

SOME NESTING WATERBIRDS FROM SOUTHERN SAN JOSE ISLAND AND ADJACENT ISLANDS, GULF OF CALIFORNIA, MEXICO

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The Gulf of California is important for nesting seabirds (Anderson 1983), but the low productivity of the southern portion causes the abundance of seabirds to decrease with latitude (Cody et al. 1983, Carmona et al. 1994). Perhaps for this reason there have been few recent ornithological studies of this area. San José Island, north of La Paz Bay, is one of the areas for which very few records exist (Grinnell 1928, Wilbur 1987, Velarde and Anderson 1993). This paper presents a preliminary list of waterbirds breeding in the southernmost portion of San José Island and on three smaller adjacent islands.

The study area is located on the southeast side of the Baja California peninsula and marks the northern limit of La Paz Bay (Figure 1). San José Island has a semidesert climate with a mean annual temperature of 23° C (García and Mosiño 1969) and an average annual precipitation of <250 mm (Jiménez 1989). It lies at the edges of two major biogeographic areas: the California region and the Cortez province (Anderson 1983).

Off the southeast tip of San José Island are three important small islands: San Francisquito, with an area of 3.8 km², has 45-m cliffs along its east side and sandy beaches elsewhere around its periphery; El Callo, with an area of 0.13 km², is surrounded by rocky beaches only; El Pardino, covering 0.12 km², has no vegetation and is inhabited year round by fishermen (Anonymous 1987).

In this area, we identified four nesting sites. Two are on San Francisquito Island: El Arenal, a sandy beach 1.5 km long, located on the northern portion of the island, and Punta Colorada, a rocky beach 2 km long with a 5-m cliff, located west of El Arenal. The third location, La Cocina, is a rocky beach 2 km long on the southwest side of San José Island. Finally, El Callo has an elevated plain with vegetation dominated by cholla cactus, *Opuntia cholla*, and surrounded by cliffs 20 m high.

We visited the area from 4 to 7 and 28 to 30 May 1995. On both visits, we censused all four sites, counting nests, eggs, and chicks. We made the counts in the shortest possible period of time, early in the morning and late afternoon, by walking through every area. We found six species nesting.

Blue-footed Booby (*Sula nebouxii*). This species was observed nesting only at El Callo. During the first visit, we found one nest with two eggs and an adult perching nearby; during the second, three nests, two with one egg, the third with two (probably the same recorded for the first visit), but neither chicks nor adults. Two nesting colonies of *S. nebouxii* have been reported previously in La Paz Bay. One small colony, at Gaviota Island, was used annually until the end of the 1970s. It was abandoned because of the disturbance caused by the detonations when San Juan Nepomuceno Island (approximately 800 m from Gaviota Island) was artificially joined to the coast (Mendoza 1994). The other colony at La Lobera, (north of Espiritu Santo Island) had one and two nests in 1988 and 1990, respectively (Carmona et al. 1994).

Brown Booby (*S. leucogaster*). Several individuals were observed perching at El Callo, but only one adult was incubating during the first visit and no evidence of nesting was observed during the second. The only nesting recorded within approxi-

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mately 40 km of the study area is of a small colony on La Gaviota Island, La Paz Bay, that has since disappeared following the same disturbance that terminated the Blue-footed Booby colony (Mendoza 1994). The paucity of nests of both booby species in La Paz Bay and at El Callo may be attributable to the low productivity of the lower Gulf of California.

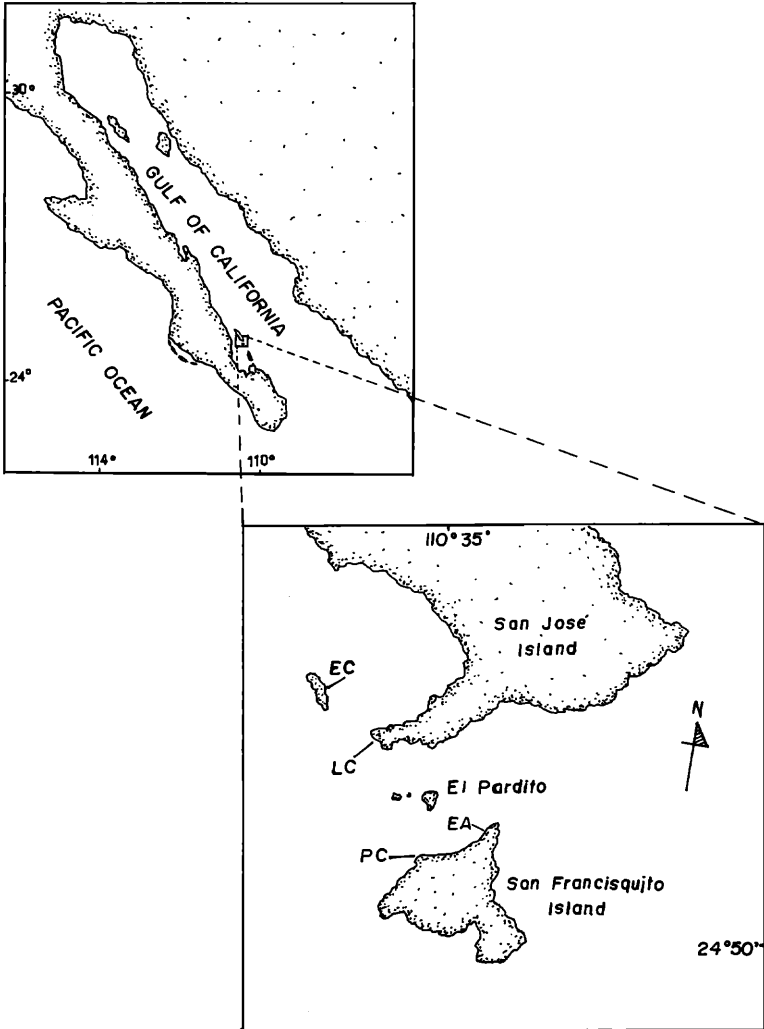


Figure 1. Southern San José Island, showing sites of waterbird colonies. EC, El Callo; LC, La Cocina; EA, El Arenal; PC, Punta Colorada.

