

Restoring Oak Habitats in Southern Oregon and Northern California:

A Guide for Private Landowners

Version 3.0





California black oak leaves and flowers. Photo: Rich Fairbanks

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Contributing Partners



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Confederated Tribes of Grand Ronde Community of Oregon is a federally recognized Tribe that includes over 30 Tribes and bands from western Oregon, northern California, and southwest Washington. These include tribal bands from the Kalapuya, Molalla, Chasta, Umpqua, Rogue River, Chinook, and Tillamook. The Tribe is active throughout its ancestral homelands but located in western Oregon where it has an 11,500-acre reservation in Yamhill County. With approximately 5,400 enrolled tribal members, the Tribe is governed by a nine-member Tribal Council that is elected by the Tribe's voting membership.



Klamath Basin Audubon Society provides opportunities for people of all ages to experience and appreciate our region's birds and other natural resources. They achieve this mission through educational programs, field trips, and grants that support worthy local or regional projects.



Klamath Bird Observatory is a scientific non-profit organization that achieves bird conservation in the Pacific Northwest and throughout the migratory ranges of the birds of our region. We developed our award-winning conservation model in the ruggedly beautiful and wildlife-rich Klamath-Siskiyou Bioregion of southern Oregon and northern California, and we now apply this model more broadly to care for our shared birds throughout their annual cycles. Emphasizing high caliber science and the role of birds as indicators of the health of the land, we specialize in bird monitoring and research projects that improve natural resource management. Also, recognizing that conservation occurs across many fronts, we nurture a conservation ethic in our communities through our outreach and educational programs. We owe our success to committed donors, volunteers, staff, and conservation partners who demonstrate that each of us can contribute to a legacy of abundant bird populations and healthy land, air, and water.



Klamath Siskiyou Oak Network (KSON) is a regional collaboration that works to conserve oak ecosystems on private and public lands in southern Oregon and northern California. First established as an informal working group in 2011 and formalized in 2014, KSON is a partnership of local agencies and non-profit organizations. Each KSON partner brings significant and unique contributions in the form of financial assistance, technical assistance, and in-kind contributions. Together, we accomplish project objectives in a cost-effective manner, incorporating diverse expertise into all phases of restoration planning, implementation, and monitoring.



Lomakatsi Restoration Project is a non-profit, grassroots organization that develops and implements forest and watershed restoration projects and initiatives in Oregon and northern California. Since 1995, we have worked collaboratively to restore thousands of acres of forests and miles of streams. In cooperation with a broad range of partners including federal and state land management agencies, Tribal Nations, non-profit organizations, land trusts, private landowners, watershed councils, and city and county governments, our work has set precedents on nationally recognized projects. Lomakatsi provides expertise and capacity in project development, planning, management, fine-scale ecological treatment design, monitoring, and implementation for ecosystem restoration projects. We integrate restoration practice with science delivery, education and workforce training. Lomakatsi coordinates closely with multiple funding partners and manages a diverse workforce in complex social settings supported by critical community outreach.



Pacific Birds Habitat Joint Venture (Pacific Birds) works to create an ideal environment for habitat conservation to achieve their vision of a Pacific Region united for bird habitat conservation. Their work to create effective partnerships is inspired by the beauty and diversity of migratory birds and is guided by their value for environmental sustainability. Joint ventures are the key habitat delivery arm of the North American Bird Conservation Initiatives and therefore Pacific Birds will be an essential partner in the implementation of this plan.



Umpqua Oak Partnership (UOP) is a collaborative regional partnership of landowners, tribes, agencies, and organizations working together to preserve and promote healthy oak habitats in Douglas County. UOP works to bring people together around oaks, help keep farms and ranches in the family, connect landowners to programs and funding, and share information. UOP provides a forum for community engagement, encourages applied science towards conservation, education, and promotes habitat restoration and conservation efforts towards long-term sustainability of oak habitats of all types.



The Understory Initiative (TUI) facilitates the restoration and conservation of native species habitat through partnership and community engagement. We partner with a variety of stakeholders to provide science-driven restoration tools and monitoring for sensitive plants and ecosystems. We also work with small, local farms to develop native seed mixes that are ecologically and genetically tailored to specific restoration projects.



US Fish and Wildlife Service (USFWS) works to efficiently achieve voluntary habitat restoration on private lands, through financial and technical assistance, for the benefit of Federal Trust Species.



USDA Natural Resources Conservation Service works hand-in-hand with people and organizations, conservation districts, and other agencies to conserve natural resources primarily on private lands. The mission of NRCS is to provide leadership in a partnership effort to help people conserve, improve, and sustain our natural resources and environment.

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Summary



A view through an oak woodland into the Rogue Valley in southern Oregon. Photo: Brandon Breen

For time immemorial, the oak ecosystems of southwestern Oregon and northern California have been stewarded by Indigenous peoples. Over the past century, oak-prairie ecosystems have experienced dramatic loss and degradation. An exciting opportunity exists for landowners, Indigenous peoples, and conservation partners to work together to restore native oak systems and their diverse wildlife communities. Private landowners own and manage roughly 60% of the land area of the United States.



These private lands sustain native wildlife populations while also benefiting landowners and society. In the western United States, private lands are especially important for the conservation of oak habitats.

This landowner guide describes how to apply conservation practices for Oregon white oak and California black oak habitats on private lands in southwestern Oregon and northern California. The document discusses the importance and history of oak habitats across three ecoregions and then provides detailed conservation guidelines for oak habitat restoration. Indigenous Traditional Ecological Knowledge is woven throughout the document.

Also, the guide includes supplemental resources for the restoration-minded private landowner, including a list of organizations that will assist with private lands restoration as well as step-by-step instructions for monitoring birds on your land to track the return of wildlife following oak restoration activities.

This landowner guide describes how to apply conservation practices for Oregon white oak and California black oak habitats on private lands in southwestern Oregon and northern California.

Indigenous Stewardship of Oak Ecocultural Systems

Oaks and Indigenous people of southwestern Oregon and northern California are intertwined together. The importance of the oaks is shared through ancient stories, tribal and family traditions and ceremonies, and on-going connection to the landscape today. The oak savannah landscape provides food, medicine, cultural, and utility resources for the tribes. The interaction between the tribes and these environments is critical for honoring their ancestors, supporting subsistence resources and first foods, and providing these cultural beneficial uses for future generations.

The term Indigenous Traditional Ecological Knowledge (ITEK) refers to the Indigenous interrelationship with the landscape. This usually conflicts with concepts of conservation that emphasize a “hands off” approach to human interaction with the land. The Indigenous relationship is built upon ancestral knowledge and sense of place and its diversity. This knowledge has been passed down generation to generation through oral traditions, customs, and practices. From the tribal perspective, this relationship is reciprocal. The Indigenous people have a sense of responsibility to ensure there is wise stewardship of their ancestral lands, and the first foods, including acorns.

An important Indigenous element of ITEK in this region is the use of fire to keep the savannas open, reduce disease, improve wildlife habitat, and increase acorn production. Early contact records extensively document tribal use of fire. The “Eden-like” landscape described by early European settlers in the Willamette Valley, mistaken by many for untouched wilderness, was in fact carefully tended for millennia through sophisticated methods including cultural fire. Fire was, and continues to be, important for the interrelationship between oaks and other plants, wildlife, and the people. The oak understory included native grasses and additional first foods such as camas, mariposa lily, brodiaeas, tarweed, and wild celeries, to name a few. Carefully applied, low- to moderate-intensity Indigenous burning is a time-proven method for enhancing oak habitat, helping to maintain healthy oak density and reduce competition from other trees, such as Douglas fir, which often overtops and kills off oaks if left unchecked by fire. Burning can help improve wildlife habitat for the deer, elk, and other game. Seasonally-applied fire can also reduce the occurrence of the larger, more destructive wildfires.



Confederated Tribes of the Grand Ronde fire crew working a controlled burn in an oak woodland stand. Photo: Confederated Tribes of Grand Ronde



Fire burns fine fuels to remove thatch and provide nutrients to soils. Photo: Confederated Tribes of Grand Ronde

Tribes of this region have used and will continue to use fire extensively in their relationship with the landscape. Ancestral knowledge is passed generation to generation, with observation, experiences, and interaction with the land over time guiding interrelationships with specific oak landscapes. This ITEK provides important tools for when to set the fires, how often to apply them, and how to manage the areas burned.

The stewardship of oaks, water, and other ecocultural resources through multi-generational care is a top priority for tribes today. However, there are many barriers to the use of ITEK on the landscape, including lack of access to ancestral lands, and pollution and contamination that impact access to and use of first foods and other resources. Tribal involvement in ITEK practice is a foundational element. This includes cultural fire practitioners and tribal community involvement. It is important to include tribal people tied to their ancestral homelands.

Often ITEK is tied to a seasonal round of activities that may involve multiple interactions with the landscape. It involves seeing a bigger picture of place instead of land tracts within property boundaries. It can include very large areas such as watersheds, firesheds, or multiple ecoregions, each with their own unique characteristics. From an Indigenous perspective, these are all inter-related to the traditional and modern way of living. It can be families and their generation to generation use of the landscape as well as tribal and inter-tribal gatherings and stewardship.



Acorns at the base of an oak, which are an important first food and food for wildlife. Photo: Confederated Tribes of Grand Ronde

Water stewardship is another important element of ITEK. This can be snow, snowmelt, springs, creeks and larger waterways and water bodies. Tribes have long interacted with waterways for important cultural and subsistence practices. Clean, unpolluted water is necessary for healthy ecosystems. This includes healthy fish runs, gathering of uncontaminated first foods, and food processing in traditional ways. For instance, certain types of springs are important for storing and removing the bitterness of acorns. Clean, safe water is needed for these purposes. These can be in the oak savanna areas or perhaps processing and gathering locations away from where the acorns are gathered. Tribal involvement in ITEK is critical. For property owners who would like ITEK practices integrated with their landscapes, it is important to learn about the specific tribes who have ancestral connections to the lands.

The tribal practices related to ITEK are more than consultation or technical assistance. It is involvement of the tribal communities and the opportunities to access and utilize sites for traditional cultural practices. The Indigenous interaction with the landscape is what will drive the ITEK practices. This may include the use of fire, gathering of first foods, stewardship activities, an understanding of restoration and enhancement opportunities, and knowledge of the post-contact use of the landscape including pollution and contamination issues.



The use of ITEK practices within oak areas includes the ancestral knowledge and aboriginal connection to the landscape and is a multi-generational endeavor that elevates important knowledge from time immemorial.

Geographic Scope

This landowner guide specifically applies to oak habitat in Douglas, Josephine, Jackson, and Klamath Counties in Oregon, and Siskiyou County in California.

Many of the restoration principles and recommendations will be relevant to those who manage oak habitats outside of this region as well.

The Umpqua Oak Partnership encompasses the Umpqua Basin and the Klamath Siskiyou Oak Network encompasses the Rogue Basin and part of the Klamath Basin.



Umpqua Oak Partnership field tour for landowners and the public showcased private land restoration projects north of Oakland, Douglas County in the Umpqua Drainage. Photo: Allison Manwaring



Partnerships and Collaboration

We are seeing unprecedented collaboration at the local level through partnerships. Both the Klamath Siskiyou Oak Network (formed in 2011) and Umpqua Oak Partnership (formed in 2019) have been formalized through agreements to strategically advance conservation across public and private lands, and to leverage resources for a more strategic and effective approach to oak and prairie conservation. Members represent private landowners; non-government organizations; local, state and federal agencies; tribes; and members of the public with an interest in restoration of oaks and protection of existing oak habitat.

The Umpqua Oak Partnership includes the Umpqua Basin, one of three basins in Oregon that originate in the Cascade Mountain Range. Immediately to the south, the Klamath Siskiyou Oak Network includes portions of the Rogue and Klamath basins in southern Oregon and northern California. Both partnerships are focused on fostering the conservation, restoration and long-term health of oak habitats, including both Oregon white and California black oak, as well as tanoak, canyon live oak,



An oak restoration project completed on a ranch north of Oakland, Douglas County in the Umpqua Drainage. Photo: Allison Manwaring

These partnerships are also coordinating with other oak partnerships across the Pacific Northwest.

and Brewer's oak, within a diversity of oak savanna, chaparral, woodlands, and mixed forest ecosystems.

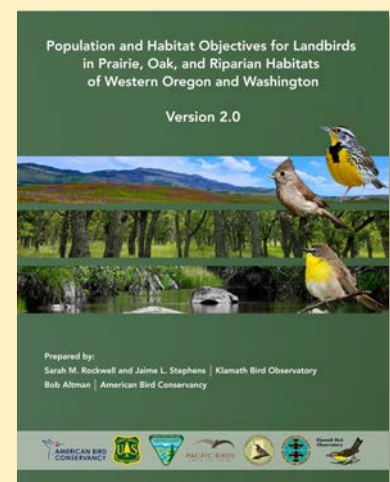
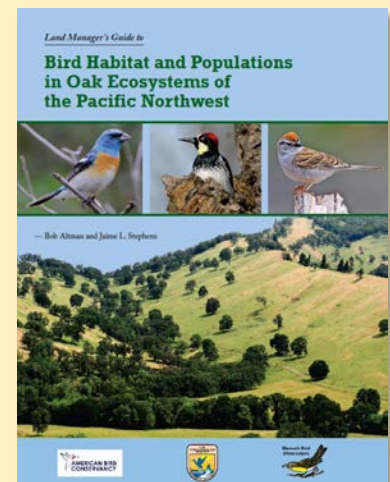
Oak habitats within the region are currently threatened with loss and degradation due to fire exclusion, invasive species encroachment, certain agricultural practices, conversion to intensive agriculture such as vineyards, and conversion to commercial timber, as well as rural and urban residential development.

These partnerships are also coordinating with other oak partnerships across the Pacific Northwest, working collaboratively on strategies to fund, design, implement, and manage oak habitat restoration initiatives at the state and multi-state scale. By pooling resources, developing consistent messaging on issues, and planning together, we are leveraging opportunities that benefit from a shared voice from many diverse partners.

Consider downloading one of these two documents published by Partners in Flight: Land Manager's Guide to Bird Habitat and Populations in Oak Ecosystems of the Pacific Northwest and/or Population and Habitat Objectives for Landbirds in Prairie, Oak, and Riparian Habitats of Western Oregon and Washington.

The first is a good source of general information about oaks and associated birds in the Pacific Northwest. This guide provides information on bird species' status, distribution, density, habitat relationships, and potential responses to oak habitat management or restoration activities. This information can be used to facilitate sound decisions to support bird conservation in the context of protection and management of the unique and threatened oak ecosystems of the Pacific Northwest. Available at <https://avianknowledgepnw.net/land-manager-guide-pnw-oak-ecosystems/>

The second document is a bit more technical and provides a foundation for how avian science can inform management and be applied through an adaptive management approach to measure success. The recommendations in this latest Partners in Flight publication provide the biological foundation for developing and implementing integrated conservation strategies for 14 focal and seven imperiled bird species in oak and prairie habitats at multiple geographic scales to ensure functional ecosystems and healthy bird populations. Available at <https://avianknowledgepnw.net/landbirdsinpriarioakandriparianhabitatsofWORandWA>



Value of Oak Habitats

Oaks provide a diverse set of values to humans and wildlife. They provide important ecosystem services, such as maintaining healthy soils and sequestering carbon. Oak systems support grazing habitat, provide firewood and timber, particularly from California black oak and tanoak. The presence of oaks on a landscape provides fire resilience because their thick bark and branch structure generally resist flames and prevent ground fires from spreading to the forest crown. Oak-dominated landscapes are also aesthetically pleasing — a characteristic that can lead to increased property values — and they are suitable for numerous recreational activities, such as hiking, photography, hunting, and wildlife-viewing.



Oak trees and habitats are considered attractive by many people. Photo: Frank Lospalluto

Oak habitats are also among the richest wildlife habitats in Oregon and California. For example, studies reported over 200 vertebrate species were found in oak woodlands in the Willamette Valley, Oregon, and over 330 species of vertebrates were found in oak woodlands in portions of California. Oak habitats are especially important because many of the species they harbor are not found in neighboring conifer-dominated landscapes.

A handful of characteristics help explain why oak trees are so important for wildlife. First, and foremost, is the production of acorns. Acorns can be produced in prolific numbers, and these energy-rich seeds provide nutrition at the base of the food chain; for example, acorns are part of the diet for many bird species including the acorn woodpecker, western scrub jay, band-tailed pigeon, California quail, wild turkey, oak titmouse, and white-breasted nuthatch. Mammals such as western gray squirrels, Douglas squirrels, Columbian white-tailed and black-tailed deer, and



American black bears also feed on acorns. See *Appendix I: Plants and Animals in this Guide* for a list of the scientific names of plants and animals mentioned in this document.

