

Acorn Yield During 1988 and 1989 on California's Central Coast¹

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Abstract: In 1988, a study was begun to evaluate acorn yield of valley oak (*Quercus lobata*), coast live oak (*Q. agrifolia*), and blue oak (*Q. douglasii*) in three of California's central coast counties: Santa Barbara, San Luis Obispo, and San Benito. The purpose of the study was to examine the degree and variability of acorn production and factors, such as geographic location, individual tree differences, and land-use history, which may contribute to these differences. Data collected during autumn 1988 and 1989 indicate that acorn production was low on the three oak species surveyed; nearly 90 percent of the 266 surveyed trees produced no acorns. Low acorn production in each of the three counties which was surveyed suggests that production may have been quite widespread.

Most (about 80 pct) of California's three million ha of oak woodland is privately owned and used mainly for livestock production. Oak woodland provides habitat for more kinds of wildlife than any other habitat in the state; more than 300 terrestrial vertebrates use this rich habitat for food, water, and cover (Barrett 1980, Verner and Boss 1980, Ohmann and Mayer 1987). Oak (*Quercus* spp.) mast (acorns) is an important component of the diet of many of the kinds of wildlife that inhabit oak woodland—game and nongame alike (fig. 1). In spite of the importance of acorns to wildlife, variations in annual production and factors that affect production are not well understood. Here we report preliminary results of the first two years of a long-term survey of annual acorn production in three central coast counties.

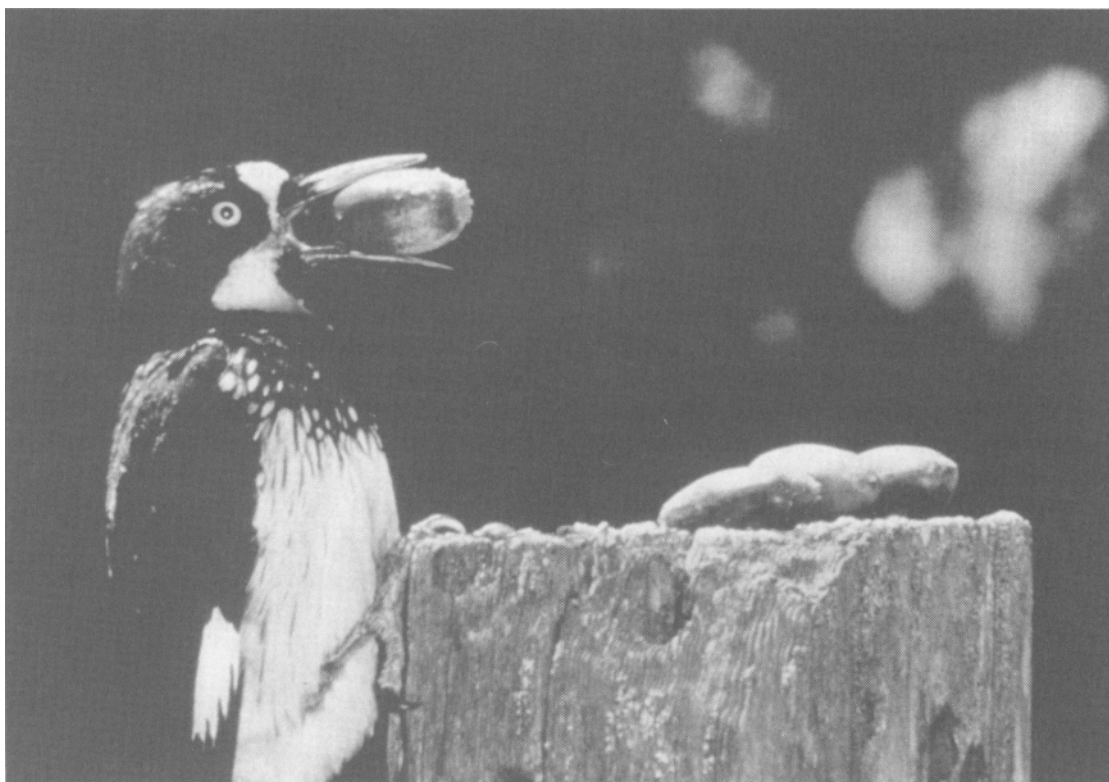


Figure 1—Many kinds of oak-woodland wildlife include acorns in their diet. Productivity of acorn woodpeckers increases during years when acorn production is high. Photograph by Guy E. Connolly.

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METHODS

During summer and fall 1988, in Santa Barbara, San Luis Obispo, and San Benito Counties, blue oak, coast live oak, and valley oak stands were located. Within these stands, 0.04-ha (tenth-acre) plots were established 6.1 m (200 feet) from a road in the cardinal direction nearest to perpendicular with the road. Plots had a minimum of 10 percent oak canopy cover and at least three oak trees at least 10.2 cm (four inches) dbh (diameter at breast height, or 1.4 m [4.5 ft] from the ground). Any plot not meeting these criteria was excluded.

