

# WESTERN BIRDS



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## NOTES ON THE BREEDING BIRDS OF ISLA RAZA, BAJA CALIFORNIA

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The ornithological significance and conservation importance of Isla Raza ( $28^{\circ}49'N$ ,  $112^{\circ}59'W$ ) rests on the nesting of three Larids endemic to northwestern Mexico: the yellow-footed race of the Western Gull, the Heermann's Gull and the Elegant Tern. The Heermann's Gull colony is one of only eight known colonies (Anderson et al. 1976) and is easily the largest, containing perhaps over 90% of the species' nests (Orr 1970). The majority of the world's Elegant Terns are said to nest on Raza. A fourth Larid, the Royal Tern, also nests on the island. An Alcid endemic to northwestern Mexico, Craveri's Murrelet, may well still nest on Raza.

The ornithological literature on Raza is fragmentary and scattered. For early references see Grinnell (1928). Apparently the only major papers since then are those by Anon. (1967), Tobias (1968), Velazques-Nogueron (1969) and Barreto (1975). All four of these are in Spanish, however translations have been made—see Literature Cited.

This paper presents observations made from 1 to 20 May 1975, when we were resident on Isla Raza (Flat Island). The island lies about one-third of the way down the 1000 km long Gulf of California (Sea of Cortez) and about 20.3 km from the coast of Baja California. The long, comparatively narrow Gulf supports one of the most diverse and rich sub-tropical marine ecosystems in North America. Raza is one of a number of important sea bird islands in the Gulf; for a masterly synthesis see Anderson et al. (1976).

