

**DISTRIBUTION AND ABUNDANCE OF BREEDING SNOWY
PLOVERS ON THE PACIFIC COAST OF
BAJA CALIFORNIA**

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Abstract.—The breeding population of Snowy Plovers (*Charadrius alexandrinus*) was surveyed along the Pacific coast of Baja California from 1991 to 1992. All accessible potential breeding sites from Tijuana to Cabo San Lucas were covered. The 1344 adult Snowy Plovers counted were mostly distributed (88% of the total Baja population) at the four main coastal wetland complexes of the peninsula: Bahía San Quintín; Laguna Ojo de Liebre and Laguna Guerrero Negro; Laguna San Ignacio; and Bahía Magdalena. The habitats harboring the largest numbers of birds were barrier beaches and salt flats. It is concluded that the number of Snowy Plovers on the peninsula of Baja California likely represents at least 50% of the total population nesting on the west coast of North America.

**DISTRIBUCIÓN Y ABUNDANCIA DE *CHARADRIUS ALEXANDRINUS* EN
REPRODUCCIÓN EN LA COSTA DEL PACÍFICO DE BAJA CALIFORNIA**

Sinopsis.—La población reproductiva de *Charadrius alexandrinus* se muestreó a lo largo de la costa del Pacífico de Baja California desde 1991 a 1992. Se examinaron todas las áreas potenciales para la anidación de la especie entre Tijuana y el Cabo San Lucas. La mayoría de los 1344 *Charadrius alexandrinus* contados (88% de la población total de Baja California) se distribuyeron en los cuatro grandes complejos de humedales costeros de la península: Bahía de San Quintín, Laguna Ojo de Liebre y Laguna Guerrero Negro, Laguna San Ignacio y Bahía Magdalena. Los habitats con mayores números de aves fueron las barras arenosas y las planicies salinas. Se concluye que el número de *Charadrius alexandrinus* en la península de Baja California representa por lo menos 50% de la población total que anida en la costa de los Estados Unidos de Norte América.

On the Pacific coast, the Snowy Plover (*Charadrius alexandrinus*) breeds from southern Washington to southern Baja California (American Ornithologists' Union 1983). The coastal population in the western United States is declining because of heavy human recreational use of beaches (Page and Stenzel 1981, Page et al. 1991). The status of this species in Mexico is unknown. On the California coast of the United States, Page and Stenzel (1981) found larger concentrations of birds in the south than in the north, suggesting that the center of the coastal distribution of this species lies closer to the southern than the northern boundary of the state. Therefore, they hypothesized that Baja California might also support substantial numbers of breeding birds. The purpose of this paper is

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to provide an overview of the breeding status of the Snowy Plover on the Pacific coast of Baja California.

METHODS

We surveyed all accessible sites with potential habitat for breeding Snowy Plovers along the Pacific coast of the Baja California peninsula from Tijuana to Laguna Ojo de Liebre between 2 and 30 May 1991 and from Laguna Ojo de Liebre to Cabo San Lucas between 18 May and 18 Jun. 1992. Methods used to cover potential breeding habitat and to determine the age and sex of birds were similar to those of Page and Stenzel (1981). Field work was carried out primarily by two people. Only in Laguna San Ignacio were there two teams of two persons each. We covered potential habitat by walking 20–50 m apart depending on the width of the site. We searched for birds from a vehicle at the salt evaporation system of Guerrero Negro, and on the long beaches of Santo Domingo and the Magdalena Islands (both are part of Bahía Magdalena). A potential site was defined as any coastal sandy beach or salt flat close to salt water. For each survey we recorded: location; date; number, age and sex of all adult-sized birds; number of nests; and number of broods. We searched for evidence of nesting at each site.

Habitats with plovers, were grouped into seven types: (1) barrier beach: sand spit at entrance of a wetland or an island at entrance of a wetland; (2) dune-backed beach; (3) cliff-backed beach; (4) pocket beach: beach at creek or river mouth in an otherwise rocky shoreline; (5) salt flat or playa; (6) salt evaporation pond; and (7) island: an isolated body of land not at the mouth of a wetland. These types of coastal habitats have been described in detail for California (Page and Stenzel 1981).

