Oak Tree Selection by Nesting Turkey Vultures (*Cathartes aura*)[1]

Gregory A. Giusti,[2] R.J. Keiffer,[3] Shane Feirer,[3] and R.F. Keiffer[4]

Abstract

Turkey vultures (*Cathartes aura*) are a ubiquitous component of California's oak woodland faunal assemblage. Though obvious, they are one of the least studied vertebrates found in our hardwood forests. This study attempts to define the role of oak trees as nesting sites for this large avian species. Verified nest trees are evaluated to determine tree structure and morphology, tree size, cavity size and cavity volumes. Nest trees need to be large and old to develop the nest characteristics being utilized by turkey vultures. Nest trees tend to be erect with large trunk cavities that extend to the ground. The entrance location and aspect of the nest cavity does not appear to be a limiting factor in selection. Internal nest cavity volumes vary between 0.80 m^3 and 1.55 m^3. External tree sizes (DBH) vary between 91.4 cm to 165.1 cm. Selected trees were both alive and standing snags. The project is currently conducting transect surveys across the ownership to determine the relative abundance of potential nest trees based on the information gathered from known nest trees.

Key words: *Cathartes*, nest cavities, turkey vultures

Introduction

Long-term quantitative life history studies of turkey vultures (*Cathartes aura*) are sporadic in different parts of the breeding range across North America, but rare in California. Such studies are needed to evaluate the factors affecting the status and health of turkey vulture populations (Kirk and Mossman 1998) particularly in a state like California where oak woodlands are under various pressures from development and conversion. Limited information exists for western populations nesting habits except in generalized format such as "typically roosts in large trees"—for example, cottonwood (*Populus deltoides*) – or on rock outcrops (Davis 1983, Thomaides and others 1989) and on saguaro cactus (*Carnegiea gigantea*) in southern Arizona (Bennett and Kunzmann 1994).

This study surveys known oak trees used by turkey vultures on the 2144 ha (5,300 ac) University of California's Hopland Research and Extension Center (HREC) in southern Mendocino County, California. The purpose of the HREC study is to identify, catalog, analyze and characterize existing turkey vulture nest trees and nest tree cavities. Data collection included: 1) tree characteristics (species, diameter at breast height [1.37 m, DBH]); 2) nest characteristics (cavity volume, entrance dimensions, cavity height, tree structure characteristics); and 3) site characteristics (slope, aspect, elevation). The study also includes a property-wide transects/assessment of existing trees that meet the physical parameters of currently occupied nest trees to better understand the availability of suitable nest sites. The paucity of information regarding tree selection by these large cavity nesters in

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[2] Advisor, UC Cooperative Extension, Ukiah, Mendocino County, CA 95482. (gagiusti@ucanr.edu).

[3] Superintendent and GIS specialist, respectively, UC Hopland Research and Extension Center, Hopland, CA 9595449.

[4] UC Cooperative Extension, Ukiah, Mendocino County, CA 95482.

California's oak woodlands puts this ubiquitous species at risk of losing suitable nesting habitat through benign neglect and lack of instructional information for resource managers and planners who have the jurisdiction to protect habitats.

Methodology

Historically, known nest trees have been archived at HREC during the past 20 years. Not all known nest trees are still standing as many of them have fallen due to age and decay and are no longer available for use. Those remaining trees have been cataloged using GPS technology and overlaid on existing property maps.

Once identified, tree metrics were collected including 1) tree species identification; 2) trunk DBH; 3) height of cavity entrance; 4) cavity entrance opening (including radius for volumetric estimates); and 4) length or depth of nest cavity.

Surrounding stand characteristics (trees per acre, distance to closest neighboring tree, percent canopy cover, and proximate distance to road) were also collected at the time. Those nest site characteristics are not included in this assessment as no linear relationship was evident relative to nest tree selection and surrounding oak woodland structure or composition.

Additionally, 30-m belt transect surveys are underway to assess the presence of potential trees that have both the size and cavity characteristics that may suit turkey vulture nesting. Trees over 50.8 cm (20 inches) DBH along these transects are tallied and assessed for nesting potential. If present, cavities are measured, cataloged and mapped.

Results

During the past 20 years 12 known nest sites have been cataloged and verified as turkey vulture nest sites. In every case, the discovery of the nest tree was a matter of chance as the adult birds exhibit no obvious signs of nest presence such as aggressive behavior, calls, agitated behavior, and so forth. Even when chicks are present, the adults exhibit no obvious evidence of nest presence.

One of the nest sites included a large black oak (*Quercus kelloggii*) that had fallen over and a nest with nestlings was found. The nest was located within the root ball of the fallen tree and the eggs and later young were on the ground. Two young were hatched and raised until one day the site was visited and found to have been raided by a predator. Only fledging feathers were found spread across the area and both the young and adults were gone. It is assumed that this nesting attempt ended in failure.

