

**Western Riverside County
Multiple Species Habitat Conservation Plan (MSHCP)
Biological Monitoring Program**

Turkey Vulture (*Cathartes aura*) Survey Report 2008



17 April 2009

TABLE OF CONTENTS

INTRODUCTION	1
SURVEY GOALS.....	2
METHODS	3
PERSONNEL AND TRAINING.....	3
SITE SELECTION.....	3
SURVEY METHODS.....	5
RESULTS	7
DISCUSSION.....	9
RECOMMENDATIONS FOR FUTURE SURVEYS.....	10
LITERATURE CITED	11

LIST OF FIGURES

Figure 1. Foraging Cores for Turkey Vultures in the Western Riverside MSHCP.....	4
Figure 2. Walk-in trap used for capturing turkey vulture baited with calf carcass.....	5
Figure 3. Larger of 2 nestlings occupying the nest site found in the Bernasconi Hills. Pictured chick was between 5 and 7 weeks at the time photo was taken, 3 July 2008.....	8
Figure 4. One of 2 nestlings sitting on a ledge adjacent to the nest site in the Bernasconi Hills. Nestling pictured here was between 7 to 9 weeks of age when photo was taken, 17 July 2008.....	9

LIST OF APPENDICES

Appendix A. Patagial tag number, location, bird activity (foraging (F), roosting (R)), and observation date of marked turkey vultures relocated with radio telemetry or binoculars and spotting scopes. Birds may have been observed multiple times on any given date. ...	12
Appendix B. Patagial tag number, total number of re-sightings (visual, telemetry only), and final observation date for 22 turkey vultures marked in 2008.....	13
Appendix C. Significant observations made while monitoring TUVU nest in the Bernasconi Hills.	14

NOTE TO READER:

This report is an account of survey activities undertaken by the Biological Monitoring Program for the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). The MSHCP was permitted in June 2004. The Biological Monitoring Program monitors the distribution and status of the 146 Covered Species within the Conservation Area to provide information to Permittees, land managers, the public, the California Department of Fish and Game, and the U.S. Fish and Wildlife Service. Monitoring Program activities are guided by the MSHCP species objectives for each Covered Species, the information needs identified in MSHCP Section 5.3 or elsewhere in the document, and the information needs of the Permittees.

We would like to acknowledge the land managers in the MSHCP Plan Area, who in the interest of conservation and stewardship facilitate Monitoring Program activities on the lands for which they are responsible. A list of the lands where this year's data collection activities were conducted is included in Section 7.0 of the Western Riverside County Regional Conservation Authority (RCA) Annual Report to the Wildlife Agencies.

Partnering organizations and individuals contributing data to our projects are acknowledged in the text of appropriate reports. We would especially like to acknowledge the Santa Ana Watershed Association, the Center for Natural Lands Management, and the Orange County Water District for their willingness to initiate or modify their data collection to complement our survey efforts in 2008.

While we have made every effort to accurately represent our data and results, it should be recognized that our database is still under development. Any reader who would like to make further use of the information or data provided in this report should contact the Monitoring Program to ensure that they have access to the best available or most current data. All Monitoring Program data, including original datasheets and digital datasets are stored in the Monitoring Program office in downtown Riverside, CA.

The primary authors of this report were the 2008 Avian Program Lead, Nick Peterson and Staff Biologist, Lynn Miller. If there are any questions about the information provided in this report, please contact the Monitoring Program Administrator. If you have questions about the MSHCP, please contact the Executive Director of the RCA. For further information on the MSHCP and the RCA, go to www.wrc-rca.org.

Contact Info:

Executive Director
Western Riverside County
Regional Conservation Authority
3403 10th Street, Suite 320
P.O. Box 1667 Riverside, CA 92502
Ph: (951) 955-2857

Monitoring Program Administrator
MSHCP Biological Monitoring Program
4500 Glenwood Drive, Bldg. C
Riverside, CA 92501
Ph: (951) 248-2552

INTRODUCTION

The turkey vulture (*Carthartes aura*, TUVU) is a large new world vulture that feeds almost exclusively on carrion, which it finds by both smell and sight. Adult birds have featherless red heads, clear bone-colored beaks, and white facial spots near the eyes. They have a wingspan that approaches 6 feet. TUVU are the most widely distributed of all 7 species of new world vultures, ranging from southern Canada to southernmost South America.

