildlife Refuge's wildlands.

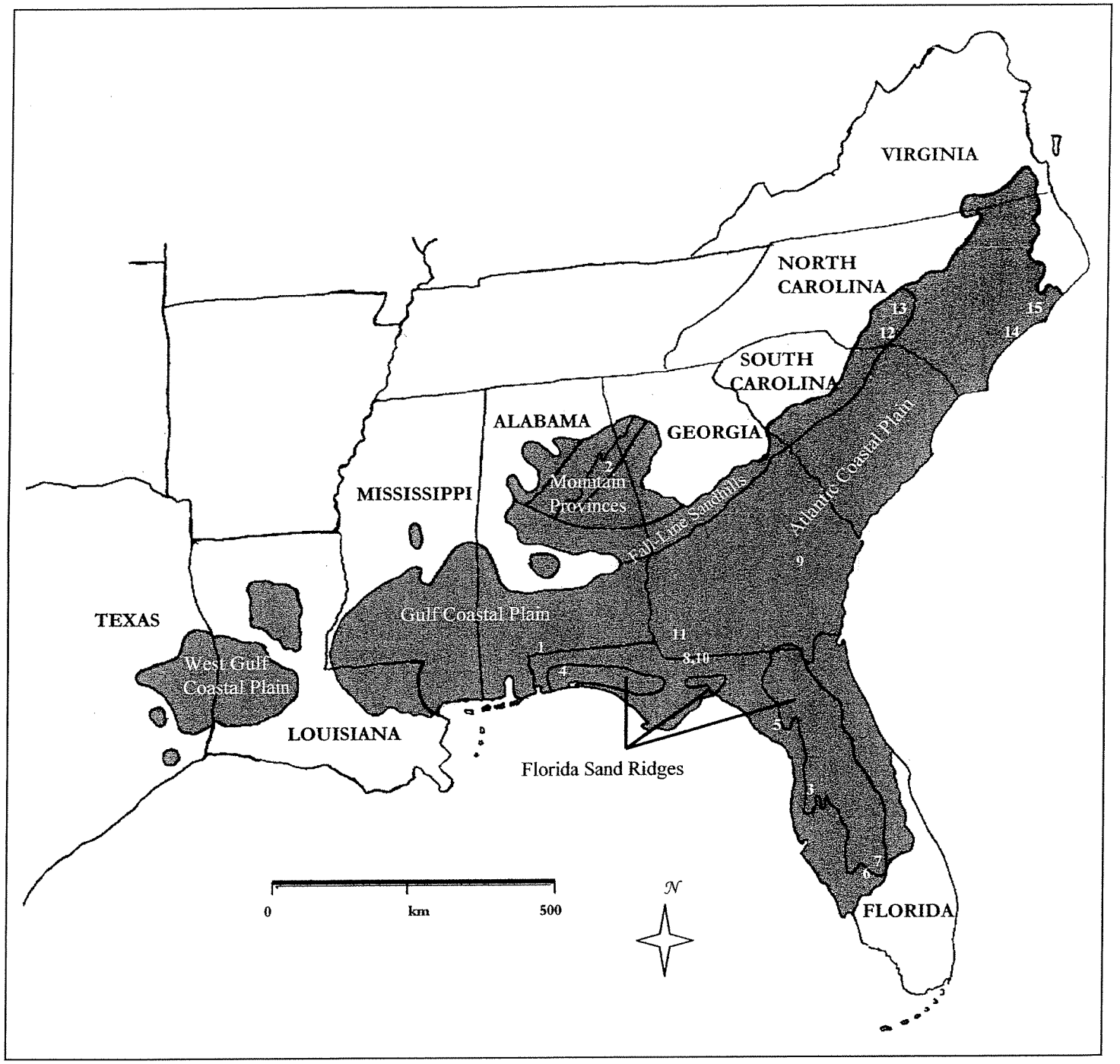

Figure 3. Locations of remnant (2004) old-growth longleaf pine stands in the southeastern USA. Shaded areas represent the historic range of longleaf pine, with significant physiographic provinces labeled. Map numbers represent approximate stand locations, corresponding to descriptions in the text.

