

## White Oak Sustainability Series: The White Oak Resource in Arkansas and the Gulf Region

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### Introduction

White oak (*Quercus alba*) is one of the most important hardwood tree species in forests of the southeastern United States. It is a long-lived tree that provides a multitude of benefits and services to the forested ecosystems where it occurs. These benefits include high-value timber products, desired acorns for wildlife, den trees for many small mammals and birds, long-term carbon storage, and soil stabilization from erosion.

### White Oak Identification

There are many oak species that are considered in the white oak “group” but only one species is actually named white oak or *Quercus alba*. White oak can be easily identified by a few characteristics. The leaves will be lobed with deep sinuses, smooth leaf margins, and no teeth or spines at the lobe tips. The bark is blocky for a short distance near the ground and becomes platy to flaky up the trunk. Acorns are large, measuring up to 1 inch or more in length.

### White Oak Distribution

White oak is the most prevalent oak species in U.S. forestlands by total volume. It occurs primarily in upland areas where flooding is not common. However, white oak can move into well-drained bottomland areas on occasion. In Arkansas, it is most prevalent in the Ozark and Ouachita



**White Oak Leaves in Fall.** Photo by Kyle Cunningham

regions where pure upland hardwood forests occur. Oak/hickory forests make up about 40 percent of Arkansas forestlands. White oak often makes up significant portions of the main canopy trees in these forests.

In the Coastal Plain regions, pure hardwood stands are less common, and white oak usually are a component of the mixed pine/hardwood forest types. One exception is in the upper portion of the Eastern Coastal Plain (north AL and MS, and west TN) where pure hardwood stands occur.

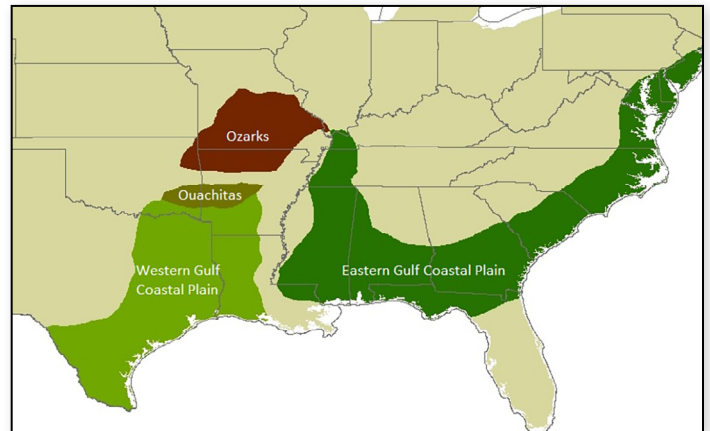
Upland forests in the Ozark and Ouachita regions have a significant percentage of public lands. The Gulf Coastal Plain forestlands are mostly owned by private forest landowners.

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**White Oak Identifying Features.** Source: USFS Field Guide to Native Oak Species



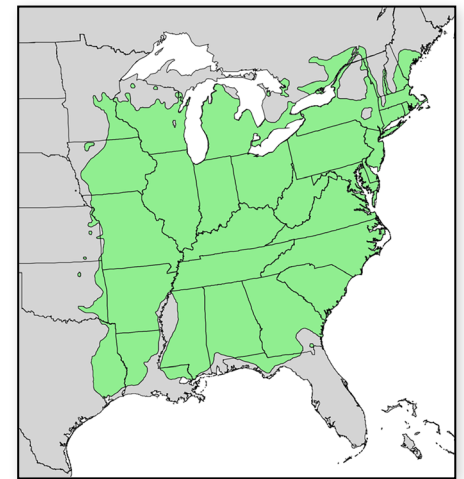
**Ozark, Ouachita and Coastal Plain Regions.** Map by Kyle Cunningham

## White Oak Timber Products

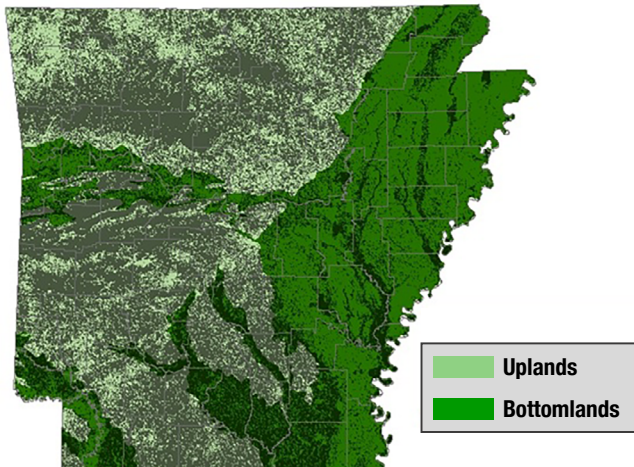
White oak is often considered the most important commercial hardwood tree species in the southeastern United States. In 2018, the white oak group comprised almost 15 percent of the total hardwood volume taken to mills in the Ozark, Ouachita and Coastal Plain regions collectively. In Arkansas, the white oak group made up 21 percent of total hardwood volume taken to mills. Furthermore, the white oak group comprised 38 percent of hardwood volume taken to mills in the Ozark region (Source: U.S. Forest Service, Forest Inventory and Analysis data).

White oak can be used to make paper, flooring, crossties, furniture, cabinetry, lumber, handles and many other products. However, the most unique use of white oak is in the making of barrels for bourbon production. It is this utilization that makes white oak trees highly valuable and, in turn, has threatened the presence of quality white oak as a component of forests in the region. White oak is unique in that the wood is “sealed” by structures called tyloses that prevent leaking. Therefore, the wood or white oak “staves” are used to construct barrels in cooperage mills.

