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BREEDING BIRDS OF THE GUERRERO NEGRO SALTWORKS, BAJA CALIFORNIA SUR, MEXICO

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Ojo de Liebre (Scammon's) Lagoon, on the west coast of the Baja California peninsula, is surrounded by saltmarshes and saltflats exposed to periodic tidal inundation. Part of these areas was modified in 1956 by the building of saltworks, a system of managed ponds covering 27,773 ha. These ponds contain several islands, sand bars, and sand flats suitable for nesting birds (Figure 1). In 1996 we surveyed the saltwork's nesting birds, as part of a year-round study (Carmona and Danemann 1998).

These saltworks lie next to Ojo de Liebre Lagoon and south of Guerrero Negro, a small industrial town in the northwestern portion of the state of Baja California Sur, in Mexico (Figure 1). The salt-production process involves the pumping of sea water from the lagoon into a system of concentration ponds, where it evaporates through the action of the sun and wind. Water levels and salinity are kept fairly stable at all times, as a requirement for the process.

The area, which is part of El Vizcaíno Reserve of the Biosphere, is concessioned to Exportadora de Sal S.A.C.V., a joint venture of the Mexican government and a foreign corporation. All access to the area is restricted, and occasional visitors are escorted in company vehicles. As a result, the saltwork is the only portion of the reserve to receive effective protection from human intrusion.

The birds of Ojo de Liebre Lagoon have been studied since 1927. Massey and Palacios (1994) reported 15 species breeding in the lagoon, 13 of which had been previously observed by Bancroft (1927). Other reports for the area (Kenyon 1947a,b, 1949, Castellanos et al. 1994, and Castellanos and Ortega 1995) made no additions to the list of birds breeding in the lagoon.

We performed 12 monthly censuses in the saltworks, from December 1995 to December 1996; there was no census in October. During censuses we carried out detailed inspections of all areas suitable for nesting, by foot and/or using binoculars (8x and 10x) and a spotting scope (15–60x). Sand bars and sand flats were reached by road, while a motor boat was used to visit islands in areas S1-A, 8, and 9 (Figure 1). The poor condition of some of the pathways and dikes made visiting the coast to the south and east of the concentration ponds impossible. Each survey required two days, covering 18,117 ha, equivalent to 65.2% of the saltworks. We recorded ten species breeding in the saltworks.

Osprey (*Pandion haliaetus*). We recorded 24 active nests, 20 of them built on artificial platforms, three on other structures (tank tower, power post, and lighthouse tower), and one on *Salicornia* bushes. Ten nests were located on the road to El Chaparrito channel (including the one on *Salicornia* bushes), 13 along the channel, and one in the Salitrales pumping station, in a post right over the pumps. The birds' breeding season here in 1996 extended from January to June, with the highest number of active nests observed during March (24 nests). From their survey of the lagoon and the saltworks, Castellanos and Ortega (1995) reported a total of 126

