First Nesting Record by the Least Tern in Sacramento County

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At 0630 on 27 June 2008, I saw a Least Tern (*Sternula antillarum*) on a gravel road between two sewage ponds at the Sacramento Regional Wastewater Treatment Plant (SRWTP) between Sacramento and Elk Grove, Sacramento County. I was driving on the road looking for shorebirds that often use the mud flats that develop in the ponds, when I saw a small white bird with buoyant flight flush from the ground and fly just above the water. I stopped, and the bird circled back and landed on the road about 15 m in front of me. As I noted the bird's small size, long wings, dark-tipped yellow bill, white forehead and black cap, a second Least Tern joined it in the middle of the road. This is the first documented record for the species in Sacramento County.

The birds remained in the area through the late afternoon on 27 June, although by 1530 they were loafing at Nicolaus Pond (see Conard 2007 for pond names and locations) on the adjacent Bufferlands. The Bufferlands comprise a 1,070-hectare (2,650-acre) open space buffer surrounding SRWTP (Conard 2007). Both birds were still present on 28 and 30 June, and appeared to spend much of each day on the gravel road at the sewage ponds, making brief foraging forays over the Bufferlands. Because there is no public access to the sewage ponds, shuttle van visits were arranged for afternoons and weekends, and approximately 55 people were able to see the terns over the course of their stay.

On 27 June, after securing documentary photographs and a short video of the birds, I posted a link on the Central Valley Bird Club's e-mail list serve (groups.yahoo.com/group/ central_valley_birds). In a subsequent email, Matt Sadowski (pers. comm.) stated that the 'reek' audible in the video (flickr.com/photos/conardc/2617341392) was an agitated call normally associated with nesting. Initially I thought there was too much traffic around the sewage ponds for nesting to occur, despite witnessing courtship behavior on 30 June. The terns were together and one had a small fish and was pointing its bill straight upward. This appears to be a variant of mate feeding, an important part of courtship behavior (Thompson et al. 1997), but I did not observe the expected transfer of a fish. When I arrived at 0630 on 1 July, the terns were together on the road. I stopped my vehicle about 25 m from them, and unlike on previous days, both birds flew at the vehicle and circled it, calling repeatedly. A search of the immediate area from which they had flown revealed a scrape containing a single egg in a depression created by a tire track. When I moved the vehicle farther back, they flew back to the nest site and one bird resumed incubating. SRWTP staff agreed to close the road for the duration of the nesting effort.

Over the next few weeks, I regularly observed the birds foraging, incubating their eggs, and changing places on the nest. On 3 July, I watched one of the terns hunt for about 15 minutes. It dove at least seven times and flew around the periphery of Nicolaus Pond, 0.4 km south of the nest. Later the same day, I saw it flying over Black Crown Lake, 0.2 km west of the nest. Although I did not see this individual catch anything during this foraging effort, the male fed the female during an incubation exchange at 1515. Courtship feeding continues through the incubation period in Least Terns, and is important for maintaining the pair bond (Thompson et al. 1997). At 1710 on that same afternoon, I observed two eggs during a subsequent incubation exchange.

The typical incubation period for Least Terns is 19-25 days, with an extreme of 28 days recorded in California (Thompson et al. 1997). By 27 July, 26 days after I observed the first egg in the nest, I began to suspect that this two-egg clutch was not going to hatch. Also that day, two Ring-billed Gulls (*Larus delawarensis*) and 10 California Gulls (*Larus californicus*) began loafing near the nest, some within 15 m. At one point, both terns were diving and calling loudly at a California Gull that walked within 10 m of the nest. The gull did not retreat, but did stop moving toward the nest and finally sat down. This appeared to calm the terns because one tern returned to the nest and the other flew off to forage. From 28 to 31 July, they left the eggs unattended for up to two hours. The nest appeared to be abandoned on the morning of 30 July. I took photos of the nest during the pair's absence, though they returned later that morning. They kept a similar schedule on 31 July where they were not present at 0630 or 0900, but were back at the nest at 1100 and again at 1500-1530.

The terns were not seen near the nest on 2 August, though one was at Fishhead Lake on the Bufferlands over 2 km east of the nest. Prior to this, the birds had not been seen more than 0.5 km from the nest. They were not seen on 4 August, by which time only one egg remained, laying about 10 cm outside of the scrape. It was collected and has been deposited at the University of California's, Davis Museum of Wildlife and Fish Biology. Presumably, the other egg was taken by one of the growing number of gulls loafing near the nest site. The two terns were last seen in 2008 on 5 August, when they were foraging together at Fishhead Lake.

