California Native Oaks: Past and Present

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The fossil record indicates that oaks have been in California for at least the past ten million years. Relatives of most of the California oaks have been found in late Miocene sediments deposited five to thirteen million years ago.

There are approximately sixty species of oaks in the United States, and an estimated three hundred worldwide, primarily in the Northern Hemisphere. Ten tree and eight shrub species of Quercus grow in California. California species fall into three different subgenera: the white oaks, Lepidobalanus (now Section or Subgenus Quercus); the intermediate oaks, Protobalanus; and the black oaks, Erythrobalanus (also known as Section Lobatae of Subgenus Quercus). The prefix Erythro is derived from the Greek word for red. Generally, taxonomists and foresters refer to the Erythrobalanus group as red oaks. However, in California and the northeastern United States, this group is known as black oaks. The local usage probably arises from Q. kelloggii (California black oak), a species in the Erythrobalanus that is physically similar to the red oaks in the eastern part of the United States. Hybridization, which is naturally restricted to crosses within a subgenus, has result in eleven named hybrids and ten unnamed hybrids.

Oak life cycle

Oaks are monoecious, bearing male catkins and female flowers upon the same individual plant. Flowers are wind pollinated, and acorns mature in either one- or two-year cycles. The acorns of the white oaks characteristically mature in the fall of the same year the flowers bloomed. In contrast, most of the black oaks exhibit delayed fertilization similar to some of the pines; acorns mature in fall of the second year.

California white oak acorns do not require a period of dormancy and generally germinate in the fall or winter after dropping. In fact, emerging roots are visible on some blue oak acorns while still on the tree. On the other hand, black oak acorns often respond favorably to a period of cold stratification with rapid germination.

Seedling oaks are temporary. Huge populations of seedlings come and go following good seed crops. Seedlings succumb to a variety of problems including drought, herbivory (both above- and below-ground) and fire. Although physiologically equipped to sprout after above-ground damage, very few seedlings survive and grow to the next stage of maturity, the short sapling stage.

Short sapling oaks have an increased likelihood to survive to adulthood. Short saplings, under four and one-half feet in height, have a woody stem and a well-developed root system which serves as a reservoir of energy. Short saplings sprout readily after injuries from fire, drought or browsing, and may be kept in a hedged condition for decades. Only after the sapling’s leader reaches above the deer browse line does the sapling proceed to the next level of maturity, the tall sapling stage.

Tall saplings, greater than four and one-half feet (above the browse line), gain height and girth rapidly. At this stage, after top death due to burning, they may regain their previous stature within a few years. Saplings gain height before adding girth, and then develop into the next stage of maturity, young trees.

Tree status can be considered the beginning of the productive stage of an oak’s life. Although timing and triggering mechanisms for sexual maturity are unclear, root and shoot mass, as well as vigor and crown position, are components. As an oak matures, it begins to display its characteristic bark and growth form as well as the cycle and quality of mast, the acorn crop.

The life of a tree can be divided into three stages: young, mature and declining. Young trees usually have a strong ability to sprout from the base after injury. Mature trees may sprout from the stumps of broken branches. However, the ability of mature trees to sprout from the stump is more variable. For instance, blue oak (Q. douglasii) and Garry or Oregon oak (Q. garryana) appear to stump sprout well to mid-size classes, while valley oak (Q. lobata) loses this ability earlier. The black and intermediate oaks, as well as most of the shrub species, sprout vigorously after fire.

Disease plays a large part in the life of the adult oak. To quote the British ecologist M. J. Penistian, in his paraphrase of Dryden: “The monarch oak, the Patriarch of trees, springs rising up, then spreads by slow degrees; one hundred years he grows, one more he stays supreme in state, then in one more decays.”

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Wildlife and oak habitats

During their long history in California, oaks have evolved strong interrelationships with wildlife. Today, an estimated 5000 species of insects use oaks, and 1000 are dependent upon oaks. Approximately 170 species of birds use oaks at some point in their life cycle. Fifty-eight species of lizards, snakes and amphibians are associated with oak habitats. One hundred five species of mammals, including most of the game species in the state, use the oak resource.

Interactions between diseases, wildlife (including feral hogs), and introduced annual plants are avenues of research being explored by contemporary researchers. However, research efforts are uneven across the species in the state.

Approximately ten million acres of California are habitat to the nineteen native species of oak. The California Department of Fish and Game Natural Diversity Data Base recognizes sixty-seven different types of oak habitat. Oaks dominate or co-dominate in twenty-five natural plant communities, and are characteristic members of forty-three others.