Turkey vultures are found throughout California and are widespread, but numbers and distribution vary according to season (Grinnell and Miller 1944). Part of the California population is resident, but birds from the northern parts of the state withdraw to the south during colder winter months. Thus, the status of TUVU in southern California is complex; transient individuals, seasonal visitors, and year-round residents may all be present, especially along the coast and in coastal valleys (Small 1994). Some individuals found in western Riverside County are known to be year-round residents (Zeiner et al 1990).

Turkey vultures forage in mountains, grasslands, deserts and agricultural lands where open or semi-open country occurs, especially within a few miles of rocky or wooded areas that can provide secure nesting sites. Turkey vultures use communal roosts at night, although breeding pairs may roost separately. Roosting sites are typically large trees, rock outcrops, or riparian thickets (Garrett and Dunn 1981), and the same primary roosts may be used for multiple years.

Investigators currently do not know at what age TUVU first form pair bonds and breed, but typical pair formation involves several birds gathering in a circle on the ground and performing ritualized hopping movements with wings partially spread (Brown and Amadon 1968). Aerial courtship displays are also often performed where one bird closely follows another while diving and wing flapping (Kaufman 1996). The relationship is monogamous after a bond is formed, with the pair often remaining together year-round (Rabenold 1986) or until one member dies. Existing pairs return and reuse nesting sites year after year. The pair also spends time sitting together at the nest site for several days to several weeks prior to egg-laying.

The breeding season of TUVU commences in March and peaks from April to May. Nesting sites are in sheltered areas, such as inside hollow trees or logs, in crevices in cliffs, under rocks, in caves, inside dense thickets, or in abandoned buildings. There is little to no construction of a nest, and 1–3 eggs are laid on a bare surface. The eggs are cream-colored with brown or lavender spots. Both the male and female incubate the eggs, and both have a brood patch. Incubation commences after the first egg is laid, with the second egg laid 1–4 d later. Typically, the eggs hatch after 30–40 d.

Once hatched, the nestlings are brooded almost continuously for the first 5 d. Both parents take turns brooding and collecting food, which is then regurgitated to the

nestlings. Foraging individuals regularly travel 24–32 km from the roost or nest (Zeiner et al 1990). Parents spend less time at the nest site when nestlings approach their first week of age. The young may be fed twice per day to only once every day or two (Work and Wool 1942; Kirk and Mossman 1998).

Chicks fledge approximately 9–10 wks after hatching. The fledglings then perch and roost at the nest site for another 1–3 wks, and continue to be fed by their parents before dispersing from the area. Family groups remain together until fall or the next breeding season.

Turkey vultures are widely distributed throughout the Plan Area and are an MSHCP Covered Species. The Bernasconi Hills and Rawson Canyon are specifically identified in the MSHCP as known historical TUVU nest sites. Historic nest records for the Bernasconi Hills are from egg collections dating from 1900–1908 (Dudek & Associates 2003). Peter Bloom (Bloom Biological Consulting, pers. comm.) regularly observed a pair of adult birds at Rawson Canyon in 2002 that perched together on the same rock outcropping, but he did not locate a nest site. Conserved land around the Bernasconi Hills includes the Lake Perris State Recreation Area (California State Parks) and the Davis Unit of the San Jacinto Wildlife Area (SJWA; California Department of Fish and Game). Rawson Canyon is northeast of Lake Skinner and is a part of the Southwestern Riverside County Multi-Species Reserve.

The MSHCP species objectives specify that nesting locations should be protected from disturbance, and that the production of ≥ 1 fledging from each known nest should be verified every 3 yrs (Dudek & Associates 2003). Another objective is to include within the Conservation Area cliff areas that are capable of supporting nesting TUVU. Locations within the Conservation Area that are thought to be important for TUVU are Lake Mathews-Estelle Mountain, Sedco Hills, Lake Skinner/Diamond Valley Lake area, Wilson Valley/Sage, Badlands, Prado Basin/Santa Ana River, and a portion of Santa Rosa Plateau (Figure 1). We observed TUVU throughout the Plan Area in 2008 to increase our knowledge of their habitat and specific site use.