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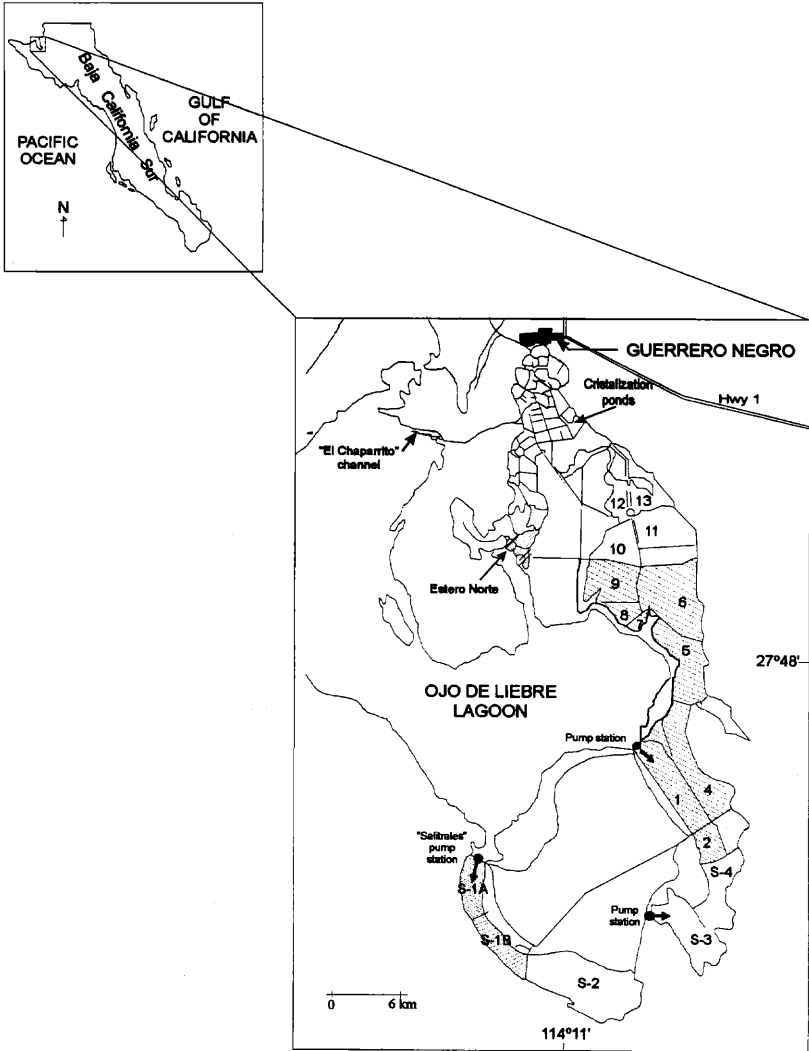


Figure 1. Saltworks next to Ojo de Liebre Lagoon, Baja California Sur, México. The evaporation ponds are indicated by numbers. The ponds visited during this study are shaded.

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pairs, 13 of them within the saltworks. According to those figures and our own data, the saltworks hold between 10 and 19% of the local breeding population.

Peregrine Falcon (*Falco peregrinus*). We observed one nest, active in March and April, on a light tower in El Chaparrito channel. The same nest was noted by Castellanos et al. (1994) in 1993. This species is enlisted as endangered by Mexican law (Gobierno de los Estados Unidos Mexicanos 1994).

Snowy Plover (*Charadrius alexandrinus*). We found two nests (each one with one egg) in June, on a sand flat beside Area 1. There may have been more, since we saw at least 20 adults in the area. Additionally, in August we found three chicks on another sand flat, beside Area 8. The Snowy Plover is a common resident on both coasts of the peninsula, nesting on sandy beaches between March and July (Wilbur 1987, Howell and Webb 1995), and was reported nesting previously in the saltworks by Massey and Palacios (1994).

American Oystercatcher (*Haematopus palliatus*). We found one nest with two eggs in April, on a sand bar in Area 8. This species is a common resident on both coasts of the peninsula (Wilbur 1987, Howell and Webb 1995) and has been long reported as a breeder in the area (Bancroft 1927, Kenyon 1949).

Gull-billed Tern (*Sterna nilotica*). We found four nests and seven adults in June, on a sandy islet in Area S1-A. Each nest contained two eggs. The nests consisted of shallow hollows in the sand, and all of them contained pieces of shell. We saw no nesting activity in July, suggesting that breeding might not have been successful. This is the first breeding record for the species in the Baja California peninsula. The closest Gull-billed Tern colony is located in the Gulf of California on Montague Island, in the Colorado river delta, 500 km north of Guerrero Negro (Palacios and Mellink 1992, Peresbarbosa 1995).

