

# Monitoring Survival and Vigor of Specimen Valley Oaks Influenced by Urban Development Sites<sup>1</sup>

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*Abstract:* In July 1985, a study was conducted of more than 400 valley oaks (*Quercus lobata*, *Née*) in the Conejo Valley area in Ventura County, California. The intent was to document the survival and vigor of trees in representative growing conditions that were in or adjacent to urban development sites. Each tree was visually evaluated for vigor; selected tree sites were documented through photography. During the summer and fall of 1995, the selected tree sites were revisited to extend the study on a 10-year interval basis. The sites were evaluated using the same process, with any changes noted in the condition of either the trees or the sites.

The southern limit of the valley oak habitat extends to southeastern Ventura County and southwestern Los Angeles County. The valley habitat favored by the tree is a preferred type of development site. Development now threatens the future existence of the valley oak in this region. Much of the development in this region that has impacted the valley oak occurred in the 1960's and 1970's, before enactment of oak protection ordinances. Development continues today in urban-wildland interface areas.

The residents of the Conejo Valley have enjoyed a long-standing love affair with the valley oak. Stories of stagecoach stops identified by an oak tree, 100 cattle resting under a single tree, and landmark trees for property boundaries abound in the written and oral history of the region. Historic photographs document the savannah vegetation type covering the valley, including large valley oaks, just before the major housing and community developments of the 1960's. The local residents even selected the name of "Thousand Oaks" for the newly formed city in 1963, reflecting their admiration for the dominant valley oak. An ordinance to protect the oaks in the city (one of the first to protect native trees in the state of California) was enacted in 1972 after a development project removed many large valley oaks (Elmendorf 1991).

While oaks have been provided with special protective measures during the development process for the past two decades, the effectiveness of these measures has been questioned. Despite all the efforts including careful urban planning, mitigating oak-tree impacts, strict environmental protection, and preservation of thousands of acres of open space, the future presence of the valley oak in the region is threatened. This appears to be due to three factors: urban sprawl, natural mortality, and negligible propagation. Urban sprawl contributes by removing trees, changing land use patterns which reduces the land base for natural regeneration, and introducing negative environmental impacts harmful to residual trees. The natural mortality of the valley oak as documented by Brown and Davis (1991) in the nearby Santa Ynez Valley is about one tree annually per 220 trees for valley-floor habitat type. For unknown reasons, natural regeneration of the valley oak is in decline. The valley oak is now restricted to only a few remaining viable sites in the Conejo Valley.

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## Methods

### **Initial Study—1985**

In July 1985, a one-time study was conducted on the valley oaks in the Conejo Valley area of Ventura County (Nickles 1985). The intent was to document the survival and vigor of trees in representative growing conditions that were in or adjacent to urban development sites. In addition, several of the tree sites were photographed as examples of the risk categories used to evaluate vigor and the different site categories.

In order to document the survival and vigor of specimen valley oaks in the Conejo Valley and to provide a baseline from which to determine what factors may contribute to their health and mortality, tree sites were selected for analysis within the urbanized area of the valley floor. Criteria for selection were convenience, accessibility, quantity of trees in each location, and availability of historical records such as those provided by Conejo School (1940). Five risk levels were defined to classify the condition of the trees as a measure of vigor:

	<i>Risk level</i>	<i>Description</i>
Low Risk	Vigorous	Excellent shape and form; crown full with no evidence of dieback; good color; new growth visible throughout crown.
	Healthy	Good shape and form; missing foliage in less than 25 percent of crown; color good to fair; minimal evidence of dieback; some new growth visible.
	Maintaining	Adequate form; missing foliage in 25 percent to 50 percent of crown; color fair; obvious evidence of dieback; minimal to no new growth.
	Declining	Poor form; missing foliage in more than 50 percent of crown; poor color; major evidence of dieback; no new growth; reduction of crown size apparent from previous year.
High Risk	Dead	No evidence of green foliage; bark sloughing from many branches.

Two general categories for distinguishing tree population were used for comparison purposes: Disturbed (developed or landscaped) and Greenbelt (natural or open space).

More than 400 valley oaks were included as part of the initial study; each tree evaluated was mature, established, and among some of the larger specimens in the Conejo Valley (average diameter at breast height estimated at 24 inches). A tally sheet was prepared (*table 1*) with additional data regarding site condition. This included information such as landscaping material and location in parking lots and vacant lots. Representative trees at 19 different sites were selected at random to be photographed as examples of the different risk levels and site categories (*table 2*).

