

# Diversity of Shortleaf Pine Forest Types

**AUTHORED BY: ROBERT SUTTER**

## Table of Contents

Introduction.....	1
North Atlantic Coastal Plain.....	3
Mid-Atlantic Piedmont.....	3
Piedmont and Cumberland Uplands.....	3
Southeast Coastal Plain.....	4
Upper East Gulf Coastal Plain.....	4
West Gulf Coastal Plain.....	4
Appalachians and Interior Low Plateau.....	5
Ozark-Ouachita.....	6
References.....	7

## Introduction

Shortleaf pine is one of the most widespread pines in the country, occurring in 23 states, with a range over 440,000 square miles.<sup>7,10</sup> Shortleaf pine woodlands and forests once stretched from southern New York and New Jersey, south on the Atlantic and Gulf Coastal Plains and inland to Pennsylvania, West Virginia, Indiana, Kentucky and Tennessee, and west of the Mississippi River in Missouri, Arkansas and Oklahoma, and south to western Louisiana and eastern Texas (Fig. 1).

Shortleaf pine can grow on a range of soil types and hydrologic conditions and occurs in a variety of habitats.<sup>1,2,5,6</sup> It grows on xeric sandhills in Florida and Louisiana; xeric south- and southwest-facing slopes in the Appalachians, Ozarks, and the Ouachitas; and well-drained sandstone hills on the Cumberland Plateau. It also occurs on mesic stream terraces and rolling uplands separating major and minor stream bottoms in the Piedmont and Coastal Plain. In some ecosystems, the species is co-dominant with many other tree species. In the New Jersey Pine Barrens and in the Appalachians, shortleaf pine is a close associate of pitch pine. Along the Atlantic and Gulf Coastal Plains, shortleaf pine is found in varying degrees of mixture with three common southern yellow pine species: loblolly, longleaf, and slash. In the eastern part of its range, shortleaf pine is found mixed with oaks, while rarely found in stands of only shortleaf pine. Conversely, in the northwestern part of its range (Ouachita Mountains),