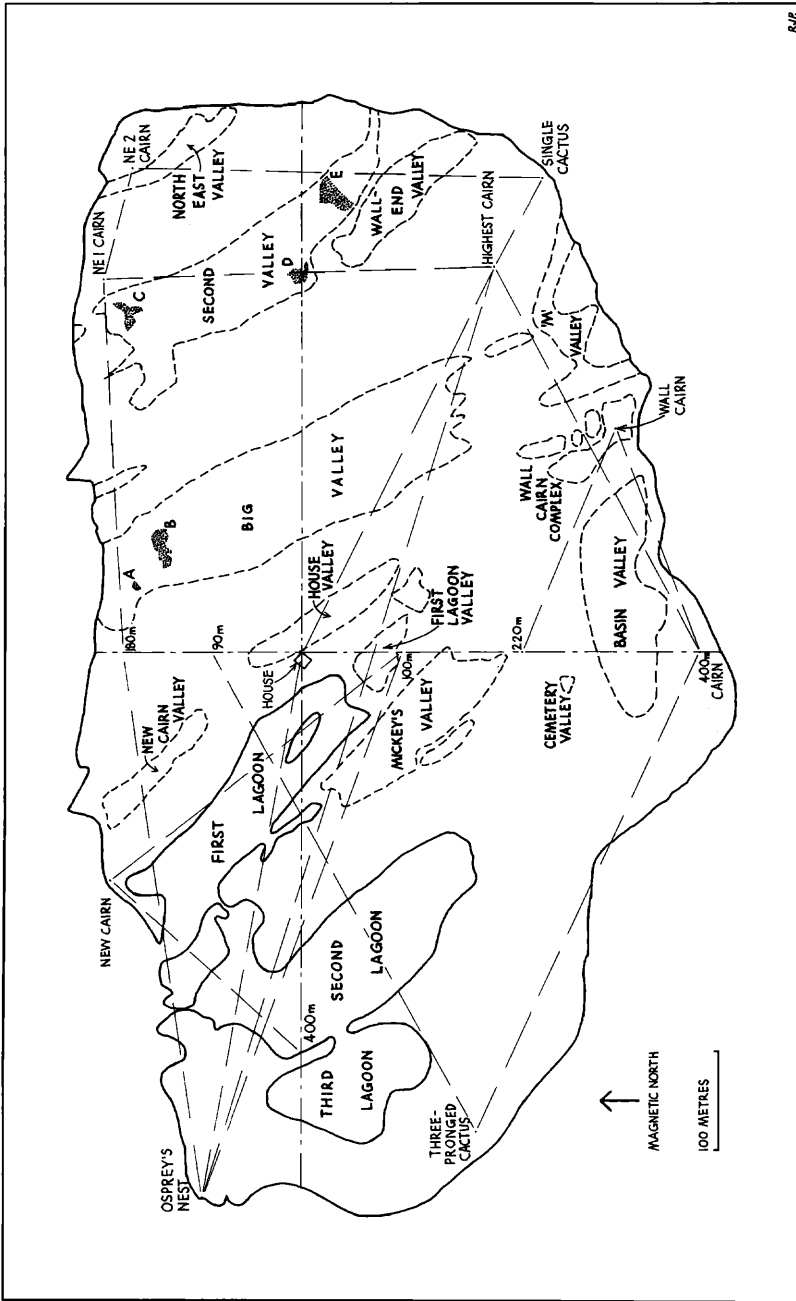


Figure 1. Isla Raza, Mexico. The extremity of the land represents the high water mark of ordinary spring tides. The flat areas are enclosed by dotted lines. The north-south and east-west base lines (dashes and dots) were used for surveying and censuses (see text). The other straight lines (long dashes) are sightings used in surveying. Stippled areas lettered A to E are the terneries. The house is not to scale. Drawn by Robin J. Prytherch from an original survey by the authors and Donald MacIver.

## BIRDS OF ISLA RAZA

### METHODS AND STUDY AREA

Having no detailed map of Raza, we made our own (Figure 1) using a compass, surveyor's tape and sighting poles. Prominent points were found by triangulation and subsequent details filled in by further measurements and by sketching from eye. The map given in Anon. (1967) and no doubt used by Barreto (1975) is apparently based on an oblique aerial photograph.

The area of Raza is about 53.8 ha including the three tidal lagoons which together cover 6.08 ha. The land surface is 47.72 ha, 35.97 ha being classified as "rocky" and 11.75 ha as "flat." The island's longest axis lying exactly east-west is 1.11 km; at its widest point (north-south) Raza is 0.65 km. These two axes are not the base lines shown on the map, but lie parallel to them. The island's highest point is about 30 m above mean sea level.

Geologically much of Raza appears to be volcanic in origin and may have been formed by a volcanic upwelling; see Brusca (1973). Climatologically, Raza lies in the Gulf Coast Desert (Jaeger 1957). At El Barril, about 60 km south on the coast of Baja California, the mean annual temperature is 23.5°C and the mean annual rainfall 90.2 mm (Instituto de Geografia 1970). The island has an impoverished terrestrial flora. Barreto (1975) mentions fifteen species. Among the more conspicuous or commoner plants are the Giant Cardon (*Pachycereus pringlei*), two

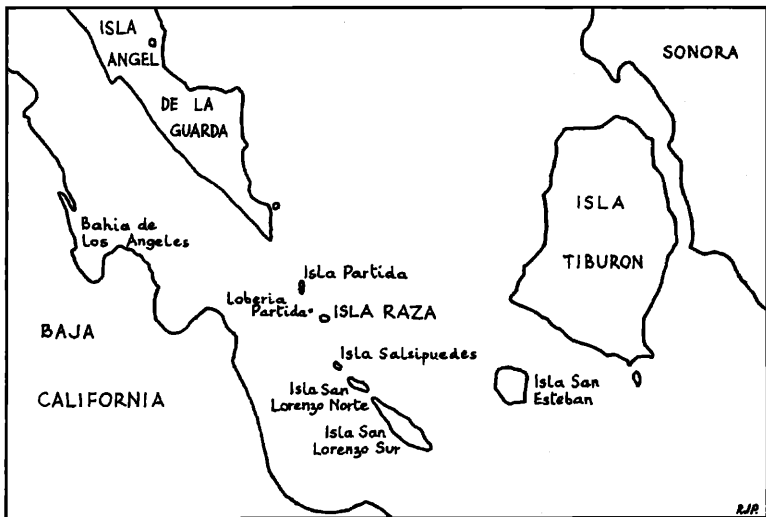


Figure 2. The location of Isla Raza and certain localities mentioned in the text. Drawn by Robin J. Prytherch from Lindsay (1966:347) and adapted originally from U. S. Hydrographic Office Chart No. 0620, 17 July 1963.

## BIRDS OF ISLA RAZA

cholla cacti (*Opuntia* spp.), and a salt bush (*Atriplex barclayana*). Round the shores of the lagoon a species of *Suaeda* is abundant (Tobias 1968).

