

Landowners Guide to:

## UNDERSTANDING THE IMPORTANCE OF WHITE OAK

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FOR-147

### Introduction

White oak (*Quercus alba*) is considered the most important hardwood tree species in the eastern United States. Most of us, regardless of whether we focus on wildlife, timber, or recreation, agree with this. There are many reasons to hold white oak in such high regard. White oak is long-lived, easily surpassing 200 years or more with some living to 500 years. White oak is one of the most widely distributed of all the oaks growing on a wide range of soils and sites over a very large geographic area. As a result, white oaks are often important landmark trees, having historical or cultural significance. White oaks are also critically important today as a keystone species of the central hardwoods region's green infrastructure. In addition, white oak trees have tremendous potential to help address climate change by sequestering carbon in extensive root systems and through long-lived wood products. The species is seen as a majestic and stable representation of our landscape whether planted in urban areas or found in their natural habitat in rural and secluded forests. This results in many who have a personal association with white oak.

### Wildlife Value

The value of white oak is not solely related to how long it lives or its widespread occurrence. White oak has special characteristics which make it ecologically and economically important. White oak provides significant food and shelter for both game and non-game wildlife species. Let's first consider the acorn. White oak acorns are one of the most palatable of all the oaks. This is due to their relatively low concentration of tannic acid that makes other acorns bitter. While we would find white oak acorns distasteful, they are a highly digestible source of food and many species of wildlife thrive on them. This is obvious from September through November, when acorns are falling from the trees. Deer, turkeys, and squirrels, to name only a few, can often be found under white oaks scratching, raking, pawing, and digging through the leaves to get to the nutritious acorns that are an important staple during the winter months. However, acorns are not the only source of food provided by white oak. The tender buds and new shoots of seedlings and saplings in the spring, are perfect for browsing by deer. Even rabbits can be found eating young bark and twigs.

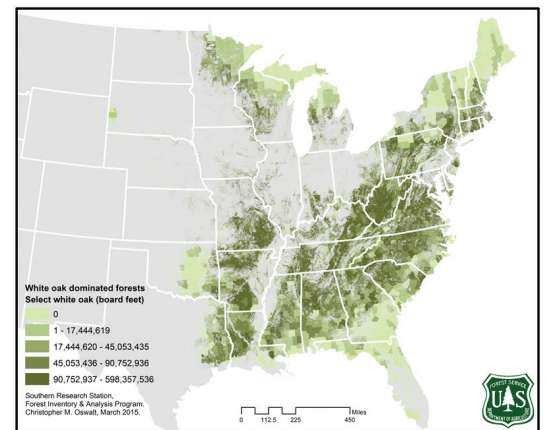


Figure 1: White oak is widely distributed across a large geographic area. Photo courtesy: USDA Forest Service

This publication is part of the White Oak Initiative's ([www.whiteoakinitiative.org](http://www.whiteoakinitiative.org)) **Landowners for Oaks Series** designed to provide foundational information necessary for sustainable management of white oak and upland oak forests.

The **Landowners for Oaks Series** is produced by the Cooperative Extension Service, University of Kentucky, Department of Forestry and Natural Resources (<http://ukforestry.org>) in support of the White Oak Initiative.

Authors: Dr. Jeff Stringer and Darren Morris, UK Forestry and Natural Resources. Published as University of Kentucky's Cooperative Extension publication FOR-147.

Funding for the **Landowners for Oak Series** was provided by the Kentucky Division of Forestry through the Upland Oak Sustainability and Management Project sponsored by USDA Forest Service, State and Private Forestry, Landscape Scale Restoration Program.

Along with food, white oak also provides significant habitat and shelter for a host of wildlife species.

Mature trees develop cavities which can be used by a wide range of wildlife including birds, squirrels, and raccoons. Many birds nest in white oak, such as the near threatened cerulean warbler that spends much of its time hopping around from branch to branch feeding on insects in the canopy of mature white oaks. The cavities and flaky bark of white oaks are also used as hiding places in the summer by a number of forest dwelling bats, some of which are federally protected. Oaks, including white oak, are also home to more species of Lepidoptera (moths and butterflies) than any other tree species, making them an important food destination for many species of wildlife. White oak provides significant food and shelter to many different species of wildlife and is critical to the overall health of the ecosystem.



Figure 2: Newly emerging white oak leaves provide browse for deer.

### Commercial Value

Most oaks are important providers of forest products, and white oak is no exception. White oak provides a wider range of products to the forest product industry than most other oaks. Lower quality white oak, possessing knots or other blemishes, is harvested for a number of lower valued products such as pulpwood for paper production, logs for manufacturing pallets, crossties for railroads, and the sawing of lower quality lumber.



Figure 3: These white oak logs have been laid out on the log yard to be sorted based on quality and hauled to the appropriate markets.

On the opposite end of the spectrum, high quality white oak trees, with no branches, knots or other signs of degrade are harvested for highly valued wood products. The pattern of the grain and color of white oak wood make it sought after in manufacturing veneer, the highest valued forest product. Along with veneer, these trees yield wood used in the production of highly valued lumber for furniture, cabinets, and flooring. White oak also has wood properties that make it uniquely suited for manufacturing barrels used by the wine and whiskey industries. Logs used in the manufacture of barrels are called stave logs (staves being the vertical pieces of wood in a barrel). White oak wood cells are naturally occluded with a growth called tyloses which greatly reduces leakage, a highly useful trait if you are aging whiskey, wine, or other spirits for several years. Few other species have this characteristic. Further, the charred white oak wood in a barrel contributes all of the color and seventy percent of the flavor to bourbon whiskey. All of these characteristics result in white oak being used by a large number of wood product industries, which creates steady competition for white oak timber and logs and is the reason for its place as one of the most historically sought after commercial hardwood species.