On 29 May 2009, I found a Least Tern pair, presumably the 2008 pair, very near the 2008 nest site. While they arrived nearly a month earlier than they did in 2008, they were still a month behind most of the terns nesting in Alameda County (S. Euing, pers. comm.). On 1 June, I watched three separate episodes of breeding behavior. Each time, the presumed male was perched slightly higher and behind the female at the edge of a sewage pond. They both waved their heads side to side, a typical pre-copulatory behavior (Thompson et al. 1997), but it did not lead to copulation while I was present. At 1520 on 2 June, a tern was apparently sitting on a nest, 130 m north of the 2008 nest, and on the most heavily traveled road accessing the sewage

ponds (though traffic had ceased for the day). On 3 June, I was able to confirm at least one egg in the nest at 0615, and SRWTP granted permission to block the road and detour traffic. This was the road where the terns were first detected on 27 June 2008, and had apparently been their first choice then as well, despite traffic of 10 to 20 vehicle trips per day.

I first confirmed two eggs in the nest on 7 June, and saw three eggs on 23 June. On 24 June, two chicks were in the nest along with an unhatched egg. At 0730, with an adult on the nest, the other adult brought a small fish and tried to feed it to one of the chicks. The chick pecked at the fish, but did not swallow it, and the fish was left on the ground near the nest. At 1320 on the same day, with one adult on the nest, the other flew to an adjacent sewage pond and dipped its breast into the water while flying, then landed near the nest. The adults exchanged places, and the tern that had been at the nest picked up an egg shell fragment, flew about 15 m south of the nest and dropped it before continuing to the south. At 1335 on 25 June an adult was standing over the chicks with wings partially spread. It then flew over an adjacent sewage pond, dipped its breast in flight, and returned to the nest. The chicks rubbed themselves against the wet adult. The same behavior was seen on 29 June at 1347, though the chicks were too large to fit completely under the adult, and while the adult attempted to shade them, they were on the wrong side to receive any benefit from its shade; the adult and chicks were panting heavily.

There were three chicks at the nest on 25-26 June, but only two were seen on 28 June and thereafter. By 28 June, the chicks were mobile, covering distances of 10 m or more in as little as a minute. They no longer gathered at the nest, but gathered near one of the adults wherever they happened to land. At times the chicks were more than 30 m apart. Susan Euing (pers. comm.) suggested putting up fencing to keep the chicks from moving into the still active roads adjacent to the nest area. Silt fencing was secured to the barricades blocking the road. This made it difficult, though not impossible, for the chicks to move outside the confined area (10 m by 200 m of gravel road) prior to fledging. The adults responded aggressively to intruding birds; although they mostly tolerated a family of Black-necked Stilts (*Himantopus mexicanus*) living within the confined area, they would periodically dive at adult and half-grown stilts for a minute or more before going back to apparently ignoring them. Other birds near the nest area, such as Canada Geese (*Branta canadensis*) and Mallards (*Anas platyrhynchos*) were also attacked inconsistently, as were Mourning Doves (*Zenaida macroura*), Barn Swallows (*Hirundo rustica*), Red-winged Blackbirds (*Agelaius phoeniceus*), and Brewer's Blackbirds (*Euphagus cyanocephalus*). More serious encounters included attacks on White-tailed Kites (*Elanus leucurus*), Northern Harriers (*Circus cyaneus*), Swainson's Hawks (*Buteo swainsoni*), and American Crows (*Corvus brachyrhynchos*) that had flown over or near the nest area. The terns would make sharp alarm calls, repeatedly diving on these birds, and escort them

for several hundred meters out of the area. When the adults were chasing other birds, the chicks would crouch low to the ground on the gravel road.

From 24 June to 23 July, the fish offered to the chicks appeared to be mosquito fish (*Gambusia affinis*) and inland silversides (*Menidia beryllina*), both small introduced species that are common to abundant in the waters of the Bufferlands. I did not see a chick swallow a fish until 25 June, although several had been dropped by the chicks after receiving them and left on the ground near the nest. The fish that was finally eaten was nearly as long as the chick, which struggled to swallow it and then collapsed for 20 seconds or more, as if dead, before returning to an upright posture. By 1 July, the chicks would quickly consume a fish, almost too fast to be seen on some occasions. The adult would fly in uttering sharp calls, and the chicks would raise their wings and run toward the fish-bearing adult. Several of these feedings and interactions were captured on video (flickr.com/photos/conardc/sets/72157622212928051). Video footage taken on 13 July shows a quick transfer of a fish from adult to chick, and the fish quickly slipping into the chick's throat.