Invertebrate animals include a numerous but unidentified blackfly, at least one scorpion, and, in the splash zone, crustaceans including numerous rock lice (*Ligia occidentalis*) and Sally Lightfoot Crabs (*Grapsus grapsus*) (Barreto 1975, Brusca 1973). Besides birds, the only vertebrates appear to be Leaf-toed Geckos (*Phyllodactylus xanti*), Side-blotched Lizards (*Uta stansburiana*) and introduced rats (*Rattus* sp.) (Tobias 1968, Barreto 1975).

In 1964 Isla Raza became the first official bird reserve in Mexico. Before that time a number of articles and reports were written to bring attention to the need for protection (e.g. Corzo 1964; Peterson 1961; Walker 1951, 1963). The problem had been commercial eggging from the early 1950s to the early 1960s (Walker 1965), though as long before as 1922 Anthony (1925) had warned that the Heermann's Gull would soon become extinct from this cause.

The island had earlier been mined for guano. Streets (1877) reported that 10,000 tons had been removed by 1875 and that an estimated 60,000 tons remained. These high estimates receive some confirmation from a report that in 1874-1877 no less than 13,530 tons of Raza Island phosphatic guano was received at Hamburg, Germany (Hutchinson



Isla Raza, Gulf of California, looking NW. Immediately beyond lies Loberia Partida, and in the top right hand corner Isla Partida is visible.

Photo by Douglas Fisher

1950). Further mining was undertaken in 1912 (Barreto 1975). It was to facilitate its collection that rocks were piled up into the cairns that can still be seen (Lindsay 1962).

Visitors walking through the colonies is a current problem (Pacific Seabird Group 1974, Anderson et al. 1976). During our 3 weeks' stay one party of about 12 people from the United States entered Big Valley and caused the loss of maybe 30 to 40 terns' eggs to gulls (Boswall and Fisher 1976).

Eggs may still be taken for human consumption but on only a very minor scale. The need now is for bilingual notices warning visitors not to disturb the birds, and roped trails for tourists to follow. Ideally, the island should be wardened in the breeding season as it was, for example, in 1971, 1972 and 1973 (Anderson et al. 1976).

The most recent summaries of the biology of Heermann's Gull and the Elegant Tern appear to be those of Bent (1921). To these summaries the work of Anon., Tobias, Velazquez-Nogueron and Barreto (op. cit.) add a good deal of new information.

## THE BREEDING BIRDS

Five species of birds were breeding on the island and another was almost certainly doing so. A seventh species may have finished nesting before our arrival. Two more possible nesters are mentioned.

**MANX SHEARWATER** (*Puffinus puffinus*). Bancroft (1927) reports finding old shearwater burrows on Raza, but we found no evidence of this species.

**BLACK STORM-PETREL** (*Oceanodroma melania*). Despite our residence on the island, including four night forays, we found no evidence of this bird's presence; neither sight, sound nor smell. The species is known to nest on neighbouring Partida (Banks 1963), a rather larger island a few km to the northwest.

**OSPREY** (*Pandion haliaetus*). One pair had a nest on a cliff top at the northwest corner of the island. On 2 May their nest contained one dead chick about one-quarter grown, and one live chick about one-third grown. Food remains included a few remnants of fish and two partly consumed Eared Grebes. The taking of grebes by Ospreys in the Gulf of California appears not to have been published but is well known to D. W. Anderson (pers. comm.).

**AMERICAN OYSTERCATCHER** (*Haematopus palliatus*). Several individuals and one anxious, no doubt nesting, pair were observed. One or two more pairs may well nest on the island.

**WESTERN GULL** (*Larus occidentalis livens*). A nest found on 5 May contained two newly-hatched chicks and one pipping egg. A second pair of gulls, no doubt nesting nearby, mobbed the intruder. There could

have been a total of three or four pairs nesting on the island. Two individuals at the edge of the mixed tern colonies seemed intent on taking eggs. Western Gulls may well also take Heermann's Gulls' eggs.

**HEERMANN'S GULL** (*Larus heermanni*). These gulls were easily the most conspicuous and numerous birds on the island, nesting almost everywhere. The density of nests was greatest in the flat-bottomed valleys and in a few other small rock-free areas. The birds nested less densely over the much more extensive rocky areas, and on a few small areas of *Suaeda* just above the high tide mark around the three lagoons. But even in areas that appeared to offer comparable habitat for nesting, the observed densities of nests could be sometimes dissimilar. For example, in the apparently preferred valley bottoms, there were small areas not used. Overall, however, our impression was that the birds were probably as evenly distributed as the terrain allowed. Raza houses "a colony" rather than a number of colonies.