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Great Blue Heron (*Ardea herodias*). We found four nests at El Callo. During the first visit, one was empty, one had two eggs, and two had two chicks each. During the second visit, one was empty, one had one egg, one had two eggs, and one had two chicks. Two fledglings were also nearby. Nesting of this species has been widely recorded in Baja California Sur (Becerril 1994, Carmona et al. 1994, Maldonado and Sánchez 1994).

Heermann's Gull (*Larus heermanni*). This species was observed nesting only at El Callo. We counted 14 nests with 26 chicks and one egg during the first visit. During the second visit only 11 chicks were observed, for a productivity of 0.78 fledglings per nest. First- and second-winter immatures were also observed. This colony is very recent; Carmona visited the area during the breeding seasons of 1986 and 1988, finding no evidence of nesting by this species. The colony was surrounded by about 25–30 Yellow-footed Gull nests. Predation by the Yellow-footed Gull may explain the apparent losses of Heermann's chicks between the first and second visits (e.g., Velarde 1992). There is one previous report of nesting for this species in La Paz Bay, of two solitary nests in 1990 (Carmona et al. 1994).

Yellow-footed Gull (*L. livens*). Nesting was observed at all four localities. At El Callo there were 25–30 nests, with a total of 73 and 68 chicks observed during the first and second visits, respectively. At La Cocina 22 nests, 13 chicks, and 27 eggs were recorded on the first visit, 37 chicks and 3 eggs on the second. During both the first and second visits to El Arenal, five nests and 10 chicks were observed. On the second visit an additional six nests were seen about 500 m west of El Arenal. At Punta Colorada the gulls' nesting was more advanced than at the other localities. During the first visit, 14 nests, 24 chicks, and one nest with two eggs were observed. During the last visit we found 25 chicks and no eggs.

Interestingly, the Yellow-footed Gull's nesting in this area, both within and between colonies, is asynchronous. During the first visit to Punta Colorada, there was only one egg, and most of the chicks were more than 15 days old; in contrast, at La Cocina eggs predominated, though chicks older than 15 days were also found. Several factors may cause this asynchrony: the colonies consisted of a mix of young and old pairs; asynchrony diminishes competition for food at the most critical stage of the reproductive cycle; egg predation by fishermen induced renesting. Testing of these hypotheses requires further studies.

The smallness of these colonies may be attributable to the characteristics of the substrate and the thermoregulatory requirements of the chicks (Hand 1980, Hand et al. 1981) and/or eggging by fishermen, since smaller colonies are harder to spot (Spear and Anderson 1989).

Osprey (*Pandion haliaetus*). A pair was bringing new material to a nest atop an abandoned lighthouse during our first visit to La Cocina, but they were absent during our second visit.

Only six nesting species were recorded in this study area, compared to 21 for the better-studied La Paz Bay (Carmona et al. 1994). However, San José Island has several mangrove areas that we did not survey during our study. It is likely that some species of the families Ardeidae and Rallidae nest in these mangroves. Furthermore, remains of nests observed in crevices on San Francisquito Island suggest nesting of storm-petrels (*Oceanodroma* sp.). More detailed investigations will likely turn up additional nesting waterbirds. Still, these colonies, like those in La Paz Bay, are marginal in comparison to the much larger colonies farther north in the Gulf of California. Further information is needed for the monitoring of the stress and potential impacts of egg collection by local fishermen, as well as to help the design and implementation of a future management program for this area.

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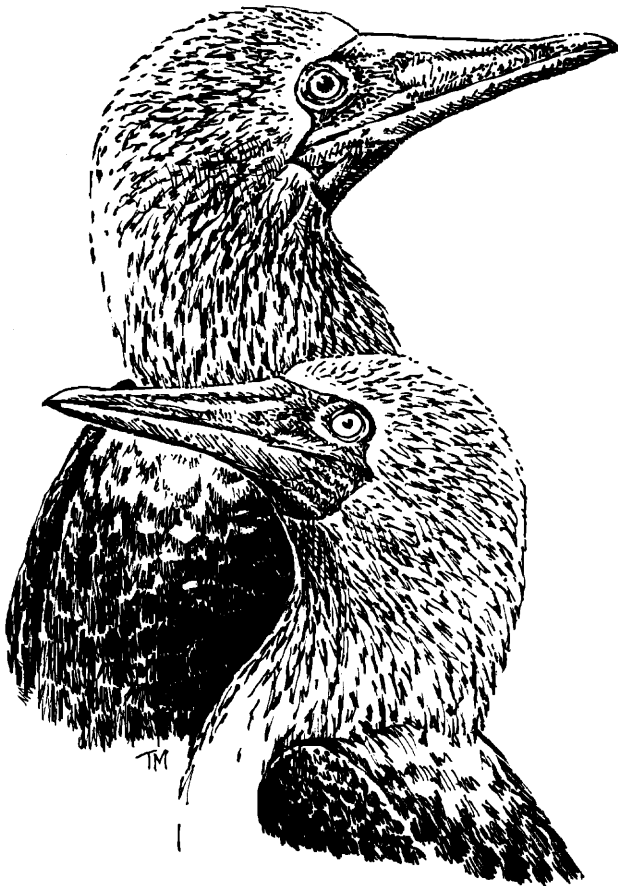
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Blue-footed Boobies

Sketch by Tim Manolis