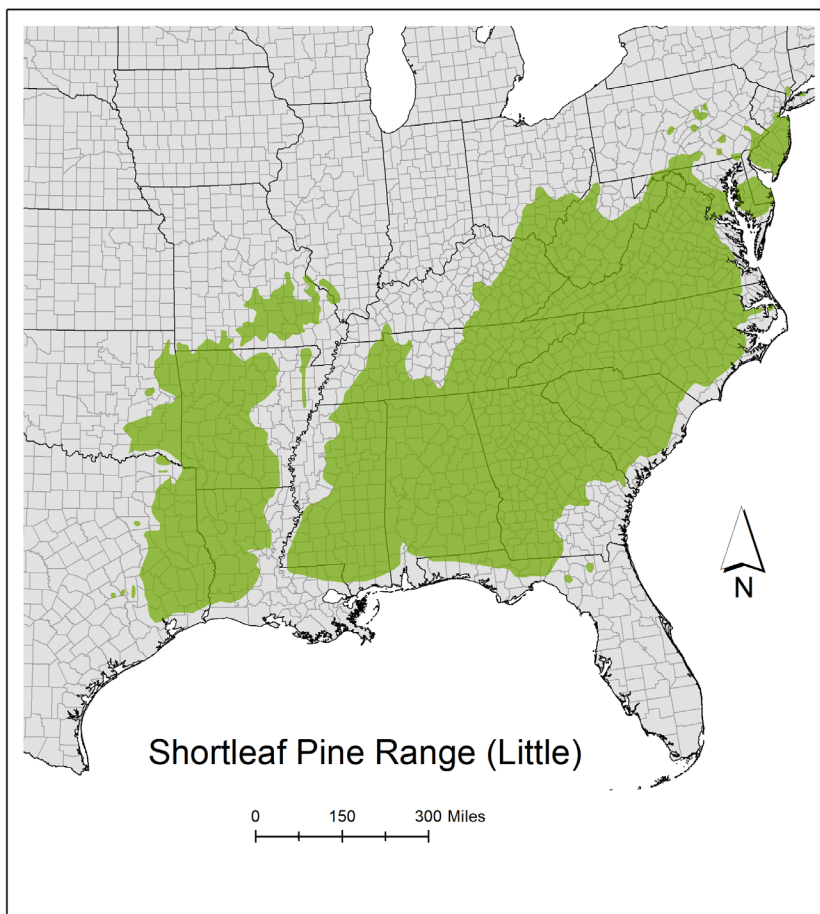


Figure 1. Historic range of shortleaf pine. Data: Little<sup>8</sup>

**Table 1. Shortleaf Pine Cover Types Recognized by the Society of American Foresters.<sup>3</sup>**

Component	Shortleaf Forest Cover Types
Major	Shortleaf Pine (75) Shortleaf Pine-Oak (76) Loblolly Pine-Shortleaf Pine (80)
Minor	Eastern White Pine (21) Post Oak-Blackjack Oak (40) Bear Oak (43) Chestnut Oak (44) Pitch Pine (45) Eastern Redcedar (46) White Pine-Chestnut Oak (51) White Oak-Black Oak-Northern Red Oak (52) Yellow Poplar (57) Longleaf Pine (70) Virginia Pine-Oak (78) Virginia Pine (79) Loblolly Pine (81) Loblolly Pine-Hardwood (82) Black Oak (110)

shortleaf pine is the dominant canopy species either alone or with a mix of oaks and eastern red cedar.

As a result of its distribution across a wide range and in a variety of habitats, shortleaf pine occurs in a number of different forest types. These forest types vary depending on the vegetation classification standard that is used. Shortleaf pine is associated with 18 forest cover types according to the Society of American Foresters (SAF) (Table 1),<sup>3</sup> but only two in which it is dominant or co-dominant. Shortleaf is dominant or co-dominant in 67 NatureServe plant communities (called associations), a finer forest classification than the SAF types.<sup>9,11</sup> The majority of these NatureServe plant communities are considered critically imperiled or imperiled. The critically imperiled natural communities of shortleaf pine occur throughout the range of the species, including shortleaf-oak woodlands in North Carolina, Tennessee, Georgia, and Mississippi, longleaf-shortleaf woodlands in Georgia, and shortleaf-oak woodlands and mesic longleaf-shortleaf woodlands in Louisiana and Texas. Many of these for-

est types are the focus of conservation efforts.

This fact sheet provides an overview of the different shortleaf pine forest types found throughout the range of the species using the NatureServe classification as the source for this regional diversity.<sup>9</sup> The objective is to provide a guide to shortleaf pine forest types that can be used by forestry professionals, ecologists, and interested public.

The different forest types are grouped by geographic range (Table 2). In each geographic region, the most common forest types are described. The name of each forest type is bolded and italicized. A forward slash separates different strata in the forest (canopy / subcanopy / ground cover). A species name by itself in a stratum designates dominance

while multiple species indicate co-dominance. A species in parentheses is a less consistent member of the forest type. The summary of each forest type includes the forest structure (forest - >60% canopy cover, woodland - <60% canopy cover), topographic position (lower slope, mid-slope, upper slope, ridgetop, sandhills), and soil moisture condition (xeric – very dry, mesic – moderate amount of moisture). Vegetation structure is variable and depends on many factors including the frequency and time since fire. With frequent fire, many shortleaf pine forest types are open woodlands with reproduction of shortleaf pine and a grass and herb-rich ground layer. With fire exclusion, the canopy layer is dense and contains species that are fire sensitive, the understory dense, and the ground cover has fewer species. Shortleaf pine plantations are not included in the descriptions.

In addition to forest structure, topographic position, and soil moisture condition (which is related to topographic position and soil type), forest types are described by the presence of different species of pine and oak. Among the pines, this includes shortleaf, pitch, Virginia, Table Mountain, loblolly, longleaf, and slash. Descriptions of southern yellow pines (shortleaf, loblolly, longleaf and slash) can be found in the fact sheet Comparison of Southern Yellow Pines on the Shortleaf Pine Initiative website ([shortleafpine.net](http://shortleafpine.net)). Oaks are very diverse across the range of shortleaf pine. A good reference for oak identification is Stein et al. 2003.<sup>12</sup>

For those interested in more detailed information on the shortleaf pine associations presented below, please go to NatureServe Explorer and type in the name of the association in box under Search

**Table 2. Geographic Units for Shortleaf Forest Types**

North Atlantic Coastal Plain	Upper East Gulf Coastal Plain
Mid-Atlantic Piedmont	West Gulf Coastal Plain
Piedmont and Cumberland Uplands	Appalachians and Interior Low Plateau
Southeast Coastal Plain	Ozark-Ouachita

by Name: (<http://explorer.natureserve.org/servlet/NatureServe?init=Ecol>).