Mature oak trees often contain a mixture of living and dead tree limbs, and the dead limbs provide wildlife cavities for nesting and roosting. Many oak-associated bird species build their nests in cavities, including western bluebird, oak titmouse, house wren, blackcapped chickadee, and woodpeckers. Dead trees and limbs also provide critical storage sites — called **granary trees** — for acorn-caching acorn woodpeckers, as well as habitat for wildlife food items such as grubs and other insects. Honey bee hives are also commonly found in oak cavities.

Oak trees and their associated shrubs and understories support unique insect communities that provide food to birds and other wildlife. In fact, oak trees are considered a keystone plant species and host more species of caterpillars than any other tree in North America. Caterpillars are the primary food source for nesting songbirds and their chicks.

Over 950 different species of butterfly and moth caterpillars use oaks in North America — over 500 in any one location. Oak leaves also provide browse for Columbian white-tailed and black-tailed deer and elk, and oak limbs provide perches for raptors and flycatchers.

Many oaks also support Pacific mistletoe. This flowering, parasitic plant draws water and minerals from its host oak tree and produces berries important for many wildlife species, such as the western bluebird. Mistletoe is the only larval host plant for the great purple hairstreak, a common butterfly.

Many reptiles and amphibians dwell in oak habitats, including *Ensatina* salamanders, northern red-legged frogs, ring-necked snakes, Pacific tree frogs, western skinks, sharp tailed snakes, Pacific gopher snakes, northwestern garter snakes, and western fence lizards.



Band-tailed pigeon. Photo: James Livaudais



Ash-throated flycatcher. Photo: James Livaudais



Pacific giant salamander in California black oak leaves. Photo: Mathew Cocking



Elk in an oak woodland. Photo: Frank Lospalluto

Oak Habitats are Important for Birds

Since 1970, we have lost one in four birds, in North America. These staggering declines include both migratory species and year-round residents. Landscapes are losing their ability to support bird populations. Protecting and promoting healthy oak and prairie habitats across the Pacific Northwest is one of the actions needed to halt and reverse the decline of imperiled species such as the Oregon vesper sparrow, western bluebird, and white-breasted nuthatch. Many individuals working on regional bird conservation collaborate through Partners in Flight, to ensure current science considers the full annual cycle for migratory species and to identify conservation actions across international borders.

Since 1970, we have lost one in
four birds in North America.

Throughout the year, oaks provide habitat for birds and other wildlife. Resident species, such as bushtit, use oak habitats year-round, whereas many migratory birds, including ash-throated flycatcher and western wood-pewee, use oak habitat during the breeding season (from May to late July). Lewis's woodpecker, by contrast, is a short-distance migrant that uses the habitat

primarily during winter. Other migratory birds that breed farther north spend winters in oak habitats in southern Oregon and northern California, or they stop here during migration to rest and refuel before traveling to destinations farther south. Oak habitats truly support rich communities of life in every season.



A History of Change and a Future of Possibility

Historically oaks were widespread throughout the valleys and foothills of California, Oregon, and Washington. Since the start of European settlement in the mid-1800s, California has lost 33% of its oak woodlands and estimates of regional oak habitat losses in Oregon and Washington range from 50% to near total loss. Moreover, many of the remaining oak habitats tend to occur on poor soils because more productive land has largely been cleared for other uses.

A variety of factors have contributed to the loss of oak habitats. For time immemorial, the oak ecosystems of this geography have been stewarded by Indigenous peoples. Tribes have a deep cultural knowledge of oak woodlands, and regard the plants, animals, natural resources, and even natural processes as relations. These relations include a cultural stewardship approach to managing for beneficial uses of traditional resources including oaks, acorns, fire, oak-associated subsistence first foods, and many other oak-associated species. Over time, Indigenous peoples developed sophisticated traditional practices that shaped landscapes to support sustainable foraging, gathering, and hunting for ceremonial and subsistence purposes. Some traditional benefits of managed oak habitats included food and fiber resources such as acorns, bulbs, deer meat, and regalia, as well as aesthetic benefits and community protection from severe fire.

Fire has long been an indispensable tool for Indigenous peoples in stewarding landscapes. Many tribes with ancestral lands in Oregon and California have evolved fire-dependent cultures and continue to use fire to this day. They rely on cultural burning to increase the quality and quantity of plants, limit pests, enhance germination or re-sprouting, and promote desirable forms of growth. As a reflection of their value to Indigenous communities, ancestral village sites are often located near oak woodland habitats.

Following European settlement, many oak woodlands and savannas were converted for agriculture or urban development. Also, decades of fire suppression during the latter half of the 1900s has allowed less fire-resistant, yet faster-growing tree species, such as Douglas-fir, to encroach upon and displace oak trees. Additionally, cattle grazing can degrade oak systems by compacting soils and reducing oak regeneration. More recently, non-native invasive species — including plants, insects, and disease agents — have contributed to negative impacts in oak habitats. For example, the invasive shrub Scotch broom has altered understory and shrub communities in these habitats, and the disease **Sudden Oak Death** has devastated some oak forests in California and Oregon.



School children learn about oak habitats at the Table Rocks Education Program, led by The Nature Conservancy and the Medford District BLM.
Photo: The Nature Conservancy

The degradation and loss of oak habitats has led to real and negative consequences for wildlife. Almost half of the 49 bird species in the Pacific Northwest that are highly associated with prairie-oak habitats have experienced extirpations, range contractions, and/or regional population declines. This habitat decline has affected other wildlife too, including mammals, butterflies, and other invertebrates.

Fortunately, wildlife populations can usually bounce back if appropriate habitat conditions are in place for wildlife to live and breed. Private landowners, by referring to the guidelines in this document, can play an integral role in returning healthy, wildlife-rich oak ecosystems to the landscape, thereby leaving a valuable legacy for future generations.

The Role of Private Landowners

Oak habitats in southern Oregon and northern California are found from sea level to over 3,000 feet in elevation. While land ownerships include federal, state, and local governments, as well as tribal trusts, most regional oak habitat is found on privately-owned lands. These lands are managed for a variety of objectives and goals that can shift with changes in markets, societal factors, economics, land use planning laws, and most importantly changes in ownership. Since some oaks can live as long as 500 years, successful stewardship of oak habitats — whether for protection, enhancement, or restoration — requires a long-term commitment by landowners.

The value of oak habitat to private landowners has often fluctuated. In many cases, oaks were viewed as a worthless tree meant to be cleared, cut up for firewood, or burned in slash piles with little thought to their value. While some of the greatest impacts to oak habitats on private land come with changes in land use over time, private lands also provide the greatest opportunity for oak stewardship, protection, enhancement, and restoration. Shifts in new crops and markets have resulted in major clearing of oak habitat. Examples include conversion of oak habitat to tree plantations, clearing of oak habitat for pasture, and the proliferation of new vineyards in southern Oregon and northern California which has resulted in extensive clearing of oaks to make way for new plantings.



Maintaining and improving oak habitat offers many benefits for landowners. Oaks are very compatible with a variety of land management opportunities — including agriculture — and oak restoration planning can be integrated into a wide range of working lands to reap the ecological, aesthetic, and recreational opportunities described above. Oaks are also fire resistant and have evolved with varying fire regimes, which make them a valuable commodity in today's wildfire climate. Oaks are also suitable to a range of climates, and can be relatively drought resistant, making them particularly desirable from a climate adaptation perspective.



A growing volume of science demonstrates the value of oaks to landscapes, watersheds, soils, and wildlife, and an increasing number of resources describing how to manage and restore oak habitat. There is also growing interest in stewarding oak landscapes. A survey of landowners completed in Douglas County in 2021 showed a growing interest in managing oaks on private lands. The unmet landowner need mentioned most in the survey was for more educational opportunities and materials for how to manage lands for multiple uses. The desire for more workshops and field tours on private lands describing management techniques were also mentioned, along with requests for more funding and technical assistance from agencies and experts.

Private landowner and US Fish and Wildlife Service personnel discuss an oak restoration plan. Photo: Marko Bey



Individuals interested in oak conservation attend a field day led by American Bird Conservancy, Klamath Bird Observatory, Lomakatsi Restoration Project, Natural Resources Conservation Service, and US Fish and Wildlife Service. Photo: Jaime Stephens

Since oaks are such a long-lived species, finding the right protection mechanism is vital. This can run the entire spectrum from agreements with landowners and agencies to various kinds of easements, including agricultural or through a land trust. Incentive programs at the local, state, and federal levels can provide income to landowners while at the same time creating a foundation for long-term protection.

Fortunately, there are many reasons why landowners may decide to undertake oak restoration. Oak woodlands and savannas have a unique aesthetic that many people find beautiful; oak trees have interesting and artistic growth forms, and oak woodlands are excellent for wildlife viewing. Restoring habitat brings satisfaction and increases a landowner's connection to the land. Additionally, it can be thrilling when new wildlife species appear in habitat created by restoration activities.

Landowners want to manage their lands to meet their objectives and to leave their land in better shape than when they purchased it. They want to make the right choices for their property, and outcomes are enhanced when they have the right tools, information, education, incentives, and assistance. This guide is meant to provide some of that information.

Private Lands Restoration Matters

Recent research by Klamath Bird Observatory's Kate Halstead and colleagues at Oregon State University demonstrates that even small parcels of high quality oak habitat will attract oak-associated birdlife. This is reassuring to private landowners because it means that oak restoration activities, of nearly any size, will make a difference for wildlife.

Helpful Tip:

There are ways private landowners can cover costs associated with oak restoration. Conifer trees are often removed during restoration activities and the sale of these trees can offset the cost of restoration, or even generate a profit for the landowner.

Numerous conservation programs exist that can provide expertise and further assist landowners with restoration costs. We provide an overview of these programs in *Appendix IV: Help with Your Restoration*.

Oak Species of our Region

Oregon White Oak

General: Oregon white oak (*Quercus garryana*) is deciduous and the most common and widespread oak in Oregon. The heart of its range extends from southwestern British Columbia through northern California, but the species can also be found in isolated pockets in central and southern California.

Trees can reach 100 feet in height on moist, productive sites, but typically attain heights between 40 and 80 feet, and can be even shorter on dry sites. Oregon white oak grows slowly, adding less than a foot in height per year and typically 15 to 20 growth rings per inch (meaning a tree 6 inches in diameter could be 100 years old), while faster growth is possible depending on site conditions.

These trees often occur in clumps, with multiple stems representing a single organism. Following disturbance, new stems sprout from around the weakened or dead standing trunk, or from the stump if the tree had been cut down. Oregon white oaks can live to 300 or 400 years old, and some may reach 500 years of age.

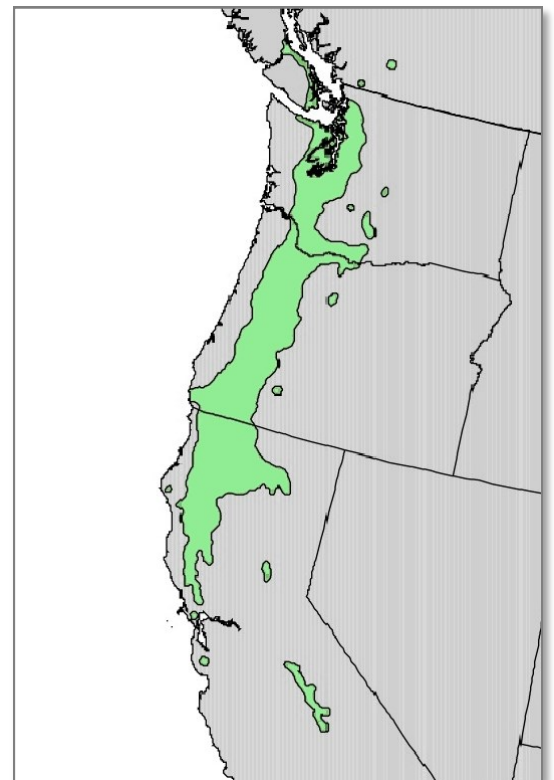
The thick and leathery leaves of Oregon white oak are 3 to 6 inches long and the lobes on the leaves are distinctively rounded (for comparison, the California black oak has pointy bristles on the tips of the leaf lobes).

The color of their bark also helps with identification; the bark is white to grayish, or light brown with broad ridges.

Acorns have a shallow acorn cap, and are oval or barrel-shaped.



Oregon white oaks tend to have noticeably whitish bark. Photo: Jaime Stephens



Range map of the Oregon white oak.
Map: United States Geological Survey



Tree Species Associations: Oregon white oak is commonly found alongside the following tree species: Douglas-fir, ponderosa pine, Oregon ash, California black oak, and Pacific madrone.

Acorn Production: Oregon white oak trees begin producing acorns around age 20 and achieve maximum acorn production around age 80. After this time, acorn production levels off.

Trees with broad “mushroom-shaped” crowns produce more acorns than those with narrow “vase-shaped” crowns, and acorn production is also greater in trees with better access to water.

Oregon white oaks generally have high year-to-year variation in their production of acorns, and large acorn crops may occur every two or three years.



Above: Oregon white oak leaf; notice the rounded leaf lobes.
Photo: Jaime Stephens

Left: Oregon white oak acorn.
Photo: Jim Conrad

Shade and Fire Tolerance: Oregon white oaks are shade-tolerant as seedlings but by the time they are mature they are shade-intolerant. Thus, mature oak trees require ample sunlight to survive.

Oaks are adapted to frequent fire; their bark provides protection against the flames, their leaves promote low intensity burning, and they can sprout from the tree base if their above-ground portions are killed by fire.

Oregon white oaks can be the dominant tree species in areas too harsh for other trees, as well as in landscapes experiencing repeated disturbance such as fires.

Conservation Overview: Oregon white oak has suffered substantial declines throughout its range. A major threat to this species is the encroachment of conifer trees, often the result of planting and/or the removal of periodic fire from the landscape. Encroaching conifers grow faster than oaks and eventually cover them in shade. Without access to direct sunlight, the oaks lose vitality and eventually die.

Historically frequent fires reduced the number of conifers, allowing the oaks to thrive and reach maturity. Fire also controls other successional shrubs, helping to maintain grassland savannas.

Oregon white oak is fortunately quite resistant to the disease Sudden Oak Death, and can persist in areas where other oaks might not.

Brewer's Oak

General: Brewer's oak (*Quercus garryana breweri*) is a dwarf or shrubby form of Oregon white oak that occurs almost exclusively in the Siskiyou Mountains and typically grows to just a few feet in height, but may reach as high as 20 feet. Its leaves are velvety underneath and generally not as deeply lobed as those of the Oregon white oak. Brewer's oak occurs in characteristic pure, shrubby stands on shallow soils, and its primary mode of regeneration is sprouting after high-intensity fire. Brewer's oak communities represent rare, valuable habitat for migratory birds and other wildlife, and add diversity to adjacent oak woodland and grassland habitat. See management considerations for Brewer's oak on page 51.



Brewer's oak leaves are not deeply lobed.
Photo: Jim Conrad



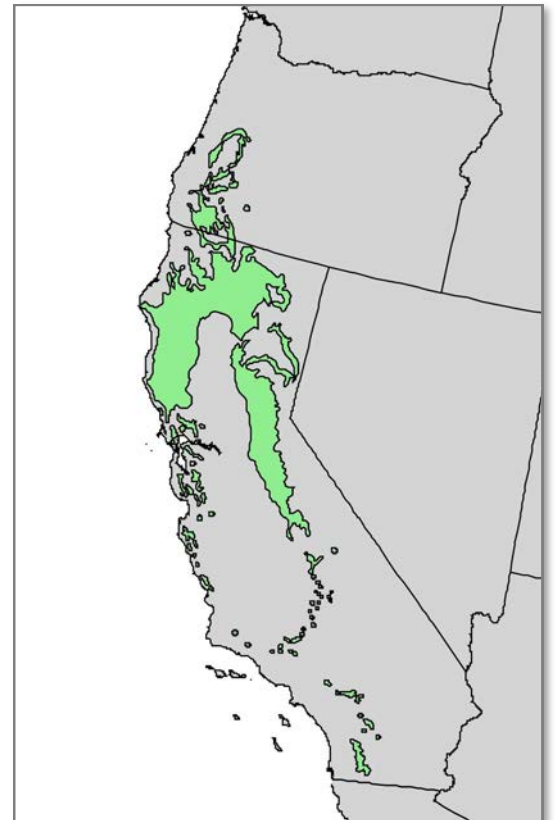
A Brewer's oak stand (foreground) in the
Colestin Valley, Oregon. Photo: Marko Bey

Conservation Overview: Brewer's oak is one of the least common oak species in the region, and is a high priority for conservation.

