

## Recovery Of Oaks (*Quercus agrifolia*) Following The Old Topanga Fire, November 1993

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**Abstract.** Post fire recovery of coast live oaks was high at several sites in the Santa Monica Mountains. Differences based on size and location, were noted in rate of recovery, which in all cases was from epicormic sprouting from stems and not from basal sprouting.

**Keywords:** Coast live oak; fire; mortality; survival.

### Introduction

Due to the apparent intensity of the Old Topanga Fire in November 1993, concern was expressed about the survival rates of the affected oak trees (*Quercus agrifolia*). This study was established to follow 90 trees for 5 years tracking tree recovery processes and long term survival.

Thirty oaks in Red Rock Canyon (valley riparian), Tuna Canyon (ridgeline) and Cold Creek Valley Preserve (open riparian) were chosen for long term monitoring. Each site represents a different subset of the terrain covered by oaks in the burned area. All were hit by approximately equal fire intensity, based on the presence of white ash residue, in some places inches thick.

Tree condition was noted one week following the burn and subsequently in January, March and April 1994. Trees were classed by size (range from <25 cm - > 125 cm diameter at breast height), condition (total burn, crisp leaves still attached, some green leaves remaining) and evidence of recovery (flushing growth, living cambium). Significant differences were noted between the three sites.

### Site Characteristics and Fire History

#### *Red Rock Canyon*

The stream bed of this relatively narrow north-east trending canyon follows the 335 m (1100 ft) contour as it cuts through beds of Sespe sandstones and conglomerates. Last burned in the November 1943 Woodland Hills Fire, the mature stand of riparian oaks and sycamores was surrounded by mixed chaparral and grasslands with a closed canopy of up to 6 m (20 ft). Dead material in the surrounding chaparral was estimated to have exceeded 50% (Pierpont personal communication).

#### *Tuna Canyon (Bel-Mar Property)*

Located on an exposed sandstone ridgeline at an elevation of 425 m (1400 ft), this cluster of oaks bisects the fire road and has a history of frequent fires. Most recently part of a prescribed burn in 1988, it was previously affected by wildfires in 1938, 1942 and 1970. The oak trees form a mature stand surrounded by annual grasses, disturbed soils and slopes covered with mixed coastal sage and chaparral. The crush and burn technique used in the prescribed burn lessened the fuel load in the area surrounding the study site, so accumulated dead material was not as abundant as that in the other two sites.

#### *Cold Creek Valley Preserve*

The more open north-east trending riparian corridor lies at approximately 335 m (1100 ft). The sandstone/alluvial/clay based soils support a mixed riparian plant community surrounded by meadows of native chaparral and introduced annuals. Last burned in the November 1943 Woodland Hills Fire, the proportion of dead chaparral material here was also significant.

## Results and Discussion

Oak tree survival after fires is a function of heat intensity and duration, tree vigor and the degree of crown and cambial damage (Plumb 1980). Each of the three sites experienced high intensity fires of approximately one hour duration (L.A. County Fire Department, personal communication 1994).

Spatial characteristics of the stands, in addition to surrounding fuel load and topography caused different patterns of damage (Tables 1 and 2). The cluster of trees at Tuna Canyon, surrounded by low fuel load, had five totally burned trees. Most trees still maintained some green leaves amid the crisp canopy. The grove at Cold Creek had little understory vegetation due to heavy shading and proximity to the stream. Only five trees were totally burned.

In Red Rock Canyon the trees are not clustered in a grove but spread out along the streambed in a narrow canyon. Eleven (36.6%) trees burned totally leaving nothing but the charred trunk and scaffold branches. Crisp leaves remained attached to the others. New shoots on all trees did not begin to appear in Red Rock until March 1994, 2 months following the flush at both La Tuna Canyon and Cold Creek. This is possibly due to the fact that it is significantly colder in this area and the canyon walls limit sunlight exposure.

Trees with crisp leaves remaining began sprouting 2-4 weeks following the burn in both La Tuna Canyon and Cold Creek. New shoots emerged from the canopy top most exposed to sun. Sprouts ranging from 10-30 cm (4-12 in) grew from areas within 2-5 cm (1-2 in) of nodes on burned twigs and branches. In some cases, shoots also emerged from the center and upper trunk. Catkins were found immediately following the flush on a few trees. In only one instance did basal shoots occur. The trees in Cold Creek (18 cm DBH) had some

Table 1. Stand survival characteristics for coast live oaks burned in fall of 1993.

Size Class (cm)	Red Rock		Tuna Canyon		Cold Creek	
	Dead	Alive	Dead	Alive	Dead	Alive
Single Stem						
< 25	2		1	6		3
25-50	11			11		1
50-75	3			2		8
>75	1					
Multiple Stems						
25-50	1	1				2
51-75		2		3		1
76-100		4		2		3
101-125		3		2		2
>125		3		3		8

\*Multiple trunk value = sum of DBH for all stems

Table 2. Burn condition and recovery of coast live oaks burned in fall of 1993.

	Red Rock (Site 1)	Tuna (Site 2)	Cold Creek (Site 3)
<b>Burn Status</b>			
Total	11	5	5
Crisp leaves	19	5	22
Crisp+green leaves		20	3
<b>Recovery Status</b>			
No flush	1	1	
Flush Dec 93		14	19
Flush Apr 94	29	29	29
Catkins		2	
Alive May 1994 (%)	97	97	100

canopy shoots as well, despite peeling, cracking trunk bark and partially dead cambium.

One tree at Tuna Canyon (single trunk, 18 cm DBH) and one at Red Rock Canyon (single trunk, 20 cm DBH) have not shown any signs of recovery. Larger trees have taken longer to regenerate shoots. Seedlings have sprouted at Cold Creek and Tuna Canyon. None have been found at Red Rock Canyon.

## Summary

Six months following the Old Topanga Fire, 97% of the study trees are still alive and growing. Damage to the trees seemed related to the spatial characteristics of the stand, the surrounding fuel load and topography. The elongated stand at Red Rock, surrounded by mature chaparral, was the most severely damaged. In all trees, most of the new growth was concentrated in the central portion of the canopy, with few shoots either at the root crown or at the totally burned terminal ends of trees, consistent with the pattern observed by Plumb (1980). This conflicts with other reports in the literature describing basal sprouting from the root crown (Pavlik 1991). Perhaps this fire was not strong enough, or that effect is yet to come. Crisp leaves still remain attached to the majority of trees.

Those trees having heat singed leaves resprouted from the canopy top within weeks, with flushing growth up to 25 cm (10 in) in Tuna Canyon and Cold Creek. Those in Red Rock Canyon did not begin to recover until March 1994. In all areas, totally burned trees took one month or longer to begin flushing.

In order to see what oak trees look like after these shoots replace the lost canopy, observations were made of a grove of 58 trees at open riparian Rocky Oaks Park (365 m) burned in the October 1978 Kanan Fire. The canopies were noticeably thin, extending in a shell with

little inner leaf growth and numerous dead branches and scars. Eleven trees (18.9%) have died since the 1978 fire. None appeared to have sprouted from the root crown.

Long term photo monitoring of study trees should provide insight into the mortality and regeneration pattern of burned oak trees.

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