

# The Status of Island Scrub Oak (*Quercus pacifica*) on Catalina Island, California<sup>1</sup>

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The island scrub oak is characterized by a shrubby (to 2 meters) or arborescent (to 5 meters or taller) growth form. It is the dominant species of the scrub oak chaparral community on Catalina Island, which occupies approximately 25 percent of the 76 square-mile island, primarily on north-facing slopes. The Santa Catalina Island Conservancy, which owns and manages 88 percent of the island, is actively working to protect, monitor, and restore this unique plant community. This includes investigating the cause of a large-scale oak dieback, monitoring health, growth, and reproduction, reducing feral animal impacts, and propagating young oaks for restoration.

A large-scale die-off threatens the health of the scrub oak community on Catalina Island. This pattern was noted by Conservancy personnel as early as 1995. It is patchy in distribution, and appears to be concentrated on the Channel side of the island. Island residents have noted episodic oak mortality in the past; this appears to be cyclical in nature, possibly coinciding with moisture patterns.

An oak root rot fungus in the genus *Armillaria* was found in both the northeast and northwest areas of the island. This is a naturally occurring fungus that usually takes a long time to affect the tree. These trees have most likely been infected for decades. Investigations have revealed no sign of the Oak Mortality Syndrome fungus, *Phytophthora*.

The less pathogenic species of *Armillaria* tend to invade when the trees are stressed by environmental factors. The prevalence of dying trees on the Channel side of the island suggests air pollution as a potential stressor. Future research is needed to investigate the distribution of trees which are dying from this fungus and several different environmental factors such as water potential, slope/aspect, and air pollution. Also illuminating would be a demographic study of the island's scrub oak populations through either dendrochronology or Carbon dating.

The presence of non-native animals on the island has greatly inhibited regeneration of the island scrub oak. Feral pigs, mule deer, feral goats, and American bison have variously reduced regenerative potential and damaged scrub oak habitat. Feral animal removal efforts in the last decade by the Conservancy's Ecological Restoration Department have concentrated on goats and pigs, and are nearing completion.

In order to maintain or enhance the natural structure of Catalina Island's plant communities, a pilot monitoring study was initiated in 2001. The objectives of this

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study are: 1) to provide detailed descriptions of the variability of stand structure, health, and regeneration of island scrub oak trees (*Quercus pacifica*) to use as a general model for restoration and maintenance management, and 2) to investigate the influence of herbivory on the dynamics of this species.

Two locations predominantly supporting scrub oak habitat were selected for the study: the west end and airport areas of the island. The west end has had all feral animals except deer removed since the mid- to late-1990s, thus providing an impact comparison. Four permanent plots have been located randomly within each area, and more will be added in the future.

Plots are 30 meters by 6 meters. The plot is divided into five 6 by 6-meter subplots within which each individual rooted within the plot is mapped. For each individual, the following parameters were recorded: number of stems/trunks, basal diameter of the largest three trunks, age class, overall health, animal/pest damage, and acorn production. In addition, the following is recorded for seedlings and saplings: substrate (litter or bare ground), whether or not is immediately associated with annual grasses, and whether or not is growing under the cover of another species.

The number of mature trees per plot ranged from 3 to 13. Dead trees comprised an average of 26 percent of the trees in each plot, and was 100 percent in one plot. Saplings were found in only two of the eight plots studied, with one and four saplings found (25 percent and 14 percent of all individuals, respectively). Seedlings were found in 3 of the 8 plots studied, with one seedling found in each of two plots and 21 seedlings found in one plot. The majority of trees had an acorn production class of 0 (no acorns), 1 (a few seen after close scrutiny), and 2 (a fair number, acorns seen readily).

Island scrub oak outplanting trials were begun in 1999 in preparation for future large-scale restoration efforts. The trials involve the planting of oak seedlings and acorns with several different soil, watering, and depth treatments. James H. Ackerman Native Plant Nursery staff, with the help of many volunteer hours, have been actively collecting acorns from island scrub oak trees and raising them to saplings for this project.