### **Current Study—1995**

In early 1995 it was determined that an abbreviated version of the initial study could be performed and continued on a 10-year interval basis to track the survival and vigor of the sampled tree sites. Each of the 19 sites was observed during the late summer of 1995. During the field visit, the tree sites were evaluated for their risk level and site category and conditions using the same criteria as in 1985 (*table 2*). Photographs were also taken with an attempt to replicate the original photograph.

Table 1—Data for 1985 initial study

Risk Level	Vigorous	Healthy	Maintaining	Declining	Dead	Total
<b>Disturbed</b>						
Park / recreation	1	4	2	3	0	10
Building	3	29	21	11	2	66
Parking lot	0	6	7	4	0	17
Road	3	13	9	14	1	40
Landscaping	15	41	37	20	5	118
Animal/pasture	0	1	1	1	1	4
Vacant lot	8	5	1	2	0	16
Subtotal	30	99	78	55	9	271
<b>Greenbelt</b>						
Flat	16	24	25	42	12	119
North exposure	2	2	4	4	5	17
South exposure	0	0	0	0	0	0
East exposure	1	1	4	3	0	9
West exposure	2	0	1	1	0	4
Subtotal	21	27	34	50	17	149
Total	51	126	112	105	26	420

Table 2—Data for selected trees in 1985 and 1995

No.	Address	Site category		Risk level		Condition		Comments	
		1985	1995	1985	1995	1985	1995	1985	1995
1	1595 La Granada	Disturbed	Disturbed	Declining	Declining	Vacant lot	Vacant lot		No change
2	1516 La Granada	Disturbed	Disturbed	Vigorous	Vigorous	Landscaped / dirt	Landscaped / dirt		No change
3	1574 El Cerito	Disturbed	Disturbed	Maintaining	Maintaining	Landscaped / lawn	Landscaped / lawn		No change
4	1590 El Cerito	Disturbed	Disturbed	Healthy	Maintaining	Landscaped / plants	Landscaped / plants		
5	1356 La Jolla Dr.	Disturbed	Disturbed	Healthy	Maintaining	Landscaped / lawn	Landscaped / lawn		
6	750 Erbes Rd.	Disturbed	Disturbed	Vigorous	Healthy	Vacant area of lot	Vacant area of lot		
7	600 Blk. Erbes Rd.	Greenbelt	Greenbelt	Dead	Not visible	Open space / creek	Open space / creek		Likely decayed
8	400 Blk. Rancho Rd.	Disturbed	Disturbed	Vigorous	Vigorous	Landscaped / dirt	Landscaped / dirt		Pruned branches
9	Old Meadows Park	Greenbelt	Greenbelt	Dead	Fallen	Open space / creek	Open space / creek	Regeneration	Shrub encroachment
10	2522 Pleasant Way	Disturbed	Disturbed	Maintaining	Missing	Landscaped / dirt	New park site	Tallest	Possibly removed
11	2522 Pleasant Way	Disturbed	Disturbed	Healthy	Healthy	Landscaped / dirt	New park Site	Widest	
12	Prudential / GTE Place	Disturbed	Disturbed	Vigorous	Healthy	Parking lot	Parking lot		
13	100 S. Lkvw Cyn Rd. <sup>2</sup>	Greenbelt	Disturbed	Various	Uncertain	Undeveloped land	Developed lot	Multiple trees	Status uncertain
14	4400 E. T.O. Blvd. <sup>2</sup>	Greenbelt	Disturbed	Various	Uncertain	Undeveloped land	Parking lot	Multiple trees	Status uncertain
15	4300 E. T.O. Blvd. <sup>2</sup>	Greenbelt	Disturbed	Various	Uncertain	Undeveloped land	Parking lot	Multiple trees	Status uncertain
16	100 Via Merida <sup>2</sup>	Greenbelt	Disturbed	Dec./Maint.	Uncertain	Undeveloped land	Developed lot	Multiple trees	Status uncertain
17	30856 Agoura Rd.	Disturbed	Disturbed	Shock	Maintaining	Grading in process	Landscaped / plants		Retaining wall
18	29851 Agoura Rd.	Disturbed	Disturbed	Declining	Missing	Parking lot	Parking lot		Died & replaced
19	29851 Agoura Rd.	Disturbed	Disturbed	Vigorous	Vigorous	Parking lot	Parking lot	Best specimen	No change

<sup>1</sup>*Quercus agrifolia*

<sup>2</sup>Tree sites - several trees evaluated

## Results

In comparing the data from 1985 and 1995 for the sampled tree sites, noticeable changes occurred in both the risk levels and site categories (*table 2*). Of the 13 trees originally in the Disturbed category, six (46 percent) had an increase in risk level from 1985 to 1995, representing a reduction in vigor (Nos. 4, 5, 6, 10, 12, 18). As there was no obvious change in the conditions surrounding the trees, the reason for the reduced vigor is uncertain. It is possible the trees are gradually succumbing to development impacts suffered earlier. Two trees (13 percent) died in the intervening period; one is believed to have been removed as part of a development project (No. 10), and one (No. 18) declined to the point of collapsing from rot (personal observation). [The three trees noted as dead in 1985 have since fallen or are no longer visible.]