This species is so reliant on fire for reproduction, that populations are in decline in some areas where fire has been excluded from the landscape for long periods of time.

California Black Oak

General: California black oak is deciduous and has the widest distribution of all western oak species, occurring naturally from west-central Oregon to southern California and into Baja California. California black oak is typically larger than Oregon white oak, often reaching 60 to 120 feet in height, and can frequently reach 300 to 500 years old. California black oaks can be easily distinguished from Oregon white oaks by the pointed tips on the lobes of their leaves.



Range map of the California black oak
Map: United States Geological Survey



Also, California black oak trees tend to have dark gray or black bark compared to the lighter gray or white bark of Oregon white oaks. They have the largest acorns of any western oak and their acorn cup covers about half of the acorn.

Tree Species Associations: California black oaks usually occur in ponderosa pine forests, mixed-conifer forests, or pure stands. They occur alongside ponderosa pine, incense cedar, white fir, Douglas-fir, and sugar pine. California black oaks are also found in oak woodlands with other trees including Oregon white oak, canyon live oak, tanoak, and Pacific madrone.



Above: California black oak leaf.
Photo: Confederated Tribes of Grand Ronde
Left: California black oak acorn.
Photo: Jim Conrad

Acorn Production: Similar to Oregon white oaks, California black oaks begin to produce acorns at around 30 years of age, but usually do not produce heavily until they are 80 or more years old. Acorns take two years to mature. Fire stimulates the germination of acorns and low- to moderate-intensity fires can improve regeneration of this species.



California black oak. Photo: Marko Bey

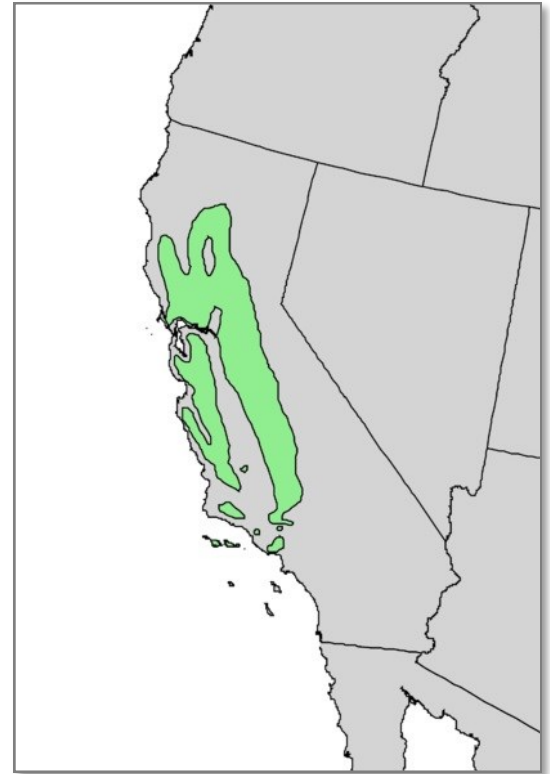
Shade and Fire Tolerance: California black oak is intolerant of shade for the majority of its life, although seedlings and saplings can tolerate some shade. Mature trees cannot survive in shade, and are particularly vulnerable to conifer encroachment. This species is tolerant of fire, as its thick bark provides heat protection. When fire kills the above-ground portion of a California black oak, it survives by sprouting from the root collar, much like Oregon white oaks.

Conservation Overview: California black oak (*Quercus kelloggii*), like Oregon white oak, is primarily threatened by the shade cast by encroaching conifers. California black oaks naturally occur in large pure stands or with conifers in mixed oak-conifer habitats. Loss of frequent fire has caused rapid proliferation of conifers at densities too great to sustain California black oak throughout much of its range.

Additionally, **Sudden Oak Death** represents a moderate threat to this species.

Valley Oak

General: Valley oak (*Quercus lobata*) is a long-lived, drought- and flood-resistant, native deciduous tree of California with range extending from central California north into southern Siskiyou County. Individual valley oaks are the largest oaks in North America, although trees typically only grow between 30 and 75 feet in height. This species is dominant in valley oak woodlands as well as valley oak forests on the higher portions of floodplains. Valley oaks grow in deep, rich soils. Valley oak forests are extremely valuable for birdlife, supporting more known breeding bird species than any other habitat in California. Trees in full sun produce the most acorns. Because of limited overlap with the geography of this guide, habitat restoration for this species is not addressed.



Range map of the valley oak.
Map: United States Geological Survey



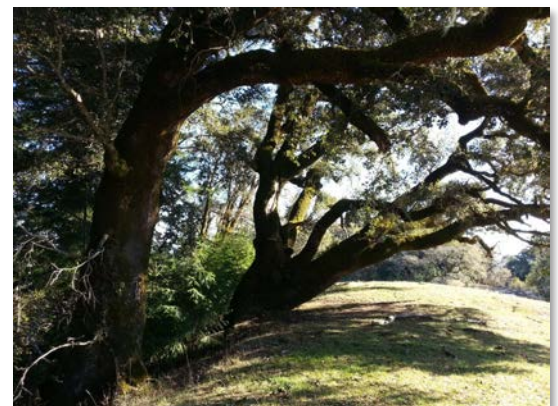
Conservation Overview: Valley oak is a seriously threatened species. A large proportion of historic valley oak habitat has been cleared for farmland and urban development, and private lands hold greater than 80% of remaining valley oaks. Current threats include poor regeneration and the continued removal of mature trees.



Valley oak. Photo: Flickr User JKehe

Canyon Live Oak

General: Canyon live oak is an evergreen tree native to California, Oregon, Nevada, Arizona, and Mexico. These trees often have twisted, complex trunks and broad, spreading crowns. On good sites they will easily grow as large as California black oak or valley oak, reaching heights greater than 100 feet — though they are typically shorter in stature, and sometimes occur in a shrubby growth form.

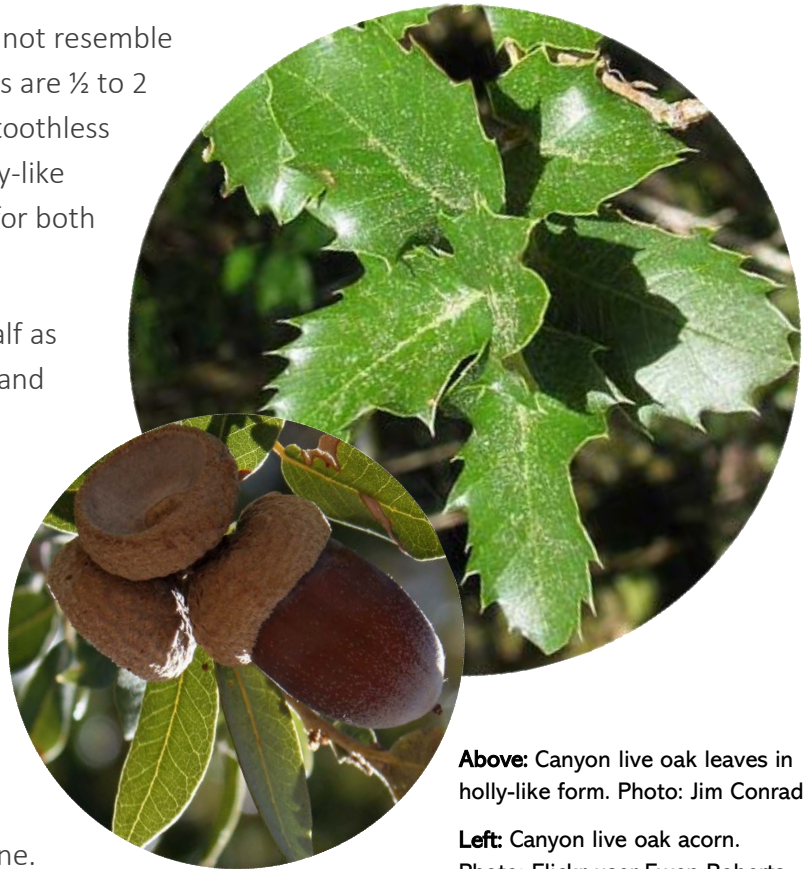


Canyon live oak stems in a forest.
Photo: Mathew Cocking

Canyon live oak leaves do not have lobes and do not resemble classic oak leaves. These thick and leathery leaves are ½ to 2 inches long and come in two forms: one form is toothless and the other form may have some or many holly-like teeth or spines at the leaf margin. It is common for both types of leaves to be present on the same tree.

Their acorns are ½ to 2 inches long, and about half as wide. Their mostly smooth bark has small scales and is grayish-brown and tinged with red. They may live for up to 300 years, and usually occur on dry and well-drained sites in the sun, including rocky mountain slopes and steep canyons.

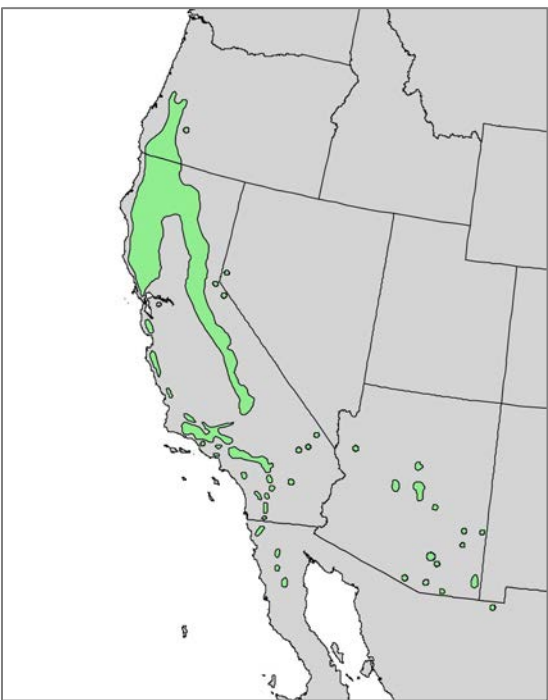
Canyon live oaks can occur in pure extensive stands, shrubby chaparral habitats, or mixed forests with species such as Douglas-fir, ponderosa pine, California black oak, Oregon white oak, tanoak, sugar pine, and Pacific madrone.



Above: Canyon live oak leaves in holly-like form. Photo: Jim Conrad

Left: Canyon live oak acorn. Photo: Flickr user Ewen Roberts

Acorn Production: Acorn crops vary year to year, and it takes two years for acorns to mature.



Range map of the canyon life oak.
Map: United States Geological Survey

Shade and Fire Tolerance: Canyon live oaks are shade-tolerant and although their bark is often thin, they are quite fire resilient.

After very hot, intense fires, canyon live oaks are still able to sprout from the root collar, along the tree bole, or even from a defoliated tree crown.

Conservation Overview: Canyon live oak (*Quercus chrysolepis*) faces a moderate threat from **Sudden Oak Death**, and mortality from this disease has been reported as far north as Humboldt County, California.

Canyon live oaks are occasionally overtopped by Douglas-fir, however their shade tolerance and tendency to occur on harsh sites limits conifer encroachment and competition with other tree species.



Tanoak forest, Humboldt County, CA. Photo: Mathew Cocking



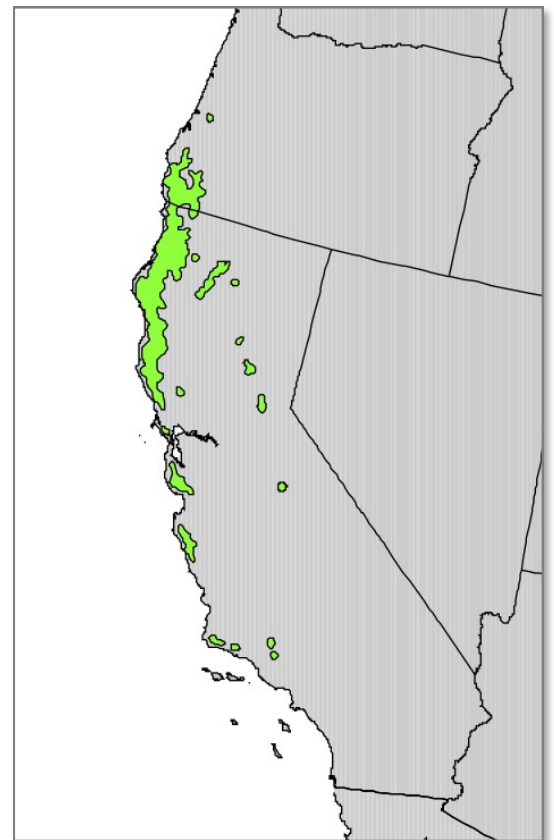
Tanoak

General: Tanoak (*Lithocarpus densiflorus*) is an ecologically significant acorn-producing tree that shares the same family with oaks, although it is not a true oak. Tanoak is native to California and southwestern Oregon.

Tanoak is a major species in mixed-evergreen forests along the Pacific Coast, where it can dominate the subcanopy or shrub layer in forests where conifers such as Douglas-fir and redwood dominate the canopy.

Pacific madrone is its most common hardwood associate, and it can also be found growing alongside California black oak, chinquapin, and California bay laurel.

Tanoak is sensitive to frost, drought, and fire, and therefore tends to occur closer to the coast where marine precipitation and fog are common.



Range map of the tanoak.
Map: United States Geological Survey

Trees are evergreen and typically grow between 60 and 100 feet tall. Tanoak can persist as a shrub in shaded forest understories, and a shrub variant (*L. d. echinoides*) occurs on serpentine and other harsh soils across the Klamath Mountains.

Their stiff, leathery leaves are simple, alternate, and 3 to 5 inches long with smooth or coarsely-toothed edges. Their acorns have bristly caps.

Conservation Overview: Tanoak is threatened by **Sudden Oak Death**.

In the 1800s, the tanbark industry decimated this species, and in the past century it has suffered from forest management policies that favor conifers.



Above: Tanoak leaves. Photo: Joseph O'Brien, USDA Forest Service

Left: Tanoak acorn. Photo: Flickr user HockeyholicAZ

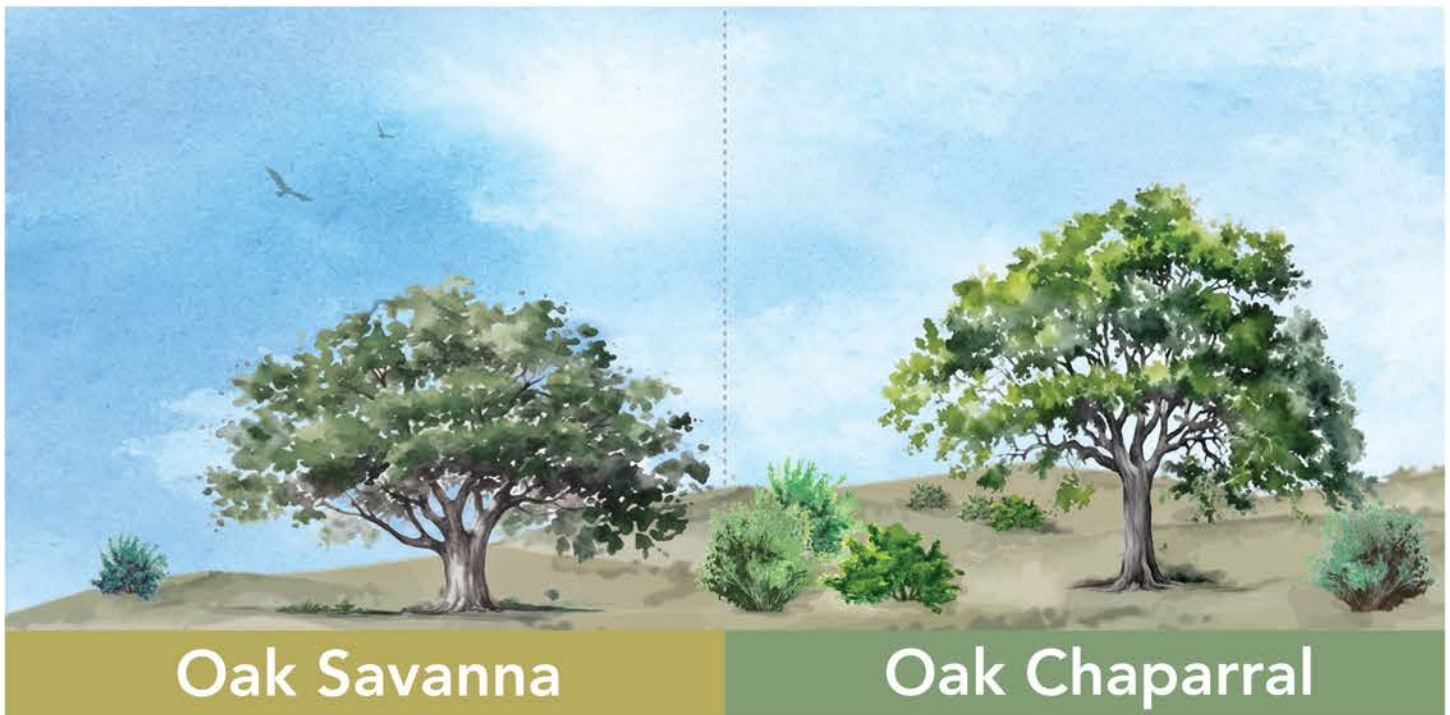


Photo: Jaime Stephens

Chaparral Habitats and Ecology

Chaparral habitats in southern Oregon and northern California occur in areas with hot, dry summers and mild winters. These habitats are dominated by dense shrubby vegetation comprised of drought tolerant plants with hard evergreen leaves. Infrequent fires, generally with burn-intervals between 10 and 100 years, are a natural feature of chaparral habitats.