## NORTH ATLANTIC COASTAL PLAIN

New Jersey, New York, Delaware, Maryland

The center of shortleaf pine's distribution in this region is the Pine Barrens, or Pinelands, of southern New Jersey. The Pine Barrens is a relatively flat landscape with well-drained, sandy, and infertile soils dominated by pitch pine (*Pinus rigida*) forests and woodlands, which include a minor component of oaks—in particular post oak (*Quercus stellata*) and black oak (*Quercus velutina*)—in the canopy and a sub-canopy dominated by scrub oaks—blackjack oak (*Quercus marilandica*) and bear oak (*Quercus illicifolia*). These forests were maintained by frequent fire occurring on an average of every 20 years.<sup>4</sup> While the most expansive pine barrens are in New Jersey, there are outliers in New York.

Shortleaf pine is a co-dominant or minor component of pitch pine forests in this region. The *Pitch Pine - Shortleaf Pine/Blackjack Oak Pine Barren Woodland* is found in the central Pine Barrens, on flats and uplands, in areas that do not have the highest but still a high natural fire frequency of 20 to 40 years. The sites with the highest fire frequencies are dominated by pure pitch pine of moderate height. The lower frequency and intensity of fire allows the presence of shortleaf pine and oaks. The *Pitch Pine - (Shortleaf Pine) Post Oak/Blackjack and Bear Oak Woodland* in the Pine Barrens have a fire frequency slightly less than the previous forest type, with more oaks in the canopy and sub-canopy. Heaths such as blueberry and huckleberry dominate the ground cover. This forest type is found in sites with lower fire frequencies and intensities.

Occurring on sandy uplands and dunes along the coast and rivers in New Jersey is the *Southern Red Oak-Pitch Pine- Shortleaf Pine/American Hol-*

*ly Woodland*, with southern red oak (*Quercus falcata*) in the canopy with the two pines and American holly in the sub-canopy. These woodlands would have had an average natural fire frequency of around 100 years. Interior stabilized dunes along floodplains and ponds in New Jersey have very xeric conditions that result in an open canopy of pitch pine and shortleaf pine. This *Pitch Pine-Shortleaf Pine/Pine Barrens Golden Heather Woodland* may have a sparse mid-story of post oak or sassafras (*Sassafras albidum*).

Inland dunes and coastal ridges in Delaware and Maryland have a slightly different forest type (*Shortleaf Pine/Southern Red Oak-Water Oak/Blueberry Woodland*) with an open canopy of shortleaf pine dominating or sharing dominance with loblolly pine (*Pinus taeda*), and water oak (*Quercus nigra*), southern red oak and water oak in the sub-canopy, and a tall shrub layer dominated by heaths. This forest type is maintained primarily by drought, with occasional fire.

With the increase in fire return time over the last century, oaks are increasing in dominance in both the canopy and sub-canopy of all these forest types.

## MID-ATLANTIC PIEDMONT

Virginia, North Carolina, South Carolina, Georgia

Shortleaf pine occurs in the Piedmont of Virginia, North Carolina, South Carolina, and Georgia on dry ridges, south and southwest facing slopes, bluffs, and on soils derived from volcanic rocks (specifically, metavolcanics of the Carolina Slate Belt and isolated occurrences of diabase and gabbro). The species is thought to have been more abundant before European settlers harvested trees for sawtimber and altered the natural fire regime. Fire is an important process in these drier habitats, necessary for shortleaf regeneration and reducing competition with other tree species, primarily oaks. With the absence of fire, and an increasing local seed source, loblolly pine, a species originally restricted to lower

slopes and drainages, outcompetes shortleaf pine in disturbed areas.

Most commonly in the Piedmont, shortleaf pine is mixed with white oak and post oak (*Shortleaf Pine - White Oak - Post Oak / Blue Ridge Blueberry Woodland*), with an open mid-story and an understory of blueberry and other species. On soils derived from volcanic rocks, shortleaf shares the overstory with drier oak species (*Shortleaf Pine - Post Oak - Blackjack Oak Woodland*) or is a minor component in forests dominated by post oak (*Post Oak - (Shortleaf Pine) Woodland*). Shortleaf is a co-dominant with chestnut oak (*Quercus montana*) on dry, usually west-facing slopes of rocky remnant hills (monadnocks) in the southern Piedmont from North Carolina to Georgia (*Chestnut Oak - Shortleaf Pine / Hillside Blueberry Piedmont Monadnock Forest*).