Mountain Longleaf National Wildlife Refuge, Alabama).

Extant old-growth longleaf pine stands

1. Flomation Natural Area (Escambia County, Alabama)
Owner: Private (International Paper Company)
Ecosystem Type: Clay-Loamhill

The Flomaton Natural Area is a classic example of a fire-excluded pineland. The 23 ha site contains many large, old pines (maximum age > 300 y) with heavy forest floor accumulations (Varner et al. 2000a). An aggressive restoration program utilizing prescribed fire and hardwood harvesting began in 1994. Active education, restoration, and science programs are in place (Zutter et al. 2003). The current ownership protects the stand, and management is guided by a Memorandum of Understanding (MOU) among several public and private partners. Current threats include non-native species, duff fire danger, Wildland-Urban Interface

(WUI), and uncertain ownership future (Figure 4).

2. Mountain Longleaf National Wildlife Refuge (Calhoun County, Alabama)
Owner: Public (U.S. Fish and Wildlife Service/Joint Powers Authority)
Ecosystem Type: Mountain

The recently dedicated (June 2003) Mountain Longleaf National Wildlife Refuge was created from a portion of Fort McClellan, a U.S. Army garrison and formerly active military installation. Military training with flammable flares and explosives helped maintain several large patches of frequently burned mountain longleaf pinelands. The Refuge contains the only known old-growth longleaf pine forest in the Blue Ridge Physiographic Province. Twelve old-growth stands cover ca. 45 ha, ranging in size from 1 to > 15 ha, in the mountainous portions of the Refuge and its boundaries (Varner et al. 2000b). Four noteworthy tracts include stands at Redtail Ridge (4 ha), Caffey Hill (8 ha), Mt. Tylo (10 ha), and the border stand along Skeleton Mountain (8 ha). These tracts have undergone varied burning regimes, from annual to extremely fire-excluded (> 40 y since fire), and contain the only known frequently burned old-growth stands in the Mountain Province. Stands contain species-rich groundcovers (Varner et al. 2003a) and patchy old (trees > 230 y) pine canopies (Varner et al. 2003b). The present boundaries of the Refuge omit three old-growth longleaf pine stands: Skeleton Mountains (under consideration), Ford Hill (under consideration), and Reynolds Hill (unlikely for inclusion); this uncertain ownership future is among the acute threats to these mountain pinelands. Other current threats include duff fire danger and WUI issues.

3. Big Pine Tract (Hernando County, Florida)
Owner: Public (Florida Fish and Wildlife Conservation Commission)
Ecosystem type: Sandhill and Loamhill

The Big Pine Tract is a large (170 ha), infrequently burned site on the Brooksville Ridge. Many trees are young (ca. 160 y), and the groundcover communities are degraded from decades of fire exclusion. An active restoration program is underway, including hardwood harvesting and burning. Many longleaf pinelands-associated species are present, including gopher tortoises and numerous herbaceous species. Big Pine Tract is one of the few extant stands within a large protected wildland, heightening its conservation value and integrity. Current threats include duff fire danger and non-native species invasions.

4. Eglin Air Force Base Tracts (Okaloosa and Walton Counties, Florida)
Owner: Public (Department of Defense, Air Force)
Ecosystem types: Sandhill and Flatwoods

Eglin's tracts represent the largest remaining old-growth landscape at ca. 3650 ha, with many high-quality pineland communities and intact focal animal associates. Noteworthy tracts at Eglin include the Patterson Natural Area (375 to 2031 ha area), White Point (58 ha), Brandt Pond (155 ha), Field One (507 ha), Sandy Mount (200 ha), and several others (pers. comm., K. Hiers, Niceville, Fla.). Estimates of the total old-growth acreage at Eglin range