In our region, there are unique chaparral oak habitats characterized by dense stands of *Ceanothus* shrubs, usually buckbrush, and a few Oregon white oak trees. These chaparral habitats are little-studied, but believed to provide wildlife values not found elsewhere.



- 20 - 30% total tree canopy cover
- < 5% non-oak canopy cover
- < 15% native shrub cover

- 20 - 30% total tree canopy cover
- < 5% non-oak canopy cover
- 30 - 80% native shrub cover

Landowner Worksheet: Considering Oak Habitat on Your Land

Take a moment to complete this worksheet about oaks and your land. This worksheet will direct you to the areas of this guide where your restoration efforts can produce the best results for Oregon white and California black oak habitats. Be aware that oak restoration requires work over multiple years.

Look at the graphic above.

On your land, do you have (circle one):

- A. Oak savanna C. Oak woodland
B. Oak chaparral D. Mixed oak-conifer



Each of these habitat types are important for wildlife and this guide provides restoration guidelines relevant to all of them.

Do you have large, old oak trees?

- ☐ Yes ☐ No

Do your oaks receive full sunlight?

- ☐ Yes ☐ No



Large, old oak trees provide immense wildlife value, and they need full sunlight to thrive. See pages 32 - 33 to learn how to protect existing — and encourage new — large, old oaks.

Do you have many standing dead trees (snags)?

- ☐ Yes ☐ No



Snags are very important for wildlife. See pages 34 - 35 to learn more about snags and how to have them on your land for wildlife.

Do you have invasive shrubs or grasses in your oak habitat?

- ☐ Yes ☐ No



Native shrubs are better for wildlife than invasive shrubs. Learn more on pages 36 - 41.



Oak Woodland



Mixed Oak - Conifer

- 25 - 75% total tree canopy cover
- < 10% non-oak canopy cover, favoring ponderosa pine and sugar pine
- 10 - 30% native shrub cover in variably-sized patches

- 30 - 60% total tree canopy cover
- < 50% conifer tree cover, favoring med-large conifers (>15" dbh) preferably in pockets not crowding oaks
- 10 - 40% native shrub cover in variably-sized, dense patches

Do you have multiple age classes of oaks (seedlings, saplings, young trees, mature trees)?

☐ Yes ☐ No



Healthy oak habitat has multiple age classes, including seedlings and saplings. Learn more about having diverse habitat structures on your land on pages 30-31.

Are your oaks threatened by overtopping conifers or crowding?

☐ Yes ☐ No



Mature oaks require abundant sunlight to thrive. Faster-growing conifers can overtop and cast shade upon oaks, causing the oaks to lose vitality and eventually die. These overtopping conifers can be removed to restore healthy oak habitats. Learn more on pages 32-33.

Is your habitat grazed by cattle?

☐ Yes ☐ No



Well-managed grazing can benefit oak habitats, but in other cases grazing can present challenges. Learn more on page 48.

Does your land experience frequent low-intensity fire?

☐ Yes ☐ No



Prescribed, low-intensity fire has many benefits for oak savanna and woodland. Learn more on pages 42 - 45.

Do your oaks have insect pests or diseases?

☐ Yes ☐ No



*Oaks are subject to a variety of insect pests and diseases. Some symptoms are obvious but cause little damage, whereas others are less obvious but lethal. You may download a copy of *A Field Guide to Insects and Diseases of California Oaks* at www.fs.usda.gov/research/treesearch/25928.*

Desired Conditions for Your Oak Habitat



Surveys in oak.
Photo: Jaime Stephens



What does healthy oak habitat look like?

In general, healthy oak habitat will contain large, old oak trees that receive plenty of sunlight, an understory of native shrubs and plants, and habitat variability, characterized by variably spaced trees of different ages and shapes, and shrub and grass patches of varying sizes and spacings.

Here we discuss seven desired conditions for oak habitat on your land:

1. Diverse Habitat Structures
2. Large, Old Oak Trees
3. Snags and Downed Wood
4. Restored or Retained Native Understory
5. Frequent, Low-intensity Fire
6. Healthy, Functional Chaparral
7. Balanced Grazing

These guidelines can be applied to oak savanna, oak chaparral, oak woodland, and mixed oak-conifer habitats.

Each desired condition represents a characteristic of a healthy, functioning oak ecosystem.

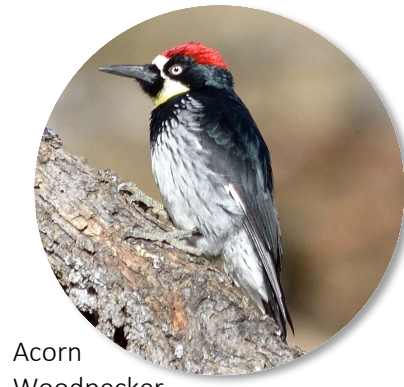
We present guidelines that will help you achieve each desired condition, and these guidelines can be applied to oak savanna, oak chaparral, oak woodland, and mixed oak-conifer habitats.

Even if you cannot achieve all the desired conditions, every effort helps restore our region's unique oak systems.

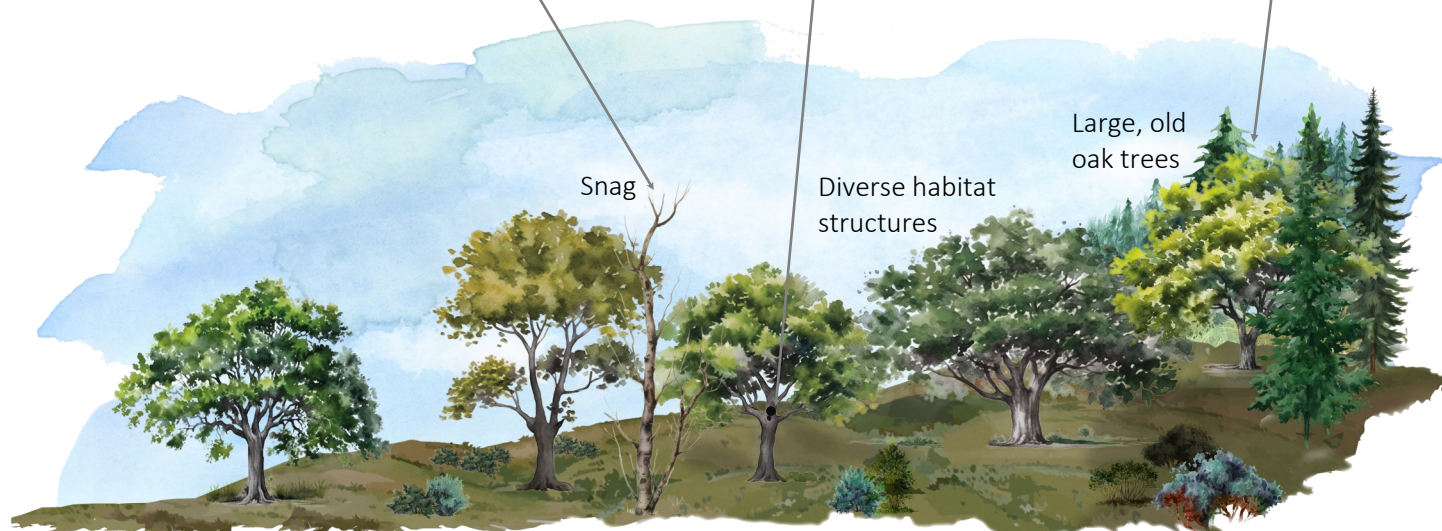


Downy
Woodpecker

White-breasted
Nuthatch



Acorn
Woodpecker



Snag

Diverse habitat
structures

Large, old
oak trees

Frequent,
low-intensity
fire

Balanced grazing

Healthy, functional chaparral

Retained or restored
native understory



Western
Meadowlark



Blue-gray
Gnatcatcher



Spotted
Towhee

Healthy oak habitat often has seven desired conditions.

Birds are good indicators of these habitat attributes and provide an additional lens to think about your land and oak restoration actions.



Diverse age classes of oaks, including this new recruit in the foreground, are an indication of healthy oak habitat.
Photo: Jaime Stephens



1. Diverse Habitat Structures

Significance

The diversity of wildlife in your oak habitat depends in part on the diversity of important structural components, such as saplings, young trees, old trees, snags, grassland areas, shrubby areas, and low spreading limbs. Healthy oak habitats have variability in the pattern of vegetation on the land, including clumping, open spaces, and areas of differing tree densities, rather than even tree spacing.

Brush piles on your land can aid oak and shrub regeneration by providing a refuge for seedling growth; such regeneration helps maintain a diversity of age classes. Coarse woody debris from deciduous trees, such as fallen limbs and whole trees, are used by invertebrates as well as vertebrates including reptiles and amphibians. Shrub cover is important for small animals and shrub-dependent birds. Mixed oak stands that have some conifers can attract additional wildlife compared to pure oak stands. Finally, wetland and stream or river components in oak systems, if present, are extremely valuable for wildlife.

Helpful tip:

When you're deciding where on your land to implement oak restoration, give priority to sites that have large, old oaks, as well as oaks of varying ages. Large, old oaks are particularly valuable as wildlife habitat. When possible, choose restoration sites that are adjacent to good quality oak habitat because doing so will increase the size of an existing oak system, rather than create a new, small, and isolated oak habitat patch.

If the option to expand a habitat patch does not exist, there is still value in creating new oak habitat patches.

Threats

Threats include development for homes or other infrastructure, and invasive plants.

Guidelines

Aim to have multiple oak age classes represented on your land

- Maintain individuals from all existing age classes
- If oak regeneration is low or non-existent, you may need to plant acorns or oak seedlings. To learn more, read *Devine and Harrington's Planting Native Oak in the Pacific Northwest*.

Reclaim and maintain natural openings and edges

- Consider removing trees that encroach upon natural openings
- Restore and/or maintain native shrub and herbaceous understory in these gaps. Regular seasonal mowing can encourage remnant oak understory forbs to reemerge by giving them space and light.



Above: Acorn woodpecker granaries, where the birds store acorns, are valuable structural components on your land.



Left: A gall is formed in this oak tree. Galls provide a nursery environment for gall wasp larvae.

Both photos: Confederated Tribes of Grand Ronde.

Consider leaving some brush piles on your land for wildlife and to protect regenerating trees and shrubs

Keep trees with unique wildlife benefits

- Retain all trees with unique growth forms that provide wildlife habitat, acorn woodpecker **granary trees**, and **snags** or standing dead trees (for safety reasons, don't leave **snags** within falling distance of a house or other structure).



White-breasted Nuthatch

White-breasted nuthatches are often seen moving down oak trunks and limbs, probing bark crevices for insects to eat. They store nuts and seeds under loose tree bark for winter, and benefit from the extra foraging area provided by low spreading oak limbs.

These small birds live in pairs on permanent territories. You typically find white-breasted nuthatches in oak chaparral and oak woodland.

Photo: James Livaudais

2. Large, Old Oak Trees

Significance

Large, old oak trees are the cornerstones of healthy oak habitat. These dramatic figures on the landscape are critically important for wildlife. They can produce huge numbers of acorns, which are important as a First Food to Indigenous peoples, and provide nutrition to wildlife during the fall and winter when other food sources may be scarce. Their plentiful foliage provides foraging substrates for birds and bats. Both dead and living limbs provide nesting cavities, and fallen leaves become cover for soil invertebrates. These large trees provide substantial wildlife benefits and their acorns become the next generation of oak trees.

Threats

Mature oak trees require sunlight and will eventually die if they are in the shade of overtopping conifers. Neighboring trees also compete for resources such as soil nutrients and water. Additionally, encroaching young conifers can increase fire risks for old oaks, as their regularly-spaced low branches can transfer ground fires into oak canopies, acting as ladder fuels and causing more extensive fire damage. Diseases and very heavy mistletoe infestations can also harm oak trees.



Guidelines

Keep legacy conifers and other legacy hardwoods

- Retain all legacy conifers and hardwoods; these older trees are often >24" **dbh**, but you should also consider retaining individual smaller conifers and hardwoods on your property that are large relative to most other trees.

Remove conifers and hardwoods that encroach upon large, old oaks

- Consider removing conifers (generally <24" dbh) and competing hardwoods within two times the dripline of large or vigorous oaks.
- Remove conifer trees that create deep shade over oaks, keeping in mind that conifers located on the north side of oaks cast less shade and cause less harm to the oaks.
- Take care not to damage your oaks when felling overtopping conifers; **girdle** (rather than remove) overtopping conifers likely to damage oaks if felled.
- In oak savanna and woodland, you may choose to remove almost all small diameter (<12" **dbh**) conifers, whereas in mixed-oak conifer forest you should think about leaving a wide spacing (10 to 30 trees per acre) of recruitment-age conifers, generally giving preference to ponderosa pine and sugar pine, and ideally having patches of conifers away from oaks.

Additional Considerations

- Avoid restoration actions that lead to a type transition (e.g., changing a woodland to a savanna).
- If you have multi-stemmed oaks, keep in mind that each clump of connected stems functions as a single organism. If you have many young oak sprouts (DBH <3") you may want to consider **sprout clump thinning** explained on page 54 to achieve diversity of single- and multi-stemmed oaks as the trees mature.
- If conifers are removed, do so during fall or winter, or during spring before leaf out; avoid using heavy equipment on wet soils.
- Whenever possible, hand crews should be used instead of heavy equipment.
- Forestry contractors must understand the goal is to preserve oaks and be able to describe practices to minimize damage to oaks. Alternately, consider extensively marking stands prior to treatment.
- Clean and inspect logging equipment entering a restoration site to prevent the introduction of non-native, invasive species.
- Removing trees through the use of equipment (e.g., dragging trees with cables) can disturb the forest floor and create favorable conditions for invasive plants. To mitigate this, spreading seeds of native understory **perennial plants** following forest floor disturbance is highly recommended.
- See the bottom of *Appendix IV: Help with Your Restoration* (page 66) for information on disposing of slash created from tree removal.



Oregon white oak. Photo: Mathew Cocking



Acorn Woodpecker

Acorn woodpeckers are communal breeders. Up to as many as 15 individuals from multiple generations will live together in an established territory. Only some of these individuals breed, while others help raise the young. The number of breeding individuals varies, but usually consists of one or two females and up to four males per female.

Acorn woodpeckers collect acorns during autumn and winter and store them in dead trees and telephone poles and other manmade structures. These acorn storage sites are called granaries, and one granary tree may contain as many as 50,000 acorns. All of the woodpeckers that live in a community are responsible for collecting and storing acorns. Still, acorns make up only about half of the acorn woodpecker diet, followed in importance by fruit or other vegetable matter and insects. Insects are likely the preferred food when available, with acorns supplementing the diet in the winter months.

You typically find acorn woodpeckers in oak savanna, oak chaparral, and oak woodland.

Photo: James Livaudais

3. Snags and Downed Wood

Significance

Snags are standing dead trees, and these are essential for many wildlife species. Snags provide cavities for nesting, perches with good vantage points, and insects for food.