Survey Goals

We conducted a pilot survey in 2008 to examine the use radio telemetry to locate active TUVU nest sites. We captured TUVU and fitted them with backpack-mounted radio transmitters and attached wrap-around patagial tags so that observers could identify and track marked birds to nesting sites. We also visited historic nesting sites at the Bernasconi Hills and Rawson Canyon to document reproduction of TUVU in these areas. Specifically, the goals of the 2008 survey were as follows:

- Test the utility of Radio Frequency (RF) telemetry as a method for tracking adult TUVU to nest sites.
- Document nesting of TUVU, focusing on the Bernasconi Hills and Rawson Canyon.

- Observe behaviors of TUVU that provide evidence of important foraging locations within the Plan Area and advance our knowledge of potential nesting sites.
- Locate roosting sites.
- Document the distribution of TUVU within the Plan Area during the breeding season.
- Establish a group of marked birds for follow-up studies in the future.

METHODS

Personnel and Training

Dr. Peter Bloom (Bloom Biological Consulting), an expert in raptor capturing and tagging, provided training in the proper handling and tagging of vultures, and operates under a master permit from the Bird Banding Laboratory. Bloom was also present throughout the tagging procedures to provide supervision and assistance. The personnel receiving this training were:

- Karin Cleary-Rose (U.S. Fish and Wildlife Service)
- Lynn Miller (Regional Conservation Authority)
- Nick Peterson (California Department of Fish and Game)
- Matt Talluto (Regional Conservation Authority).

Personnel involved in the radio telemetry portion of the project demonstrated proficiency in radio tracking and visual observation of TUVU behaviors. They showed proficiency in locating and observing vultures foraging, roosting, and soaring over potential nest sites in Core Areas. The surveyors were:

- Amanda Breon (Regional Conservation Authority)
- Conan Guard (Regional Conservation Authority)
- Ana Hernandez (Regional Conservation Authority)
- Lynn Miller (Regional Conservation Authority)
- Jonathan Reinig (Regional Conservation Authority)
- Matt Talluto (Regional Conservation Authority).

Site Selection

We focused our trapping efforts at the Davis Unit of SJWA because it is immediately adjacent to a pass in the Bernasconi Hills that was known to be used by TUVU traveling to and from a well-used roost site near Lake Perris, thus providing the opportunity to capture and mark many birds. Furthermore, we anticipated at least one of these marked birds would be nesting in the Bernasconi Hills.

The Bernasconi Hills are a small range (elevation 776 m), approximately 7.6 km long and 1.5 km wide, predominately oriented northeast-southwest. The west side of the Bernasconi Hills border Lake Perris and grasslands, and the east side faces agricultural fields, dairy farms, and the Davis Unit of the SJWA. The hills are composed of granitic

Figure 1. Foraging cores and observations for Turkey Vultures in the Western Riverside MSHCP.

