

A shorebird banding program at Coquimbo Bay, Chile: some general observations and comments

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INTRODUCTION

Every year thousands of long distance migratory shorebirds fly from their breeding grounds in the Northern Hemisphere to their non-breeding grounds which are strategically located throughout the Western Hemisphere, especially in South America (Myers 1983; Myers *et al.* 1985). In addition another group of shorebirds migrates during the Austral winter from Patagonia to the Central zone of South America (Goodall *et al.* 1951).

The particular biology of these species often makes their populations very fragile and sensitive to environmental changes (Myers *et al.* 1987). Because of this, they constitute an interesting group for studies of their biology and conservation.

With its 4,200 km of coastline, Chile is an excellent site for studying migratory shorebirds. With this in mind, some Chilean members of the Panamerican Shorebird Program initiated an extensive banding program with the objective of learning more about the migratory pathways of these species from their breeding to non-breeding grounds (Myers *et al.* 1984, 1985, in press). This information is essential to plan future conservation programs for both the environment and the species themselves.

In this paper we present the most important observations of the shorebird banding program in Coquimbo Bay, Chile, from January 1984 to February 1987.

STUDY SITE

The coastline of Coquimbo (29° - 32° S and 69° - 72° W) is characterized by extended beaches, cliffs, and peninsulas. It is a transitional zone that receives desertic influences from the north and mediterranean influences from the south, affecting the physiognomy of the landscape. It is a zone with considerable climatic variation between years. The predominant vegetation is xerophytic shrub characterizing the area as a mediterranean arid region, in that the aridity is less than for other continental zones at similar latitudes. This difference is due to fog during the morning and the low temperatures resulting from the cool Humboldt current (Di Castri & Hajek 1976; Cepeda y Campusano 1982).

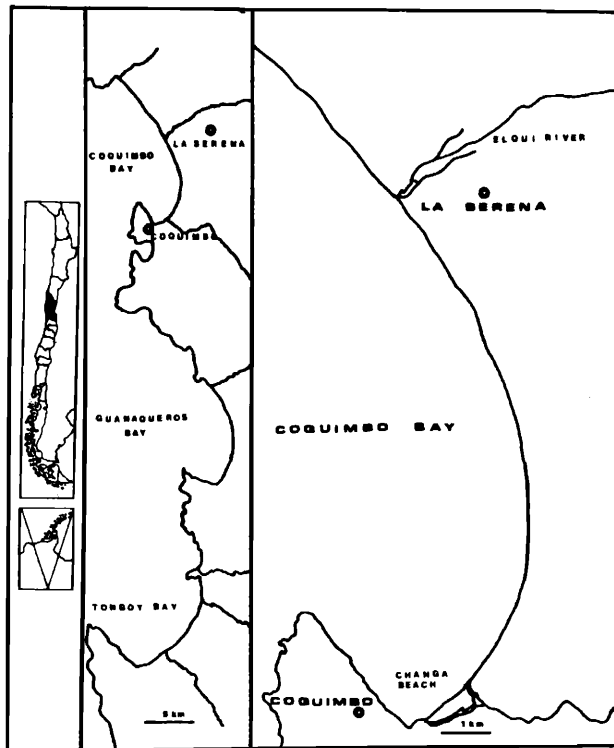
Coquimbo Bay (Figure 1) is 18 km in length and very well protected from the prevailing southerly winds. Two important cities are located nearby: La Serena and the harbour of Coquimbo, with approximately 200,000 inhabitants. In the northern part of the bay is Punta Teatinos lagoon and a huge field of dunes resulting from the strong winds from the southwest. More to the south, the delta of the Elqui River is located, producing a particular sandy zone with many lagoons. La Changa beach is located in the southern part of the bay. It is a sandy, very regular and smooth beach sheltered from the wind. The mouth of El Culebrón estuary and the presence of permeable rocks allow underground water to form small lagoons in Changa Beach (Galvez *et al.* 1984).