## PIEDMONT AND CUMBERLAND UPLANDS

North Carolina, South Carolina, Georgia, Alabama

Shortleaf pine is co-dominant with longleaf pine in two forest types in upland areas in the interior regions of North Carolina, South Carolina, Georgia, and Alabama. Ecologists and foresters know these forest types as montane longleaf pine, a unique Piedmont distribution of the predominantly coastal plain species. These forest types are found in a variety of settings, including sandstone ridges and bluffs in the Ridge and Valley Province and Southern Blue Ridge of north-central Alabama and northwestern Georgia, slopes and ridges in the Carolina Slate Belt of North Carolina, and ridges underlain by quartzite, phyllite, mica schists, or gneiss in Georgia, South Carolina, and North Carolina. Good examples are found in Talladega National Forest in Alabama, Pine Mountain in Georgia, and the Uwharrie National Forest in North Carolina.

These forest types are defined by the co-dominance of longleaf and shortleaf pine. Higher quality stands are open

woodlands, but if fire has been absent the forest types will have a denser canopy, with the oaks and other hardwoods filling in the understory and ultimately entering the canopy. Both fire and the steep xeric soils allow for reproduction of longleaf and shortleaf pine.

The two forest types in this region differ in the species of co-dominant oak present and whether the understory is tall heaths or blueberry. **Longleaf Pine - Shortleaf Pine - Chestnut Oak / Mountain Laurel - Piedmont Rhododendron Woodland** occurs on rocky ridges in the southern Cumberland Mountains and southern Ridge and Valley of Alabama and on steep, rocky river bluffs in the lower Piedmont of Georgia. **Longleaf Pine - Shortleaf Pine / Blackjack Oak - (Chestnut Oak) / Blue Ridge Blueberry Woodland** is more widespread, occurring on steep, rocky ridges composed of various rock types, including sandstone, quartzite, phyllite, mica schists, and gneiss.

### **SOUTHEAST COASTAL PLAIN**

*North Carolina, South Carolina, Georgia, Alabama, Florida, southern Mississippi, and the Florida parishes of Louisiana*

Fire maintained forest types in the southeast Coastal Plain are dominated by longleaf pine (*Pinus palustris*). Fire frequency in most longleaf forests is between 3 to 5 years (or less), the result of the high frequency of lightning strikes, xeric habitats, long drought periods, and large connected landscapes. Longleaf is currently most common on xeric sandhills and interior dunes and flat sandy uplands, the latter being the classic longleaf pine savannas: low density pine woodland with a ground cover dominated by grasses (especially wiregrass (*Aristida* sp.)) and a rich diversity of herbaceous species. Longleaf savannas are one of the most species rich ecosystems in the world and occur on saturated soils. Longleaf pine formerly occurred on other soil types throughout the coastal plain, but the stands on finer textured soils have largely been converted to agricultural uses.

In sandhill habitats throughout this region, where fire has been reduced in frequency, shortleaf pine can be a minor component with longleaf pine (**Longleaf Pine - (Shortleaf Pine, Loblolly Pine) - (Bluejack Oak, Turkey Oak) Woodland**). Unlike longleaf pine dominated sandhills that have frequent 3 to 5 fire return intervals, this forest type has a mix of pine species, with sandhill oak species, blackjack oak (*Quercus marilandica*) and turkey oak (*Quercus palustris*), in the subcanopy and canopy.

On flat sandy uplands between wetlands, streams, and rivers occurs the **Longleaf Pine / Three-awn species - Little Bluestem Southeastern Coastal Plain Woodland**, open woodlands of longleaf pine occasionally with a component of other pines or hardwood trees such as shortleaf, loblolly, and southern red oak (*Quercus falcata*). The understory is often very sparse, making these woodlands appearing park-like. The herbaceous layer is dominated by wiregrass (*Aristida beyrichiana* or *Aristida stricta*) and other grasses (*Andropogon* spp., *Aristida purpurascens*, *Sorghastrum nutans*, *Schizachyrium scoparium*, and *Schizachyrium tenerum*). These woodlands are found in the Southeastern Coastal Plain on upland soils which have finer texture than the coarse sands.