Dead wood on the ground (**downed wood**), is important in soil development, provides nutrients to streams, and is essential for maintaining fungi and other microorganisms that are the foundation of woodland food webs. Downed wood also provides habitat for small mammals, reptiles, amphibians, and insects, many of which serve as prey for animals further up the food chain.



The hollowed out base of snags can provide den habitats for a variety of wildlife. Photo: Jaime Stephens

Threats

Snags and **downed wood** are often removed as potential safety or fuels hazards, or for aesthetic reasons, especially on private lands, rather than recognized as important resources for wildlife.

In moderation, snags and large downed wood do not contribute substantially to the spread of most ground fires, and can usually be safely retained in your land stewardship planning to promote healthy oak wildlife communities.



A Douglas squirrel uses a cavity in this downed wood. Photo: Jaime Stephens



Oak Titmouse

The oak titmouse nests in natural cavities more often than old woodpecker holes, and will even partially excavate holes in rotted wood. The female chooses the nest site after inspecting several cavities in the area. You typically see oak titmice in oak savanna, oak chaparral, and oak woodland.

Photo: James Livaudais





House Wren

The house wren is one of many bird species in oak habitats that nest in cavities, especially old woodpecker holes. The male begins building its nest in a cavity and once he pairs with a female, she will complete construction of the nest. Compared to other cavity nesters, house wrens prefer cavities close to the ground, and they will use cavities in dead as well as living trees. They avoid nest sites more than 100 feet away from patches of woody vegetation. You typically find house wrens in oak savanna, oak chaparral, and oak woodland.

Photo: James Livaudais



Guidelines

Retain snags and downed wood for the benefit of wildlife

- Retain **snags** if at all possible, and also retain all dead oak limbs.
- Retain some large dead wood on the ground and consider leaving large trees on the ground if they are felled for other reasons.
- Provide new snags if they are not abundant on your property.
- **Girdle** conifers to create snags in areas with few or no snags; consider this method if you decide some conifers need to be removed, especially if felling them may harm oaks. See page 56 for a description and photo guide to this management practice.
- Aim to have snags of various sizes, tree species, and levels of decay.

Standing dead wood, or snags, are an important component of all oak habitats. Photo: Jaime Stephens

4. Restored or Retained Native Understory

Significance

Understory shrubs, bunchgrasses, and wildflowers comprise most of the plant diversity in oak habitats and provide important structural characteristics and foraging resources for many wildlife species. Shrubs provide cover for nesting birds. They also produce fruit, seeds, and nuts for a variety of animals, host the larvae of multiple native moths and butterflies, and produce nectar used by many pollinators.

Bunchgrasses create unique structural features that are preferred by certain ground-nesting birds as well as many insects. Both bunchgrasses and wildflowers provide foliage and seeds eaten by elk, deer, and birds. Wildflowers also produce pollen and nectar resources for native pollinators.

Oak habitats also host a large number of culturally important plants that are used as food, materials, or medicinal products by Indigenous peoples of the region. Furthermore, native understory species associated with oak habitats have a high degree of resilience following wildfires and are capable of storing substantial amounts of soil carbon.



Remnant Lemmon's needlegrass in an oak savanna. Lemmon's needlegrass is a native bunchgrass that occurs in open oak ecosystems. Photo: The Understory Initiative



Seeding native species into an oak restoration project. Photo: Allison Manwaring



Encroaching conifers shade oak understory communities and reduce associated biodiversity. Photo: The Understory Initiative

Threats

Many native plant species found in the understory of oak habitats are not found in other ecosystems and rely on intact overstory conditions and ecosystem processes to persist.

Most understory plant communities in oak habitats have already been highly altered and degraded due to intense livestock grazing, the discontinuation of Indigenous burning practices, and the introduction of invasive species.

For example, heavily grazed oak savannas that were once dominated by perennial bunchgrasses and annual wildflowers have been largely converted to exotic annual grasslands dominated by species such as medusahead grass, oats, and yellow starthistle.

The result has been a loss of biodiversity, lowered resistance to wildfire, and a loss of resources for both wildlife and Indigenous communities.

In oak woodlands that are threatened with conversion to conifer forest as a result of fire suppression, understory plant communities may be entirely lost due to shading and resource competition.

To protect and restore understory plant communities in oak habitats, a number of tools may be needed to reintroduce both the native plants that have been lost and the disturbance cycles on which they are reliant.

Restored or Retained Native Understory, continued

Guidelines

Characterize current conditions

- Identify and map existing noxious weeds as well as desirable native plants; consult a professional botanist if necessary.

Consider historic conditions to determine your desired shrub cover

- Consider historic shrub cover when deciding whether to remove or plant native shrubs; consult old photos if they exist.
- Generally, retain variably-sized patches of dense native vegetation if it is present in your oak woodland and does not pose a fire hazard to homes or communities.

Develop an integrated weed control approach based on current composition

- Utilize a combination of mowing, burning, hand pulling, and (if tolerable) herbicides to control weeds. The combination of tools used will ultimately be determined by the native and exotic species on site as each species responds to each treatment differently. Repeated treatments and appropriate timing are critical.

Strive for balanced grazing pressure (See Desired Condition #7, pages 48 - 49)



Oak savanna that has been nearly entirely converted to exotic annual grasses and wildflowers, particularly common wild oat and hairy vetch. Photo: The Understory Initiative



Spotted Towhee

The spotted towhee is a bird of thickets and scrubby habitats. During the breeding season, spotted towhees flip through the leaf litter under shrubs in search of high-protein insects and arthropods. Native shrubs attract richer insect communities that feed towhees and other birds.

You can encounter spotted towhees in oak savanna, oak chaparral, oak woodland, and mixed oak-conifer, wherever there are relatively dense shrub patches.

Photo: James Livaudais

Prescribed fire timing is critical

- Burning of invaded grasslands or woodlands should be conducted just before undesired exotic species produce seed, typically in mid- to late-spring.
- Fall burning in oak habitats dominated by exotic species is not advisable as the invasive species seed will likely survive the fire and recolonize the following year.
- Oak habitats that are dominated by native species should be burned in fall to avoid damaging native plants during the growing season.

Retain and/or plant native perennial grasses

- Strive for a diverse, native understory with a balance of grasses, **forbs**, and shrubs.
- Encourage native understories by seeding grass and forbs into mineral rich ashes leftover from prescribed fire or disturbed areas following restoration thinning.

Left: Wildflowers blooming in a seeded burn pile scar following an oak restoration project.

Below: A Rogue Native Plant Partnership native seed collection event. The collected seed will be used in future oak restoration projects. Photos: The Understory Initiative





Weed control being conducted in an oak savanna that is highly invaded by exotic annual grasses.
Photo: The Understory Initiative



An oak savanna that has been heavily invaded by medusahead grass. Photo: The Understory Initiative

Restored or Retained Native Understory, continued

Guidelines

Remove non-native plant species if practical

- Refrain from using herbicides if possible; hand-pulling plants is very effective. If hand-pulling is labor- or cost-prohibitive, well timed mowing may be effective. If neither approach is feasible, minimize the application of herbicides through spot spraying.
- Agencies and/or local restoration organizations can help you develop a plan for dealing with non-native species (see *Appendix IV: Help with Your Restoration* on page 66).
- There may be situations where only a combination of herbicides, burning and/or mechanical removal will restore highly degraded areas.

Minimize likelihood that non-native species will establish

- Minimize ground disturbance at sites with native understories to prevent opportunities for non-native species to establish.
- If restoration actions lead to ground disturbance, plan to reseed the site with native species and have the seed on hand before starting restoration.

Source locally grown native seed

- In any oak habitat that is dominated by exotic species, a native seed mix that is appropriate for the site should be applied following burning activities.
- The Rogue Native Plant Partnership and the Umpqua Native Plant Partnership often have pre-selected seed mixes available for this purpose.



Sowing Native Seeds

Following burning, a good restoration practice is to sow native grass seed into the mineral-rich ashes of some of the burn locations to restore the native grass community. Native grass can establish itself well in disturbed locations like burn spots.

It may be possible to acquire native grass seed for specific locations from the US Forest Service, a local nursery in the area, or the Rogue Native Plant Partnership. Seed can be sown by hand; experimentation with amounts will produce different results. Seeding rates will vary, so check when purchasing the seed as to how much to use per location.

The best time to sow native grass seeds is October through March during their dormant time, depending on elevation. More diverse native seed mixes that include wildflowers should typically be sown in fall. Sowing native grasses not only restores herbaceous plant communities to the site, but is a good preventive measure for noxious weed mitigation.

Common non-native, invasive plants in oak habitats

- Scotch broom
- English hawthorn
- Yellow starthistle
- Armenian blackberry
- English holly
- Himalayan blackberry
- Bull thistle
- French broom
- St. John's wort
- Medusahead
- Cheatgrass



Collecting seed of native species to plant out into future oak restoration projects.
Photo: The Understory Initiative

Native oak grasses and shrubs

- California fescue
- Roemer's fescue
- California brome
- Blue wildrye
- Purple needlegrass
- Idaho fescue
- Western fescue
- California oatgrass
- Junegrass
- Sweetcicely
- Coffeeberry
- Poison oak
- Common snowberry
- Ocean spray
- Hazel
- Serviceberry
- Oregon grape
- Bitterbrush
- Mountain mahogany
- Buckbrush

5. Frequent, Low-intensity Fire

Significance



Restoring natural fire regimes can produce many benefits for your oak ecosystem. Restoring fire can reduce fuel loads, remove encroaching young conifers (i.e., seedling and sapling size), maintain an open understory, create understory conditions suitable for native plants, and possibly encourage oak recruitment.

However, restoring fire will not be realistic in many areas due to fire use restrictions related to safety and air quality.

Prescribed fire should be implemented to best mimic site-specific fire regimes. Fire regimes are a suite of characteristics that describe the role fire plays, and are commonly described by their frequency and severity for a particular forest type.

Private lands prescribed underburn implemented by Lomakatsi Restoration Project as part of an oak habitat restoration project in Coletsin, Oregon. Photo: Lomakatsi Restoration Project

Ecological effects of fire reflect the adaptations of species present to a particular fire regime. In general, it is highly recommended that fire treatments are repeated periodically (typically, every 3 to 5 years) to maintain low fuel loads and reduce the likelihood of a high-intensity wildfire that could damage or kill valuable, old oaks.

Also, it should be noted that the use of **controlled burns** occurs *after* initial restoration and thinning treatments have been implemented and vegetation density has been reduced.

Threats

High-intensity fires can harm large, old oaks. Oak habitats have historically experienced frequent low-intensity fires and thus do not naturally have high fuel loads.

Oaks persist when there are frequent fires and benefit from low-intensity fires because these fires can remove species that are susceptible to fire when young, such as Douglas-fir, white fir, and other conifers; a competitive benefit for oaks.

If fuel levels build up, however, high-intensity fires can burn and kill oak trees, and pose risks to persons and property.



Guidelines

Understand the liability associated with prescribed burning and reach out to professionals for guidance or assistance in implementing a burn on your property

- The use of fire requires planning, necessary permissions, experienced personnel, and communication with neighbors and other interested parties.
- Due to decades-long absences of fire in many places, mechanical fuel reduction treatments are often necessary to reduce fuel loads to safe levels prior to implementing understory burning.
- Post-burn seeding of native understory plants and herbaceous vegetation is an important step to creating a healthy oak understory. Use a local seed source and consult with professionals.
- The frequency at which fire is needed at a site depends on how quickly woody fuel accumulates.

Ensure stand conditions are suitable for prescribed fire

- Open canopy conditions and low stocking rate (25 – 30% of max stocking rate) is necessary for minimizing the risk of crown fire and drought conditions.
- Stand should be dominated by fire-tolerant and drought-tolerant species.
- Surface and **ladder fuels** should be reduced and minimized to prevent surface fires from transitioning into crown fires. Prescribed fire is the best ecological approach, but mechanical thinning or a combination can also be implemented. Note, lower oak branches are not typically considered **ladder fuels**.

Protect important habitat components, like snags, downed wood, and large oaks, prior to burning

- Create buffer areas of bare dirt around important habitat components to prevent fire from reaching them. This can be done by raking litter and duff to mineral soil within 2ft of important habitat components.
- Seedling and sapling oaks may be top-killed by fire but will usually re-sprout.
- The thick bark of mature oaks protects them from low-intensity fires.



Western Bluebird

Western bluebirds are open-country birds that prefer areas with few shrubs — the types of habitats created by low-intensity burns in oak savanna or oak woodland. Burned areas with large trees for perches, and snags for nest cavities are ideal. Both parents feed the young, and these birds feed on insects during warm months and on mistletoe berries during winter. You typically see western bluebirds in oak savanna and oak woodland.

Photo: James Livaudais

Frequent, Low-intensity Fire, continued

Guidelines

Observe the following common sense practices

- Keep your neighbors informed and forewarned.
- Burn when moisture levels are appropriate, neither too dry nor too wet.
- Do not burn when weather conditions are inappropriate (e.g., too windy, or during an inversion).
- Follow fire precaution levels.
- Always have a fire line (approximately 12 to 24 inches in width) cleared to bare mineral soil encircling the fire.
- Start by igniting small test patches.
- Patrol the area periodically until the fire is dead out and all the heat is gone.
- Do not leave your property while there is the potential for reburning.
- Check old rotten stumps and duff for residual heat.
- Patrol and inspect burned areas for residual smoke in the hours and days following burning.

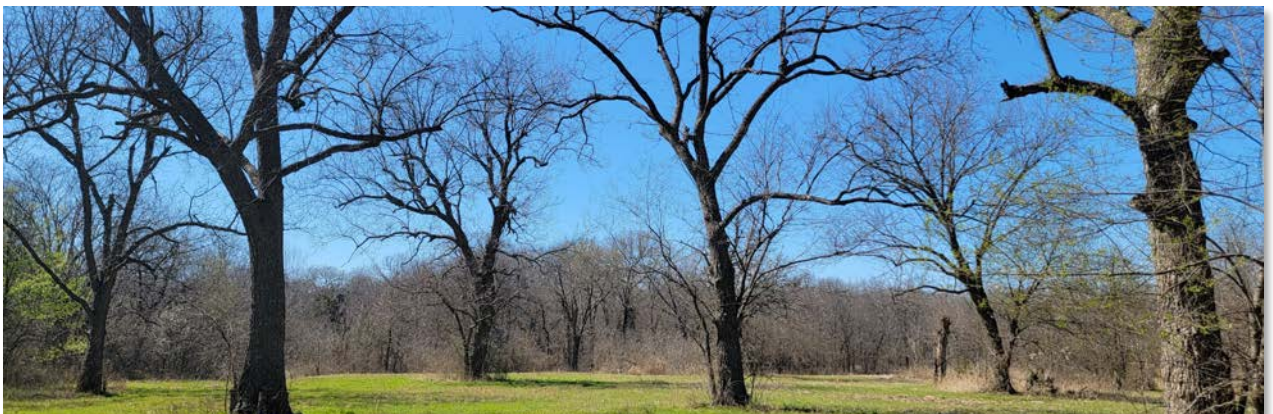
Barriers

Two primary barriers to prescribed fire include the need to development a prescribed fire plan, and appropriate weather and favorable burn window to conduct the prescribed burn. While weather is out of our control, a prescribed fire plan can be developed in advance so when the window arrives, private land managers can be ready to implement a burn.

Burn plans can range from very detailed written documents to more informal plans. In either case a burn plan will typically contain the specific goals of the fire, topographic map of the area, fuel types, control lines, prescribed fire criteria, alternative fire plans, logistical information, and monitoring commitments.

A variety of planning aids are available for prescribed fire. It is highly recommended to consult a professional before beginning.

Below: Oak understory after prescribed fire.
Photo: Confederated Tribes of Grand Ronde



Fire responses of important species

Oak ecosystems of the KSON geography are fire adapted. Relatively frequent low- to mixed-severity fire historically occurred in the region's lower elevations where these oak systems occur. This historic fire regime created a shifting mosaic of habitat types and vegetation structures and served to maintain the region's oak ecosystems

Responses of important species to frequent low- to mixed-severity fires are in the table below. Populations can increase through re-sprouting, although establishment occurs in fire-free periods as well. Individuals can generally survive fire; however, response strategies differ between species with thicker bark such as California black oak and Oregon white oak that have a greater ability to resist heat kill than tanoak and canyon live oak which re-sprout after being top-killed.

— Fire response types of important species. Adapted from Sugihara et al. 2006.