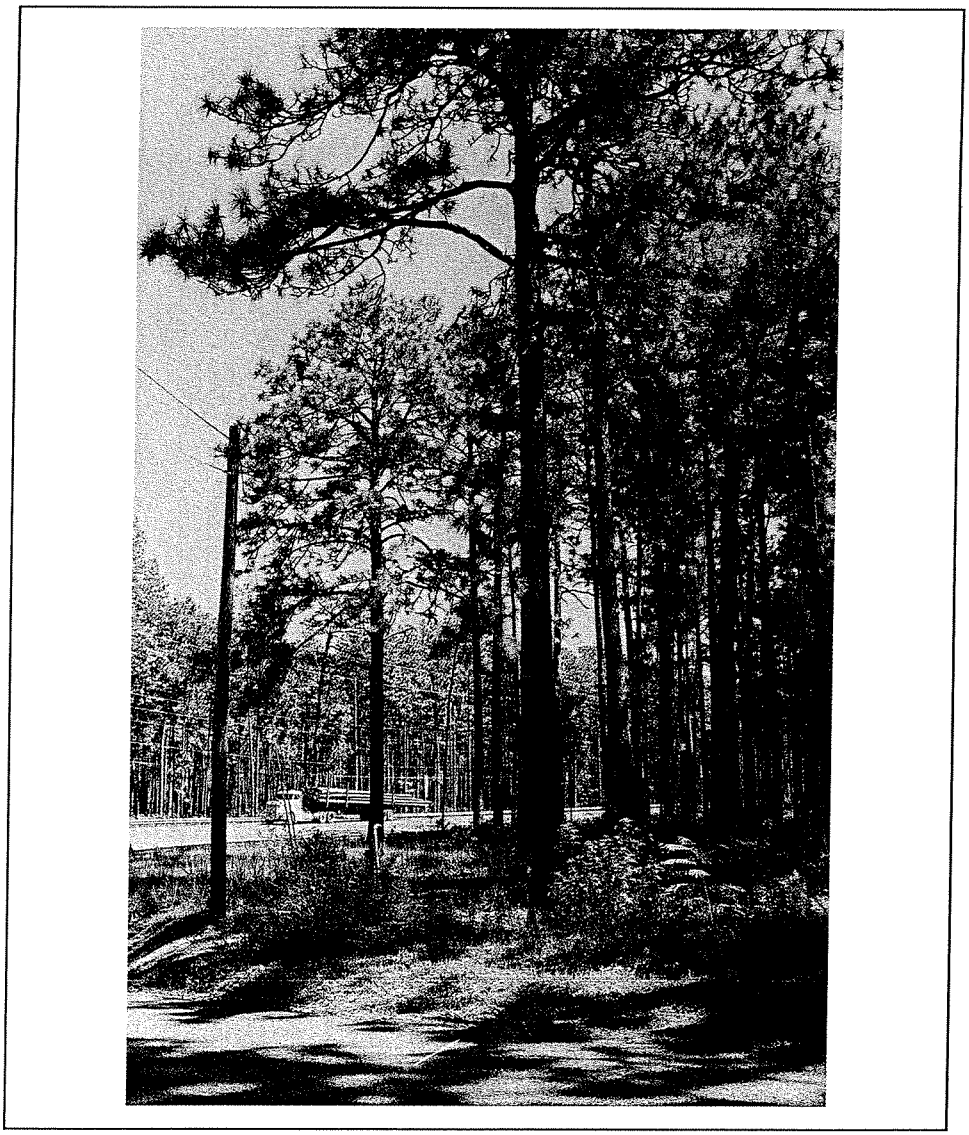

Figure 4. Extant old-growth longleaf pineland at the Flomaton Natural Area, near Flomaton, Alabama. The Flomaton tract contains many of the most common threats to remnant old-growth stands: high fuel loads resulting from decades of fire exclusion, degraded groundcover species composition, presence of invasive species, highly fragmented, and located near smoke-sensitive and ever-urbanizing suburban areas.

from our conservative 3650 ha figure (fitting data gathered by a Florida Natural Areas Inventory survey; pers. comm., C. Kindell, Tallahassee, Fla.) to areas as large as 21,000 ha (pers. comm., K. Hiers, Niceville, Fla.), highlighting the need for more formal surveys of Eglin's old-growth pinelands. Eglin's old-growth stands have experienced various burning regimes, from annual fire to extremely fire-excluded. Intense management attention has been focused on Eglin's remnant old-growth pinelands (McWhite et al. 1999), a fact encouraging to many conservationists concerned for the status of southeastern old-growth longleaf pine stands. Eglin's stands contain very old trees; it is common to encounter 400 year-old longleaf pines. Owing to its history of erratic burning, several stands have recently experienced mortality resulting from re-introduction of fire. Eglin's stands face the least risk from urban areas, and represent the most ecologically viable old-growth longleaf pine landscape in existence. Current threats to Eglin's stands include duff fire danger and isolated WUI issues.

