

ANIMAL INTRODUCTIONS TO ISLA CHANARAL, CHILE; THEIR HISTORY
AND EFFECT ON SEABIRDS

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INTRODUCTION

The islands of central Chile have important seabird populations (Araya 1983, Schlatter 1984), but they are little known. One of the most interesting islands is the state-owned but unprotected Isla Chanaral (29 01S, 71 37W). The island holds at present a population of about 700 pairs of Humboldt Penguins *Spheniscus humboldti* and probably one of the few surviving colonies of Peruvian Diving Petrels *Pelecanoides garnoti* (Duffy et al. 1984, Schlatter 1984).

Fortunately, the diary of William Reddy Millie, who contributed to *Las Aves de Chile* (Goodall et al. 1946, 1951), provides valuable information on the island, based on his visit in December 1943. An earlier account, apparently based on a letter, was published by Johnson (1965), but the two differ in some details. We decided to publish Millie's account, together with our notes reflecting current knowledge of the island. Parentheses reflect our clarifying notes. The complete diary is held by the senior author.

"December 20, 1943.

"The island is about 5 miles long and 5 miles wide and is located on lat 29° 02'S, 59° 32'W and about 60 nautical miles south of Huasco, Atacama. All accesses to the island are rocky and when the lighthouse was placed there, they made a sort of landing and an iron ladder leading about 158 metres straight up the cliff. The eastern side is all high cliffs but on the western and northern sides these have crumbled and so in parts one is able to go down almost to sea level. The island on top is fairly flat, stony, dry and with a fair amount of shrubs; very similar to the mainland surrounding it. At the southern end and facing west there is a long strip projecting out to sea, about 400 metres long and forty wide, with fairly steep sides about 120 metres above sea level. It was along this ridge where on December 7th 1938 I obtained (from fishermen) 24 eggs of this species (Pato Yunque: Peruvian or Chilean Diving Petrel *Pelecanoides garnoti*). It was also here that I first saw (during this visit) the Pato Yunque burrows, scattered all along the southern side of this ridge. However, I noticed also that most of them were deserted and old. But looking around, we came across six which looked fresh. Of the two we dug out first, we found in one, an egg, and in the other an almost full grown young bird covered with dark grey 'down'. The next two contained an egg each, and of the last two, one contained an egg and a parent

bird sitting. Nemesio captured it and I photographed it in his hand. The other contained a recently hatched young which was covered in white fluffy 'down'. I photographed this bird too, as well as the first two we found; that is a nest with an egg and the large almost full grown young bird. So I got all the main stages in the nest life of a young Pato Yunque.

"Later we scoured all the rest of the slopes for more burrows and these we found by the thousands but all empty. The story is a sad one. In 1938 when my first clutches were found, this island was a swarming mass of Pato Unques and the burrows show the colony must have been enormous. Now, six years later, there were only a few scattered pairs using the island, although on our way to the island we saw a great number of them flying about and swimming in the water. The cause of this is attributed to a great number of foxes which have bred there unmolested during three years, when Ramon Callejas took a pair over in 1941. These foxes have no fresh water to drink on the island but seem to thrive well. They have also almost entirely exterminated the wild rabbits which were once abundant on the island. I saw one rabbit and seven foxes (It is not clear if he is referring to separate individuals).

"The damage done by the foxes to the Pato Yungues is clearly visible by the debris of bones and wings and feathers of these poor birds scattered over all the island. I cannot give a good guess at the number of skeletons found, but I should say well over 200 000 of them and so if the foxes remain much longer, the Pato Yungues will leave the island completely. This will end the gluttonous life of the foxes too because, having no birds and eventually exterminating the rabbits, they too are doomed to perish. The Pato Yungues then may return again, although I believe these birds are getting fewer and fewer every year.