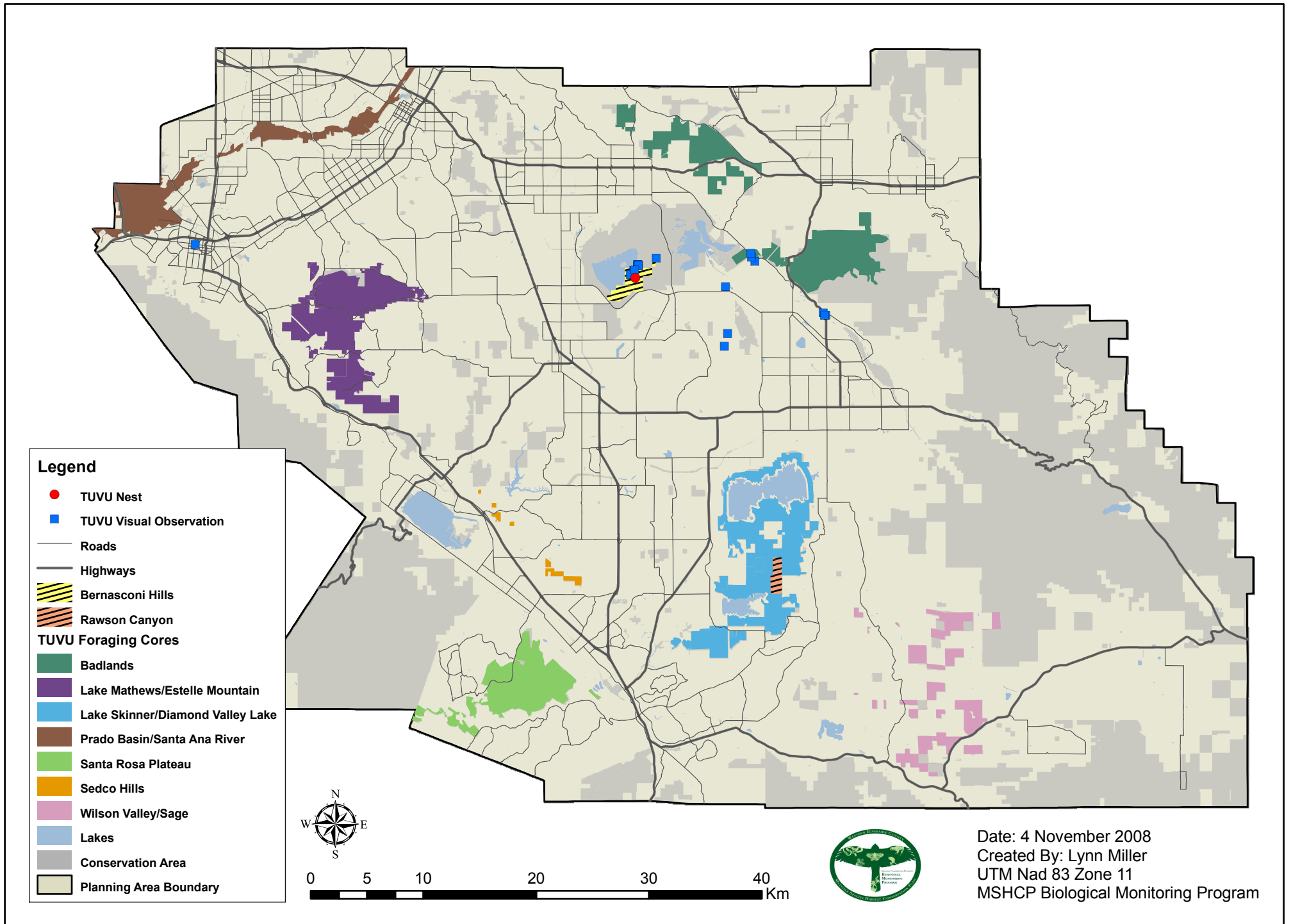




Figure 2. Walk-in trap used for capturing turkey vulture baited with calf carcass.

rock that has weathered into large boulders with crevices, ledges, and caves suitable for TUVU nesting. The Bernasconi Hills have remained relatively undisturbed since completion of the Lake Perris Dam in 1973, and large cottonwood trees (*Populus fremontii*) are also present around the lake that provide perches and roost sites. Foraging opportunities in the area are extensive, with road kill along well-traveled roads and dead fish along the shores of Lake Perris.

Survey Methods

We captured TUVU using a walk-in trap made of hardware cloth (3 m x 3 m x 3 m) provided by Peter Bloom (Bloom Biological Consulting) (Figure 2). We surrounded the trap with chicken wire placed on the ground to prevent predators from tunneling under and accessing captured birds. Mr. Bloom also constructed a circular entrance (0.75-m diameter) in a trap wall, and inserted a funnel made from the same material into the circular opening. The funnel narrowed to a 0.5-m opening with exposed wires that prevented birds already in the trap from escaping, while still permitting birds to enter from outside the trap. Birds in the trap were provided with shade, perches, food, and water. We baited the trap with both a lure bird and a fresh calf carcass. The lure bird was a healthy, but flightless, adult TUVU from a rehabilitation center. The lure bird was equipped with a radio transmitter and a patagial tag identical to those used in the project.

Carcasses were donated from a local dairy farm (John Bootsma Dairy) and positioned near the circular opening. After the trap was set, we opened and closed the portal daily at sunrise and sunset, provided fresh water, and replaced the bait as needed.

We operated the trap from 26 April to 13 May at the Davis Unit of the SJWA near a group of trees that provided shade, and away from areas frequented by the general public. We opened traps each morning before sunrise and closed them each evening at sunset. After TUVU were captured, we removed them from the trap within 24 h. The birds were hooded with a sock to keep them calm and then processed.