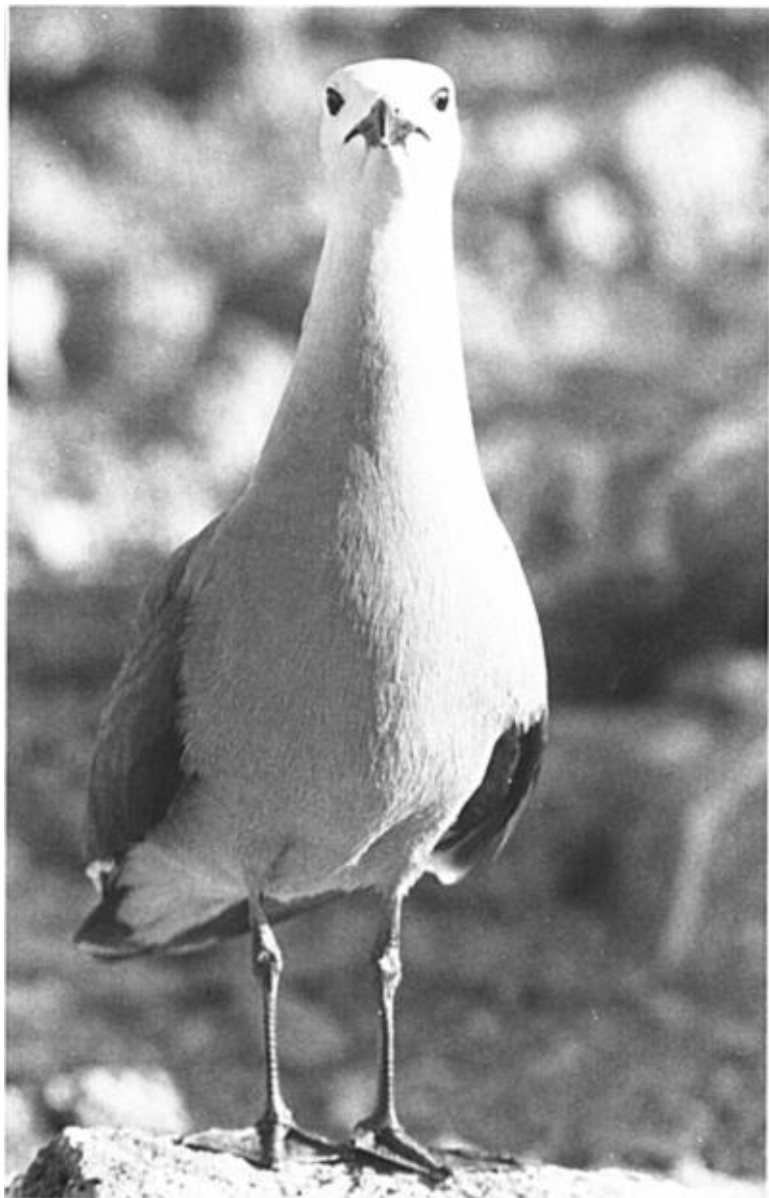
To gain some idea of the density of nests (including only those containing eggs or chicks), counts were made in sample plots of 10 m x 10 m, pegged out with rope. On 11 and 12 May, 47 sample plots were selected along lines south and east from the eastern corner of the stone building (see Figure 1). Every alternate 10 m a plot was staked out and censused. The total number of plots sampled was 20 to the south and 27 to the east. The average number of nests was 13.4 nests per 100 m<sup>2</sup> (range 0-62). If these plots are representative of the total land area of the island (an estimated 47.72 ha), then the number of nests would be 65,000 (rounded off to the nearest five thousand).

Alternatively, by classifying the plots as either "flat" or "rocky," separate average densities can be calculated and used to determine the number of nests. Twenty-one plots were classified as "flat" and had an average of 20.5 nests per 100 m<sup>2</sup>. The remaining 26 "rocky" plots had an average of 8.2 nests per 100 m<sup>2</sup>. About 11.75 ha were "flat" and 35.97 ha "rocky." These figures give a total (rounded off to the nearest five thousand) of 55,000 nests for the whole island.