RESULTS

We found 1344 adult Snowy Plovers in 16 locales between La Salina, Baja California Norte and La Poza de Todos Santos, Baja California Sur (Fig. 1, Table 1). Snowy Plovers were present in almost every site with potential habitat, but were concentrated at four wetland complexes: Bahía San Quintín, which also includes Bahía San Ramón and Vasos de La Salina (25% of all adults); the Laguna Ojo de Liebre wetland complex, which includes Lagunas Manuela and Guerrero Negro (28%); the Laguna San Ignacio complex (28%) and Bahía Magdalena complex, which includes Bahía Almejas and Isla Santo Domingo (7%). Irrefutable evidence of breeding (eggs or chicks) was found at all sites, except San Antonio del Mar and La Poza de Todos Santos (Table 1). At San Antonio del Mar we observed a distraction display and nest scrapes attended by a female, but at La Poza de Todos Santos we saw only a single male. The majority of adult Snowy Plovers were found on barrier beaches (37%) and playas (36%, Table 2). Salt ponds held 14%, dune-backed beaches 6%, pocket beaches 4%, cliff-backed beaches 3% and islands less than 1% of the adults observed.

The 36 plover nests found were typically in flat open areas devoid of,

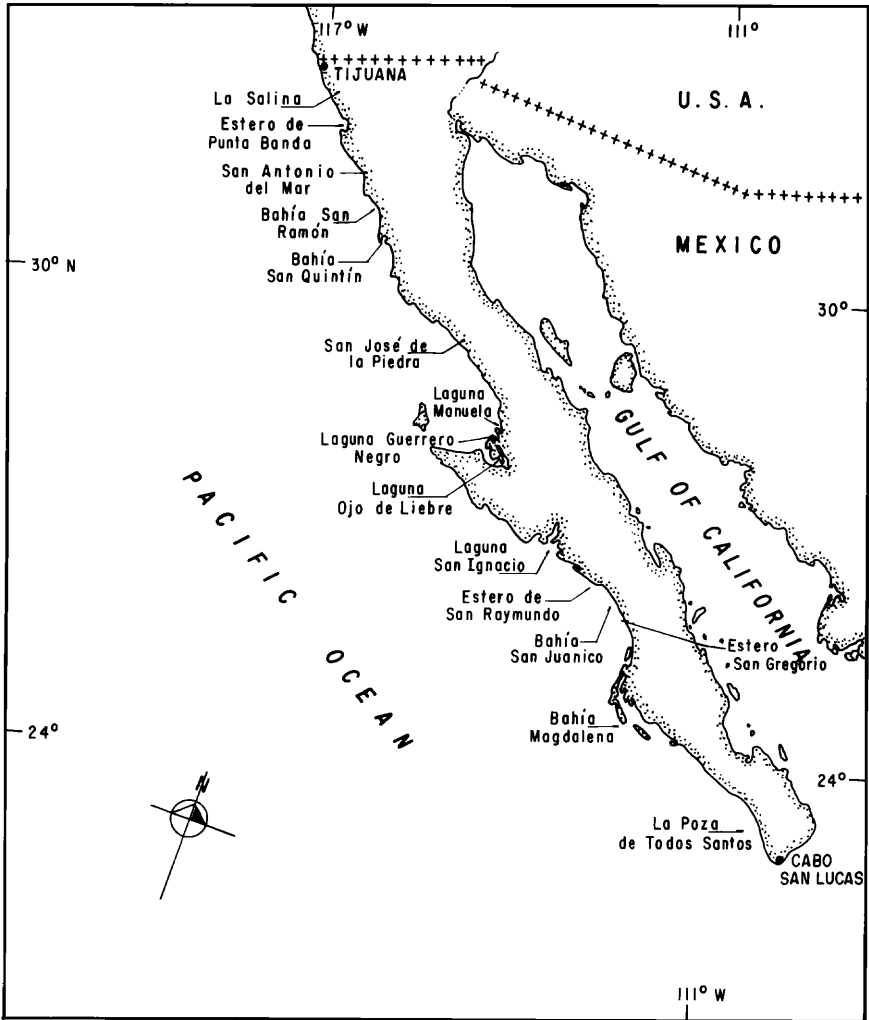


FIGURE 1. The peninsula of Baja California showing the locations mentioned in text.

