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NESTING WATERBIRDS OF SANTA MARIA BAY, SINALOA, MEXICO, APRIL 1988

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Santa Maria Bay (25°00' N, 108°10' W) extends northwest-southeast along the coast of the state of Sinaloa, Mexico, 100 km southwest of Los Mochis (Figure 1). One of the largest coastal wetlands of Sinaloa, it covers 1350 km² and includes several islands and extensive mudflats. It is separated from the Gulf of California by Altamura Island, a sand bar 42 km long. At low tide, most of the bay is less than one meter deep, revealing several channels ranging from 2 to 20 meters deep. The area is highly productive, owing to its mangrove forests (Dawes 1986). Santa Maria Bay supports an important fish and shrimp industry (McGoodwin 1979).

Most bird surveys in the bay have focused mainly on waterfowl (Velazquez et al. 1972, 1975, Velazquez and Ortega 1973), including waterbird surveys from 1937 to 1964 and 1979 to 1984 (Norman 1979-1982, Saunders and Saunders 1981, Conant and Novara 1983, Conant and Voelzer 1984). A report on the status and distribution of the Jabiru (*Jabiru mycteria*) and other waterbirds in western Mexico (Knoder et al. 1980) included some information on pelicans, cormorants, frigatebirds, herons, and egrets from Santa Maria Bay.

From 18 to 26 April 1988 we surveyed four mangrove islands (Pájaros, El Salero, Las Tunitas, and La Coyotilla) in the north portion of the bay to census all birds and record the species breeding there.

The surveyed islands are located 10 km southeast of the north mouth of the lagoon, around 1000 m from the inner coast of Altamura Island, between 25°03' and 25°06' N and 108°10' and 108°13' W (Figure 1). Pájaros (PI), also called Tijeretas, the largest of the four islands, is 1.7 km long and 0.5 km wide. Length and width for El Salero (ES), Las Tunitas (LT), and La Coyotilla (LC) are 0.45 by 0.4, 0.78 by 0.3, and 0.1 by 0.08 km, respectively. All except La Coyotilla are covered almost completely by Red (*Rhizophora mangle*) and Black (*Avicennia germinans*) Mangrove. White Mangrove (*Laguncularia racemosa*) is uncommon. La Coyotilla is a small shell-covered island, lacking vegetation.

The breeding species (11) and other species of interest were as follows:

Magnificent Frigatebird (*Fregata magnificens*). An estimated 15,000 pairs breed on PI. We found young in all stages of development, from eggs to fledglings. Knoder et al. (1980) mentioned this bay as an important breeding site for this species, and observed 1500 nests in January 1971, 1000 in January 1972, and 500 in July 1972. The next northernmost reported frigatebird colony is on Margarita Island, on the west coast of Baja California Sur (Moreno and Carmona 1988), and consists of about 20,000 pairs.

White Pelican (*Pelecanus erythrorhynchos*). We saw three individuals feeding near PI. The population for the whole bay has been estimated at up to 1000 (Conant and Novara 1983). The closest breeding colony (500 individuals) is located in Santiaguillo Lagoon, Durango (Knoder et al., 1984), southeast of Santa Maria Bay, but we presume that the birds in Santa Maria Bay are winter visitors from the north, probably unrelated to the Durango colony.

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Brown Pelican (*Pelecanus occidentalis*). Some 1000 to 1500 pairs were nesting on PI, another eight on LT. The nests, constructed on Red and Black mangroves, contained from eggs to almost-fledged chicks. The species had been reported breeding in the area by 1947 (Saunders 1981). Knoder et al. (1980) estimated 1500 nests in the bay. The winter population has been estimated as high as 11,000 individuals (Conant and Novara 1983).