### How White Oak Regenerates

Unfortunately not everything about white oak is ideal, especially when it comes to regenerating white oak in existing forests where there are some hurdles to overcome. White oak happens to be one of the slower growing upland oaks, often slower growing than many of the tree species they compete with. Because white oaks are slow growers, they are at a disadvantage when it comes to keeping pace with competing species after a timber harvest or a storm that opens up the canopy.

In order to ensure that white oak has a good chance of becoming a part of the next forest stand, white oak seedlings need a head start. This means making sure white oak seedlings are growing in the understory prior to harvesting timber. This "advance regeneration" is a key component of upland oak forest management.

An important factor in establishing regeneration is acorn production. This brings up another characteristic that makes managing white oak difficult. It turns out that most white oaks only have good acorn producing crops every few years. These bumper crops are necessary to ensure that enough acorns are present so wildlife does not consume all of them before they have a chance to germinate and become seedlings. Further, if an acorn is to have a good chance at germinating and growing into a seedling, it is necessary for it to be in direct contact with the soil. White oak acorns germinate in the fall, sending out a small root from the acorn. If the acorn is not lying on the soil, covered with newly shed leaves, it is susceptible to drying out. Animals also can help white oak by burying acorns, further helping to protect them from drying out. Keeping the acorns out of sight, also helps



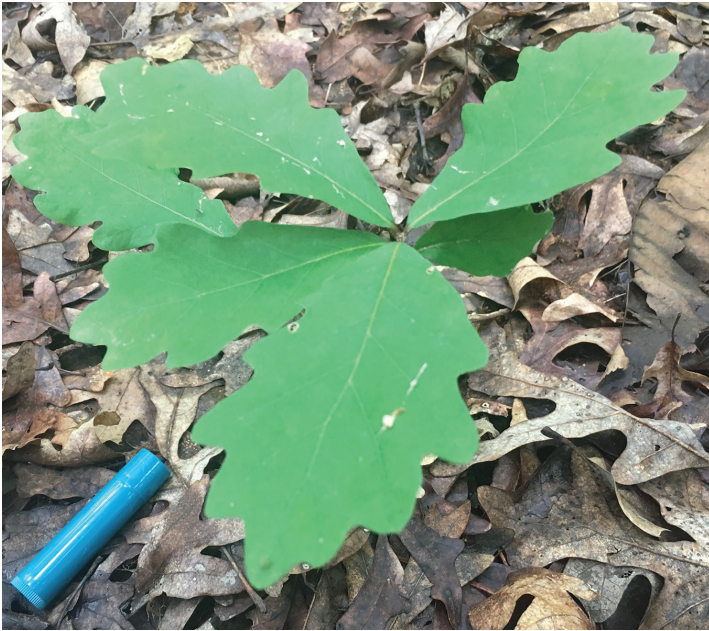


Figure 4: This white oak seedling is currently too small and will not survive to become a mature tree unless it is developed into a larger (advance regeneration) oak.

some of them avoid being eaten. The contact with the soil helps firmly establish a root that can successfully live over the winter. This is required so that when the top emerges in the spring it is provided with abundant water and nutrients. Without a vigorous root the top will soon wither and die.

To successfully regenerate white oak, an abundance of seedlings and saplings, advance regeneration, must become established in the understory. This is required, so when a complete or partial opening in the forest canopy occurs and increases the amount of light to the forest floor, white oak seedlings and saplings can outgrow competition, eventually maturing to become a dominant tree of the forest. It is important to note that this canopy disturbance can be a result of a timber harvest or naturally caused by wind or ice storms. Regardless, when this occurs, vigorous white oak seedlings and saplings must be present in advance, because a newly emerging one-year-old seedling does not have enough vigor to compete

and will soon be overgrown. Specific management techniques have been developed to provide the conditions described above. Some have been developed to increase the number of seedlings, some to improve the vigor of seedlings, and some to ensure that small- and medium-size oaks continue to grow well.

### Important to All

White oak is clearly an important component of our forests. Not only is white oak an important timber resource, but it is also one of the most highly valued wildlife trees in the eastern United States. All of these reasons compel us to work towards sustaining this important resource. The use of oak-friendly management practices is a key element in ensuring that white oak forests continue to successfully regenerate and thrive.



Figure 5: This oak regeneration is approximately 4 feet tall and contains vigorous white oaks capable of outgrowing competition.

**The photos at the top of page one represent a few of the many benefits and uses of white oak, making it one of the most important tree species in the Eastern United States. Photos and images courtesy of the authors or the University of Kentucky Department of Forestry and Natural Resources unless otherwise noted.**

For more information about white oak and white oak management, refer to other White Oak Initiative - Landowners for Oaks Series publications. Landowners Guide to: Identification and Characteristics of Upland Oaks provides information about the characteristics and identification of eight important upland oaks (including white oak) that are commonly found in upland oak forests. Landowners Guide to: Challenges Of Upland Oak Regeneration delves deeper into the complex processes necessary for successful oak regeneration. Landowners Guide to: Sustainable Oak Management Practices provides a basic overview of oak management practices that are necessary management tools for growth, development, and maturity of healthy upland oak forests.

Stringer, J., and Morris, D. 2022. Landowners Guide to: Understanding the Importance of White Oak. Cooperative Extension Service, University of Kentucky, Department of Forestry and Natural Resources, FOR-147. 3pp.

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Issued 10-2022