### **UPPER EAST GULF COASTAL PLAIN**

*Alabama, Mississippi, Tennessee, and Arkansas*

The shortleaf pine - hardwood forests in this region are characterized by shortleaf pine with a mix of hardwoods with intermediate moisture preferences, such as white oak (*Quercus alba*) and southern red oak (*Quercus falcata*), and sometimes with mockernut hickory (*Carya tomentosa*). There are four forest types that vary in topographic position and soil moisture. The region includes the Upper East Gulf Coastal Plain of Mississippi and Alabama and the adjacent Interior Low Plateau of TN and Crowley's Ridge in Arkansas.

The **Shortleaf Pine - White Oak - Mockernut Hickory Forest** occurs on sites with intermediate soil moisture on slopes or uplands with clay soils. White oak with shortleaf pine is an indicator species of this forest type. Fire plays a role in maintaining a shortleaf pine forest, but other factors like drought and gap dynamics (trees dying of old age, drought or Southern Pine Beetle (*Dendroctonus frontalis*)) provide sites for shortleaf regeneration. This forest type extends beyond this region to Florida and Georgia.

On the dryer sites on upper slopes and ridges within this region, white oak disappears from the canopy leaving only southern red oak (**Shortleaf Pine - Southern Red Oak Forest**). This forest type occurs north of the range of longleaf pine and east of the predominantly loess (wind-blown sediment) soils. On dryer sites, with shallow soils, southern red oak is replaced with post oak and occasionally blackjack oak (**Shortleaf Pine - Post Oak - (Blackjack Oak) Forest**).

The **Shortleaf Pine - Loblolly Pine - (White Oak, Post Oak) / Sourwood Forest** is characterized by the presence of both shortleaf and loblolly pine. A mixture of hardwood species may be present canopy or understory, such as white oak, post oak and sourwood (*Oxydendrum arboreum*). This forest occurs on sites with intermediate moisture status with the best examples occurring on southwest-facing, somewhat steep, lower slopes in the Coastal Plain of Alabama.

### **WEST GULF COASTAL PLAIN**

*Northwestern Louisiana, southwestern Arkansas, and eastern Texas and a small area of southeastern Oklahoma*

Shortleaf pine occurs in this region on xeric uplands, sandhills, and mesic slopes. In the southern part of this region, longleaf pine dominates the sandy, xeric uplands, replaced by shortleaf pine further north, while loblolly is present throughout. On more mesic



slopes shortleaf is often mixed with loblolly pine. With a natural fire regime, the forest type is an open woodland but with fire suppression, loblolly and oaks increase in density and dominance. The dryer shortleaf forest types have open tree canopies with usually <60% canopy closure and sparse ground cover vegetation.

### Shortleaf Pine Sandhill Woodlands

There are several shortleaf pine forest types that occur on the xeric sandhills in this region. These forest types are found primarily north of the historic range of longleaf pine. All have a mix of scrubby oaks such as bluejack oak (*Quercus incana*) and sand post oak (*Quercus margarettae*), with bluejack oak being the most characteristic and dominate. These stands are often short-statured, with scattered pines. Due to the xeric conditions, the ground cover is very sparse, and patches of exposed sand are common. Lichens (*Cladonia* spp.) and spikemosses (*Selaginella arenicola* ssp. *riddellii*) can form large patches.

The (*Shortleaf Pine - (Bluejack Oak, Post Oak, Sand Post Oak) / Woodland*) may be the most common and abundant in the region on the extremely dry, nutrient-poor, strongly acidic, sandhills. The (*Bluejack Oak, Sand Post Oak, Arkansas Oak - (Shortleaf Pine) / Little Bluestem Woodland*) occurs on xeric sandhills with a short-statured, open canopy of oaks and lesser density of shortleaf pine. The *Shortleaf Pine - (Sand Post Oak, Post Oak, Southern Red Oak) - Black Hickory Woodland* is less xeric than the first forest type and can be identified by the presence of southern red oak and a diversity of species in the ground cover, including a number of legume species.

In a different environmental location, a shortleaf pine forest type is also found on xeric stream terraces, flat, sandy areas formed by stream deposition. Shortleaf pine and bluejack oak are the co-dominants in this forest type (*Shortleaf Pine / Bluejack Oak / Riddell's Spikemoss Woodland*), with sparse ground cover.

### Shortleaf and Longleaf Pine Woodlands

Within the range of longleaf pine in Louisiana and Texas, shortleaf can be a co-dominant or minor component of the canopy.