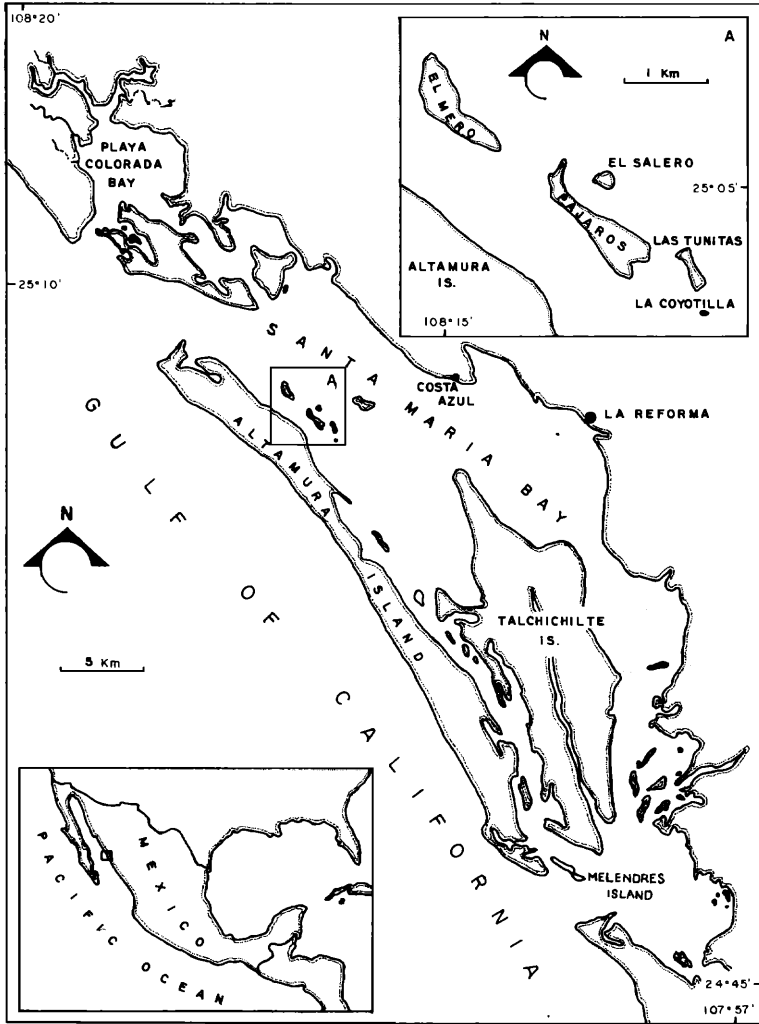


Figure 1. Santa Maria Bay, Sinaloa. A, location of the surveyed islands.

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Double-crested Cormorant (*Phalacrocorax auritus*). A breeding colony of 1000 to 1500 pairs is located on PI. Built on Red and Black mangroves, nests contained from eggs to fledglings. Knoder et al. (1980) estimated 4300 and 4000 nests of *Phalacrocorax* spp. in January 1971 and 1972, respectively.

Yellow-crowned Night-Heron (*Nyctanassa violacea*). We found two subcolonies, each of 200 to 300 pairs, on PI. Most nests, in the mid-heights of Red Mangrove trees, were under construction, and only 12 of them had eggs. Additionally, two nests with eggs were in the same kind of vegetation, mixed in the Roseate Spoonbill colony (see below). Knoder et al. (1980) recorded in July 1972 several colonies of from 5 to 25 nests.

Black-crowned Night-Heron (*Nycticorax nycticorax*). We saw four individuals in breeding plumage near the colonies of the Yellow-crowned Night-Heron on PI, but did not find any nests. Knoder et al. (1980) recorded 12 nests in July 1972.

Cattle Egret (*Bubulcus ibis*). We found between 100 and 150 pairs building nests in the middle heights of Red Mangrove trees on PI. Knoder et al. (1980) recorded in July 1972 five large colonies averaging 700 pairs each, for an estimated total of 3600 pairs in the whole bay.

Great Blue Heron (*Ardea herodias*). We found four nests on the few White Mangrove trees of PI. A larger colony (150–200 pairs) is located to the south, on Melendres Island, where the White Mangrove dominantes. Probably the nesting of the Great Blue Heron, because of the size and weight of the nests, is limited in this area to the more resistant White Mangrove. Knoder et al. (1980) mentioned that the bay supported 30 to 50 pairs in 1971 and 1972.

Other ardeids. Beside those mentioned above, egrets and herons were few. We found only one nest of the Reddish Egret (*Egretta rufescens*), in one of the few White Mangrove trees of PI. We saw Snowy Egrets (*Egretta thula*), Little Blue Herons (*E. caerulea*), and Great Egrets (*Casmerodius albus*) in breeding plumage, but failed to find any nests. These numbers contrast with those reported by Knoder et al. (1980), who, in July 1972, estimated 830 nests of the Little Blue Heron, 41 nests of the Reddish Egret, 200 nests of the Great Egret, 90 nests of the Snowy Egret, and 230 nests of the Louisiana Heron (*E. tricolor*).