Private lands prescribed underburn implemented by Lomakatsi Restoration Project as part of an oak habitat restoration project in Colestin, Oregon. Photo: Lomakatsi Restoration Project

Prescribed Fire Timing

- Prescribed fire should ideally be scheduled prior to leaf out in the spring or after leaf fall in the autumn.
- Prescribed fire in the spring can damage the apical meristems of deciduous oaks and should be done prior to the onset of leaf development. A challenge to early spring burning is fuel moisture, which can be high, making it difficult to get the site into prescription.
- Prescribed fire in the autumn should be scheduled after oaks have lost their leaves. A challenge to autumn burning is often high, and very dry, fuel loads, which can create a challenge for implementing and maintaining a low-intensity burn.

Type of Fire Response

Species	Sprouting	Seedling	Individual
Tanoak, canyon live oak	Fire stimulated	None	Top-killed/survive
California black oak	Fire stimulated	None	Resistant/top-killed/survive
Oregon white oak	Fire stimulated	Stimulates establishment	Resistant/top-killed/survive



Chaparral understory provides important habitat for many bird species in oak ecosystems. A series of studies over the last few years have found that birds need large patches to establish breeding territories in oak chaparral. Photo: Jaime Stephens

6. Healthy, Functional Chaparral

Significance

Chaparral is a short, shrubby vegetation type that can be composed of a variety of plant species. In this region, chaparral habitat is often associated with oak woodlands. Chaparral is a natural part of oak habitats, but it also poses a risk of spreading severe fire which can put large, old oak trees at risk. Because oak woodlands are threatened by loss and degradation, management initiatives sometimes reduce chaparral to reduce the risk of high-severity fire and promote a mix of low- to moderate-severity fire.

Still, functioning oak woodland mosaics in southern Oregon need many types of vegetation cover, including patches of chaparral. Restoring and managing oak woodland ecosystems in this region requires learning how to best achieve a balanced vegetation composition that includes chaparral habitat components.

A balancing act

Despite the importance of shrubs for birds and other wildlife, land managers are often concerned about leaving shrub patches because of the risk of wildfire. Frequent mixed, low- to moderate-severity fires are an important component of healthy oak habitats and can help control non-native grasses, but large severe fires can be detrimental to oak trees. So how can managers reduce fuel loads while still providing enough cover for chaparral-associated bird species? Understanding how birds respond to restoration projects can help inform ongoing management in oak-chaparral systems.

Threats

Chaparral is often removed as a potential fuels hazard, or for aesthetic reasons, but it is also an important resource for wildlife. The guidelines below will help you balance retention in your land stewardship planning to promote healthy chaparral wildlife communities.



Blue-gray Gnatcatcher

The blue-gray gnatcatcher is considered a chaparral obligate in this region, meaning that it requires shrubby vegetation like chaparral to nest and breed. Like other chaparral-associated species, larger patches of chaparral are necessary to provide habitat for these birds in the breeding season.

Photo: James Livaudais



Guidelines

Restore a variety of oak woodland types and conditions

- Design restoration plans that will result in a balance of open grass, shrubs, and large oak trees to ensure each important habitat is represented.

Apply low-impact treatments like hand pile and burn

- Fuel reductions with small-scale (<120 acre) treatments instead of larger, mechanical treatments protect habitat for shrub-loving bird species.

Retain large (5 - 12 acre) patches of chaparral

- Not all chaparral is created equal; very small patches of shrubs may not have enough of the shelter and resources birds need to settle and reproduce in oak and chaparral communities.

Leave smaller patches near each other

- Smaller patches are more likely to be used by birds if they are clustered near larger patches, rather than separated by large distances.
- To provide the greatest benefit to chaparral bird species, prioritize chaparral patch retention at sites where chaparral is common on the landscape within a 6-mile surrounding area.

Maintain management practices that control non-native species

- When chaparral is removed, retain and/or plant native perennial grasses.
- Foster frequent, mixed low- to moderate-severity fire.



Chaparral-associated bird species. **Top:** Bewick's Wren. **Above:** California Towhee. Photos: James Livaudais



An Oregon white oak savanna with high **Residual Dry Matter**. Photo: Jaime Stephens

7. Balanced Grazing

Significance

Grazing, when managed well, can occur in healthy oak woodlands. Too much grazing pressure, however, can increase soil erosion, compact the soil, and favor non-native grasses, shrubs, and conifers instead of native grasses and oak trees.

Oak regeneration is most successful in areas that have mature oaks that produce acorns and adequate protein-rich grass, which is preferred by cattle over oak seedlings. The effects of grazing on the health of oak systems are complex and require further study.



Oak woodland cleared from an Umpqua hillside for livestock pasture. Photo: Steve Denney

Threats

Cattle and other grazing animals can inadvertently destroy bird nests by bumping into them, trampling them, or eating the plant in which the nest is built. Grazing and browsing can also reduce vegetative cover, decreasing the number of suitable nesting sites and potentially exposing nests to predators. Soil compaction from grazing can limit native plant growth, degrade wildlife habitat, and reduce the growth of young oaks. Excessive grazing can destabilize soils, increasing erosion, and reducing water quality.



Guidelines

Ensure grazing pressure from livestock is in balance with supply

- Rotate livestock away from grazing areas to provide recovery periods for grasses and forbs to regrow.
- Allow palatable plants to grow to the proper height, and thus to restore nutritional reserves and regrow roots, before reintroducing grazing animals.
- Meet or exceed the minimum **Residual Dry Matter (RDM)** standards for annual grasslands/ hardwood rangelands in your area. Contact a local rangeland specialist to learn the minimum **RDM** on your oak savanna or woodland.



Reduce the potential for grazing impacts on oaks and wildlife

- Refrain from grazing oak recruitment areas during the dormant season for grasses, or place temporary enclosures around young oak trees to protect them during this period.
- To promote healthy habitat for breeding birds, rotate cattle out of woodlands during the breeding season (April 15 through July 31) to prevent trampling and ensure sufficient grass cover to conceal nests from predators.
- Use fencing to keep cattle away from wildlife-rich stream and riverside habitats adjacent to oak woodlands.

Previous oak woodland intensively cleared for agriculture, one of the primary threats to oak habitats in the Umpqua Basin.
Photo: Steve Denney



Western Meadowlark

Western meadowlarks live in open habitats, including grasslands and oak savanna. This species is well-known due to its abundance and conspicuousness, and well-loved owing to its bright yellow undersides and melodious song.

Western meadowlarks prefer habitats with a large amount of grass cover. Females choose sites for their ground nests, which are often well-concealed by dense vegetation.

Habitats with heavy grazing can reduce the breeding success of western meadowlarks because short-cropped vegetation does not adequately conceal nests from predators. Also, trampling of eggs and nestlings by cattle may occur.

Photo: Frank Lospalluto

Tips and Techniques



Sampson Creek Preserve.
Photo: Jaime Stephens

Oak Cultivation

Since time immemorial, Native American tribes have been active land managers using proactive methods on the land. Fire has been traditionally used to maintain open prairie ecosystems all throughout Oregon. Frequent, low-intensity fires were commonly used in the fall to limit the establishment of trees and shrubs, allowing important first foods and culturally important game species to flourish.

The landscape was very different looking prior to European settlement. The land had frequent fires, both natural and managed, which resulted in large, widely spaced legacy oaks with understories dominated by grasses and **forbs**, which today we know as the oak savanna ecosystem. This plant composition of dominant finer fuels (grasses and **forbs**) allowed for lower intensity, fast-burning fires.



These low-intensity fires left fire-adapted oaks unscathed and allowed for open growth and large sweeping canopies. Fire also stimulated fire-adapted **forbs**, meanwhile controlling other species that might encroach and compete for water, nutrients and light.

Tarweed, for example, is an important first foods understory plant. Tribes harvested the seed after fire and the seed was used as a food in many different ways. This plant needs open growing conditions to thrive, and fire to keep encroaching vegetation at bay.

Camas is another important first food that is typically associated with oak understory. This plant often grows in the shade of the oak



Left: Tarweed.
Photo: Shutterstock



Below: Camas.
Photo: Shutterstock

in wetter soils, but fire again was used to keep competing species from overtopping camas and crowding it out.

Coexisting with the understory diversity in this ecosystem was incredibly important, and remains important to tribal communities today.

Acorns are also an important first food and fire is used to control vegetation competition with oaks and allow open, full canopy sun exposure without competition from other faster growing trees to maximize acorn production. Late season fires can also keep grasses low around the oaks to be able to harvest this important food more efficiently.

The understory composition of native grasses was a major component to these ecosystems that is largely lost now. Native grasses such as Roemer's fescue are bunchgrasses with finer blades than turf variety grasses that are often seeded in pastures. These finer blades made for lighter fuel load compared to non-native grasses.

Late season fires also acted as a pest management tactic. Lower intensity burns would target insect pests that had some life cycle stage in the soil or in the organic material on the soil surface.

The soils in Oregon are naturally acidic. Burning the grasses, **forbs** and organic material on the surface provided important nutrients. Fire ash is also alkaline, which helps to raise the soil pH.

The understory composition
of native grasses was a
major component to these
ecosystems that is
largely lost now.



Selberg Institute's Sampson Creek Preserve encompasses nearly 4,800 acres of undeveloped grasslands, woodlands and forests in the Sampson, Cattle and Soda Creek watersheds of Jackson County, Oregon. Photo: Jaime Stephens

Tips and Techniques, continued

Wildfire and Oak Ecosystems

Western oak ecosystems have coexisted with fire for millennia. In fact, depending on the site conditions present on your property, oaks may have historically been dependent on fire to reduce competition from conifer species and to maintain associated vegetation.

Tribes, prior to European settlement, burned the area frequently to manage for a diverse oak structure and open grassland understory. With knowledge developed over generations, they know that large, old oaks are well adapted to resist low-intensity ground fires that may burn quickly through understory plant communities, keeping seral succession of woody shrubs and



Above: The South Obenchain wildfire in Jackson County, Oregon burned at a variety of severities. This photo, taken the same year as the fire, shows some oak trees have died while others remain green. Photo: Jena Volpe **Below:** Ash-throated Flycatcher. Photo: Frank Lospalluto



trees from progressing. Even when more intense crown fires often burn the aboveground portion of oak trees, affected oaks typically grow back by resprouting from belowground stems and roots.

Following a high severity fire in oak ecosystems, a landowner can take the opportunity to seed native understory species in areas where exotic vegetation has been problematic.

We can try to incorporate this kind of traditional management in preventative measures today, including through thins to target conifer removal and prescribed burning, which can help reduce the likelihood of oak loss during low- to moderate-severity wildfire. However, high-intensity fire that we have seen more recently and more frequently that severely impacts even large, fire-resistant oaks may not be entirely avoidable. In this case, the stand may take many years or decades to recover. Following a high severity fire in oak ecosystems, a landowner can take the opportunity to seed native understory species in areas where exotic vegetation has been problematic. These native species have been fire-adapted.

In these cases, where high-severity fires have had severe impacts on existing oak stands, a landowner should consider the extent of the damage (how much crown is remaining in the oaks), age of the stand (are the oaks near the beginning, middle or towards the end of their lifespan) and what kinds of trees and shrubs were in the stand before the fire.

Where large legacy oaks are left standing with large intact crowns, planting young trees under or around those crown canopies should be avoided. However, if the large legacy oaks look like they will not recover from the fire, planting some young oak seedlings or other native vegetation may be recommended.

Conifer planting is almost never advisable as the site is likely not optimal for conifer growth, and conifer competition is likely to limit or eliminate the potential for oak trees and associated species to repopulate the area. Work with a botanist or wildlife biologist to determine when and where it is important to seed or plant native species following wildfire.

While patience may be required to see an oak ecosystem recover from severe wildfire, the process itself is a feature of western landscapes and a major reason why oak ecosystems continue to support such a high level of biodiversity.



Fourteen years after the Antioch wildfire burned in Jackson County, Oregon oaks and madrone dominate the shrub layer and some dead trees remain standing. This photo was taken in November, the oak leaves are brown for the season. Photo: Jaime Stephens

Tips and Techniques, continued

Sprout Clump Thinning

Oaks routinely re-sprout from the base following disturbance (e.g., fire), or from the stump if they have been cut down. Smaller oaks are occasionally thinned during restoration to release large, old oaks from competition. In these cases, dealing with oak sprouts represents a maintenance issue. In other cases, sprout clump thinning can be used on young, multi-stemmed oaks to increase structural diversity and encourage the growth of the most vigorous stems.

Here are guidelines for thinning young multiple-stemmed oaks that are already established on your property:

- Focus thinning when sprouts are relatively young and respond well to release (typically 5 to 15 years old and <3" DBH).
- Plan to have remaining stems widely spaced.
- Favor stems on the uphill side of a slope.
- Favor smaller high-quality stems over larger poor-quality stems.
- Retain some un-thinned oak clumps for wildlife.



This clump of re-sprouting oaks was thinned at eight years of age, and is shown here 14 years after a wildfire.
Photo: Jaime Stephens



Top: An oak clump that was never thinned provides structural diversity and habitat for shrub-associated birds.
Photo: Jaime Stephens

Left: This clump of oaks was thinned six years ago and the thinned sprouts have re-sprouted. Further maintenance might benefit this oak clump. Photo: Jaime Stephens



Special note

Brewer's oak (see page 20) can easily be mistaken for sprout clumps or young oak thickets. Brewer's oak is not the same as young oak sprouts clumps, and thinning is not recommended as the effects are unknown.



Lazuli Bunting. Photo: Frank Lospalluto

Management Considerations for Brewer's Oak

The main conservation issue with Brewer's oak is probably the lack of fire as a life cycle process. This species relies on sprouting more than acorn dispersal for regeneration. It is unlikely encroachment by conifers is an issue because this species occurs on shallow soils where conditions are too harsh for many trees.

As part of an overall oak management plan, careful application of prescribed fire can benefit Brewer's oak patches, as well as adjacent woodland and grassland habitat patches.

Where fire risk is a major concern, contiguous Brewer's oak patches may be separated by fire breaks into large, distinct patches to retain its function as bird and wildlife habitat.

The predominant growth form of Brewer's oak is as chaparral rather than single-stemmed or clumped trees. Mechanical thinning is generally not recommended within Brewer's oak patches.

Seasonal Considerations

If possible, avoid restoration actions during the songbird nesting season (April 15 through July 31). If mowing is necessary (for example, if needed to comply with local fire regulations), maintain mowed areas at less than 6 inches in height to discourage nesting in between mowing events.

The idea is to avoid attracting birds to an area where they might nest in taller grass, and then mow over the nests, which would likely kill the eggs or young.

Tips and Techniques, continued



Mathew Cocking originally developed the information on this page for the Natural Resources Conservation Service. All photos by Mathew Cocking.

Photo Guide to Girdling

Girdling refers to the process of cutting through the cambium and sapwood layers around the circumference of a tree stem to interrupt the flow of nutrients between the below- and above-ground portions of the tree, resulting in the death of the tree. Girdling is a good option when removal of a conifer tree would likely damage an oak tree — for example, a conifer tree that has grown directly up through the branches of an old oak canopy. The resulting **snags** — or standing dead trees — that result from girdling provide nesting and foraging habitat for wildlife.

Girdled trees will generally die within three years. Trees should be monitored for girdle failure (i.e., the girdle did not completely sever the cambium, or live foliage below the girdle was not removed). If trees do not die, they may require re-girdling or felling.



Step 1:

After removing branches, make shallow (<1 inch deep) horizontal cuts through the bark using an axe or chainsaw. These parallel cuts should be 4 to 8 inches apart, and should not be so deep as to compromise the structural integrity of the tree.



Step 2:

Use a flat edge shove, pry bar, axe or other wedge tool to pry bark away from outer sap wood.



Step 3:

Continue to pry away from outer sap wood until no connective bark or cambial tissue remains between the two initial horizontal cuts. If all connective tissue is not removed, or if the **girdle** is not wide enough, trees are less likely to die. Do not leave any live branches below the **girdle** as they may prevent the death of the tree.



Thinned black oak-conifer forest.
Photo: Mathew Cocking



Oak woodland with high-vitality trees.
Photo: Karen Hussey



Oaks have irregular cycles of acorn production; good crops referred to as mast years occur every 2-5 years, with few acorns in between. In fall and winter, Lewis's Woodpeckers will congregate in areas with high acorn mast. Photo: James Livaudais

What to Expect After Restoration

Within a few years after overtopping conifers are removed, oak trees will start to show results. Growth rates of California black oaks, for example, can double following thinning. Also, released oaks can increase the number of acorns they produce and begin building larger crowns. Oaks are slow-growing, so changes in growth will be gradual. If conditions remain favorable, oaks may expand their crowns for years.