Caspian Tern (*Sterna caspia*). This species nested in two areas of the saltworks. One was on a sandy islet in Area 8, which in June had 15 nests (13 of them with only one egg). In July this colony was abandoned. The other colony shared an islet in Area S1-A with the Gull-billed Terns. In June, this colony had 37 nests containing from one egg to newly hatched nestlings, while in July it held 20 active nests and 23 well-developed nestlings. The Caspian Tern was reported previously nesting in Ojo de Liebre lagoon by Bancroft (1927) and in these saltworks by Massey and Palacios (1994).

Royal Tern (*Sterna maxima*). We found the first nests of this species in May, sharing a sandy islet in Area 8 with the Caspian Tern colony. The colony had 23 nests, most with only one egg. In June we observed 99 nests (17 with two eggs), but in July the colony was completely abandoned. This species was first noted breeding in the saltworks by Massey and Palacios (1994).

Least Tern (*Sterna antillarum*). We found five nests in June, on the same sand flat beside Area 1 used by the Snowy Plover. Nests contained one or two eggs. This species, listed as endangered (Gobiernos de los Estados Unidos Mexicanos 1994), had been previously reported breeding in Ojo de Liebre Lagoon by Bancroft (1927) and in the saltworks by Massey and Palacios (1994).

Black Skimmer (*Rynchops niger*). We found eight nests in June, with the Caspian and the Gull-billed Terns, on a sandy islet in Area S1-A. The nests had two or three eggs. In July the colony had grown to 22 nests with eggs, 85 adults, and 13 nestlings. This is the first breeding record for the Black Skimmer on the peninsula. The species has been recorded in Baja California Sur (Palacios and Alfaro 1992, Carmona et al. 1995), but the closest breeding colony is located on Montague Island, in the Colorado River delta (Palacios and Mellink 1994, Peresbarbosa 1995).

Savannah Sparrow (*Passerculus sandwichensis*). We found two nests (one with one egg, the other with one egg and two nestlings) in May, on a sandy islet in Area 8, and another (with two eggs) on an islet nearby. Nests were built in *Frankenia* bushes.

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We counted totals of 24 and 15 adults on those islets. Ojo de Liebre Lagoon is the type locality of subspecies *P. s. anusulus*.

Several characteristics of the saltworks enhance their use as breeding habitat for birds. According to the information provided to us by the Exportadora de Sal biology department (J. C. Peralta pers. comm.), physical and chemical conditions of the evaporation ponds are stable within each pond and through time, this being a basic requirement of the salt-production process. This stability promotes the growth of diverse fish and marine invertebrate communities, which provide an abundant and dense food resource for birds. Shallowness of the ponds makes prey easy to spot and catch. Also, the saltwork area is currently protected by Exportadora de Sal. This limits human transit and prevents any alteration of the birds' breeding habitat, as well as the extraction of prey species of economic value (i.e., fish, shrimp, and brine shrimp).

The large numbers of resident and migratory birds using the area (Carmona and Danemann, 1998), together with its use as a breeding area, suggests the Guerrero Negro saltworks are a functional, diverse, and high-quality bird habitat.

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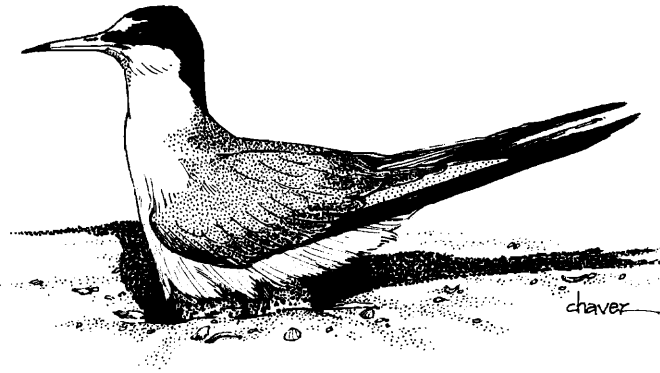
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Least Tern

Sketch by Jamie M. Chavez