Humans and oaks

California’s human history is inextricably interwoven with its landscape and vegetation. Over millennia, native Californians developed many uses for oaks. Acorns were a major item in their diet; acorns were also important for the animals they used for food. Many native American cultures acknowledged their dependence upon oaks through ritual and legend. The near extinction of these indigenous peoples from their ancestral oak populations marked a loss of a sophisticated understanding about oak stewardship. Today we cannot fully recover the loss of oak management lore that passed away with these people.

When Franciscan missionaries arrived in 1769 they often located missions in oak woodlands. These missions, and the associated Mexican ranchos, had a profound impact on oak woodlands. The introduction of aggressive Mediterranean annual grasses and forbs along with Mexican cattle changed forever the nature of the California grassland and oak woodlands. How many current California residents know, or care, that much of the green woodland understory in spring has been here for less than two centuries?

The arrival of vast numbers of gold miners also had a lasting and negative effect on California oaks.

Before we enter the next century, Californians should critically evaluate the role of oaks in modern society and how these ancestral landscapes can be preserved amid rapid population growth and land speculation.

Although it is difficult to imagine California devoid of oaks, with treeless foothills or coastal landscapes, the history of Europe and the British Isles gives us pause. At one time Ireland, England and Wales were almost entirely covered with trees—mostly oaks. For many Californians, blue gums and other exotic trees are not an acceptable alternative for our native oaks.

Historic glimpses of California Oaks

Many California explorers and botanists recorded observations of the oak-filled landscapes they encountered. Their comments remind us of the rich diversity of California oaks, ranging from low, arid Mojave Desert slopes to high, wet ridges in the Klamath ranges.

George Vancouver, commander of the English ship Discovery, described valley oaks in the Santa Clara Valley in 1792: “For about...
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twenty miles it could only be compared to a park which had originally been closely planted with the true old English oak; the underwood, that had probably attended its early growth, had the appearance of having been cleared away and left the stately lords of the forest in complete possession of the soil which was covered with luxuriant herbage.

The magnificent valley oak woodlands of the Sacramento and San Joaquin valleys, as well as the larger foothill valleys, are noted repeatedly in journals of early travelers. John C. Fremont discovered the interior live oak on the South Fork of the American River in March, 1849 after crossing the Sierra Nevada. Later, on a journey from Sutter’s Fort to Los Angeles, he passed through impressive interior live oak groves on the Consumnes, Mokelumne, Stanislaus, and other streams on the east side of the San Joaquin Valley. “The country is smooth and grassy; the forest had no undergrowth; and in the open valleys or rivulets, or around spring heads, the low groves of live oaks give the appearance of orchards in an old cultivated country.”

Charles S. Sargent in 1905 described coast live oak as “a tree, occasionally eighty to ninety feet high, with a short trunk three to four or rarely six to seven feet in diameter, dividing a few feet above the base into numerous great limbs often resting on the ground and forming a low round-topped head frequently 150 feet across...usually in open groves of great extent from Sonoma County southward over the coast ranges and islands to San Pedro Matrí...very abundant and of its’ largest size in valleys south of San Francisco Bay and their commonest and characteristic tree; frequently covering with semiprostrate and contorted stems the sand dunes of the Coast.”

Willis Jepson, who hiked and rode for many years gathering information and specimens of California’s wild plants, commented on the blue oak in a way that rings familiar to all who have trod the dry foothills in summer. “Not in itself an attractive tree, the blue oak by reason of its form, color and habitat plays a strong and natural part in the scenery of the yellow-brown foothills. Always scattered about singly or in open groves, the trees are well associated in memory with bleached grass, glaring sunlight, and dusty trails, although for a few brief days at the end of the rainy season the white trunks rise everywhere from a many-colored cloth woven from the slender treads of innumerable millions of flowering annuals.”

Jepson was also greatly impressed with canyon live oak (which has many common names). “In the Sierra Nevada the species is most common and of largest size between 1500 and 5000 feet, being chiefly confined to the canyons. In size of individuals it reaches greatest development in Mendocino and Humboldt counties, where the most massive trees grow on bottomlands in the valleys. The narrow floor of Hupa Valley is distinguished by its maul oaks, their great size and port. One of these trees, named Old Scotty, is ninety-five feet high and one hundred twenty-five across the crown. The tallest trees grow on the sharp walls of deep cool canyons, and as such habitats so commonly exhibit well-developed trees the species is often called canyon oak.”