At 1505 on 13 July, both chicks made short flights of less than 50 m over the sewage ponds before returning to the gravel road within the confined area. The chicks appeared to be nearly as large as the adults, but with shorter wings and bills. They spent most of their time within the confined area, but sometimes moved to the road south of the barricades, where they were vulnerable to traffic. On 20 July, both adults and both chicks were flying over Nicolaus Pond and diving into the water, but did not catch any fish while I watched. On 21 July, an adult caught a fish at Fishhead Lake and flew toward the nest area. On 23 July, all four birds were again at Nicolaus Pond, and an adult fed a fish to one of the chicks as it sat along the water's edge. On 27 July, the four terns were at Nicolaus Pond, and the chicks and one adult were at the same site on 28 July. Despite thorough searches, no Least Terns were found from 29 July to 3 August, but a single adult was seen on 4 August carrying a fish caught in Black Crown Lake toward the sewage ponds. The last sightings for 2009 were of a single adult on 5 and 7 August.

DISCUSSION

Although these terns provide the first documented record for Sacramento County, a small colony (10 pairs in 2008, Marschalek 2009) in West Pittsburg, Contra Costa County, has been active since 1982 (Glover 2009). The West Pittsburgh colony is only a few kilometers from the Sacramento County line near Sherman Island, so it is likely that Least Terns had strayed into the county before, especially since they were recorded even closer at the Montezuma Wetlands in Solano County near Collinsville in 2005 (R. Leong, pers. comm.). Breeding was confirmed there in 2006, with 110 birds present on 9 July (Rogers et al. 2007) and the site was active through the

2009 breeding season, with 34 nests producing 24 chicks in 2009 (R. Leong, pers. comm.).

This Sacramento County record, over 50 km inland from the nearest breeding site at Montezuma Wetlands, may be part of the wave of expansion for the species in the region. The California Least Tern (*S. a. browni*) is federally and state-listed as endangered. Human disturbance to nesting colonies was largely responsible for the decline in the state to an estimated 624 pairs in 1973 (Patton 2002). Following years of careful protection and monitoring of colonies, the 2008 statewide nesting population was estimated at between 6,998 and 7,698 pairs. San Diego County hosted 60% of the pairs in 2008, with 24% in Los Angeles and Orange Counties combined, just over 8 percent in Ventura County, and just over one percent in San Luis Obispo and Santa Barbara Counties combined (Marschalek 2009). Just over six percent of the breeding population occurs in Northern California, with all 443-451 pairs nesting in the San Francisco Bay Area and adjacent Delta, except the pair at SRWTP. Alameda County accounts for 382-388 pairs, or 86% of the Northern California total (Marschalek 2009). The expansion of new colonies is very encouraging. In addition to the expansion into the Contra Costa (in 1982) and Solano County (in 2005), nesting was confirmed in Napa County in 2007 and 2008, with 16-18 pairs in 2008 (Marschalek 2009, Rogers et al. 2009).

The Sacramento County birds almost certainly came from the San Francisco Bay region. Their late nesting attempt in July 2008 may have been a renesting by a pair displaced from an established colony, or young birds making their first nesting attempt. Egg-laying typically occurs by May, but a "second wave" of nesting has been documented, comprised of renesters and a large proportion of two-year-old terns. The late-nesting birds experience higher levels of nest failure than birds nesting in the "first wave" (Massey and Atwood 1981).

While this breeding record is new for Sacramento County, nesting has been documented for 11 years in the Tulare Basin, Kings County. The first record for the Tulare Basin, a single adult, was observed on 8 July 1995 at Tulare Lake Drainage District's North Evaporation Basin northwest of Corcoran (R. Hansen, pers. comm.). The first Central Valley breeding record and, indeed, the first inland breeding record for the state was also from Kings County, near Kettleman City (Roberson et al. 1998). A second breeding site was recorded in Kings County in 1999 (Rogers et al. 2004), a third (at Tulare Lake Drainage District's Hacienda Evaporation Basin) in 2003 and 2004 (R. Hansen, pers. comm.), and breeding has continued in the county, with one pair near Kettleman City fledging a single chick in 2009 (Rogers et al. 2009, S. Rottenborn, pers. comm.).

