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NOTES

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LEAST TERNS NEST ON THE DRY LAKEBED OF LAKE JACKSON, LEON COUNTY, FLORIDA

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Least Terns (*Sterna antillarum*) have nested in the interior north of the central peninsula of Florida in only two counties. Least Terns nested at phosphate mines from 1979-1981 in Hamilton County (Maehr 1982, Stevenson and Anderson 1994) and other breeding sites are in Leon County. A former breeding site in Jacksonville, Duval County, was on an abandoned surface mine near the St. Johns River where it is tidal and brackish (DeMort 1990); however, I do not consider this colony to be truly inland (*contra* Lof-tin 1973, Lohrer and Lohrer 1973).

In Leon County, Least Terns nested at the old Tallahassee Airport in 1975-1976 (TTRS archives; G. Menk, unpubl.) and have positively nested on roof-tops of a number of buildings in Tallahassee since 1983 (possibly as early as 1970) (Gore 1991, 1996; Tall Timbers Research Station archives; G. Menk, unpubl.). A maximum of two roof-top colonies were active each year until an additional colony became active several years ago (G. Menk, unpubl.). In 1999, at least 50 pairs of Least Terns nested on roof-tops in Tallahassee although the total was probably higher (G. Menk, W. W. Baker, and J. Cox, unpubl.).

Least Terns have also nested in Leon County on natural habitat, on the lakebed of Lake Jackson in 1955 and 1982 (Stevenson and Anderson 1994). On 1 July 1955, J. Fehon and H. M. Stevenson found a colony of about 20 birds and two nests, each with one egg (Stevenson 1995, Lohrer and Lohrer 1973, TTRS archives). On 2 July 1982 Stevenson found a colony of about 75 birds and six nests with eggs plus several recently fledged juveniles (one female barely able to fly, TTRS 3706; TTRS archives). The exact location of the colonies in 1955 and 1982 are unknown. I discovered one breeding colony of Least Terns at Lake Jackson on an island that emerged when the water began to drain in 1999.

Other than on Lake Jackson, Least Terns have not been documented to breed on natural substrates in the interior of Florida (McNair 2000). Lake Jackson is a sinkhole lake which has no surface outflow. This note documents Least Terns nesting at Lake Jackson in 1999. I also evaluate breeding information in 1955 and 1982 with respect to the unusual hydrology of this lake (e.g., see Wagner 1984) and within the context of nesting of Least Terns in the interior of Florida.

The colony site was near the southwest shore of Lake Jackson about 2 km north of the mouth of Megginnis Arm. The water level fell from 24.64 m (80.8 feet) to 24.59 m (80.62 feet) above sea level (staff gauge readings taken on U.S. Highway 27 by personnel of the U.S. Geological Survey) from 1-10 June. On 5 June the section of the lakebed where the nesting island formed was just above water (1-2 cm) and expanded to about 1 ha as water levels continued to drop. Much of the island was surrounded by emergent vegetation. Least Terns nested on the drier interior of the island which had fairly coarse light-colored sandy loam which supported less vegetation than the island edge. The dominant plant at the colony site was *Rynchospora* (spp.) which began to grow in early June. By early July, this sedge had a mean height of 15 cm (approximate range: 7.5-22 cm). The other common plant within the colony site was pickerel weed (*Pontederia cordata*) which were 20-25 cm tall by early July and some individuals had doubled in height by mid-July.

Least Terns began laying eggs on 9 June (three clutches with one egg each), when the colony site was approximately 5 cm above water and the surface was still moist. I visited the colony once and occasionally twice a week thereafter. Some clutches were placed next to flotsam (driftwood, glass bottles). The maximum number of active nests present occurred on 27 June when I found 19 clutches (5 with one egg, 14 with two eggs). The minimum number of clutches laid by Least Terns was between 23 and 30. The last active nest was observed on 22 July. Thirteen nests failed between 11-18 July. Only four new or replacement clutches were laid after June, when the sedge rapidly began to cover the colony site and pickerel weed invaded the site.

Least Terns were also exploring a 2 ha, broad, moist flat near Brill Point, 3 km away, and initially in early June the number of birds on this flat was greater than on the island. The terns scratched out several nest scrapes but abandoned this flat, possibly because the vegetation was higher and much denser than on the island and ground predators had greater access to the flat because it became attached to the mainland at Brill Point because of falling water levels.

I saw four downy chicks (1-2 days old) on the island on 11 July. One chick died between 11-18 July, but the other three plus one smaller chick previously overlooked, were still present on 27 July. This chick died but the three larger young successfully fledged by 1 August. No other juveniles were present at the colony site on 1 August. W. W. Baker and I watched adult Least Terns repeatedly feed the three recently fledged young at roosting areas at the perimeter of the island, for a maximum success rate of less than 10%.

Predation was likely the major cause of low nest success. I found six eggs with punched holes during 11-18 July. Most other eggs disappeared without a trace. Flocks of Fish Crows (*Corvus ossifragus*) depredated other species of nesting birds along the shore of Lake Jackson in 1999 (D. B. McNair and W. W. Baker, pers. obs.). Laughing Gulls (*Larus atricilla*) occurred in low numbers (≤ 6 birds) at Lake Jackson and were repelled by adult Least Terns (D. B. McNair, pers. obs.).