MATERIALS AND METHODS

The capture of birds was concentrated mainly at La Changa



Figure 1. The Coquimbo Coastline and La Changa Beach (banding site) in Coquimbo, IV Region, Chile.



beach. Monofilament nets were utilized and mounted on the edges of the lagoons and beach using the methods of Myers & Sallaberry (1984). For handling and banding techniques we followed those of the Panamerican Shorebird Program (Myers *et al.* 1984; Myers & Sallaberry 1984).

The resighting of banded birds was performed simultaneously with censuses of marine birds on the coast, using field glasses (10x32) and spotting scopes with 60x zoom. The colour-band combination of birds was recorded (Myers *et al.* 1984). The original records of the banded birds are located in the Data Bank for the Western Hemisphere Shorebird

Reserve Network WHSRN) in the Vertebrate Zoology Laboratory at the Faculty of Sciences, University of Chile. We do not include statistical analyses because of the low number of observations.

RESULTS AND DISCUSSION

Since 1984, work has been conducted on La Changa Beach at Coquimbo Bay (Figure 1). This beach was selected for its capture facilities, the abundance of birds and diversity of habitat types, and other characteristics that together concentrate large numbers of birds (see Table 1). At night the most important factors attracting the large number of birds and diversity of species appears to be the variety of habitats in conjunction with a very protected and illuminated area. The small bays of La Herradura and Barnes were not good places to work because of human interference, especially during summer, and the low number of birds (Tabilo 1985, 1987). The huge Bays of Tongoy and Guanauqueros also supported few birds as they were always affected by strong winds and hence were difficult to work in. Only two Snowy Plovers *Charadrius alexandrinus* were captured at Guanauqueros Bay.

During the day the movement of birds was followed in order to determine roosting areas at night (Myers & Sallaberry 1984). The results were negative and it was impossible to locate any particular roosting places of birds. At Coquimbo Bay many attempts were made at different locations. At the extreme north of the beach, as at other beaches, there was no evidence of roosting. This is probably because this area of the Bay is always affected by the prevailing winds from the south, which produce strong waves. The central part of the bay is more protected from the wind and the waves. Moreover, in this zone there is a road close to the shore that illuminates it throughout the night. In this area there were always some birds feeding at night and it was possible to capture some Sanderlings *Calidris alba*. Lastly, we netted birds in the southern portion of the Bay, specifically at La Changa Beach. In this area there is almost no wind or waves, and a diversity of habitats. It is partially illuminated during the night because

Table 1. Characteristics determining the selection of a bay as the capture site at Coquimbo Region.

	Coquimbo	Herradura	Guanauqueros	Barnes	Tongoy
Length	18	2	12	2	15
Other micro-environment	many	none	few	few	few
Orientation of the bay	S-NE	NW	NW	N	NW
Dunes	yes	no	yes	yes	yes
Wind direction	SW-NW	SW	SW-NW	SW	N
Protection of the bay	good	good	medium	bad	medium
Strength of the waves	variable	low	variable	strong	variable
Human interference	high	medium	medium	medium	high
Nocturnal light	S,C	S	S	S	S,N

N = North, S = South, E = East, W = West, and C = Central



Table 2. Presence of shorebirds at La Changa Beach, Coquimbo Bay, Chile: status, environment, type of migration, occurrence and number of birds by species banded during 1984 - 1987.