Follow-up treatments are often desirable to remove newly encroaching conifers. If fire is used, it should be repeated every few years as needed, depending on the growth of competing conifers and shrubs. Invasive, non-native species may need to be controlled through repeated treatments if they persist. As your oak habitat becomes restored, new species of wildlife are likely to appear on your land. For example, in Marin and Sonoma Counties in California, the number of bird species at restored oak habitats increased steadily over a 16-year period from an average of 8 to 27 species. In the years following restoration, you can watch with pride as your oak trees develop to support rich wildlife communities and provide a pleasing landscape aesthetic.

What the Birds Tell Us

Birds are excellent indicators of the health of your oak habitat. Birds are diverse and each species depends on specific habitat features, such as cavities for nesting, shrub structure for cover, and abundant insect populations for food. An oak habitat that can support many types of birds will contain habitat components of value to other wildlife as well. By observing which birds occur on your land following oak restoration, you can bear witness to the return of ecological health to your land. Birds provide a colorful, musical, and accessible window into the functioning of your land that can increase your appreciation of your oak habitats. See *Appendix V: Monitoring Birds on Your Land* on page 67 to get started.

A Landowner Success Story

Mark and Lisbeth LaCoste underestimated the amount of work and learning that would be required of them when they relocated to a 230-acre tract of rural farm and forestland in the remote Colestin Valley of southern Oregon.

The couple sought cost share funds for fuels reduction and pre-commercial thinning, but did not feel as though that type of treatment fully addressed the needs of their forested property.

They became interested in restoration of the oak tree component of their forests during a conversation with Marko Bey of Lomakatsi Restoration Project. Marko described the open condition of oak woodlands prior to Euro-American settlement, when the landscape was subject to frequent low-intensity fires lit by Native Americans. These fires maintained productive plant communities, helped oaks thrive by removing competing vegetation, and made it easier for Native people to collect acorns, a staple of their diet. This conversation prompted Mark and Lisbeth to begin to look at their property in a new way.

When funding later became available for oak woodland restoration on private properties in the Colestin Valley through a cooperative agreement among Lomakatsi Restoration Project, US Fish and Wildlife Service, Natural Resources Conservation Service, and Klamath Bird Observatory, the LaCoste's were excited to begin work.

“Contributing to the
restoration effort was
rewarding in so
many ways.”



Mark and Lisbeth on their property in southern Oregon.

“Contributing to the restoration effort was rewarding in so many ways,” says Mark. “We found it incredibly satisfying to engage in restoration work, not only for the good of our own property, but also for the good of the surrounding community. We felt gratified as local interest in oak restoration grew and neighbors became involved in similar restoration work on their properties.”

“Our biggest challenge was deciding how much involvement was right for us. When the time came for the on-the-ground work to begin we thought we could just give some general guidance and leave the details up to



A nice California black oak on the LaCoste property. Photo: Josh Budziak

“We feel comforted
knowing that our woodlands
are not only healthier,
but safer in terms of
fire risk and more
beneficial for wildlife.”

the professional work crews. But when we saw the initial results, we were shocked at how much the stand had opened up. We were uncertain as to whether we wanted to proceed further but when we brought our concerns to Lomakatsi, we realized that we could specify our wishes in a very detailed way. For example, we could say, ‘Leave a 20-foot buffer along roads so there is not a clear view from the road all the way up to our house,’ or ‘Let’s keep this particular tree right here because we like it, even though it may be crowding a single oak tree.’”

“Once we learned that we could provide specific input on treatments, we were excited to watch the additional work proceed. As encroaching conifers were thinned from around dominant California black oak and Oregon white oak trees, we saw new parts of our property open up that we had never



previously really seen or explored. This inspired us to make walking paths and appreciate our property in a whole new way.” We feel comforted knowing that our woodlands are not only healthier, but safer in terms of fire risk and more beneficial for wildlife.”

“What really excites me now,” says Mark, “is thinking about additional treatments that we can do, especially using prescribed fire.”

To help prevent a mismatch in vision between landowners and resource professionals, it can be useful to first treat a small sample area. This will allow landowners to see actual results and make modifications before the bulk of restoration begins.

The LaCoste’s are planning for a prescribed underburn on 40 acres of their property under a cooperative agreement between the US Fish and Wildlife Service Partners Program and Lomakatsi Restoration Project.

A certified burn plan and professional crew are needed to safely plan and execute a prescribed fire. The LaCoste’s are motivated by the expected restorative benefits of prescribed underburning following the recent thinning work, and feel that carefully executed burning, followed by reseeding with native bunchgrasses and **forbs**, can reduce the chance of noxious weed invasion and result in mixed vegetation patterns that restore forest health and habitat diversity for wildlife.

Overall, they say the restoration experience has been positive and rewarding. For them, the best part was finding value in not just treating the forest to harvest resources, but in learning to become land stewards. “Actually, becoming a land steward through practice,” says Mark, “has been a very satisfying experience.”



The same stand of mixed oak-conifer forest on the LaCoste property is shown, from top to bottom, in stages of “before,” “during,” and “after” restoration thinning. California black oaks are easily visible in the bottom photograph. Photos: Josh Budziak

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Appendix I:

Plants and Animals in this Guide

Plants

Native

Oregon white oak (*Quercus garryana*)
Brewer's oak (*Quercus garryana breweri*)
California black oak (*Quercus kelloggii*)
Canyon live oak (*Quercus chrysolepis*)
Tanoak (*Lithocarpus densiflorus*)
Valley oak (*Quercus lobata*)
California redwood (*Sequoia sempervirens*)
Douglas-fir (*Pseudotsuga menziesii*)
Oregon ash (*Fraxinus latifolia*)
Pacific madrone (*Arbutus menziesii*)
Ponderosa pine (*Pinus ponderosa*)
Incense cedar (*Calocedrus decurrens*)
White fir (*Abies concolor*)
Sugar pine (*Pinus lambertiana*)
Chinquapin (*Quercus muehlenbergii*)
Coffeeberry (*Rhamnus californica*)
Poison oak (*Toxicodendron diversilobum*)
Common snowberry (*Symphoricarpos albus*)
Ocean spray (*Holodiscus discolor*)
Hazel (*Corylus spp.*)
Serviceberry (*Amelanchier spp.*)
Oregon grape (*Mahonia aquifolium*)
Bitterbrush (*Purshia tridentata*)
Mountain mahogany (*Cercocarpus spp.*)

Buckbrush (*Ceanothus cuneatus*)
 Pacific mistletoe (*Phoradendron villosum*)
 California bay laurel (*Umbellularia californica*)
 California fescue (*Festuca californica*)
 Roemer's fescue (*Festuca roemerii*)
 Idaho fescue (*Festuca idahoensis*)
 Western fescue (*Festuca occidentalis*)
 California brome (*Bromus carinatus*)
 Blue wildrye (*Elymus glaucus*)
 California oatgrass (*Danthonia californica*)
 Junegrass (*Koeleria macrantha*)
 Sweetcicely (*Osmorhiza spp.*)

Non-native Invasive

English hawthorn (*Crataegus laevigata*)
 Armenian blackberry (*Rubus spp.*)
 Himalayan blackberry (*Rubus armeniacus*)
 French broom (*Genista monspessulana*)
 Scotch broom (*Cytisus scoparius*)
 English holly (*Ilex aquifolium*)
 Yellow starthistle (*Centaurea solstitialis*)
 Bull thistle (*Cirsium vulgare*)
 St John's wort (*Hypericum perforatum*)
 Medusahead (*Taeniatherum caput-medusae*)
 Cheatgrass (*Bromus tectorum*)

Birds

California quail (*Callipepla californica*)
 Wild turkey (*Meleagris gallopavo*)
 Band-tailed pigeon (*Patagioenas fasciata*)
 Lewis's woodpecker (*Melanerpes lewis*)
 Downy woodpecker (*Picoides pubescens*)
 Acorn woodpecker (*Melanerpes formicivorus*)
 White-breasted nuthatch (*Sitta carolinensis*)
 Black-capped chickadee (*Poecile atricapillus*)
 Oak titmouse (*Baeolophus inornatus*)
 Bushtit (*Psaltirparus minimus*)
 Blue-gray gnatcatcher (*Polioptila caerulea*)
 Western wood-pewee (*Contopus sordidulus*)
 Ash-throated flycatcher (*Myiarchus cinerascens*)
 Western scrub-jay (*Aphelocoma californica*)
 Western bluebird (*Sialia mexicana*)
 House wren (*Troglodytes aedon*)
 Bewick's wren (*Thryomanes bewickii*)

Spotted towhee (*Pipilo maculatus*)
 California towhee (*Melospiza crissalis*)
 Lazuli bunting (*Passerina amoena*)
 Black-throated gray warbler (*Dendroica nigrescens*)
 Western tanager (*Piranga ludoviciana*)

Mammals

Western gray squirrels (*Sciurus griseus*)
 Douglas squirrels (*Tamiasciurus douglasii*)
 Columbian black-tailed deer
 (*Odocoileus hemionus columbianus*)
 Columbian white-tailed deer
 (*Odocoileus virginianus leucurus*)
 American black bear (*Ursus americanus*)
 Roosevelt elk (*Cervus canadensis*)

Reptiles & Amphibians

Ensatina salamanders (*Ensatina spp.*)
 Common Kingsnake (*Lampropeltis getula*)
 Pacific giant salamander (*Dicamptodon spp.*)
 Northern red-legged frogs (*Rana aurora*)
 Ring-necked snakes (*Diadophis punctatus*)
 Pacific tree frogs (*Pseudacris regilla*)
 Western skinks (*Plestiodon skiltonianus*)
 Sharp-tailed snake (*Contia tenuis*)
 Pacific gopher snake (*Pituophis catenifer catenifer*)
 Northwestern garter snake (*Thamnophis ordinoides*)
 Western fence lizard (*Sceloporus occidentalis*)

Appendix II: Oak-Associated Native Grasses and Wildflowers for Seed Mixes or Planting

Grasses

California fescue (*Festuca californica*)
 Roemer's fescue (*Festuca roemerii*)
 California brome (*Bromus carinatus*)
 Blue wildrye (*Elymus glaucus*)
 Lemmon's needlegrass (*Eriocoma lemmonii*)
 California oatgrass (*Danthonia californica*)
 Junegrass (*Koeleria macrantha*)

Wildflowers

Mountain sweet cicely (*Osmorhiza berteroi*)
Western buttercup (*Ranunculus occidentalis*)
Lanceleaf selfheal (*Prunella vulgaris* ssp. *Lanceolata*)
Oregon sunshine (*Eriophyllum lanatum*)
Carrotleaf horkelia (*Horkelia daucifolia*)
Woodland strawberry (*Fragaria vesca*)
Yarrow (*Achillea millefolium*)
Large flowered agoseris (*Agoseris grandiflora*)
Great camas (*Camassia leichtlinii*)
Gairdner's yampah (*Perideridia gairdneri*)
Pacific houndstongue (*Adelinia grandis*)
Nineleaf lomatium (*Lomatium triternatum*)
Spring gold (*Lomatium utriculatum*)
Slender clarkia (*Clarkia gracilis*)
Winecup clarkia (*Clarkia purpurea*)
Largeflower collomia (*Collomia grandiflora*)
Henderson's shooting star (*Primula hendersonii*)
Yellowleaf iris (*Iris chrysophylla*)
Seablush (*Plectritis congesta*)
Pacific snakeroot (*Sanicula crassicaulis*)

Shrubs

Common snowberry (*Symphoricarpos albus*)
Ocean spray (*Holodiscus discolor*)
Hazel (*Corylus cornuta* ssp. *Californica*)
Serviceberry (*Amelanchier alnifolia*)
Oregon grape (*Berberis aquifolium*)
Mountain mahogany (*Cercocarpus betuloides*)
Buckbrush (*Ceanothus cuneatus*)

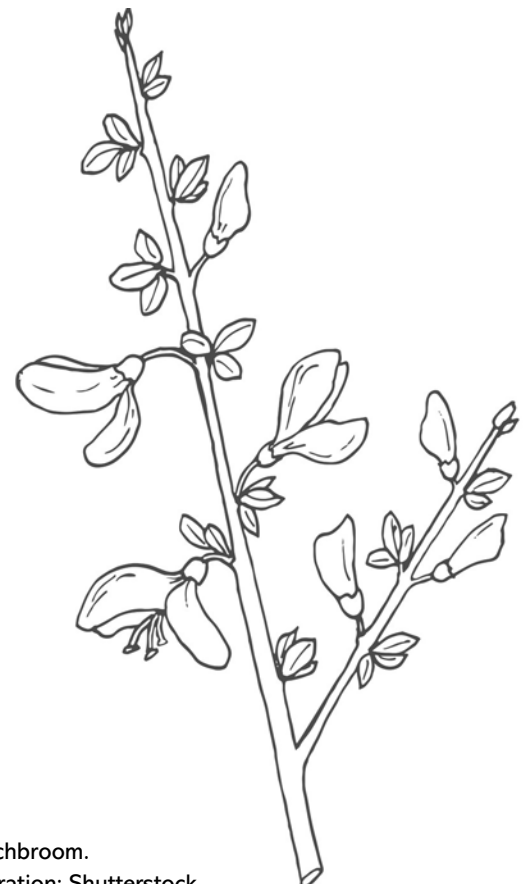
Oats (*Avena fatua*)
Bulbous bluegrass (*Poa bulbosa*)
Hedgehog dogtail grass (*Cynosuros echinatus*)
North Africa grass (*Ventenata dubia*)

Shrubs

Scotch broom (*Cytisus scoparius*)
English hawthorn (*Crataegus monogyna*)
Armenian/Himalayan blackberry (*Rubus armeniacus*)
English holly (*Ilex aquifolium*)

Forbs

Bull thistle (*Cirsium vulgare*)
St John's wort (*Hypericum perforatum*)
Hairy vetch (*Vicia villosa*)
Moth mullein (*Verbascum Blattaria*)
Yellow starthistle (*Centaurea solstitialis*)
Knapweeds (*Centaurea* spp.)
Tall sock-destroyer (*Torillia arvensis*)



Scotchbroom.
Illustration: Shutterstock

Appendix III: Common Non-native, Invasive Plant Species in Oak Habitats

Grasses

Medusahead grass (*Taeniatherum caput-medusae*)
Cheatgrass (*Bromus tectorum*)
Ripgut brome (*Bromus diandrus*)
Sterile brome (*Bromus sterilis*)
Soft brome (*Bromus hordeaceus*)

Appendix IV: Help with Your Restoration

Assistance and Professional Guidance for Private Landowners

Numerous agencies, organizations, and conservation programs can help you with your oak habitat restoration project by defraying costs, providing expertise, and offering other support services. Contact the following organizations to learn more:

CAL FIRE, and California Board of Forestry
California Department of Fish and Wildlife
DOI Bureau of Land Management
Land Trust Alliance
Lomakatsi Restoration Project
National Fish and Wildlife Foundation
Oregon Department of Fish and Wildlife
Oregon Department of Forestry
Resource Conservation Districts (by county)
Soil and Water Conservation Districts
The Conservation Fund
The Nature Conservancy
The Understory Initiative
University Extension Services
USDA Natural Resources Conservation Service
US Fish and Wildlife Service
US Forest Service
Watershed Councils
Wildlife Conservation Board



Oak Titmouse. Photo: Frank Lospalluto

Selling Restoration By-Products

You may decide to sell trees on your land that are harvested as a result of your oak habitat restoration project. These harvested trees may pay for some or all of the costs associated with managing your oaks. Agencies such as the Oregon Department of Forestry and university extension offices can offer assistance and resources to private landowners interested in managing their own timber sale.

Before beginning, you should consult with professionals to learn about applicable forest practices laws as well as timber harvest taxes on your small operation.

Dealing with Slash

Oak restoration activities, especially the removal of large conifers, can generate large amounts of slash (i.e., branches and other woody residue left on the forest floor after the cutting of timber).

Generally, the felling of trees in thinning operations is a small portion of the total work and the disposal of slash is the bulk of it. A landowner must decide how to dispose of all this woody debris. You can find useful information at ForEverGreen Forestry.