We fitted captured TUVU with BT-1 avian backpack transmitters (Communications Specialists, Inc., Orange, California) and attached wrap-around patagial tags (provided by Peter Bloom) to the right wing (Sweeney et al 1985; Coleman and Fraser 1989; Kenward and Fuller 1994; Houston 2003). Patagial tags, made of white herculite fabric, were numbered consecutively with large black numbers (beginning with 33) on the ventral and dorsal side. We recorded approximate age, breeding condition, weight, and molting condition. After the birds were processed, they were released by throwing them up into the air.

We used RA-216 (216-222 MHz) handheld yagi antennae, RA-9 non-directional magnetic mount antennae for vehicles, and R-1000 telemetry receivers (Communications Specialists, Inc., Orange, California) to relocate tagged TUVU from 28 April to 30 July 2008. We initially began daily searches for tagged birds at the Bernasconi Hills and Rawson Canyon because nesting historically occurred at these sites, but then expanded our search across the entire Plan Area when we became more familiar with the movements of marked TUVU. We did not follow tagged TUVU outside of the Plan Area, but sightings were made beyond the MSHCP boundary by non-Biological Monitoring Staff and reported to us.

We attempted to relocate tagged birds from approximately 1 h before sunrise and sunset to approximately 6 h after sunrise or sunset, thus allowing us to search for birds when either departing or returning to roost and nest sites. We began searches by scanning a large region from a vantage point with good long-distance visibility and signal reception. According to the manual, the range of the yagi antenna was approximately 1.6 km when a tagged TUVU was on the ground, and 9–40 km if the bird was in the air or on an elevated ledge. We recorded the observer location, signal direction, and transmitter frequency (unique to each bird) when tagged TUVU were detected. We then traveled toward signals if the location of tagged birds could not be immediately confirmed visually with spotting scopes, and attempted to triangulate the bird's position. We noted the general area of the signal when birds could not be visually confirmed with triangulation, but recorded patagial tag number, distance to bird, and bearing from observer to bird whenever tagged TUVU were sited. We also recorded date, time, method of relocation (visual or triangulated), activity (foraging, roosting, nesting), and number of birds present when tagged TUVU were relocated.

We performed area searches on foot in the Bernasconi Hills and Rawson Canyon for TUVU nest sites because these areas contained historic nest sites. Searches were carried out throughout June for approximately 25 h at each site. We also noted the location of potential nesting sites (e.g., cliff faces, rock outcroppings, and large snags) that were detected while relocating marked birds. We then revisited potential nest sites on foot and searched for TUVU that displayed behaviors that would indicate presence of a nest (e.g., courtship behavior or a pair staying close to a certain site) using binoculars and spotting scopes.

RESULTS

We captured and fitted 22 TUVU with radio transmitters. The ages of the birds were recorded as follows: 6 second year birds (SY), 15 after second year (ASY), and 1 third year (TY) bird. None of the captured TUVU had a brood patch. Weights of the TUVU ranged from 1,475 g to 2,000 g ($\bar{x} = 1,650$ g). We successfully released all birds unharmed after they were processed and marked.

We relocated and triangulated the general position of 91% ($n = 20$) of captured TUVU at least once in 2008. We also visually confirmed 55% ($n = 12$) of captured birds at least once by reading their patagial tags. We visually confirmed relocated birds at Lake Perris State Park, Davis Unit of the SJWA, Lakeview Mountains, San Jacinto Valley, and Prado Basin. Members of the general public also reported sighting marked birds outside of the Plan Area in Anaheim, Placentia, and at Santiago Reservoir in Orange County. We triangulated signal position, but were unable to visually confirm birds at or near the Potrero Unit of the SJWA, San Bernardino National Forest (SBNF), Estelle Mountain, Temescal Wash, Box Springs Mountain and Oak Mountain (Appendix A). One of our tagged birds (tag no. 38) was apparently struck by a vehicle near Irvine Lake in Orange County; the bird was found dead 14 d after capture by Spence Porter (Communications Specialists, Inc., Orange, CA).