On the most xeric sandhills and upper slopes, longleaf and shortleaf can co-dominant with a mix of drought tolerant oaks (*Longleaf Pine - Shortleaf Pine - (Bluejack Oak, Sand Post Oak) / Little Bluestem Woodland*). The understory is open with a grassy ground cover. The species composition of this forest type is controlled by extreme drought and a low frequency of fire. Sites that are fire-suppressed have the addition of loblolly pine and sweetgum (*Liquidambar styraciflua*) in the overstory (*Longleaf Pine - (Shortleaf Pine, Loblolly Pine) / (Sweetgum) Woodland*).

On topographically isolated ridgetops or sandhills prone to reduced fire frequencies shortleaf is a minor component with loblolly, southern red oak and black hickory (*Longleaf Pine - (Shortleaf Pine, Loblolly Pine) - Southern Red Oak - Black Hickory Woodland*). The lower frequency of fire allows a mix of pines, oaks, and other hardwood species.

### Forest Types where Shortleaf Pine is Co-dominant with Loblolly Pine

Shortleaf and loblolly pine are co-dominants in the widespread forest type (*Shortleaf Pine - Loblolly Pine - (White Oak, Southern Red Oak, Post Oak) Forest*) with a mix of oak species. This forest type occurs on slopes with an intermediate moisture status, between the moister loblolly forests and the more xeric shortleaf or longleaf woodlands. In more xeric sites, on ridgetops and upper slopes with frequent fire, shortleaf is found mixed with loblolly, post oak and black hickory (*Shortleaf Pine - Loblolly Pine - Post Oak - Black Hickory / Farkleberry Woodland*) with an understory of blueberry. An estimate of the historical fire frequency for these forests is 5 to 15 years, less than the adjacent longleaf woodlands but significantly more than the moister shortleaf and loblolly forest

types. Where the soil is less acidic, eastern red cedar occurs in the understory (*Shortleaf Pine - Loblolly Pine - Post Oak / Eastern Red-cedar Woodland*). This calcareous woodland occurs only in Louisiana and Texas.

In moister situations loblolly becomes more dominant, with a diverse mix of hardwoods, resulting in a closed canopy forest (*Loblolly Pine - (Shortleaf Pine) - Southern Red Oak - Black Hickory / Farkleberry Forest*). In sites with more soil moisture and richer soils, in lower slope positions, shortleaf and loblolly are co-dominants with a diverse understory (*Shortleaf Pine - Loblolly Pine / Horsesugar - Wax-myrtle - Elliott's Blueberry Forest*) or shortleaf is co-dominant with white oak (*Shortleaf Pine - White Oak / (Southern Arrow-wood, Maple-leaf Viburnum) Forest*). Both of these mesic types are closed forests with a well-developed subcanopy of mixed hardwoods.

### APPALACHIANS AND INTERIOR LOW PLATEAU

Virginia, West Virginia, Kentucky, Indiana, North Carolina, South Carolina, Tennessee, Georgia, Alabama

The Appalachian Region shortleaf pine forests are defined by either open woodlands dominated by shortleaf pine or shortleaf co-dominating with several different species of oak. These forest types occur across a wide exposure gradient (from mid-slope to upper slope and ridgetops) at low to middle elevations and may have been the dominant dry forest community throughout the low elevation Appalachians and Cumberland Plateau. Frequent fire maintained shortleaf pine and fire-resistant oaks and reduced invasion by more mesic species. The primary shortleaf pine forest types can be placed along an elevation and exposure gradient.

On low and middle slope positions, with deeper soils and higher soil moisture, shortleaf pine is co-dominant with white oak (*Quercus alba*), with an understory of blueberry (*Shortleaf Pine - White Oak*

/ **Blue Ridge Blueberry Forest**). This forest type has a higher canopy cover than dryer forest types. It was historically common in North Carolina, South Carolina, Georgia, Alabama, Tennessee and Kentucky but has only a few remaining stands due to the harvest of shortleaf and oaks, absence of fire, and development.

Also, at low elevations, but on exposed slopes and rocky ridges occurs a shortleaf pine forest type with two dry-site oaks, southern red oak and chestnut oak, and sourwood (*Oxydendrum arboreum*) (**Shortleaf Pine - (Chestnut Oak, Southern Red Oak) / Sourwood / Blue Ridge Blueberry Forest**). This forest type occurs on the fringes of the Southern Blue Ridge and extending into the southern Ridge and Valley and Cumberland Plateau.