Thirty-one 0.04-ha plots were established, about equal numbers in Santa Barbara, San Luis Obispo, and San Benito Counties. Within the plots, a total of 266 oak trees over 10.2 cm (4 inches) dbh was marked with numbered aluminum tags for permanent identification. During fall 1988 and 1989, each marked tree was evaluated for mast production (fig. 2) by the method developed by Graves (1980). By this method, trees are ranked 1 to 4 based on number of acorns observed on the tree—1 for no acorns to 4 if the tree is virtually covered (fig. 3). A spherical densiometer (Lemmen 1956) was used to measure canopy cover of each plot. To further characterize the plots, slope, aspect, brush and ground cover present, wildlife sign (droppings and digging), and grazing and tree-harvesting history were also recorded; results of these measurements are not reported here.

RESULTS AND DISCUSSION

There was little difference in acorn production between 1988 and 1989, and between the blue, coast live, and valley oak trees; therefore, years and oak species are combined here. Acorn production was low during 1988 and 1989 (fig. 4). Nearly 90 percent of the surveyed trees had no acorns (class 1). Only about seven percent had a production rating of 3 or 4. This was the case in each of three counties, suggesting that the low acorn production was widespread. Similarly, in a 9-year study (1977-85) of acorn production at the Dye Creek Ranch in Tehama County, conducted by the California Department of Fish and Game (McKibben and Graves 1987), three-fourths of the 363 surveyed blue oak trees produced few or no acorns. Only about three percent of the 363 trees were heavy producers.

In the three surveyed counties on the central coast during 1988 and 1989, there was a trend of increased production with tree diameter. An interesting observation of the study was that mast production on oaks located adjacent to county roads appeared much greater than on trees growing away from the roads. If this observation is real, one would conclude it may be due to greater availability of run-off water along the roads. This difference, even if slight, may be important during a drought such as the central coast has experienced the past four years.

Plans are to record mast production annually on the permanently tagged trees. Long-term data will be used to look further at variation in acorn production by years, trees, geographic location, land-use history, and weather.



Figure 2—Acorn production was assessed by ocular examination of 266 trees during August to October 1988 and 1989.

CLASS	ACORNS
1	No visible acorns
2	A few acorns visible
3	Acorns readily visible over part of the tree
4	Acorns readily visible over the whole tree

Figure 3—Acorn classification system developed by the California Department of Fish and Game and used for mast production assessment in Santa Barbara, San Luis Obispo, and San Benito Counties during 1988 and 1989.

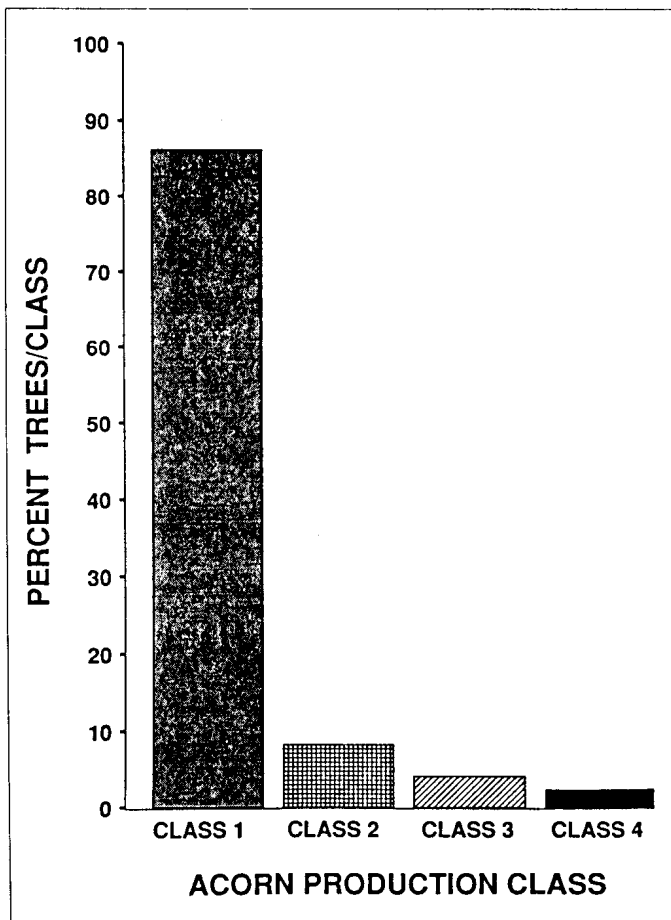


Figure 4—Acorn classification of 266 oak trees in Santa Barbara, San Luis Obispo, and San Benito Counties during 1988 and 1989.

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