I censused the Least Tern breeding colony at Lake Jackson throughout the nesting season in 1999, unlike 1955 and 1982. The colony was larger in 1999 in early July (19 nests with eggs) than in either 1955 or 1982 (2-6 nests with eggs). The similar timing of nests with eggs in all three years and the absence of any chicks suggests that Least Terns probably also initiated egg-laying around early June in 1955 and 1982. Several recently fledged juveniles in early July 1982 also suggest that some pairs nested earlier (cf., Lohrer and Lohrer 1973). Regardless, the few young that have fledged from the anomalous breeding sites on the lakebed of Lake Jackson suggest that this sinkhole lake is a biological sink for breeding populations of Least Terns.

In 1999, the presence of families of Least Terns at Lake Jackson throughout June and into July suggest that other birds which nested on the island originated from roof-top colonies in Tallahassee. The maximum number of Least Terns at the colony was 130 on 27 June. The number of non-breeding birds was always at least twice that of breeding individuals. Whether Least Terns that nested at Lake Jackson in 1999 had failed earlier or were late breeders is unknown. Nonetheless, despite the apparent breeding success of many Least Terns at roof-top colonies in Tallahassee and low nest success at Lake Jackson in 1999, the presumed shift of some birds to Lake Jackson suggests that Least Terns prefer to nest and forage in one area (cf., Maehr 1982). Least Terns foraged at Lake Jackson since their arrival in Leon County in mid-April, especially at the south end of the lake, closest (5.3 km) to the nearest roof-top colonies in Tallahassee. Typically, 30-40 terns foraged at the lake at any given time (D. B. McNair, pers. obs.). As many as 20 Least Terns also regularly foraged at Lake Carr, part of the Lake Jackson watershed, but further (11.4 km) from the nearest roof-top colonies. Both distances in Leon County are further away than distances from foraging areas to roof-top colonies on the coast (Gore 1996). The exposure of potential nesting habitat at Lake Jackson apparently initiated a rapid colonization response from birds already familiar with the area.

In contrast to 1999, Least Terns did not nest elsewhere in Leon County in 1955 and, perhaps, not elsewhere in 1982. The distance to Lake Jackson from the coast of Wakulla County is about 55 km. Least Terns were unknown in Hamilton County, even further away (75 km) from the coast, when they colonized phosphate mines located near the Suwannee River (Maehr 1982). Maehr (1982) postulated that birds flew upriver from the Gulf of Mexico to arrive at the mines. Least Terns departing from Wakulla County also could have taken an overwater route (rivers and lakes; cf., Interior Least Tern *S. a. athalassos*, Thompson et al. 1997) to Lake Jackson. However Least Terns arrived, colonization of isolated breeding sites in the interior of northern Florida (including roof-tops of buildings in Leon County) where they are otherwise rare suggests that Least Terns can rapidly disperse and opportunistically colonize potential breeding sites if suitable habitat becomes available (cf., Lohrer and Lohrer 1973, Maehr 1982).

Least Terns did not nest at Lake Jackson in the year following either 1955 or 1982. A sinkhole temporarily drained a major portion of Lake Jackson in 1982 (Wagner 1984), but water returned by June 1983. In 1956 when the water level was even lower than in 1955, some Least Terns returned to the colony site on 25 May but did not nest (TTRS archives), probably because vegetation covered the lakebed on the island. The mean surface-water elevation of Lake Jackson in June 1999 (24.6 m [80.61 feet]), when only one island in Lake Jackson was exposed, was higher than in either June 1955 (24.2 m [79.28 feet]) or June 1982 (24 m [78.75 feet]). Under current conditions, this surface-water elevation is the maximum level under which the lake bottom can become exposed. In only six years since 1950 have surface-water elevations in June been lower than 24.7 m (81 feet): 1955-1958, 1982, and 1999 (U.S. Geological Survey data). My examination (D. B. McNair, unpubl.) of information on surface-water level fluctuations and estimates of the annual gain and loss of water at Lake Jackson (cf., Wagner 1984, Bartel et al. 1991, Brenner et al. 1992) suggest that the 1950s through the 1960s appear to have been dominated by climatic conditions (wet and dry periods; e.g., prolonged drought from 1954-1958), and from 1969 to the present by groundwater loss (leakage) and sink-hole activity. Regardless, the hydrology of Lake Jackson is poorly understood and cannot be used *a priori* to predict low water levels, and thus, when Least Terns may nest.

In summary, Least Terns nested at one colony on an unusual natural substrate (dry lakebed) at Lake Jackson, Leon County, Florida, when the water level dropped in 1999. The maximum number of active nests (19) occurred on 27 June. Breeding success was low (<10%), but three young fledged in late July. Breeding of Least Terns in 1999 and also in 1955 and 1982 was opportunistic and reflects the unpredictable nature of Lake Jackson as well as the well-documented colonization abilities of the species. Lake Jackson has been the only natural site in the interior of the United States where the nominate subspecies of the Least Tern *Sterna antillarum antillarum* has nested (see Patten and Erickson 1996, Johnson et al. 1998).

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