The Value of Oaks to Wildlife[1]

Holly K. Ober[2]

Trees provide essential habitat features for birds, mammals, amphibians, reptiles, and insects. Resources provided by trees include food, shelter from the sun and rain, and places to hide, nest, and roost. As a group, oak species are among the most useful hardwood trees to many species of animals.

Oaks are relatively long-lived, slow-growing trees. They vary widely in size and form, with some species never growing in stature beyond a short shrub and others developing into large trees with such extensive crowns that they are wider than they are tall. Florida is home to 24 species of native oaks that grow in a variety of conditions, from very dry sandy uplands to periodically flooded bottomland forests.

Oaks Provide Food for Wildlife

The leaves, twigs, and young shoots of oaks provide browse for deer and rabbits. Although browse from oak trees is generally considered less desirable than browse from many other species, oak browse may become an important food resource for some wildlife during times of food shortages.

Oak leaves also provide food to a diversity of invertebrates. Many species of insects feed on oak leaves, with several species of moth larvae feeding on nothing but the leaves of oaks. Many predatory spiders take advantage of the diversity of insects attracted to oak leaves by residing in these trees and feeding on these other insects. Some birds use a similar tactic, visiting clumps of Spanish moss on the branches of live oak trees to feed on the many insects that live in the clumps of moss. Other species of birds will search the surface of branches and leaf clusters for insects.

Undoubtedly the most valuable resource oaks provide for vertebrate wildlife is acorns. Acorns are one of the most important food items in the diets of a wide variety of animals (Figure 1). More than 100 species of vertebrate animals are known to consume acorns in the US, including mammals such as white-tailed deer, gray squirrels, fox squirrels, flying squirrels, mice, voles, rabbits, raccoons, opossums, gray foxes, red foxes, and wild hogs. Birds that feed on acorns include wild turkey, bobwhite quail, wood ducks, mallards, woodpeckers, crows, and jays.

Figure 1. White-tailed deer are one of the many wildlife species that feed on acorns.

1. This document is WEC248, one of a series of the Department of Wildlife Ecology and Conservation, UF/IFAS Extension. Original publication date August 2008. Revised April 2014. Reviewed June 2020. Visit the EDIS website at https://edis.ifas.ufl.edu for the currently supported version of this publication.

2. Holly K. Ober, associate professor and Extension specialist, Department of Wildlife Ecology and Conservation, UF/IFAS North Florida Research and Education Center, Quincy, FL 32351.

Acorns are such an indispensable component in the diets of some animals that they change their movement patterns in response to acorn production. For example, deer may spend more time in oak-dominated stands during autumn of years when acorns are abundant, and more time in other habitat types during years when acorns are less abundant. Also, the home range size of black bears may decrease in years when acorns are abundant, and increase (along with complaints of nuisance activity) during years when acorns are scarce. Similarly, wild turkeys often have smaller home ranges when acorns are abundant, with reduced seasonal shifts in the locations of their home ranges.

The time of year acorns are available for wildlife is the characteristic that contributes most to their high value as a food resource. In temperate regions, both the availability and nutritional quality of most other plant foods decline as summer progresses into fall. During spring and early summer, many kinds of grasses, forbs (broad-leaved herbaceous plants), and woody twigs are high in nutritional quality and are highly digestible. This is because new growth is most common during spring and summer. As these plant materials age, the nutritional benefits they provide decrease. By autumn these foods have such low nutritional value and palatability (tastiness) that they are usually ignored by wildlife. Also, many of the species of plants that produce fleshy fruits (berries and grapes) do so during spring and summer, offering few benefits to hungry wildlife during autumn and winter.

Acorns become most abundant on the ground in autumn and winter, which is exactly the time of year when availability and nutritional quality of many other plant food resources are lowest. Another reason acorns are critically important to many animals is because autumn is a time of year when animals need to consume extra food in preparation for the harsh weather conditions of winter. Acorns supply energy at a time of year when animals most need it.

Acorns are relatively high in carbohydrates, and are therefore a highly concentrated source of energy. However, not all acorns are the same in terms of nutritional content or palatability. Acorns produced by different species of oak trees are in fact quite different.

Comparisons among Acorns of Different Species

Florida is home to approximately 24 species of native oaks. The exact classification of species has changed over time, so for this reason we say that 24 is the approximate number of species. These species can be categorized into two classes: the white oak group and the red oak group. (Note that the red oak group is sometimes referred to as the black oak group.)

Species in the white oak group include:

- Bluff oak (*Quercus austrina*) (also called bastard white oak)
- Chapman oak (*Quercus chapmanii*) (also called scrub oak)
- Chinkapin oak (*Quercus muehlenbergii*) (also called yellow chestnut oak)
- Live oak (*Quercus virginiana*) (also called Virginia live oak)
- Overcup oak (*Quercus lyrata*) (also called swamp post oak)
- Post oak (*Quercus stellata*) (also called iron oak)
- Sand live oak (*Quercus geminata*)
- Sand post oak (*Quercus margarettae*) (also called dwarf post oak)
- Swamp chestnut oak (*Quercus michauxii*) (also called cow oak or basket oak)
- White oak (*Quercus alba*)

Species in the red oak group include:

- Black oak (*Quercus velutina*) (also called yellow-barked oak)
- Blackjack oak (*Quercus marilandica*)
- Bluejack oak (*Quercus incana*) (also called sand oak or upland willow oak)
- Diamond-leaf oak (*Quercus laurifolia*) (also called swamp laurel oak)
- Laurel oak (*Quercus hemisphaerica*) (also mistakenly called diamond-leaf oak)
- Myrtle oak (*Quercus myrtifolia*)
- Runner oak (*Quercus pumila*) (also called running oak)
- Scrub oak (*Quercus inopina*) (also called sandhill oak or Florida scrub oak)
- Shumard oak (*Quercus shumardii*) (also called swamp oak)
- Southern red oak (*Quercus falcata*) (also called Spanish oak or swamp red oak)
- Swamp red oak (*Quercus pagoda*) (also called cherrybark oak)
- Turkey oak (*Quercus laevis*)