or sparsely covered with vegetation or driftwood. On beaches in particular, 15 nests were placed on patches of shells and 18 were next to some object such as a piece of driftwood, kelp or plastic. At the barrier beach of Estero de Punta Banda, three nests were placed beneath sea rocket (*Cakile maritima*). Twenty-nine out of 36 nests were within 100 m of water. Seven others were behind dunes, but without a barrier of vegetation between the nest and the water. The absence of such a barrier provides newly-hatched chicks easy access to the shore. One hundred and seven of 119 broods were found feeding near water, mostly on ponds

TABLE 1. Numbers of breeding Snowy Plovers on the Pacific coast of Baja California in 1991–1992.

Location	Males	Females	Total	Juveniles	Broods	Nests
La Salina	3	4	7	—	—	1
Estero de Punta Banda	31	25	57	1	10	15
San Antonio del Mar	4	3	7	—	—	—
Bahía San Ramón	117	113	236	—	9	1
Vasos de La Salina	7	4	11	—	3	—
Bahía San Quintín	42	39	87	—	6	5
San José de la Piedra to Bahía Blanco	7	7	14	—	4	6
Laguna Manuela	12	11	24	—	3	—
Laguna Guerrero Negro	68	69	140	—	6	1
Laguna Ojo de Liebre	90	78	219	20	22	1
Laguna San Ignacio	199	138	378	2	47	4
Estero de San Raymundo	6	5	11	—	—	1
Bahía San Juanico	21	23	44	—	3	1
Estero de San Gregorio	9	7	16	—	1	—
Bahía Magdalena	55	36	92	—	5	—
La Poza de Todos Santos	1	—	1	—	—	—
Total	672	562	1,344	23	119	36

¹ Total adults, including birds that could not be categorized by sex.

of playas. Twelve broods, located on beaches, were on the upper beach but when disturbed retreated to the dunes where the chicks crouched by driftwood or ran into vegetation to avoid being seen. The average number of eggs in 36 nests was 2.55 (range = 1–3, SD = 0.69) and the average number of chicks in 119 broods was 1.73 (range = 1–3, SD = 0.78).

The potential predators of eggs and/or chicks that we observed were: American Kestrel (*Falco sparverius*), Peregrine Falcon (*Falco peregrinus*), gulls, (*Larus* spp.), Common Raven (*Corvus corax*), Burrowing Owl (*Athene cunicularia*), Loggerhead Shrike (*Lanius ludovicianus*), coyote (*Canis latrans*), and badger (*Taxidea taxus*). We saw a male American Kestrel capture one of two chicks guarded by a Snowy Plover male. At only three of 16 locales was there evidence of heavy use by off-road vehicles.

DISCUSSION

The 1344 adult Snowy Plovers detected during the 1991 and 1992 breeding seasons on the Pacific coast of Baja California equal 92% of the 1464 adults observed on the west coast of the United States during the 1989 breeding season (Page et al. 1991). As observed numbers of plovers on surveys typically underestimate actual numbers (Page et al. 1991), the totals reported for both regions must be considered minimum estimates.

We were not able to obtain detection rates for the Baja California surveys due to the absence of marked birds. The average detection rate for

TABLE 2. Occurrence of adult Snowy Plovers on different habitat types on the Pacific coast of Baja California.

Location	Habitat							Total
	Barrier beach	Dune-backed beach	Cliff-backed beach	Pocket beach	Salt flat	Salt pond	Island	
La Salina	—	—	—	5	2	—	—	7
Estero de Punta Banda	46	—	—	—	8	3	—	57
San Antonio del Mar	—	—	—	7	—	—	—	7
Bahía de San Ramón	—	55	—	—	170	11	—	236
Vasos de la Salina	—	—	—	—	—	11	—	11
Bahía San Quintín	36	25	—	—	26	—	—	87
San José de La Piedra to Bahía Blanco	—	—	—	14	—	—	—	14
Laguna Manuela	24	—	—	—	—	—	—	24
Laguna Guerrero Negro	113	—	—	—	27	—	—	140
Laguna Ojo de Liebre	—	—	—	—	60	159	—	219
Laguna San Ignacio	187	—	—	—	189	—	2	378
Estero de San Raymundo	—	—	—	11	—	—	—	11
Bahía San Juanico	—	—	44	—	—	—	—	44
Estero San Gregorio	—	—	—	16	—	—	—	16
Bahía Magdalena	92	—	—	—	—	—	—	92
La Poza de Todos Santos	—	—	—	1	—	—	—	1
Total	498	80	44	54	482	184	2	1344