Species	Status	Environment	Type of Migration	Occurrence	Banded Birds
Charadriidae					
<i>Vanellus chilensis</i>	R	B,L	-	R	
<i>Pluvialis squatarola</i>	M	B,L	B	R	
<i>Pluvialis dominicana</i>	M	B,L	B	I	
<i>Charadrius alexandrinus</i>	R	B,L	-	R	5
<i>Charadrius semipalmatus</i>	M	B,L	B	R	4
<i>Charadrius falklandicus</i>	M	B,L	A	R	3
<i>Charadrius collaris</i>	M	B,L	R	I	
<i>Charadrius modestus</i>	M	B,L		R	4
Scolopacidae					
<i>Tringa melanocleua</i>	M	L	B	R	1
<i>Tringa flavipes</i>	M	L	B	R	
<i>Cataphophorus semipalmatus</i>	M	L	B	R	
<i>Limosa haemastica</i>	M	L	B	A	
<i>Arenaria interpres</i>	M	B,L	B	R	
<i>Aphriza virgata</i>	M	B	B	I	
<i>Calidris fuscicollis</i>	M	B,L	B	I	
<i>Calidris melanotos</i>	M	B,L	B	A	
<i>Calidris pusilla</i>	M	L	B	R	
<i>Calidris bairdii</i>	M	L	B	I	
<i>Calidris mauri</i>	M	B,L	B	A	1
<i>Calidris canutus</i>	M	B	B	A	1
<i>Calidris alba</i>	M	B,L	B	R	430
<i>Numenius phaeopus</i>	M	B,L	B	R	1
					Total 450

Status: R = resident, M = migratory
Environment: B = beach, L = lagoon

Type of migration: A = austral, B = boreal, R = regional
Occurrence: R = regular, I = irregular, A = accident

of its nearness to the Port of Coquimbo. These characteristics concentrated a considerable number of shorebirds. Because of this, La Changa Beach was selected to continue the capturing procedures of migratory shorebirds at Coquimbo Bay.

BIRD CAPTURE

Myers & Sallaberry (1984) presume permanent nocturnal roosts of birds. This was not the case at Coquimbo Bay where the birds were feeding and moving from one place to another almost all the night.

With this in mind, the nets were located to take advantage of the irregularities of the land, for example using a background of rocks behind the net. Nets were also mounted across small streams, but few birds were captured using this method.

Table 2 shows the number and species of banded birds. The marked Charadriidae were captured on the beach in spite of being species that prefer lagoon habitats. This could suggest that their capture was merely accidental. Evidently *Calidris alba* is the species captured most easily with nets.

For species such as *Charadrius alexandrinus*, *Tringa melanocleua*, *Calidris canutus* and *Numenius phaeopus*, we obtained

no resighting information because after banded these birds did not return. The single banded *Calidris mauri* was repeatedly observed in La Changa Beach during the winter of 1984, and was always associated with a banded *Calidris alba*. *C. mauri* was a species never before recorded for Chile and our observations extend the range of distribution of this species south by 2,000 km. Earlier, *C. mauri* was recorded only as far as the southern part of Peru (Sallaberry *et al.* 1985).

Charadrius modestus shows site-fidelity to La Changa Beach, as in the winters of 1985 and 1986 two individuals marked in 1984 were observed. Also, two individuals of *Charadrius falklandicus* marked in the winter of 1985 were observed in the same locations in winters 1986 and 1987. The chronology of plumage change was observed for both species, an aspect that has been studied very little in Chile (Schlatter 1979). In Coquimbo *Charadrius falklandicus* and *Charadrius modestus* change their winter plumage in the second half of June. According to Goodall *et al.* (1951), this event occurred at the end of August.

A *Charadrius semipalmatus* banded in February 1984 has returned consecutively each summer to the lagoons of La Changa Beach, showing site-fidelity to the wintering site and high survival for a migratory bird at these latitudes.



Calidris alba has shown similar fidelity and survival, individuals banded at the beginning of summer 1984 being repeatedly captured and observed. Banded individuals stayed in the area throughout the winter without moving to other nearby bays, but in the beginning of December disappeared from this locality for some months, returning in the second half of February. It is tempting to suppose that December populations that have spent all winter in Coquimbo are displaced to the south by new populations that arrive from the northern Hemisphere, and later return in February to their original bay (in this case, Coquimbo Bay) as the date of the summer population's annual migration to the North approaches. This displacement to the south could explain why, in summer, individuals banded in northern areas (USA, Peru, Antofagasta (Chile) and Mejillones (Chile)) are observed in Coquimbo (Chile), and why marked birds from Coquimbo are observed farther south (Santo Domingo and Chiloe) but why the reverse situation has not been observed (that is to say, banded birds from Coquimbo are not observed north of Coquimbo for these same dates).

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