5. Goethe State Forest (Levy County, Florida)
Owner: Public (Florida Division of Forestry)
Ecosystem type: Flatwoods

Goethe State Forest is a large north Florida pinelands landscape containing two old-growth longleaf pine flatwoods stands totaling 75 ha. Goethe's two tracts contain red-cockaded woodpecker (*Picoides borealis*) clusters and intact, frequently burned groundcover communities. The overstory contains multiple age classes above 150 y, with individuals exceeding 225 y. Isolated old (> 200 y) longleaf pines are common over much of Goethe's landscape. No acute threats to Goethe's old-growth pinelands were found.

6. Platt Branch (Glades County, Florida)
Owner: Public (Florida Fish and Wildlife Conservation Commission)
Ecosystem type: Flatwoods

Platt Branch is a large south Florida pinelands landscape containing 160 ha of old-growth longleaf pine flatwoods. This wildland is embedded in a large, unprotected wildland complex with scattered old-growth candidate stands throughout. Platt Branch stands are old, frequently burned, and contain characteristic pinelands flora and fauna, including red-cockaded woodpeckers. Acreage additions should be sought from adjacent areas to maintain site integrity. No acute threats to Platt Branch were found.

7. Venus Flatwoods (Glades County, Florida)
Owner: Private (The Nature Conservancy of Florida)
Ecosystem type: Flatwoods

Venus Flatwoods is a 40 ha, frequently burned flatwoods site with intact pinelands vegetation. The stand contains many old pines (> 200 y) and has abundant regeneration. Its small size, location within a disturbed landscape, and isolation from other pinelands communities are the most acute threats to the Venus Flatwoods' stand.

8. Greenwood Plantation (Thomas County, Georgia)
Owner: Private (The Nature Conservancy of Georgia)
Ecosystem type: Clayhills and Savanna

Often called "The Big Woods", this 200 ha site may best represent how many virgin longleaf pine stands appeared at settlement. The site is frequently burned, contains many old trees, a diversity of plant communities, and native flora and fauna characteristic of pristine pinelands. The Plantation has been carefully managed for timber, bobwhite quail (*Colinus virginianus*), and aesthetics under the Stoddard-Neel Selection System for 50 y (Neel 1971). Small groundcover disturbance patches are scattered across the site, characteristic of quail-managed lands. Greenwood faces limited threats from the WUI.

9. Moody Tract (Appling County, Georgia)
Owner: Private (The Nature Conservancy of Georgia)
Ecosystem type: Clayhills and Sandhills

The Moody Tract contains an estimated 120 ha of old-growth pinelands, with many old trees (> 250 y). Most floral and faunal elements remain, including abundant wiregrass, gopher tortoises (*Gopherus polyphemus*), and a few red-cockaded woodpeckers. The large size of the tract, its inclusion in a large protected landscape (ca. 1650 ha), and its location in the lower Atlantic Coastal Plain make it unique in this list. The Moody Tract is a recent purchase by The Nature Conservancy of Georgia. Duff fire dangers are the greatest threat to Moody's stands, with substantial pine mortality in recent restoration prescribed burns (J.M. Varner, unpublished data).

10. Wade Tract (Thomas County, Georgia)
Owner: Private (Tall Timbers Research Station Conservation Easement)
Ecosystem type: Clayhills

The 83 ha Wade Tract represents the archetypal old-growth longleaf pine savanna. The Wade Tract is frequently burned, contains an intact pinelands fauna and flora, and is the best remnant pineland landscape. Studies from the Wade Tract frame the contemporary view of pinelands ecology and stand dynamics (Platt et al. 1988, Hermann 1993, Platt and Rathbun 1993, Grace and Platt 1995, Engstrom and Sanders 1997, Hermann et al. In press). The Wade Tract faces limited threats from the WUI.