Appendix V: Monitoring Birds on Your Land

Observing birds can bring pleasure and a greater understanding of your land. Birds are among the easiest wildlife to observe; they are abundant, often brightly-colored, and many of them announce their presence through distinctive songs. Furthermore, it is rewarding to see your land provide for these animals as they go about their lives.

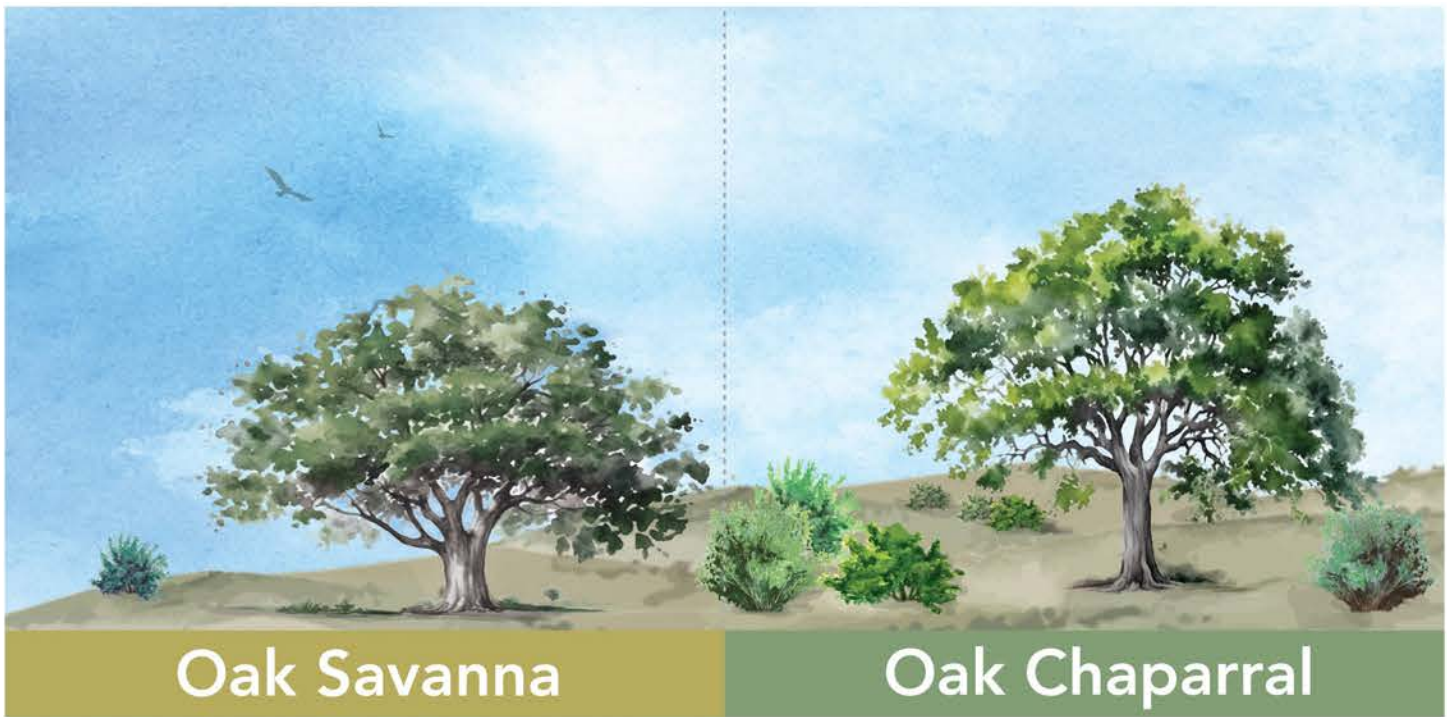
Birds also tell you a great deal about the condition of your land. A single parcel of healthy oak habitat can provide food and shelter for an amazing variety of birds. Some birds live year-round as residents on your land, others visit on migration to rest and refuel, and others spend either summers or winters on your land. By observing which birds occur on a parcel of land, we learn about the capacity of the land to support wildlife and the benefits of your restoration activities.



Bird survey in oak. Photo: Jaime Stephens

Below are some simple directions for monitoring birds on your land. If you conduct bird surveys both before and after restoration activities, you'll be able to see the benefits of restoration for wildlife.

- (1) Choose a walking route on your land that will take approximately 15-30 minutes to complete.
- (2) Walk this route at the same time of day, preferably within four hours of sunrise when birds are most active, on an approximately weekly or monthly basis.
- (3) On each walk, record how many of each of your four focal bird species you see or hear (see the next page to learn your focal species). Be conservative when recording numbers of birds, trying not to "double count" individual birds. You may also record additional bird species you are able to identify. See page 72 for an example datasheet for recording your bird sightings.
- (4) Use your computer to enter your bird observations into the eBird website: <https://ebird.org/pnw/home>. By entering your observations, you will join one of the most significant community science conservation programs in the world. Visit page 70 of this guide for instructions on how to use eBird.
- (5) Have fun and share your knowledge of birds with friends and family. Over time, watch how your bird list changes as new species appear on your land and other birds increase in abundance.



You will survey for four bird species when you monitor birds on your land. The four species you choose to survey will depend on whether you are monitoring birds in oak savanna, oak chaparral, oak woodland, or mixed oak-conifer habitat. Some species, such as the towhees, are good indicators of multiple habitats.



California Towhee

Time: All year

Identification: 9", brownish overall, top of head a warmer brown, and orange on throat and under tail

Where to find: on ground near shrubs



Western Meadowlark

Time: All year

Identification: 9", plump bird with short tail, bright yellow underneath with black V-shaped chest band, speckled brown above

Where to find: on ground, wires, fence posts



Western Bluebird

Time: All year

Identification: 7"; back, head, and wings blue; chest and sides reddish; belly light gray

Where to find: on low perches



Western Kingbird

Time: Spring and summer

Identification: 9", black tail and wings, gray upperparts, bright yellow belly

Where to find: on wires and exposed perches



California Towhee

Time: All year

Identification: 9", brownish overall, top of head a warmer brown, and orange on throat and under tail

Where to find: on ground near shrubs

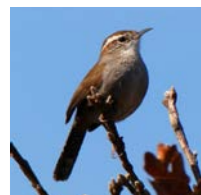


Blue-gray Gnatcatcher

Time: Spring and summer

Identification: 4", blue-gray above, long tail is black with white outer edges and white below, white eye-ring

Where to find: in shrubs or trees



Bewick's Wren

Time: All year

Identification: 5", dark brown above, whitish below, long white eyebrow, tail flits sideways and is edged with white spots

Where to find: in shrubs



Lazuli Bunting

Time: Spring and summer

Identification: 5", male is bright turquoise above and on throat, with cinnamon chest, white belly, and white wing bar

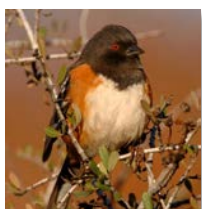
Where to find: singing from shrubs or trees



Oak Woodland



Mixed Oak - Conifer



Spotted Towhee

Time: All year

Identification: 8"; black head, back, and throat; reddish sides; white central belly; white spots on wings; red eyes

Where to find: on the ground near shrubs



White-breasted Nuthatch

Time: All year

Identification: 6", white face with black cap, blue back, underneath white

Where to find: moving down trunks and large tree limbs



Acorn Woodpecker

Time: All year

Identification: 9"; black chin; yellowish throat; white cheeks and forehead; red top of head; white eyes; black body with white rump, belly, and wing patches

Where to find: in oak trees



Oak Titmouse

Time: All year

Identification: 5", grayish brown with a short crest, lighter underneath, black eye

Where to find: in oak trees



Black-throated Gray Warbler

Time: Spring and Summer

Identification: 5", head is black with thick white streaks, chest is black and belly white, yellow spot between eye and bill

Where to find: in trees



Downy Woodpecker

Time: All year

Identification: 7", center of back is white, small woodpecker with small bill, outer tail feathers are white and tend to have faint dark spots

Where to find: in trees



House Wren

Time: Spring and Summer

Identification: 5", brown above with subtle eyebrow, little barring on belly, tail pointed upwards

Where to find: in trees and shrubs



Black-capped Chickadee

Time: All year

Identification: 5", black cap and bib, white-and-gray body, lacks the white eyebrow of the similar Mountain Chickadee

Where to find: in trees



eBird Northwest | www.ebird.org/pnw/home

eBird



What is eBird? eBird is an online program that has revolutionized the way the birding community reports and accesses information about birds. Community Scientists enter their bird sightings into eBird and then can view summaries, maps, and other representations of their data, as well as the data of other birdwatchers. The information also has tremendous value for scientists and educators.

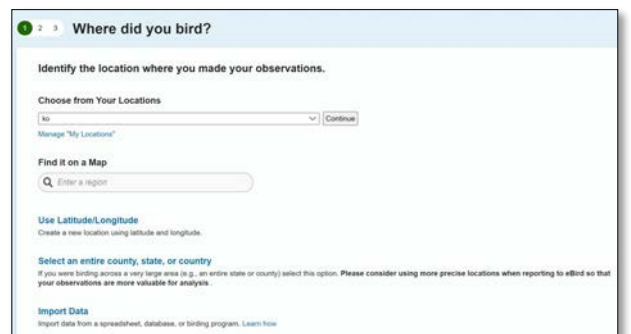
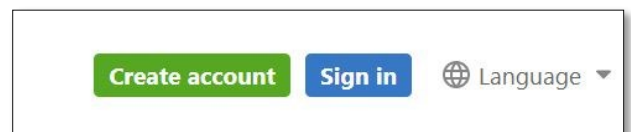
What is eBird Pacific Northwest? eBird Pacific Northwest is a regional portal of eBird that engages communities in the Pacific Northwest.

Why is eBird Important? Each person's bird sightings are joined with sightings from thousands of other participants around the world, and this wealth of information is used to understand, protect, and share information about bird populations.

Why is eBird Meaningful to You? You can use eBird to manage your bird sightings while contributing to the understanding and conservation of birds. Contributing to eBird is one of the most enjoyable ways to safeguard our natural heritage.

eBird Pacific Northwest – Get started now!
Below are steps for getting started with eBird:

- 1) **Get online.** Go to this website:
www.ebird.org/pnw/home
- 2) **Sign In or Register** as a New User.
- 3) Click “Find it on a Map” to Identify Your Property.
- 4) **Put a Marker on your Property** and Give it a Name.



Larkin Ln

Beach

Enter Location Name

Michael's Yard

☐ Suggest as a Birding HotSpot?

5) Enter Your Bird Sightings:

- Enter date and effort.
- Enter the bird species you saw or heard, including numbers of individuals of each species.
- Check “yes” or “no” depending on whether you are entering all the bird species you were able to identify.
- Click “Submit” to finish.

6) Explore eBird Northwest:

The eBird website offers interesting content and many ways to explore your personal bird observation data, as well as data entered into eBird by other users. The “Home” tab directs you to news articles about birds and the Pacific Northwest. The “Submit Observations” tab is what you will use to submit new bird checklists. The “Explore Data” and “My eBird” tabs allow you to look at the data in dynamic and fascinating ways. Play around with the website, and enjoy!

1 2 3 **Where did you bird?**

Zoom to: Enter place name, address, or lat/long coordinates...

Map Satellite

ASHLAND

1 2 3 **Date and Effort** Michael's Yard, Jackson County, Oregon, US Change

* Observation Date: Dec 22 2013

1 2 3 **What did you see or hear?**

KINGFISHERS

1 **Belted Kingfisher** Add Details

WOODPECKERS

Williamson's Sapsucker

2 **Red-breasted Sapsucker** Add Details

Red-naped/Red-breasted Sapsucker

sapsucker sp.

Lewis's Woodpecker

Acorn Woodpecker

Are you submitting a **complete checklist** of the birds you were able to identify?

☒ Yes ☐ No ☐ ?

Submit

CHECKLIST S157885634

Tue 2 Jan 2024 8:00 AM Edit date and effort

ko Jackson County, Oregon, United States Edit location

Private Lands Oak Restoration Project: Bird Monitoring

Location: _____

Date: _____

Start Time: _____

End Time: _____

Distance Covered (~miles): _____

Total # of People in Party: _____

Observer Name(s) _____

Species Name	Number	Species Name	Number
Oak Savanna Species			
California Towhee			
Western Meadowlark			
Western Bluebird			
Western Kingbird			
Oak Chaparral Species			
Blue-gray Gnatcatcher			
Bewick's Wren			
California Towhee			
Lazuli Bunting			
Oak Woodland Species			
White-breasted Nuthatch			
Spotted Towhee			
Acorn Woodpecker			
Oak Titmouse			
Oak-Conifer Forest Species			
Downy Woodpecker			
House Wren			
Black-capped Chickadee			
Black-throated Gray Warbler			
Other Bird Species (Write-in)			

Please enter your bird observations into eBird Northwest: ebird.org/pnw/home

Thank you for your participation!

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Appendix VI:

Helpful Terms

If you encounter an unfamiliar term in **bold font** in the text, return to this page for the definition.

Annual plant: a plant that lives for one year or less.

Conifer: evergreen trees that bear cones and have needle-like or scale-like leaves, such as pines, firs, spruces, and cedars.

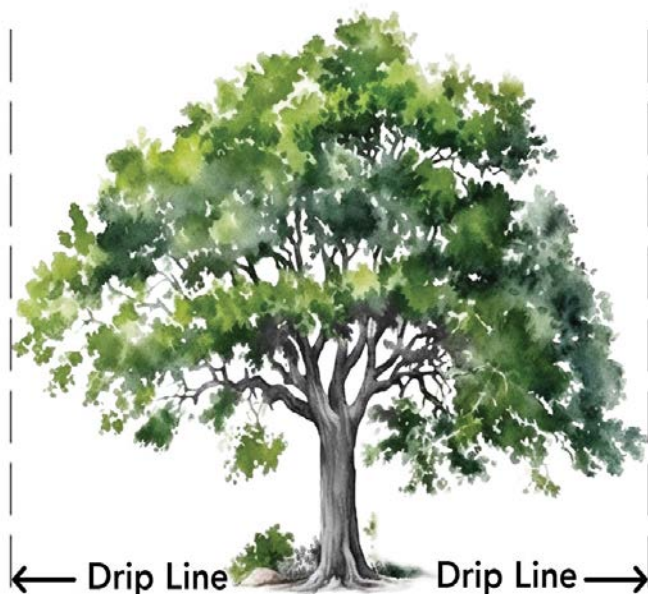
Controlled burn: the controlled application of fire over a predetermined area to reduce wildland fuels and restore ecological health. These are also known as “broadcast burns” and “prescribed burns.”

Diameter at Breast Height (DBH): which is a standard measure of tree size that is the diameter of the tree’s trunk at the height of 4.5 feet above the ground.

Downed wood: wood found on the forest floor in various stages of decomposition.

Drip line or drip zone: the imaginary circle on the soil around a tree that falls directly below the tree’s outermost branches. All the rain water that drips off a tree would fall within this circle.

Forbs: herbaceous (non-woody) plants other than grasses.



Girdle: the process of cutting through the cambium and sapwood layers around the circumference of a tree stem to interrupt the flow of nutrients between the below- and above-ground portions of the tree, resulting in the death of the tree. See page 56 for a photo guide to girdling.

Granary trees: trees that acorn woodpeckers use as storage sites for acorns.

Ladder fuels: tall grasses, shrubs, and living or dead trees that allow ground fires to travel upwards into forest canopies.

Perennial plant: a plant that lives for more than two years. An **annual plant** lives for one year, and a **biennial plant** lives for two years.

Radial thinning: the removal of competing trees within a certain radius of an ecologically valuable tree.

Residual Dry Matter (RDM): a standard used for assessing the level of grazing on rangeland. RDM refers to the number of pounds per acre of old herbaceous plant material left on the ground at the start of a new growing season.

Snags: standing dead trees, usually with hollow trunks or limbs.

Sprout clump thinning: the practice of thinning stems that sprouted from the base of a single tree following disturbance or the cutting of the tree. Learn more about sprout clump thinning on page 54.

Stocking rate: the number of animal units (AUs) grazing in a defined area for a specified period of time. Stocking rate is a management decision that takes into account variation in forage use and availability between animals of different sizes.

Sudden Oak Death: a disease in oaks and other trees caused by the non-native pathogen *Phytophthora ramorum*. Oak species show varying susceptibility to the disease, and some oak populations have been devastated recently in California and Oregon.



Klamath Basin
Audubon Society



LOMAKATSI
RESTORATION PROJECT



Natural Resources Conservation Service

United States
Department of
Agriculture