"We did find a large colony of penguins *Spheniscus humboldti* (Meyen), These were plentiful all over the island and had their nests in almost every large cave or gallery, and also on the north western exposure. There were nests under large cactus plants. These contained, almost without exception, almost full grown young, generally two in number; sometimes one; sometimes just a sitting parent with nothing in the nest. Just by luck we found two nests containing two fresh eggs each. I think that in another two weeks we would have found fresh eggs of a second brood because of the number of sitting parents in nests which had nothing else in them. These birds have powerful beaks and are strong and aggressive. They object to intruders and to get the eggs we had to lasso them. In doing so one of the eggs was unfortunately broken. They are quite safe from foxes and I am certain the foxes have too much respect for their bills. Even the young ones we found fierce. We must have found well over a hundred nests altogether. From the sea, leading up certain ravines, are well beaten paths made by the birds up to their nests, and I should say October would be the ideal time for eggs."

DISCUSSION

The account given by Johnson (1965: 114) differs in important aspects. It states that the foxes *Canis grisaeus* or *C. culpaeus* were introduced "with the absurd idea of building up a fur industry" and that "At first the foxes flourished exceedingly, then outbred the food supply and died of starvation. Now there are no foxes left. "However, Millie's diary states that he saw seven foxes during his visit, although it is not clear how many separate individuals were involved. It is difficult to imagine a fox population building up, annihilating 200 000 diving petrels, and then crashing over three years. In discussions with a fisherman (R. Alvarez) who had accompanied Millie to the island and had visited it since, Araya (1983) was told that only two foxes had been introduced, to control European Rabbits *Oryctolagus cuniculus*, and that they died without reproducing. In both 1982 and 1985, we saw no foxes, possible tracks, or skeletal remains.

Based on the diary and the account of the local fisherman, we regard the Johnson account of the fox introduction as incorrect. The fox population may have reproduced to a limited extent, but the destruction of the diving petrel population was probably the work of only a few individuals. We do not know when the fox population went extinct, but we suggest that it was only a short time after the introduction. Whatever the details, the fox represents a formidable threat to seabird populations and it should not be introduced to other Chilean islands.

European Rabbits were present, but uncommon during our visit in November 1985. They were introduced at the turn of the century to provide food for stranded fishermen (Araya 1983). We found two goat *Capra hircus* skulls and partial skeletons, suggesting an unsuccessful attempt was made to introduce this species, perhaps for the same reason.

The diving petrel is now very scarce at Isla Chanaral. No skeletons were seen by us during a visit in November 1985. No burrows were found during an earlier visit in 1982 (Araya 1983). Single, inactive possible burrows were found in 1982 and 1985, but we did not visit the peninsula mentioned by Millie as the main nesting area in 1943. Further visits to the island are needed to assess the presence and abundance of the diving petrel population at different times of the year.

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REFERENCES

- ARAYA M., B. 1983. A preliminary report on the status and distribution of the Humboldt Penguin in Chile. In: Proc. Jean Delacour/IFCB Symp. Breed. Birds in Captivity. Los Angeles, 1983, pp. 125-140.
- DUFFY, D.C., HAYS, C. & PLENGE, M. 1984. The conservation status of Peruvian seabirds. In: Status and conservation of the World's seabirds, Croxall, J.P., Evans, P.G.H. & Schreiber, R.W. (Eds.). *Internatn. Counc. Bird Preserv. Tech. Publ. 2*: 245-259.
- GOODALL, J.D., JOHNSON, A.W. & PHILIPPI, R.A. 1946 & 1951. *Las aves de Chile*. Vols. 1 & 2. Plett: Buenos Aires.
- JOHNSON, A.W. 1965. *The birds of Chile*. Plett: Buenos Aires.
- MILLIE, W.R. 1943. Unpublished diary. Vol. 1, Part 2: 563-574.
- SCHLATTER, R.P. 1984. The status and conservation of seabirds in Chile. In: Status and conservation of the World's seabirds, Croxall, J.P., Evans, P.G.H. & Schreiber, R.W. (Eds.). *Internatn. Counc. Bird Preserv. Tech. Publ. 2*: 261-269.

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