11. Red Hills Plantations (Thomas County, Georgia)
Owner: Private (Tall Timbers Research Station and The Nature Conservancy of Georgia Conservation Easements)
Ecosystem type: Clayhills

The Red Hills Plantations are a collection of privately owned stands covering ca. 400 ha (L. Neel, pers. comm., Thomasville, Ga.) in various states of conservation and management. Most sites are frequently burned and managed for bobwhite quail and timber (Neel 1971). In combination with Greenwood Plantation and the Wade Tract, the Red Hills comprise a large, high-quality pinelands landscape. Conservation efforts are prioritized here to preserve this magnificent, biologically significant landscape. Dominant threats to the Red Hills Plantations are their uncertain ownership future and limited WUI threats.

12. Bonnie Doone Tract (Cumberland County, North Carolina)
Owner: Public (City of Fayetteville, North Carolina)
Ecosystem type: Clayhills

Bonnie Doone is a 65 ha rare stand of unturpentined (so called "round timber") pineland in the sandhills region of North Carolina. The site is fire-excluded and in need of a careful ecological restoration program. Threats include duff fire danger and WUI issues.

13. Boyd Tract (Moore County, North Carolina)
Owner: Public (North Carolina Division of Parks & Recreation)
Ecosystem types: Sandhills and Clayhills

The Boyd Tract is an old (trees > 350 y old) 24 ha stand that underwent 80 y of fire-exclusion (Gilliam et al. 1993) prior to recent restoration efforts. Fire and fire surrogates (duff raking) have been underway for several years, with some areas of high pine mortality resulting. Turpentining scars are present on most trees, providing a unique aspect and cultural history. Current threats include duff fire danger, WUI issues, and non-native species invasions.

14. Camp Lejeune Tract (Onslow County, North Carolina)
Owner: Public (Department of Defense, Marine Corps)
Ecosystem type: Sandhills

The 20 ha Camp Lejeune Tract is a poorly known, frequently burned sand ridge site. The authors have not visited the area and no detailed reports on its status, threats, or quality were found.

15. Croatan Ridge (Craven County, North Carolina)
Owner: Public (U.S. Forest Service, Croatan National Forest)
Ecosystem type: Sandhills and Savanna

This site, also known as the Pringle Road Tract, is a 20 ha frequently burned sandhill ridge in the Croatan National Forest. The site strings a long, narrow pond pine (*Pinus serotina* Michx.) pocosin, so our acreage estimate is just that. The site has an intact pinelands flora and is within a large protected landscape. More field surveys should be made. Another old longleaf pine stand (Catfish Lake Bay Rims) is nearby, and may be included (pers. comm., Mike Schafale, Raleigh, NC). The only acute threat to this site is reckless Off-Road-Vehicle (ORV) use.

DISCUSSION

Summary of threats to extant old-growth longleaf pinelands

Few remnant old-growth longleaf pinelands could be described as pristine or approximating presettlement conditions (Figure 4). Acute threats to remnants include: urban interface issues (60% of extant stands), duff fire danger (47%), non-native species invasions (20%), and uncertain management future (13%). Other major threats include fragmentation and groundcover degradation, which to some degree threatens all remaining sites.

Nine sites face present threats from complications associated with the Wildland-Urban Interface (WUI). Dominant WUI threats include smoke restrictions, burning fears, feral animal problems, exotic plant invasions, and direct development pressures. Most sites will face this threat in the future without large landscapes being preserved.

Seven sites have either experienced problems from duff fires (most notably Flomaton Natural Area and Eglin Air Force Base) or face threats when fire is re-introduced. Duff fires smolder for hours to days post-ignition, consuming forest floor pine roots and potentially girdling trees. Fire-suppression's legacy of heavy fuel accumulations will be one of the most pressing issues in longleaf pine restoration management (Kush et al. 1999b). Current research is underway (Gordon and Varner 2002) to better understand duff fires and their management to minimize old-growth longleaf pine mortality.