Another first Central Valley county record in 2008 came on 23 August 2008 when at least four Least Terns, including a juvenile, were observed at Turlock Lake in Stanislaus County. On 24 August, three terns were seen at Turlock Lake, and a flying juvenile was reported by Harold Reeve from

Table 1. Least Tern records for the Central Valley.

Date	Location (County), notes	Source
23 June 1984	Stockton Sewage Ponds (San Joaquin), 1 adult	Campbell et al. 1984
13-14 June 1985	Stockton Sewage Ponds (San Joaquin), 1 adult	Campbell et al. 1985
29 May 1986	Stockton Sewage Ponds (San Joaquin), 1 adult	Campbell et al. 1986
26 Aug 1994	Clifton Court Forebay (Contra Costa), 1	Yee et al. 1995
8 July 1995	Tulare Lake Drainage Dist. North Evaporation R. Basin NW of Corcoran (Kings), 1 adult	R. Hansen, pers. comm.
July 1998-2009	Kettleman City (Kings), breeding through 2008	Roberson et al. 1998
1 June 2001	Berenda Reservoir (Madera), 2 adults	Singer et al. 2001
10-11 July 2001	Davis Wetlands (Yolo), 1 adult	England et al. 2004, CVBC list serve
14 June-12 July 2003, 18 June-6 Aug 2004	TLDD Hacienda Evaporation Basin (Kings), breeding both years, max. 3 adults, 2 juv.	R, Hansen, pers. comm.
20-22 June 2005	Davis Wetlands (Yolo), 2-3 adults	Rogers et al. 2005
16 July 2005	Fresno Wastewater TP (Fresno), 1 adult	J. Davis, pers. comm.
13 Aug 2005	Fresno Wastewater TP (Fresno), 1 juvenile	J. Davis, pers. comm.
2005-2009	Montezuma Wetlands (Solano), 2006-2008 breeding	R. Leong, pers. comm. Rogers et al. 2007
7 July 2007	Davis Wetlands (Yolo), 1 adult	J. Humphrey, CVBC list serve

(continued)

Table 1. Least Tern records for the Central Valley (continued).

Date	Location (County), notes	Source
27 June-5 Aug 2008	SRWTP (Sacramento), 2 adults, nesting attempt	Rogers et al. 2009, This article
6 Aug 2008	Hanford Wastewater TP (Kings), 1 adult	R. Hansen, pers. comm.
23-24 Aug 2008	Turlock Lake (Stanislaus), adults, 1 juvenile	S. Salerno , pers. comm. STA_Birds list serve
24 Aug 2008	Near San Joaquin River (Stanislaus), 1 juvenile	H. Reeve, STA_Birds list serve
25 May, 6 June 2009	Madera Wastewater TP (Madera), 1 adult	J. Davis, pers.comm.
29 May-7 Aug 2009	SRWTP (Sacramento), 1 pair, 2 chicks fledged	This article

a site near the San Joaquin River about 60 km from Turlock Lake (S. Salerno, pers. comm., STA_Birds list serve: groups.yahoo.com/group/STA_Birds). The source population of these terns is anyone's guess. They could have dispersed from a known breeding location, or from an undocumented breeding site nearer Turlock Lake. As is evident from Table 1, expansion into the Central Valley is a recent phenomenon. Numerous gravel operations, seldom-used gravel roads, evaporation ponds and sewage ponds in the Central Valley provide potential breeding sites. Many such locations are never visited by anyone who might notice or recognize a Least Tern and small colonies would be easy to miss. If recent trends are any indication, we should expect more Central Valley sightings and nesting records in the years to come.

ACKNOWLEDGMENTS

I thank Dan Airola, Jeff Davis, Steve Glover, Robert Hansen, Robin Leong, Frances Oliver, Ed Pandolfino, Steve Rottenborn, Matt Sadowski, Sal Salerno, and David Yee for providing information, resources, and for encouraging me to write this article; John Trochet for arrangements with the Museum of Wildlife and Fish Biology at UC Davis; Kimya Lambert for a careful review of a draft of this article; Susan Euing of the U. S. Fish and Wildlife Service for advice on protecting the nest in the middle of a busy

wastewater treatment plant, and SRWTP staff for altering their operations so the terns were able to nest.

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