In evaluating the trees by site category, four 1985 Greenbelt sites (No. 13 through 16) have been developed and are now in the Disturbed category. As a result, it was difficult to locate the trees for lack of a common fixed reference point. Sites 13 and 16 were not located with certainty because of the changes in the terrain from the surrounding development. Sites 14 and 15 appear to be preserved in the landscaped portion of a parking lot, but identification of the exact trees was difficult because of the landscaping. However, they appear to have maintained their vigor, possibly because of the design and recent nature of the development.

## Discussion

### **Initial Study—1985**

An unsuccessful attempt was made to analyze the 1985 data statistically by assigning number values to the risk levels. The statistical test was presented as part of the initial study results, but a simple review of the raw data was determined to be more informative. Overall, the Disturbed sites had most of the trees in the Healthy category, while the Greenbelt population sites had most of the trees in the Declining category (*table 1*). The study concluded the following: (1) trees in disturbed (developed) sites receive more care and attention, resulting in improved health; (2) trees of poor quality (higher risk) are more likely to be removed in the development process; (3) dead and dying trees are left to decay as part of the life cycle in a natural setting (and conversely, quickly removed in a developed setting); and (4) the impacts from relatively recent development (20 to 35 years) are not yet fully known (Nickles 1985).

While the initial study was not adequately designed for scientific analysis, it provided a simple evaluation technique to document the effects of urban development on valley oaks. The review of the data and accompanying photographic documentation led to the repeat study of the Conejo Valley oaks in 1995. It appears that a more effective method for analyzing the impact of urban development on oaks may be to continue risk-level evaluation by site, while documenting the condition of a selected sample of trees with photography over time. Hence, the 1995 study continued the risk assessment, site assessment, and photographic record approach.

### **Current Study—1995**

A number of issues arose in 1995 that made it difficult to assess several of the trees from the initial study. Tree number 10 could not be located, and tree number 11 was located with some question as to its being the same tree. (Both of these trees were in the vicinity of a new park, which was built as part of a redevelopment project.) Tree number 12 was also located with some question as

to its being the same tree, even though the parking lot surrounding it had not changed. Tree number 17, which was in shock because of extensive grading in 1985, has recovered and is now at the Maintaining risk level. Tree number 18, which was rapidly declining in 1985, eventually died and has been replaced with three saplings.

If the conversion rate from Greenbelt to Disturbed site category was extended and used to forecast future impacts to valley oaks, all oaks in the Conejo Valley (growing on an undisturbed site that is developable [any slope less than 25 percent by local standards]) are subject to development impacts. The photographs developed from the study are intended to provide ongoing documentation of the ultimate result of those impacts, particularly in those instances where it is not immediately detected. For example, an individual tree's incremental increase in risk level from Maintaining to Declining may not be readily discernible by visual observation from one year to the next, but comparison of two photographs over time would provide the basis necessary to document the decline.

The implications from this study are noteworthy considering the small size of the sample, but not surprising as the sampled sites that were converted to the Disturbed category were on land zoned for development. However, it is clear that increased development in the Conejo Valley will cause more impacts to the valley oaks. Whether or not these impacts are detrimental (either short term or long term) is unknown at this time.

In order to ensure that future monitoring is representative of the valley oak population as a whole, a larger sample population must be identified that includes trees in other communities as well. Other factors must also be part of the evaluation such as rainfall (the late 1980's were drought years), tree age (all were established trees in this study), total population size, age class distribution, land-use patterns, and protection measures and maintenance of oaks in disturbed settings.

## Summary

The use and continuation of this study should be most helpful to those involved in the preservation of established valley oak trees in developing communities. The design of the study was not intended for research purposes, but rather as a simple approach to tree evaluation for oak tree preservation practitioners. Those active in urban planning, oak tree preservation, and urban-wildland interface management must be provided with information on how urban development affects oak trees on a long-term basis. Altered construction design, landscape constraints, and other mitigation measures currently in use may not necessarily be providing the effectiveness desired for the overall protection of the valley oak habitat.

## References

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