Three sites are contaminated with non-native plant species, principally Chinese privet (*Ligustrum sinense* Lour.), Japanese honeysuckle (*Lonicera japonica* Thunb.), Japanese climbing fern (*Lygodium japonicum* [Thunb.] Sw.), Chinese tallow (*Sapium sebiferum* [L.] Roxb.), Chinese wisteria (*Wisteria sinensis* [Sims] Sweet), and several others. Non-natives reduce native species and rapidly degrade pinelands. Often these stands' losses are due to their proximity to the WUI, but exotics like cogongrass (*Imperata cylindrica* [L.] P. Beauv.) invade large interior protected areas. Feral and introduced animals (domesticated cats and dogs, wild hogs, and nine-banded armadillos (*Dasypus novemcinctus*)) also threaten pineland plant and animal biodiversity.

Two sites have uncertain futures because of uncertain preservation and conservation. The recent transfer of Fort McClellan to the Mountain Longleaf National Wildlife Refuge omitted three old-growth longleaf pine stands and a large portion of its surrounding landscape and smokeshed from protection. The privately-owned Red Hills Plantations face strong development pressures from Tallahassee and Thomasville exurbanization. Efforts should be heightened to protect these tracts with more stable conservation measures (easements, purchase, further Congressional protection).

All sites, excepting one or two stands, have a history of groundcover degradation (e.g., wildlife food plots, fire lines, fire exclusion). Groundcover disturbances create entry points for exotics, are difficult to restore, and blur perspectives on pinelands ecology. "Old-growth groundcover communities" are likely as important (or more so) as old pine canopies. All sites should work to maintain any intact groundcover and restore their degraded ones.

Potential additions to old-growth longleaf pine acreage

The lack of geographical and ecosystem representation is alarming. The states of Mississippi and Virginia may have no old-growth remaining (and potentially Louisiana, South Carolina, and Texas). The lack of Piedmont, Ridge and Valley, and Cumberland Plateau Province stands is also troubling. These points highlight the fact that our understanding of pineland dynamics and benchmark conditions is based on

a few isolated clayhill and sandhill stands that may not be generalizable to the varied sites represented by pinelands. This fact should encourage us to search harder to find these missing links.

At least six sites have reports of old-growth longleaf pine stands but have not been visited and warrant investigation:

A1. Kaul Tract (Coosa County, Alabama) – A large mountain longleaf pineland reported to have been logged; site visits are warranted.

A2. Number One Island (Ware County, Georgia) – A large (120 ha) frequently-burned flatwoods stand within the Okefenokee National Wildlife Refuge. Wildfires during 2002 may have impacted this site; field visits are warranted.

A3. Calcasieu Tract (Rapides Parish, Louisiana) – A large tract (ca. 100-250 ha) within the Calcasieu District of the Kisatchie National Forest. If this site is old-growth, it would represent the only old-growth longleaf pine stand in Louisiana and potentially the largest west of the Mississippi River. Field visits are needed.

A4. Cape Fear Stand (Cumberland? County, North Carolina) – A privately owned stand rumored to contain 20 ha of old-growth longleaf pineland; site visits needed.

A5. Boykin Spring Longleaf (Angelina County, Texas) – A potential 40 ha stand in the Angelina National Forest that contains red-cockaded woodpeckers and a frequently-burned groundcover. Site visits and data are needed.

A6. Lufkin Tract (Angelina County, Texas) – A very large (1200 ha) frequently-burned, biologically intact stand owned by Temple-Inland Corporation. Reports of this stand are impressive and warrant visits.

SUMMARY

However preliminary, this list represents the best and most complete information known on old-growth longleaf pine stands. As is obvious, very little is known about several of these stands. This represents another void in longleaf pine research and conservation. This, and more detailed surveys and projects, should give researchers a better understanding of past southeastern climates, disturbance factors, harvesting, and effects of ecological restoration on the pinelands landscape. The fact that so few old-growth stands remain should encourage quicker action to conserve these remnants – in the form of careful restoration, solidifying land tenure, and land purchases and/or easements.

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Morgan Varner is a Graduate Research Assistant in the School of Natural Resources & Environment at the University of Florida. His research interests are fire ecology, ecological restoration, silviculture, and natural history of the southeastern United States.

John S. Kush is a Research Associate in the School of Forestry & Wildlife Sciences at Auburn University. His research interests are restoration ecology, fire ecology, and longleaf pine stand dynamics.

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