Even during the late 1800s Jepson was well aware of the tremendous diversity of oaks in California. Not only does California offer a wealth of oak species, but also the luxury of an even greater number of interesting oak habitats.

Major disturbances in the oak woodlands

As California’s rural and urban populations grew after the Gold Rush, there was an ever-increasing demand for oak products. Ranchers, needed fuel, fencing, and cleared land. The cities also created an ever-growing demand on oak resources. One early example of fuel wood harvest for distant urban areas was near Castroville: “On the uplands and low hills east of town there is an almost inexhaustible supply of good oak cordwood, and large trade in which with San Jose and other points is carried on by medium of the Southern Pacific Railroad” (Resources of California, April 1881). These coast live oak forests on Aromas sand hills near Castroville did sprout and formed a new forest. However, the resprouted forest is now being rapidly cleared for strawberry farms and new homes amidst controversy over heavy soil erosion from the steep, sandy hillsides.

In the 1900s the charcoal industry began to impact the oak woodlands. San Luis Obispo County was the major charcoal-producing area in the state, with the greatest concentration in the Adelaide region west of Paso Robles. There over 1000 acres per year were cleared for charcoal at the peak of production.

From the 1940s and 1950s, several federally-funded programs encouraged agricultural development and land clearing. One program, started in 1941, was the War Food...
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Program. Another was the Agricultural Adjustment Administration's range improvement program for the Eradication and Control of Destructive and Competitive Plants. Between 1950 and 1980, 4.8 million acres of forest and rangeland were converted to urban and irrigated agricultural land uses.

Public involvement in oak affairs

Unlike the state's conifer resources, oaks inhabit private land and have received little management scrutiny from traditional forestry interests. The first public expressions of concern over the long-term future of California's oak communities surfaced in many parts of the state in the 1970s. Articles and news items about regeneration problems of valley oak and blue oak began appearing in ecological and popular journals. In the April 1973 Fremontia, James Griffin discussed valley oak regeneration problems. In the April 1976 Fremontia V. L. Holland considered regeneration of blue oak and the practice of removing blue oaks from foothill pastures to increase livestock forage. In September 1978 Peter Steinhart penned a penetrating summary of the oak situation in Audubon magazine entitled "As the old oaks fall," illustrated with David Cavagnaro's super photographs. And the October 1983 issue of Fremontia was devoted solely to the subject of oaks.

During this period the Heritage Oak Committee of Sacramento published a classic booklet, Native Oaks: Our Valley Heritage. The efforts of the committee are an outstanding example of a public service project carried out by Mike Weber and others. Over 20,000 copies have been distributed without advertising.

In the fall of 1987 the organization of a California Native Plant Society oak-hardwood committee was announced with Pam Muick and Joan Stewart as committee co-chairs. The committee defined oak policy issues for the society, assembled educational materials, and met with other groups to establish research priorities on oak issues.

In 1988 the California Oak Foundation was created as a statewide organization to promote "conservation, restoration, and management of our native oak heritage through practices that encourage its perpetuation and through focus on public education and coordination between the private sectors." The Foundation declared 1990 as the Year of the Oak, and was instrumental in two resolutions which were passed by the state's legislature. The first declared 1990 the Year of the Oak, and the second contained more far-reaching language. It called for state agency with responsibility for oak lands to develop a plan for the protection and conservation of their oaks. These plans are to be submitted to the legislature in the fall of 1991.

Era of oak meetings

Interest in oak woodlands grew in the late 1960s, partly due to California Department of Fish and Game concerns about declining oak habitats. U.S. Forest Service, University of California, and California State University researchers were concerned about adequate oak regeneration. These issues prompted an oak symposium at Scripps College, Claremont in June 1979. It attracted about two hundred attendees who heard fifty-two research reports.

The success of this meeting led to a larger meeting at California State Polytechnic University, San Luis Obispo in November 1985. That event included some five hundred attendees hearing eighty-five research reports. Proceedings of both meetings were published by the Pacific Southwest Forest and Range Experiment Station, U.S. Forest Service, and were instant best-sellers. These publications had considerable impact on the direction of new oak research and on the continuing dialogue about oak regulations.

In January 1989 an oak symposium was convened in Sacramento sponsored by the Range Management Advisory Committee (to the State Forestry Board) with many co-sponsors, including CNPS. All the major interest groups were represented, and a great deal of constructive dialogue about current oak affairs took place. Regular informal meetings of researchers working on oak-related topics are held annually. Throughout the state, local workshops and seminars are being held for education and information exchange. Regional meetings have been held at Santa Rosa, Chico, San Diego and Tuolumne County, and more are planned.