On more xeric sites at lower elevations (below 2400 feet), shortleaf pine can be the dominant species in an open woodland with blueberry and mountain laurel in the understory (**Shortleaf Pine / (Blue Ridge Blueberry) - Mountain Laurel Forest**) or co-dominant with two xeric species of oak - post oak (*Quercus stellata*) and blackjack oak (*Quercus marilandica*) (**Shortleaf Pine - Post Oak - Blackjack Oak / Blue Ridge Blueberry Woodland**).

A fire-maintained, shortleaf pine woodland (**Shortleaf Pine / Little Bluestem Appalachian Woodland**) occurred historically in the Appalachian regions of Alabama, north through Georgia, Tennessee, and Kentucky on dry ridges and slopes or rock outcrops. On broad ridges in the Ridge and Valley and the southern end of the Blue Ridge in northeastern Alabama and northwestern Georgia, shortleaf occurs with both post oak and chestnut oak. With fire, it is an open woodland (**Shortleaf Pine - Post Oak - Chestnut Oak / Poverty Oatgrass Forest**), but with a reduced fire frequency other more mesic oaks and sourwood (*Oxydendrum arboreum*) are found in the understory.

At higher and more exposed elevations, chestnut oak becomes the co-dominant oak, with Virginia pine (*Pinus virginiana*) on disturbed or very steep exposures (**Shortleaf Pine - Chestnut Oak / Appalachian Woodland**). Pitch pine (*Pinus rigida*) may be present within its range. The understory is open and dominated by graminoids and forbs. There are few examples of this fire-maintained forest type, although restoration efforts are underway in the Daniel Boone National Forest, Kentucky, the Chattahoochee National Forest, Georgia, and in the Great Smoky Mountains National Park, Tennessee. Most common in Kentucky, Tennessee, and North Carolina, but also occurs in exposed ridges and west facing slopes in the Western Highland Rim.

In the more exposed and disturbed sites with low nutrients, Virginia pine is the dominant species (**Virginia Pine - (Pitch Pine, Shortleaf Pine) - (Chestnut Oak) / Blue Ridge Blueberry Forest**). These Virginia pine dominated forests of low-elevation ridges and steep upper slopes, occur throughout the Appalachians and Interior Low Plateau. This xeric forest community will be maintained on sites where local soil conditions and topographic extremes function to retard hardwood invasion.

## OZARK-OUACHITA

Arkansas, Missouri, Illinois, Oklahoma

Shortleaf pine forests in the Ouachita Mountains represent the pinnacle of the shortleaf forest (with apologies to other regions). In this region, shortleaf is the dominant forest type and in stands, with frequent fire, it is the dominant and almost only canopy species with an open woodland with an open understory and grassy ground cover. These forests are comparable to the open longleaf pine forests of the coastal plain.

This forest type is the **Shortleaf Pine / Little Bluestem Woodland** and is an open woodland with a grassy (little bluestem; *Schizachyrium scoparium*) understory. It is found on middle to upper south- or southwest-facing slopes and

ridges with shallow and well-drained soils. Several oaks are present in the canopy, varying among sites with white oak (moister) to those with a combination of post and blackjack oaks (drier). Fire plays a key role in maintaining the open woodland and grassland character of this forest type.<sup>11</sup> Without fire shortleaf regeneration is reduced, oak and shrub cover increase, and grasses thin out. This forest type occurs in Missouri, Arkansas and Oklahoma and represents the driest shortleaf pine - oak communities in the Ozarks.

This forest type (**Shortleaf Pine - Black Oak - Post Oak / Blueberry Forest**) is found on gentle to moderately steep, mid- and upper slopes, especially with southern and western aspects. Soils are thin, dry, rocky, and sandy. A range of disturbances (drought stress, wind and lightning damage, and periodic low-intensity fires) allows the regeneration of shortleaf and the mix of xeric oak species and low shrubs.

## Shortleaf Pine - White Oak - Northern Red Oak / Farkleberry Forest

This type is the matrix forest of the Ouachita Mountains and surrounding areas, ranging from eastern Oklahoma to western Arkansas and southern Missouri. It occurs on upper to middle, south-facing slopes, saddles, and flatter ridgelines with soils that range from shallow to deep. The canopy is dominated by shortleaf co-dominating with white oak, northern red oak, or black oak. Shortleaf pine often forms an emergent canopy over the oaks. There is little understory, and the shrub layer is typically several different blueberry species with occasional areas rich in herbaceous species.