surveys on the west coast of the United States (Page et al. 1991) is likely greater than for the Baja California coast because of the greater difficulty of covering some of the larger Baja California sites such as Laguna San Ignacio. These extensive playas were much too large to be thoroughly traversed by the surveyors. Due to the probable discrepancy in detection rates, we suspect that Baja California currently holds at least 50% of the combined total of breeding Snowy Plovers along the Pacific coast of the United States and Baja California.

Prior to our survey, the reported breeding range of the Snowy Plover in Baja California was the Pacific coast south to Laguna San Ignacio, (Bancroft 1927b, Reitherman and Storer 1981). Our study extends the documented range farther south on the Pacific coast to Bahía Magdalena. The plover's breeding status on the gulf coast of Baja California is less clear. Although a few summer records from San José del Cabo and Bahía San Felipe (Grinnell 1928, Wilbur 1986) suggest that Snowy Plovers may breed on the gulf coast, there are no definitive records for nesting in this area. The reported breeding of Snowy Plovers at Laguna Percebú, 25 km south of Bahía San Felipe (Carvacho et al. 1989) was a case of mistaken identity of Wilson's Plovers (*Charadrius wilsonia*; Palacios 1992). There is little evidence that Snowy Plovers currently breed near San Felipe. In May 1991 E. Palacios failed to find plovers either at Salinas de Omatepec, salt evaporation ponds 36 km north of San Felipe, or at Estero la Ramada, just 5 km southeast of Salinas Omatepec (Palacios and Mellink 1992). During a survey for Least Terns (*Sterna antillarum*) in the upper Gulf of California in May 1992, Palacios and Mellink (1992) found nesting Wilson's Plovers at every Least Tern colony, but no Snowy Plovers. Snowy Plovers have been recorded on some islands in the Gulf of California during summer. At Isla Angel de La Guarda, E. Mellink (pers. comm.) saw a pair with chicks at a small salt flat on 27 Jun. 1991. On 20 Jun. 1992 at Punta Arena La Ventana, Baja California Sur, E. Palacios saw at least six adults that were probably nesting judging by the distraction displays of one pair. R. Mendoza (pers. comm.) saw a lone male Snowy Plover on Ensenada de la Paz on 24 Jun. 1992. Additional field work is necessary to clarify the breeding status of the Snowy Plover along the gulf coast of Baja California.

Although Baja California has not experienced wetland losses of comparable magnitude to those documented for California and other areas of the United States coast (Dahl 1990), some habitat changes have occurred. The most significant alteration has been at Laguna Ojo de Liebre, where the world's largest saline works (20,000 ha) have been built on an area that was formerly primarily salt marsh and salt flats subject to periodic tidal inundation (Nelson 1921). Snowy Plovers nest at these salt ponds where heavy vehicle traffic has been observed to destroy some nests and chicks (F. Heredia and E. Castro, pers. comm.). Although there are no numerical data on Snowy Plover numbers at Ojo de Liebre prior to salt pond construction, Bancroft (1927a: p. 49) reports "many chicks on

the great black flats when the tides were down" in May 1926 indicating heavy plover use of Ojo de Liebre prior to salt pond construction.

The number of Snowy Plovers we found in the Laguna Ojo de Liebre complex (383) was comparable to that of Laguna San Ignacio complex (378), where no habitat changes have occurred. Current plans to construct the world's largest solar salt evaporation pond system at Laguna San Ignacio (J. Bremer, pers. comm.) will affect the breeding population of Snowy Plovers. Salt evaporators will be constructed mainly on barren playa that is usually dry but is used by some nesting Snowy Plovers. As salt evaporation ponds elsewhere in Baja California provide valuable foraging and nesting habitat for Snowy Plovers, it is not known whether pond construction at Laguna San Ignacio will have a net beneficial or detrimental effect on the plover population.

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