We think this latter figure is likely to be the more accurate one. Even so, it is possibly only accurate to plus or minus 20%. Thus we estimate that 43,000 to 64,000 pairs of Heermann's Gulls nested in 1975. In addition to these breeders there were no doubt adult-plumaged non-nesters on the island, but we have no idea of their numbers.

On 11 and 12 May we found that the 631 nests in the 47 plots contained eggs as follows: 1 egg, 311 nests (51.6%); 2 eggs, 297 nests (45.5%); 3 eggs, 23 nests (2.9%). Our calculation of an average clutch size of 1.52 eggs is probably more or less accurate. Daily counts of eggs in two sample plots in Mickey's Valley showed that some eggs were still being laid as late as 16 May, and also that some were still disappearing.

BIRDS OF ISLA RAZA



Adult Heermann's Gull (*Larus heermanni*), Isla Raza, May 1975.

*Photo by Jeffery Boswall*

In the two 100 m<sup>2</sup> plots checked daily, the first chick hatched on 17 May from one of 131 eggs (0.7%) in 86 nests. By the next day, 3.4% had hatched, and by 20 May (our last day), 9.2%. At this rate, we expect that half the eggs would have hatched by 24 May, plus or minus 2 days. Thus the 1975 hatching season was similar to that in 1963 when, on 20 May, "hatching had just begun" (Banks 1963).

No first-year and only one second-year Heermann's Gulls were seen. Heermann's Gulls acquire adult plumage when they are nearly three years old (Bent 1921). They may, however, not breed until they are four or more years old and the presence of non-breeders in the same plumage as the nesters would not be easy to detect. Daily counts of all nests in the two sample plots from 4 to 20 May averaged 157 per day, the average number with eggs and/or chicks being 84 and the average number empty being 73. Some of the empty nests may have lost eggs; some more may have been awaiting eggs; and some (most?) may have been made by non-laying birds.

On 16 May we happened to be on the north coast of the island in the late afternoon. From about 1850 to 1915, thousands of Heermann's Gulls were seen leaving the island, flying at about 30-50 m above sea level, in a slow but purposeful flight to the ENE, towards Isla Tiburon. The same exodus took place the next evening (and no doubt on other evenings when we were busy elsewhere). Was this a feeding movement or were these birds adult-plumaged non-breeders going to roost elsewhere?

A noticeable feature of this species' behavior was the continual movement of birds from the nesting areas to the tidal lagoons and inshore waters, where they drank and bathed. Although the birds appeared to leave the nesting areas on individual initiative, they nevertheless gathered in tight flocks on the water. Careful observation showed that the birds were not feeding; in fact we only rarely saw the gulls eating anything at all, as the following scanty observations indicate.

When a 20 m tourist vessel anchored off the island for a few hours, a great flock of scavenging Heermann's Gulls was attracted. Also, a California Sea Lion (*Zalophus californianus*) shaking a sizeable fish from side to side out of the water attracted 10 to 20 Heermann's Gulls that hovered persistently over the mammal, dropping down for spare pieces. The only other significant feeding behavior observed was an adult that regurgitated a lizard for its chick on 18 May. It was clear that the birds had been feeding most often well away from the island.

The response of the Heermann's Gulls to the daily arrival of a Peregrine Falcon was a great lift-off. Most of the gulls settled on the lagoons or on inshore waters. The reaction of the terns was quite different: they suddenly became silent, and those in flight dropped to the nesting areas. We found three recently dead and partly consumed Heermann's Gulls which were no doubt Peregrine kills. A Common



## BIRDS OF ISLA RAZA

Raven carrying off a Heermann's Gull egg to Loberia Partida was the only other evidence of predation on this species that we observed.

The earliest reference to these gulls on Raza is that of Streets (1877). Many subsequent writers mentioned their presence there and some estimated their numbers. In April 1925 Bancroft (1927) estimated 100,000 nests. In late April 1961 Peterson (1961) tentatively estimated 800,000 pairs (not birds). Two years later, on 11 April 1963, Bucheister (1963) estimated 400,000 gulls (not pairs).