We recorded 382 observations of tagged TUVU in 2008 (Appendix B). We recorded the majority of sightings (62%; $n = 236$) in the San Jacinto Valley and Lake Perris State Park. We made few observations of relocated TUVU in the Lakeview Mountains (13%; $n = 49$), San Jacinto River area (9%; $n = 35$), SBNF (9%; $n = 35$), and Potrero Unit of the SJWA, Prado Basin, Estelle Mountain. (each < 6%). Lake Perris was primarily used as a roosting site, but we occasionally observed TUVU feeding on dead fish along the shore. We made most (64%; $n = 244$) early morning observations of tagged TUVU in the vicinity of Lake Perris where birds were seen roosting communally in the cottonwood trees along the lake shore. Many times we observed tagged TUVU foraging in the vicinity of the San Jacinto Valley agricultural fields and dairy farms in the later mornings.



Figure 3. Larger of 2 nestlings occupying the nest site found in the Bernasconi Hills. Pictured chick was between 5 and 7 weeks at the time photo was taken, 3 July 2008.

We did not observe nesting behavior in any of our relocated TUVU, nor were we led to any nest sites using radio telemetry. We did not observe TUVU nesting behaviors or find any active nest sites during our area searches of Rawson Canyon. Moreover, we observed very few tagged or untagged TUVU in this area.

We located a single active TUVU nest in the Bernasconi Hills that successfully fledged 2 nestlings. We first witnessed an adult pair of untagged vultures about 1 h before sunset on 23 June that was flying near a cave entrance overlooking Lake Perris. One member of the pair eventually entered the cave and exited soon thereafter. We then revisited the site on 3 July and climbed the hillside to inspect the cave. We discovered 2 nestlings that were 5–7 wks old. One chick was noticeably larger than the other and may have been 2–4 d older than the smaller chick. Both birds were covered in white down except for emerging black wing and tail feathers (Figure 3).

The cave was located approximately 125 m below a ridgeline and was apparently created by falling slabs of rock and boulders. The main entrance was a rather small opening approximately 0.25–1.0 m wide and 1.5 m high, and a smaller secondary opening was on one side of the cave. The inside of the cave was approximately 5 m wide in the front with a height of 0.6 m tapering to 0.1 m in the back. The depth of the cave was 3 m. There was also a deep narrow vertical crevice and ledge inside the cave to which the nestlings could retreat. We often observed the chicks sunning themselves and exercising their wings on a ledge immediately adjacent to the nest cave and accessed via



Figure 4. One of 2 nestlings sitting on a ledge adjacent to the nest site in the Bernasconi Hills. Nestling pictured here was between 7 to 9 weeks of age when photo was taken, 17 July 2008.

the secondary opening (Figure 4). We generally used spotting scopes to observe the chicks during the nest monitoring phase, thus keeping our intrusions to a minimum. We continued to monitor the nest on 9 subsequent occasions from date of discovery until 30 July, when the 2 chicks fledged. More information is given in Appendix C.

Other locations we identified as potential nest sites were certain areas within the Potrero Unit of the SJWA, the San Jacinto Mountains and Lakeview Mountains. We searched these areas on foot as well as vehicle but did not observe any nesting behavior.

DISCUSSION

We successfully captured 22 TUVU and fitted them with radio transmitters, indicating that our trap location in the SJWA was suitable; however, we observed vultures near the vicinity of the trap that did not enter the portal during a 3–4 d period when the trap was open. Observers saw several coyotes (*Canis latrans*) near the trap during this period, suggesting the vultures may have been intimidated by their presence. The coyotes' presence in that period may have affected which individual TUVU we captured. Older, more experienced birds may have stayed away from the trap as a result of coyote presence.

One of our goals in 2008 was to track radio tagged TUVU to advance our knowledge of suitable foraging locations and potential nesting sites on cliff areas in our

Core Areas. This goal was only partially successful for several reasons. First, we soon lost contact with some tagged birds, suggesting that they continued to migrate north out of the Plan Area. Second, most of the tagged birds appeared to be non-breeding birds based on beak color and lack of characteristic red skin coloration and warts on their face. Third, our tagged birds were very difficult to follow due to the great distances that TUVU cover and the uneven terrain over which they travel. Finally, the tagged birds soared over and roosted within areas that are not in conservation and therefore were inaccessible to us.

The Bernasconi Hills proved to be a viable site for TUVU nesting. The hills have suitable caves and ledges, permitting vultures to nest relatively undisturbed. In addition, the Bernasconi Hills border good foraging habitat and the nearby trees and lake provide good roosting sites and an additional food source. We were not successful in finding TUVU nests in other potential nest sites in the Plan Area, but budget limitations restricted the time we could spend in these areas. It is possible that with additional search effort, new nest sites can be discovered in these areas.