- Water oak (*Quercus nigra*) (also called spotted oak)
- Willow oak (*Quercus phellos*)

Trees in the white oak group tend to produce fairly large, heavy acorns, and drop them on an annual basis. Trees in the red oak group tend to have smaller, lighter acorns, and drop them during alternate years (see Table 1). Acorns from trees in the red oak group are typically higher in protein, fat, and calories than acorns from trees in the white oak group. These are favorable characteristics for potential animal consumers. However, these acorns also tend to be higher in fiber and tannins, which reduces their digestibility, making them less desirable. Ultimately, acorns produced by trees in the white oak group tend to be consumed more regularly by wildlife than acorns from trees in the red oak group.

Table 1. Comparisons of characteristics of acorns produced by trees in the white oak and red oak groups.

Acorn characteristics	White oaks	Red oaks
Size	large	small
Mass (weight)	high	low
Protein	low	moderate
Fat	low	high
Calories	moderate	high
Tannins	low	high
Fiber	low	moderate
Moisture content	moderate	low
Frequency of production	annual	biennial
Period of availability on ground	brief	extended

Species found in Florida that have exceptionally high protein acorns include southern red, bluejack, shumard, and post oak. Acorns with particularly high fat content come from bluejack, southern red, and water oak. Acorns especially high in calories include blackjack, willow, and southern red oak. Acorns with notably high moisture content are produced by white, overcup, and live oak. Acorns with low fiber content include overcup oak, live oak, and bluejack oak.

Acorns from trees in the white oak group germinate (the seed coat breaks open and roots begin to form) shortly after falling from the tree. This means the acorns are available for only a short period of time to terrestrial animals (those that live on the ground). In contrast, acorns from trees in the red oak group enter a period of dormancy after falling from trees, and are available to terrestrial wildlife for longer periods of time.

Wildlife Preferences for Different Acorns

Acorns from trees in both the white and red oak groups are consumed by wildlife. However, acorns produced by trees in the white oak group are typically more palatable to most animals because they contain lower concentrations of tannins. Tannins are undesirable to wildlife because they produce a bitter taste and they reduce protein digestibility.

During years when acorns are abundant, most wildlife consume acorns from trees in the white oak group in greater quantities than acorns from trees in the red oak group. However, during years when acorns are scarce, acorns from trees in the red oak group become more important. Also, during any year, acorns from trees in the red oak group tend to become more important to wildlife later in the winter when acorns from trees in the white oak group have germinated. Late winter is a time when alternative food sources are particularly scarce, so acorns from trees in the red oak group can be quite important this time of year.

Other Resources Oaks Provide for Wildlife

Another resource oaks provide for animals is cover. Dense foliage conceals nests of birds and mammals from predators. For example, Florida scrub-jays often build nests in short shrubby oaks; cerulean warblers, gray squirrels, and fox squirrels often build nests in large, mature oak trees. Many birds and squirrels also use oak foliage as material for nest construction.

Korhnak

Figure 2. Fox squirrels often build nests in oak trees, using oak leaves in the construction of the nest.

Because many oak species drop their leaves later in the fall than other deciduous species, these trees provide cover to animals during a time of year when it is sparse. Young trees with low branches are especially useful in providing cover during late fall when few shrubs have leaves. After oak leaves have fallen from trees, they continue to provide shelter to the many small mammals, reptiles, and amphibians that live in the layer of dead leaves that accumulates beneath trees.

Cavities in the trunks of living or dead trees are used as den, nest, and roost sites by many mammals and birds (see https://edis.ifas.ufl.edu/uw277). In the Southeast, cavities are much more common in live hardwood trees than in live pine trees. The hardwood species most prone to cavity formation in Florida include diamond-leaf oak (also called swamp laurel oak), red maple, water tupelo, and black tupelo. These cavities are particularly important for gray squirrels and fox squirrels during colder months of the year in northern Florida, when low temperatures can reduce squirrel survival.

Spanish moss, which is often supported by the branches of live oak trees, serves several functions for wildlife. Bats such as the Seminole bat, northern yellow bat, and tricolored bat roost within clumps of Spanish moss, and birds such as the northern parula and yellow-throated warbler nest within Spanish moss. Other bird species regularly collect Spanish moss to supplement other material when building nests.

A Cautionary Note about Oaks

Acorns, leaves, and buds of some oaks can be toxic to some domestic livestock. Cattle, goats, and sheep can all experience fatal poisoning as a result of ingestion of too many acorns or too much oak browse. Livestock should not be permitted to graze in areas with dense oak cover.

Additional Information

McShea, W. J. & Healy, W. H. (2002). *Oak Forest Ecosystems: Ecology and Management for Wildlife*. John Hopkins University Press, Baltimore, MD.

Nelson, G. (1994). *The Trees of Florida: a Reference and Field Guide*. Pineapple Press, Sarasota, FL.

Ober, H. K. & Minogue, P. J. *Dead wood: Key to enhancing wildlife diversity in forests.* WEC238. Gainesville: University of Florida Institute of Food and Agricultural Sciences. https://edis.ifas.ufl.edu/uw277

Ober, H. K. & Minogue, P. J. (2014). *Managing oaks to produce food for wildlife.* WEC249 Gainesville: University of Florida Institute of Food and Agricultural Sciences. https://edis.ifas.ufl.edu/uw293