For the later 1960s and early 1970s Barreto (1975) gives as the numbers of birds at Raza: 1966, 25,160; 1967, 125,400; 1968, 501,700; 1969, 583,000; 1970, 398,600; 1971, 410,400; and 1972, 349,000. He attributes to protection the population increase up to 1969. The subsequent decline he attributes primarily to birds moving elsewhere because the Raza population became too great, and secondarily to high mortality caused by exceptional rain in the 1972 breeding season. It must be borne in mind however that these figures are for the total number of birds present; Velazquez-Nogueron (1969) makes it clear that the 1969 figure of 583,000 birds is composed of 340,000 "reproducers" and 243,000 "juveniles," i.e., non-breeding subadults at least about a year old.

There are two other estimates for 1966, neither of which agrees with Barreto. E. C. F. Arrington (in Lindsay 1966) estimated there were 80,000 Heermann's Gulls on Isla Raza in late April, whereas Anon. (1967) gives "a total of 80,000 Heermann's Gulls and a floating population of 25,000." Nor does the 1968 figure of 1,274,800 ( $\pm 68,000$ ) nesting birds (Tobias 1968) tally with Barreto's figure for the same year of 501,700 birds! But then Anon. (1967) and Tobias (1968) give the surface of the island (excluding lagoons) as 830,000 m<sup>2</sup>, whereas Barreto uses 620,000 m<sup>2</sup>, a figure which in turn may be compared with our own of 477,720 m<sup>2</sup>.

Anderson et al. (1976) give a figure of "around 50,000 pairs" as nesting on Raza (in 1974?). This agrees fairly well with our figure of 43,000 to 64,000 pairs in 1975.

Anderson (1973) reported that during the breeding season of 1973 several seabird species in the Gulf of California failed to breed. Heermann's Gulls failed to produce anything more than nest-scraps. The event was believed to be quite normal and due to unusual water conditions.

ROYAL TERN (*Sterna maxima*) and ELEGANT TERN (*S. elegans*). Royal and Elegant terns nested together in five different areas of Isla Raza (Figure 1). These mixed colonies varied in size, and in the proportions of the two species represented in each.

We did not enter the colonies to estimate the number of nests, since this would have resulted in a high level of predation on the eggs by Heermann's Gulls. Instead, the north-south and east-west dimensions

## BIRDS OF ISLA RAZA

of each colony were measured along parallel lines we drew adjacent to the colonies, using a compass and surveying tape. The area actually covered by nesting birds within every oblong was then sketched by eye on graph paper; and the area in  $m^2$  was later determined. These areas are probably accurate to within 20%. The proportion of each colony occupied by each species was estimated by visual inspection from a distance, and must also be regarded as approximate. No direct measurements were made of the nesting densities of these terns. De Naurois (in Buckley and Buckley 1972) gives six to nine as the average



Typical densities of nesting Elegant (*Sterna elegans*) and Royal (*S. maxima*) terns (above) and Heermann's Gulls (*Larus heermanni*) (below) on a "flat" area of Isla Raza.

*Photos by Jeffery Boswall*

BIRDS OF ISLA RAZA

Table 1. Estimated numbers of tern nests on Isla Raza, Baja California, in 1975.

COLONY	AREA m <sup>2</sup>	ROYAL TERNS		ELEGANT TERNS	
		% area occupied	Nests	% area occupied	Nests
A	10	50	34	50	43
B	353	30	720	70	2,125
C	124	10	84	90	960
D	182	50	619	50	783
E	672	60	2,742	40	2,312
TOTALS			4,199		6,223

number of nests of *S. m. albidorsalis* per m<sup>2</sup>, and the Buckley's themselves found an average maximum of 6.8. For our calculations we have assumed 6.8 nests per m<sup>2</sup> for the Royal Tern.

The nesting density of Elegant Terns appears to be unknown. We have therefore assumed that the density of Elegant Terns' nests will be inversely proportional to the square of the length of the Royal Tern. In other words, if an 18 inch long Royal Tern occupies 0.147 m<sup>2</sup>, a 16 inch long Elegant Tern will occupy 0.116 m<sup>2</sup>, giving a density of 8.6 nests per m<sup>2</sup>. The percentage areas occupied by each species in each colony and approximate numbers of nests of each, are given in Table 1. The positions of the terneries are shown in Figure 1.

The grand total is 10,422 tern nests. Guessing an accuracy of 25% and rounding off the figures, there were between 3,100 and 5,200 pairs of Royal Terns, and between 4,700 and 7,800 pairs of Elegant Terns.

Peterson (1961) estimated 200,000 pairs of Elegant Terns in seven or eight aggregations and "a small minority of Royals" in late April 1961.