Arkansas currently maintains two facilities to procure white oak logs for stave milling: one stave mill in the Ouachita/Coastal Plain region and a log procurement facility for the Ozark region of the state. A stave mill is currently in development for north Arkansas. In addition, log buyers from Missouri often purchase white oak logs to be delivered to stave mills in the Missouri Ozarks. In the upper portions of the Eastern Gulf Coastal Plain, stave mills in Tennessee purchase white oak logs to be delivered to their respective mills. Thus, the reach of stave mills is often broader than that of traditional hardwood sawmills.



**Native Range of White Oak.** Source: USGS – Atlas of Trees



**Forest Site Types in Arkansas.** Shaded areas represent forest cover. White oak primarily occurs in uplands but can move into bottoms on occasion. Map by Kyle Cunningham

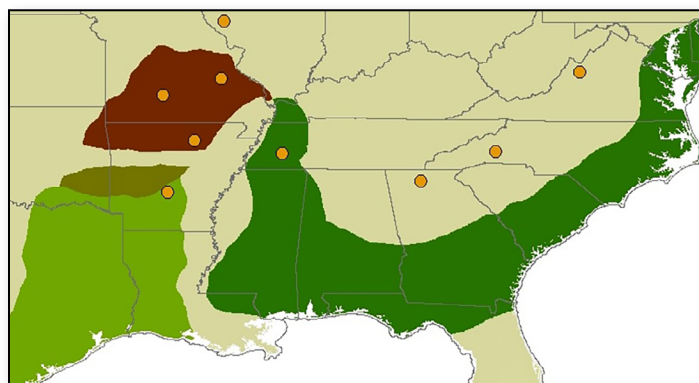
The upside is that forest landowners in these regions can see higher than normal bids for high-quality white oak timber, often as much as three times that of average oak sawtimber prices. For example, a typical quality white oak sawlog tree in the woods may be worth \$40 per ton stumpage, or higher. If that same log is graded as a stave log, the value may be \$100 per ton stumpage, or higher. If a white oak tree has a diameter of 20 inches and 2.5 logs in merchantable height, then there will be roughly 2.5 tons of green wood in the stem. The tree would be worth \$100 as a sawtimber tree or \$250 as a stave log tree. Thus, it is easy to see why forest landowners are willing to sell timber to white oak log buyers to capture the increased revenue stream.





**White Oak Barrel Production. Source: American Standard Barrels**

The concern is that sometimes unsustainable practices may be used in buying and harvesting white oak logs, resulting in “high-grading” hardwood stands. For example, stave log buyers will often be most interested in marking and removing primarily the higher quality white oaks in a hardwood stand. Depending on stand conditions, there is a potential for the residual stems to be lower vigor, lower quality, and less valuable species. The resulting stand could experience a reduction in health and productivity compared to pre-harvest conditions. In addition to buyers of high-quality logs, pressures to the resource from ecological patterns, land use change, invasive insects and disease and other factors all have the potential to alter the white oaks in hardwood forests. Many in the white oak stave industry have recognized concerns with sustainability and are interested in working to procure white oak in a sustainable way. Some companies have joined white oak sustainability efforts by enrolling in Sustainable Forestry Initiative and White Oak Initiative efforts.



**White Oak Stave Facilities in the Listed Regions. Map by Kyle Cunningham**

The obvious question becomes: How do I capture the value of these high-quality white oak logs and maintain a sustainable forest in the future? The short answer is to incorporate established sustainable harvest (or silvicultural) methods for hardwood stands when conducting a harvest. These methods could be for thinning stands or for conducting a natural regeneration harvest. The White Oak Sustainability publication series addresses these questions and introduces sustainable management methods for the regions described.

## White Oak Sustainability

White Oak Sustainability is a term given to efforts across the eastern U.S. to increase awareness and knowledge of the importance of white oak, the high demand being experienced, and the need for proper management to ensure quality white oak trees are a component in our forests for years to come. The ultimate goal is to influence harvest practices associated with white oak log procurement in a way that promotes sustainable harvesting methods.



**White Oak Stave Quality Logs. Photo by Kyle Cunningham**

Ensuring harvest practices are in line with established forest management methods will help ensure quality white oak presence in the future.

Arkansas appears to be ahead of the curve compared to other states in the central hardwood region. Sawtimber inventories for the white oak group have increased by about 1.5 million board feet over the past decade according to USFS Forest Inventory and Analysis data. However, it is not possible to pull *Quercus alba* specifically from this group in the data. The larger question remains as to what percent of these forests are maintaining high vigor, quality white oak trees to maintain stand quality and how will harvesting practices impact white oak reproduction to create new stands as demand increases for quality logs in the region. A proactive approach will help the Ozark, Ouachita and Gulf Coastal Plain regions maintain high value, productive upland hardwood forests and hopefully avoid some of the negative impacts to white oak experienced in other regions.

White Oak Sustainability program efforts are in unison with the White Oak Initiative program. This program is a multi-agency, multi-institutional, and industry approach to help address many of the concerns discussed here. For more information on the White Oak Initiative, visit <https://www.whiteoakinitiative.org/>

This introductory publication is designed to increase awareness and inform forest landowners and managers about the white oak resource, demand, and concerns moving forward. Additional publications in the series discuss management methods for sustaining white oak in upland forests in Arkansas and the Gulf Coastal region. The project is a collaborative effort between the USDA Forest Service, the Arkansas Department of Agriculture – Forestry Division, the University of Kentucky – Department of Forestry and Natural Resources, and the University of Arkansas System Division of Agriculture.



**White oak in a sustainability and natural regeneration harvest demonstration at the University of Arkansas System Division of Agriculture Livestock and Forestry Research Station at Batesville**