Finally, another symposium for oak researchers will meet at Davis, October 31 through November 2, 1990, sponsored by the University of California Cooperative Extension and the Department of Forestry and Resource Management.

Major players in oak politics

The State Board of Forestry has a long history of establishing harvesting rules for coniferous forests on private lands. Only recently has the Board and their Range Management Advisory Committee considered expanding into the role of regulating

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hardwoods. In 1983 the Board appointed a hardwood task force to study the future stability of oak woodlands used for grazing. The task force identified nineteen specific problems patently affecting oak woodlands; most of the problems involved specific needs for research and broad educational programs. A coalition of several agencies joined together to help solve these woodland problems in 1985.

The California Department of Forest and Fire Protection (CDF), with their Forest and Rangeland Resources Assessment Program (FRRAP), emerged as the lead agency for the cooperative Integrated Hardwood Range Management Program (IHRMP). CDF sponsored new, short-term research projects and monitoring. The University of California, Division of Agriculture and Natural Resources, provided five new Natural Resource Specialists and, in addition, two farm advisors were added to the program. The University of California sponsors long term research projects. California Department of Fish and Game addresses wildlife problems. The Range Management Advisory Committee provides additional policy input. A total of 9.6 million dollars was budgeted for the program, with an annual budget of approximately one million dollars. Of the annual budget, about forty percent supports the natural resource specialists, twenty percent goes to long-term competitive grants, and thirty-five percent is used for short-term research and monitoring.

The California Native Plant Society has promoted its concerns for the native oaks and their habitats. Although the state and university programs focused primarily on the blue oak grazing lands, the Society emphasized the need for more research on the Engelmann oak and the valley oak, the two species elevated to List 4 status in the 1988 Inventory of Rare and Endangered Vascular Plants of California. Engelmann oak is considered threatened by loss of habitat. Valley oak is also threatened by loss of habitat and lack of natural regeneration. Significantly, the actual acreage of valley oak woodland still remaining in the state is unknown. The Society also represented the conservation/environmental viewpoint at advisory committee meetings where research priorities were established.

The California Oak Foundation rose swiftly and effectively to embrace the diminishing urban and suburban oaks not addressed by the state’s program. The statewide Oak Foundation arose from the successful Sacramento Tree Foundation, and moved rapidly to produce informational brochures and supply educational materials to the non-ranching oak constituency. In identifying a different public and addressing their needs, the Foundation broadened the viewpoint of the state and university’s hardwood program.

A Quercus revival

Until recently, most California residents and state agencies have taken oaks for granted. At the turn of the century, between 1890 and 1925, a number of books were published containing natural history information about oaks by authors such as Kellogg, Jepson, Sudworth, Eastwood, and others. Then came a long hiatus.

For over sixty years, little attention was paid to oak preservation or conservation, although specific programs existed for eradicating oaks. During this time few researchers, in academia,
or in state or federal agencies, studied Quercus. Since the late 1970s, public and research interest has been enhanced by two USFS-sponsored oak symposia (1979, 1985). These conferences, coupled with state funding, have resulted in new generations of researchers focusing their attention on oaks. Subsequently, our knowledge about oaks has begun to increase rapidly.

As we look towards the next century, we recognize that tremendous changes will continue to occur on the landscape. California’s population is predicted to increase by twenty million in the next twenty years. Many of these people will, like us, be living among the oaks. However, many of these people may not initially value oak habitats in the same ways we do. Our only hope for meeting the needs of the new Californians and sustaining the values of an oak-filled landscape is to develop workable solutions, combining good information and workable policies.

Editor's note: James R. Griffin has served with the Museum of Vertebrate Zoology, U. C. Berkeley, at the Hastings Reservation in Carmel Valley, California USA, and has been involved with oak concerns for more than 25 years. Pamela C. Muick is with the U. C. Berkeley Department of Forestry and Resource Management on the main campus at Berkeley, California USA, and since this article was originally published has become known to many International Oak Society members as one of the authors of the book Oaks of California. This article originally was reproduced from the July 1990 issue of Fremontia with the kind permission of the California Native Plant Society, and is reprinted with corrections here. Photographer David Cavagnaro graciously has permitted International Oaks to reproduce some of his photographs used in the original Fremontia publication for this commemorative issue.