These open shortleaf pine - oak woodlands were more common historically. Currently few mature, high-quality examples of this community exist, and they are dependent on management with prescribed fire.<sup>10</sup> This community has been restored around areas of remnant woodlands that provide habitat for

colonies of Red-cockaded Woodpecker. Examples are known from Buffalo Creek (Scott County, Arkansas), Camp Robinson (Pulaski County, Arkansas), Mc-

Curtain County Wilderness (McCurtain County, Oklahoma), and Pushmataha Wildlife Management Area (Pushmataha County, Oklahoma).

## AUTHOR:

**Robert D. Sutter**, Conservation Ecologist, Enduring Conservation Outcomes

SREF-SLP-023 | [www.sref.info](http://www.sref.info)

A Regional Peer Reviewed Technology Bulletin published by Southern Regional Extension Forestry



Southern Regional  
Extension Forestry



Enduring Conservation Outcomes

*Southern Regional Extension Forestry (SREF) is a diverse team of trained natural resource educators, IT specialists, graphic designers, communications and marketing experts, and media and content producers. SREF works closely with the Southern Land Grant University System, US Forest Service, and state forestry agencies to develop content, tools and support for the forestry and natural resource community. To find out more about SREF programs please visit [www.sref.info](http://www.sref.info).*

## ACKNOWLEDGEMENTS:

We thank Holly Campbell, Milo Payne, Steven Weaver and Rick White for comments on a previous version of this document.

---

## References

<sup>1</sup>Arnold, D.H., G.W. Smalley, and E.R. Buckner. 1996. Landtype-forest community relationships: a case study on the Mid-Cumberland Plateau. *Environmental Monitoring and Assessment*. 39:339-352.

<sup>2</sup>Bried, J.T., W.A. Patterson, and N.A. Gifford. 2014. Why pine barrens restoration should favor barrens over pine. *Restoration Ecology*. 22:442-446.

<sup>3</sup>Eyre, F.H., ed. 1980. *Forest cover types of the United States and Canada*. Society of American Foresters, Washington, DC. 148 p.

<sup>4</sup>Forman, R.T.T and R.E. Boerner. 1981. Fire Frequency and the Pine Barrens of New Jersey. *Bulletin of the Torrey Botanical Club* 108: 34-50. doi:10.2307/2484334.

<sup>5</sup>Guldin, J.M., J. Strom, W. Montague, and L.D. Hedrick. 2004. Shortleaf pine bluestem habitat restoration in the Interior Highlands: Implications for stand growth and regenerations. *Silviculture in Special Places, Proceedings*:182-190.

<sup>6</sup>Guyette, R.P., R. Muzika, and S.L. Voelker. 2007. The historical ecology of fire, climate, and the decline of shortleaf pine in the Ozarks. in J. M. Kabrick, D. C. Dey, and D. Gwaze, editors. *Shortleaf pine restoration and ecology in the Ozarks: proceedings of a symposium*. Gen. Tech. Rep. NRS-P-15. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 215 p.

<sup>7</sup>Lawson, E.R. 1990. *Shortleaf Pine in Silvics of North America: Volume 1, Conifers*. Edited by Russell M. Burns and Barbara H. Honkala. Washington: U.S. Government Printing Office. pp. 316-326.

<sup>8</sup>Little, E.L., Jr. 1971. *Atlas of United States trees. Volume 1. Conifers and important hardwoods*. Miscellaneous Publication 1146. Washington, DC: U.S. Department of Agriculture, Forest Service. 9 p.

<sup>9</sup>NatureServe. 2018. NatureServe explorer: An online encyclopedia of life [web application]. Version 7.1. Nature Serve, Arlington, Virginia. Available <http://explorer.natureserve.org> [2019, April 19].

<sup>10</sup>Oswalt, C.M. 2015. Spatial and temporal trends of the shortleaf pine resource in the eastern United States. Powerpoint presentation. USDA Forest Service, Southern Research Station.

<sup>11</sup>Shortleaf pine restoration plan: restoring an American forest legacy. 2016. Available: [www.shortleaf.net](http://www.shortleaf.net) [2019, April 19].

<sup>12</sup>Stein, J.D., D. Binion, and R.E. Acciavatti. 2003. *Field guide to native oak species of eastern North America*. U.S. Dept. of Agriculture, Forest Service, Forest Health

## Figure Credits

**Figure 1:** Steven Weaver, Southern Regional Extension Forestry and University of Georgia