Bucheister (1963) made an off-hand estimate of 50,000 to 100,000 terns of both species at one colony in one valley on 11 April 1963. On 7 June in the same year he found two small and one large colonies, and estimated a total of 15,000 pairs including 3,000 Royal Terns (birds, not pairs).

E. C. F. Arrington (in Lindsay 1966) estimated that in late April 1966, there were 40,000 Elegant Terns and 7,000 Royal Terns, presumably birds, not pairs. Also, Anon. (1967) estimated 45,000 Elegant Terns and 12,000 Royal Terns in 1966. These figures appear to include non-breeding as well as nesting birds.

On 28 April 1966 Robert T. Orr (pers. comm.) found two small, two medium-sized, and two large terneries. On the same date in 1968, in company with Sergio Hernandez Tobias, he estimated one Elegant Tern colony to contain 12,000 to 13,000 birds (not pairs), and saw smaller groups of about 1,000 birds elsewhere. He noted at the time that "the

BIRDS OF ISLA RAZA



Isla Raza, Gulf of California, looking WNW across Big Valley towards the house, the three lagoons, the Osprey's nest, Loberia Partida and, on the horizon, Baja California (see Figures 1 and 2).

*Photo by Jeffery Boswall*

BIRDS OF ISLA RAZA



“Rocky” (foreground) and “flat” (beyond) areas used by nesting Heerman’s Gulls (*Larus heermanni*) on Isla Raza.

*Photo by Jeffery Boswall*

numbers were far less than when we were here two years ago." He estimated a total of over 100,000 terns (birds, not pairs) including a few Royals.

The 1969 figure of Barreto (1975) is 247,000 birds. For 1972, of both tern species together, Barreto gives 126,300 birds. He attributes the decline to the colonisation of other areas by Raza birds.

On 17 May 1971 Orr found two big concentrations of about 100,000 birds each.

Any year-by-year variations in the numbers of nesting terns may be due at least in part to the well-known tendency of some tern species to change breeding grounds from year to year.

CRAVERI'S MURRELET (*Endomychura craveri*). Three seen together on the sea on 1 May were no doubt an adult-chick group. We found none nesting on Raza quite probably because we were too late. Raza has been known as a breeding place since 1865 (De Weese and Anderson 1976).

## THE NON-BREEDING BIRDS

We also recorded the following ten species that breed near Isla Raza and six transients:

EARED GREBE (*Podiceps nigricollis*). This grebe was around the island, fishing both among inshore rocks and up to c. 1,000 m offshore. From one position on the coast we counted 333 birds on 2 May and 262 on 7 May. The total number around the entire island could have been up to 500. These birds are likely to have been summering non-breeders (Grinnell 1928).

BROWN PELICAN (*Pelecanus occidentalis*). Flocks of flying birds, up to 130 together, passed over or by the island daily. Occasionally one or two perched on the coastal rocks. Almost all individuals were in adult plumage.

BLUE-FOOTED BOOBY (*Sula nebouxii*). A single bird in flight on 14 May and three on 16 May.

BROWN BOOBY (*Sula leucogaster*). Occasionally one to four offshore.

BRANDT'S CORMORANT (*Phalacrocorax penicillatus*). Every day up to 10 birds were seen in flight, and singles were watched fishing near the island. About 100 were observed on 15 May off Loberia Partida, a rock about 2 km WNW of Isla Raza.

MAGNIFICENT FRIGATEBIRD (*Fregata magnificens*). One female on 20 May.

GREAT BLUE HERON (*Ardea herodias*). Two on 2 May.

GREAT EGRET (*Casmerodius albus*). Two were identified on 4 May.

PEREGRINE FALCON (*Falco peregrinus*). One was seen daily.

WILLET (*Catoptrophorus semipalmatus*). Two to four daily, 4-17 May.

WANDERING TATTLER (*Heteroscelus incanus*). Two on 7 May, and one on 15 May.

SANDERLING (*Calidris alba*). Up to 12 per day on four dates, 2-8 May.

WHIMBREL (*Numenius phaeopus*). Up to six per day on four dates, 2-7 May.

MARBLED GODWIT (*Limosa fedoa*). Up to three per day on seven dates, 2-13 May.

RING-BILLED GULL (*Larus delawarensis*). An immature on 5 May.

COMMON RAVEN (*Corvus corax*). One or two birds were seen on several dates.

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