Recommendations for Future Surveys

We recommend tagging only TUVU that are of apparent adult breeding condition to improve the chance of following a bird to an active nest site. We also recommend starting the trapping process at least 2–3 wks later to avoid capturing northerly migrating TUVU. Also, there may be a greater chance of trapping adult breeding birds later in the season because parents must intensify foraging for food as chicks age.

Future surveys should continue to verify that TUVU are breeding successfully in the Bernasconi Hills. More intensive survey efforts should be directed at Rawson Canyon to determine if that area is occupied by nesting vultures. Attention should also be given to other areas within the Plan Area where TUVU may nest, such as the Potrero Unit of the SJWA and the Lakeview Mountains. Finally, birds captured in 2008 should be relocated to determine if these birds regularly return to the Plan Area during the breeding season and potentially breed here. Batteries in the transmitters will likely last long enough to track birds during the spring and summer of 2009, and possibly even into 2010.

LITERATURE CITED

- Brown WH, Amadon D. 1968. Eagles, hawks and falcons of the world. London (UK): Country Life Books.
- Coleman JS, Fraser JD. 1989. Habitat use and home range of black and turkey vultures. *Journal of Wildlife Management* 53:782–792.
- Dudek & Associates. 2003. Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). Final MSCHSP, volumes I and II. Prepared for County of Riverside Transportation and lands Management Agency by Dudek & Associates, Inc. Approved June 17, 2003.
- Garrett K, Dunn J. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Society.
- Grinnell J, Miller AH. 1944. The Distribution of the Birds of California. Berkeley (CA): Cooper Ornithological Club.
- Houston CS. 2003. Wing-tagging turkey vultures. *Blue Jay* 61:204–206.
- Kaufman K. 1996. Lives of North American Birds. Peterson Natural History Companions. New York (NY): Houghton Mifflin Co.
- Kenward R, Fuller MR. 1994. Radio-tagging in conservation studies. *J. Ornithol.* 135:529–534.
- Kirk DA, Mossman MJ. 1998. Turkey vulture (*Cathartes aura*). No. 339. In: The Birds of North America, A. Poole and F. Gill, eds. BNA, Inc. Philadelphia, PA.
- Rabenold PP. 1986. Family associations in communally roosting black vultures. *The Auk* 103:32–41.
- Small A. 1994. California Birds: Their Status and Distribution. Vista (CA): Ibis Publ. Co.
- Sweeney TM, Fraser JD, Coleman JS. 1985. Further evaluation of marking methods for black and turkey vultures. *J. Field Ornithol.* 56:251–257.
- Work TH, Wool, A.J. 1942. The nest life of the turkey vulture. *Condor* 44:149–159.
- Zeiner DC, Laudenslayer WF, Mayer KE, White M (eds.). 1990. California's Wildlife: Vol. II. - Birds. Sacramento (CA): CA Dept. of Fish and Game.

Appendix A. Patagial tag number, location, bird activity (foraging (F), roosting (R)), and observation date of marked turkey vultures relocated with radio telemetry or binoculars and spotting scopes. Birds may have been observed multiple times on any given date.

Patagial tag number	Location and activity	Date observed
34	Lake Perris (R)	15-16 May
35	Bernasconi Hills (R)	9-May
36	Prado Regional Park (F)	25-Jun
38	Bernasconi Hills (R)	13-May
44	Lake Perris (R)	29-May
47	North of Lakeview Mts. (F)	19-May
	Lakeview Mts. (R)	21-May
48	Bernasconi Hills (R)	19-May
	Corona Civic Center (R)	5-Jun
49	Lakeview Mts. (R)	21 and 27 May; 10 Jun
	Laborde Canyon (R)	22-May
	North of SJWA (F)	3-Jun
	Lake Perris (F)	3-Jun
	San Jacinto (F)	9–10 Jun
	Northwest of Soboba Hot Springs (R)	17-Jun
	Hills south of Lake Perris (R)	20-Jun
50	Lake Perris (R)	20–21 May
	Lakeview Mts. (R)	21 and 29 May
51	Lakeview Mts. (F)	27-May
	Prado Basin (R)	10-Jun
	Prado Regional Park (F)	25–26 Jun
	Southeast of Mystic Lake (R)	20-May
52	Lake Perris (R)	20–21 May
	Lake Perris (F)	21-May
	Massacre Canyon (R)	30-May
	Southwest Potrero (R)	2, 5, 9, 11, 13, 17, and 20 Jun
	Southeast of Mystic Lake (F)	3 and 10 Jun
	SJWA (R)	9-Jun
53	Lakeview Mts. (R)	10-Jun
	Lake Perris (R)	16, 20, 27, and 30 May; 13 Jun