White Ibis (*Eudocimus albus*). We saw 52 individuals on PI, but no nests. Local fishermen suggested the species breeds on islands in southern Santa Maria Bay. Knoder et al. (1980) estimated 1750 nests for the bay, as well as 250 nests on Talchichilte Island, south of Santa Maria Bay.

Roseate Spoonbill (*Ajaia ajaja*). The 600 pairs were distributed in several groups, the largest of around 300 pairs. All nests were in the middle and bottom portions of Red Mangrove trees, and most of them contained eggs. Knoder et al. (1980) reported a single colony of only 18 nests.

Black-bellied Whistling-Duck (*Dendrocygna autumnalis*). Although we only saw two individuals flying south over PI, local fishermen considered this species very common. Norman et al. (1979) and Conant and Voelzer (1984) reported 40 and 100 individuals in 1979 and 1984, respectively. We found on both LT and ES some nest structures that might belong to this species.

Osprey (*Pandion haliaetus*). Around 40 pairs of this species breed in the area. We found nests as close as 15–20 m from one another, on various substrates but always high from the ground. We found nests on all the islands visited except the barren LC. Henny and Anderson (1979) observed only one nest along the Mexican coast from Punta Baradito to Mazatlan, including Santa Maria Bay. Conant and Voelzer (1984) reported five nests for the bay.

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American Oystercatcher (*Haematopus palliatus*). We found one nest with two eggs on LC, the only island with proper nesting substrate for this species.

Least Tern (*Sterna antillarum*). We saw four individuals courting. This threatened species (Palacios 1989) might breed on Altamura Island, where there are sand beaches suitable for its nesting.

Aerial counts of birds made in mangrove areas like this should be carefully reviewed. Such counts tend to underestimate less conspicuous birds and nests. Conversely, counts from randomly selected transects extended to large areas tend to overestimate aggregated populations. Thus differences in technique might explain some of the differences between our data and those of Knoder et al. (1984). Those authors based their estimates on aerial surveys with no terrestrial verification. The greater geographical and seasonal extent of their surveys, however, represents a broader perspective than does our data.

Agriculture is one of the most important economic activities in Sinaloa, so pesticides may be found in Santa Maria Bay, carried by the several streams that flow into it. Although we observed no anomalies related to pesticides, they represent a potential threat to the species nesting there.

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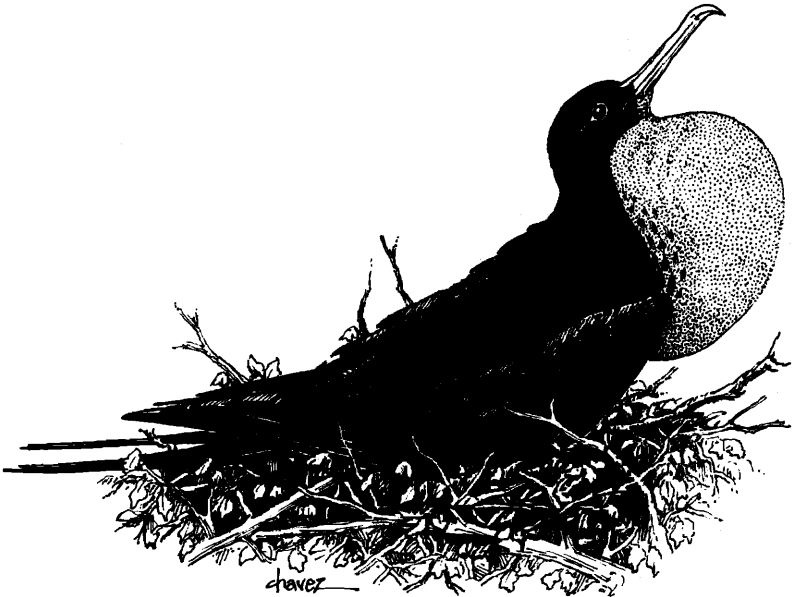
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Magnificent Frigatebird

Sketch by Jamie M. Chavez