United States
Department of
Agriculture

Forest Service

**Pacific Southwest
Forest and Range
Experiment Station**

General Technical
Report PSW-54

Oak Management in California

Timothy R. Plumb

Philip M. McDonald

Authors:

TIMOTHY R. PLUMB is assigned to the Station's research unit studying the management of chaparral and related ecosystems in southern California, with headquarters in Riverside, Calif. He attended Oregon State college, where he received a B.S. degree (1954) in forest management, and the University of California, Berkeley, where he received an M.S. degree (1959) in forestry. He received a doctorate (1970) in plant physiology at the University of California, Riverside. **PHILIP M. McDONALD** is doing research on silviculture of Sierra Nevada forest types, with headquarters at Redding, Calif. He holds bachelor's (Washington State University, 1960) and master's (Duke University, 1961) degrees in forestry, and a Ph. D. degree in forest science (Oregon State University, 1978).

Cover: A stand of old-growth valley oak (*Quercus lobata* Née) in Tehama County, California.

Publisher:

Pacific Southwest Forest and Range Experiment Station
P.O. Box 245, Berkeley, California 94701

July 1981

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IN BRIEF

Plumb, Timothy R., and Philip M. McDonald.
1981. **Oak management in California.** Gen. Tech. Rep. PSW-54, 12 p., illus. Pacific Southwest Forest and Range Exp. Stn., Forest Serv., U.S. Dep. Agric., Berkeley, Calif.

Retrieval Terms: Quercus spp., *Lithocarpus densiflorus,* California, timber management, silviculture, fire effects

Interest in native California oaks is increasing. Species like California black oak (*Quercus kelloggii* Newb.), blue oak (*Q. douglasii* Hook. & Arn.), coast live oak (*Q. agrifolia* Née), and tanoak (*Lithocarpus densiflorus* [Hook. & Arn.] Rehd.) constitute a huge reservoir of fuel and fiber that at present is not being effectively used. Other "products" such as wildlife habitat, watershed protection, and recreation-esthetic values may be more important than traditional wood products. Although little is known about the ecology and silviculture of California oaks, some knowledge is emerging. This paper attempts to summarize this knowledge and to touch briefly on wildlife, watershed, and esthetic considerations.

Of the 15 endemic oak species in California, 8—plus tanoak—grow to tree size and should be amenable to hardwood forest management. One or more species of oak can be found throughout the State. They occupy several major vegetation zones or types including chaparral, woodland, mixed evergreen, and mixed conifer. Oaks grow at elevations from near sea level to 10,000 feet (3050 m), and where the growing season ranges from about 90 to 350 days. California oaks total about 3 billion ft^3 (85 million m^3) net volume; California black oak and tanoak account for 72 percent of this volume. However, total oak volume is actually much larger because open-grown trees on noncommercial forest land are not included in these totals.

Most California oaks have adapted to harsh, semiarid, environments. Paleobotanists have traced these oaks and related communities back to the Miocene epoch of 12 to 26 million years ago. Oak persistence is a function of high adaptability. Thus, it is no surprise that native oaks have a wide climatic amplitude and a rapid and dynamic response to gross disturbance such as fire. Oak species differ widely in their response to fire, however; bark thickness, amount of living and dead bark, and ability to sprout from the bole all affect the probability that an oak species will grow in an area of frequent fires. Sprouting from the root crown is the most important survival adaptation of most oak species, and helps to maintain established stands.

For the silviculturist, there is evidence that dense 60-year-old stands respond to thinning. On a good site in the northern Sierra Nevada, mixed stands of California black oak, tanoak, and Pacific madrone (*Arbutus menziesii* Pursh) produce up to 93 ft^3 of new growth per acre per year net (6.5 m^3/ha/yr) for the first 6 years after thinning. Leaving 102 to 125 ft^2 of basal area per acre (23 to 29 m^2/ha) seems to balance available resources with amount of growing stock, and if sustained, is a much better growth rate than that of unmanaged stands.

With management, stands of thrifty oaks should yield more wood, acorns, and water than similar unmanaged stands, at no cost and probably even at a gain in esthetic value. Recognition of these values could mean that native oaks are soon going to contribute to increased productivity from California forests.

Natural regeneration of oaks, in addition to root-crown sprouting, includes seedling establishment. Acorns, disseminated by rodents, birds, and other animals, enable oaks to occupy new areas; however, regeneration from acorns is often poor especially for blue and valley oaks (*Q. lobata* Née) for reasons as yet unclear. For tanoak and California black oak, regeneration from acorns can be skimpy or abundant, depending on a host of environmental factors and the voracity of wildlife.

The plant propagator can gather acorns before they mature, thus getting the jump on natural consumers. Early-picked acorns can germinate successfully if the tips of the acorn shells are first removed. Positioning the acorn point up, rather than point down or sideways, also speeds up germination and results in an increase in number of acorns germinating. Optimum acorn storage schedules are not yet known, but temperatures just above freezing and moisture contents near 60 percent of fresh weight appear best for scrub oak (*Q. dumosa* Nutt.) acorns picked in September.

Young-growth California black oak and tanoak stumps sprout vigorously after cutting. Sprouts grow rapidly; those of California black oak on good sites may be over 19 feet (6 m) tall after 10 years. With such a growth rate, they are strong competitors with shrubs and other trees. Thinning sprouts at age 4 has been suggested, but tests show it results in no measurable gain in height growth.

Vegetative propagation of oaks has not been used because of the difficulty in rooting most oak species. Successful use of tissue culture techniques has not been achieved either, although recent work with bud culture may have opened the way to practical clonal oak propagation.

Under natural conditions, fire is necessary for the perpetuation of oak woodlands, especially on sites where oaks compete with faster growing conifers. Low intensity prescribed fire may have a place as a management tool in established oak stands. Periodic burning would reduce the fuel accumulations that support high intensity wildfires which kill or severely damage tree trunks and crowns. However, even prescribed fire must be used with caution because every fire will cause some tree damage.