During this study five of the historic nest sites were verified to be active. Each nest was found within an existing cavity. Four of the five nests were in living trees and one was in a snag. The snag was so decadent that it was not possible to determine the tree species. The other cavities are within *Q. lobata* or *Q. garryana*, or hybrids of the two. The trees are found along active roads, a skid trail, or within a stand of trees. There appears to be no linear relationship between tree location, stand density, level of human activity or other measurable metric that could aid in nest site predictions.

All of the nest trees shared similar characteristics in that each tree was erect, had relatively large cavity openings the result of limb failure with accompanying internal decay that extended the cavity to the ground. Nest cavity entrance ordinal direction does not appear to be a factor as each cavity has a different orientation.

Trees tend to be relatively large relative to other surrounding trees in the matrix. Tree height is variable as is the cavity entrance from the ground. Each tree provides structure for the birds to land and roost to aid in attending the nest (table 1).

In each case none of the nest sites had any tangible evidence of occupancy including discarded feathers, down, food remnants or detectable smell. In other words, there were no external factors that would alert a passerby that a nest was active. In every case, the nest cavity extended from the entrance to the ground. In essence the birds are ground nesters encircled by a tree.

Table 1—Nest characteristics, including tree DBH, length of the cavity, cavity entrance radius, and cavity volumes expressed in standard and metric values

Tree Number	DBH (cm)	Length (m)	Radius (cm)	Volume (ft^3)	Volume (m^3)
66	38” (96.5 cm)	10’11” (3.3 m)	12.5” (31.75 cm)	37.03	1.05
67	44” (111.76 cm)	13’ (3.9 m)	14” (35.56 cm)	54.9	1.55
68	42” (106.7 cm)	4’10” (1.4 m)	16.6” (41.9 cm)	28.5	.80
69	65” (165.1 cm)	6’3” (1.9 m)	18” (45.7 cm)	44.7	1.26
68-A	36” (91.4 cm)	7’0” (2.1 m)	17” (43.1 cm)	49.5	1.40
Mean	45”	4”10’-13	12.5-18”	42.7	1.20
Range	(36-65”)	(1.4-3.9)	(31.75-45.7)	(28-54)	(.80-1.55)

Discussion

The scope of previous work in California evaluating tree use for both roosts and nest sites is extremely limited to the works of Looney (2006) and Harris (1996). Looney (a senior project paper) is the only known work that has addressed this topic in oak woodlands. Others have studied turkey vulture roosts and nest sites in Texas (Buckley 1996), Florida (Stolen and Taylor 2003), and Pennsylvania (Thompson and others 1990). Most of these studies have linked communal roosts sites to adjacent animal damage related problems and did not necessarily address the ecological or dendrological aspects of tree selection. Coleman and Fraser (1989) describes in broad terms habitat use of turkey vultures in Pennsylvania while Kelly and others (2007) used evaluated regurgitated pellets at nest sites in South Carolina as a basis of determining adult food selection to juveniles. In each of these citations, the authors simply referred to roost or tree selection in general terms such as “large conifer” or “large hardwood” and did not provide quantitative assessments of diameters, height, nest cavity volume, or other tree characteristics.

The project raises obvious questions about turkey vulture behavior in nest selection. To date there is no obvious preference for tree location, size or juxtaposition to areas of human activity. There appears to be an obvious selection criteria based on nest cavity volume and extent. In each case the cavity size is relatively large and extends to the ground implying that not only size but “extent” of the cavity is an important determinant factor.

Another obvious question raised focuses on ingress and egress in and out of the cavity. Obviously adults must enter and exit the cavity several times a day to feed their young. Motion sensitive video used as part of this project has not detected any audible communications taking place between adults and nestlings. We assume that birds simply arrive at the nest and enter and exit without a great deal of fanfare. The young are quite while in the nest and only exhibit a loud hissing sound when

disturbed by the researchers. We further assume that the young exhibit innate exiting behavior when it's time to fledge.

As for policy implications for this study, Giusti and others (2005a, 2005b) have written extensively on the threats and risks to oak woodlands throughout California. In their works they have attempted to provide guidance to land managers and decision-makers on the aspects of oak woodland ecology, ecological services and biological functionality in their decision matrices insure the sustainability of this forest type across the landscape. Similarly in coniferous forests, oak woodlands provide critical habitat elements to a myriad of vertebrate and invertebrate species. Some species, like turkey vultures, require unique habitat elements to insure viable populations. Large nest trees with suitable cavities is a unique habitat element that has heretofore not been addressed in management guidelines and lacks any credible field testing to assist in the development of such guidelines at this time.

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