Appendix B. Patagial tag number, total number of re-sightings (visual, telemetry only), and final observation date for 22 turkey vultures marked in 2008.

Patagial tag Number	Total # re-sights (visual, telemetry only)	Final observation date
33	1 (0, 1)	12-May
34	7 (2, 5)	16-May
35	5 (0, 5)	14-May
36	18 (2, 16)	27-Jun
37	Never relocated in 2008	-
38	10 (2, 8)	20-May
39	3 (0, 3)	26-May
40	2 (0, 2)	19-May
41	1 (0, 1)	12-May
42	1 (0, 1)	19-May
43	3 (0, 3)	12-Jun
44	22 (1, 21)	6-Jun
45	4 (1, 3)	20-May
46	3 (0, 3)	16-May
47	16 (1, 15)	2-Jul
48	14 (2, 12)	30-Jul
49	73 (3, 70)	11-Jul
50	19 (3, 16)	2-Jul
51	34 (5, 29)	27-Jun
52	90 (7, 83)	30-Jul
53	56 (7, 49)	15-Jun
Tag not assigned	Never relocated in 2008	-

Appendix C. Significant observations made while monitoring TUVU nest in the Bernasconi Hills.

23 June – 18:00: TUVU pair observed at a cave entrance. One individual entered and then quickly exited.

3 July – 8:00: Nest confirmed active with 2 nestlings approximately 5 to 7 weeks old. One chick was larger than the other and possibly 2 to 4 days older.

7 July – 16:15: One chick observed preening near the cave entrance.

7 July – 17:00: Both chicks very active, stretching wings.

7 July – 18:03: Both parents return to roosting site approximately 5 minutes apart (a separate roosting site from the communal roost and directly down from the nest site in the trees on Lake Perris shoreline).

9 July – 7:30: Both parents again roosting together at same site as on July 7.

9 July – 9:30: Both parents left roost together and flew in circles around nest cave.

10 July – 8:00: Both parents at same roost, preening, presumably there from previous night.

17 July – 8:00: Both chicks on ledge outside cave opening, preening, flapping wings, sunning, black wing and tail feathers appear to be nearly grown in, black body feathers visible, white down still around neck, estimate the chicks to be 7-9 weeks old.

22 July – 18:24: Both chicks visible, flapping wings, hopping up to 3 m from cave entrance, white down appears to be replaced by all black feathers.

22 July – 18:44: One parent lands near cave entrance, enters and exits shortly after; flies over cave several times before departing.

24 July – 6:30: Both parents at usual roost, both chicks on cave ledge; older chick flew to nearby rock and back to ledge, younger chick watched from ledge, chicks age estimated to be 8-10 weeks.

25 July – 6:30: Both chicks on cave ledge, older chick hopping around, then awkwardly hopped down to rock below ledge, tumbled off rock to ground, walked around on ground, and afterwards took short flights from rock to rock in front of nest cave, younger chick stayed near cave opening.

25 July – 16:40: One parent flew above nest cave, lands and feeds younger chick which had flown approximately 13 m from cave, parent then flew away; younger chick flew another 5 m to a rock, again flew another 13 m away from cave.

25 July – 18:20: One parent landed on nest ledge, fed older chick; older chick flew to younger chick which was approximately 30 m from nest cave on a different rock ledge; older chick again made short flight around nest cave; neither chick return to nest cave as darkness descends.

30 July – 16:00: One TUVU fledgling seen flying near nest cave chased by aggressive ravens, landed near nest cave; took flight again with 6 adult TUVU that circle and land on ridge top; ravens once again act aggressively towards fledgling.

30 July – 17:15: Two fledglings seen soaring above nest cave, land on ridge top, five adult TUVU join them, mildly harass them but then settle down.