THE SHEARWATERS OF SHARK BAY

A Report to W.A. Wild Life Authority
by Dr D. L. Serventy
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The Wedge-tailed Shearwater *(Puffinus pacificus)* breeds on islands along an extensive stretch of the Western Australian coast-line, from Carnac Island in the south to the Forestier Is. in the North-West. In the islands of Shark Bay the breeding shearwaters exhibit a plumage variation unknown elsewhere in Western Australia, or, indeed in any of the other nesting stations in the Indian Ocean. A proportion of the Shark Bay birds, instead of being uniformly dark-plumaged as is normal in the species, have white underparts. This type of dimorphism is wide-spread however in the Pacific Ocean colonies, but only north of the Equator, where the dimorph ratio in favour of the white birds increases with the latitude. In some of the far northern Pacific islands, such as the Pescadores and Bonins, near Japan, all the birds have white underparts.

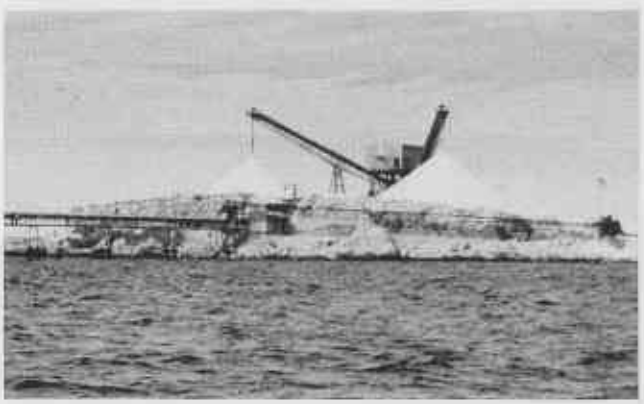
That some of the Shark Bay birds have white underparts was first made known through the collecting of the ornithologist Tom Carter in November 1916 on Slope Island. Though he made no specific mention of a white-breasted bird in his paper (Ibis, 1917: 573) such a bird was actually collected by him and is in the Western Australian Museum, where it was examined by W. B. Alexander and its significance pointed out (Emu, 20, 1920: 19). Curiously this Australian phenomenon was overlooked by overseas reviewers of the colour variation in the species and no mention is made in the definitive study by R. C. Murphy ("The Populations of the Wedge-tailed Shearwater *(Puffinus pacificus),"* American Museum Novitates, No. 1512, 1951). Murphy, even at that late date, believed that all of the Indian Ocean populations were wholly dark-coloured.

I visited Slope Island with a State Fisheries Department party in 1943, and found white-breasted individuals in burrows. In 1947 I made a survey of the guano deposits of Shark Bay in M.V. "Warreen" of the C.S.I.R.O., in the course of which I noted on which islands shearwaters nested. In 1965 Dr G. M. Storr examined several islands on behalf of the predecessor of this Authority. As a result of our joint surveys, which covered almost all of the suitable islands in the Bay, we have established that the nesting stations of the shearwaters are restricted to five islands only, all being in the Freycinet Estuary.

Owing to the rocky nature of the terrain it is difficult to make a systematic examination of the nesting burrows as the birds make extensive use of cavities in the travertine limestone of the islands. Thus until recent years the white-breasted bird was known only from the site of its original discovery—Slope Island. So when, in April 1964, it was revealed in a letter to the "West Australian" by Mr D. C. Bathgate that Slope Island had been made over to a salt company, ornithologists throughout Australia were very much concerned. It was impossible to undo the commitments, though the island was vested in the Fauna Advisory Committee (the precursor of this Authority) as a fauna reserve.

To find out what was happening to the shearwater colony as a result of the operations of the salt company, Dr G. M. Storr with Messrs J. B. Higham, N. E. McLaughlan and G. Dixon, inspected Slope Island and other breeding stations in late August and early September 1965. They found that Slope Island had been extensively altered but nevertheless a considerable number of shearwaters were still occupying nest sites on the precipitous eastern slopes of the island. An important discovery was that white-breasted birds also occurred on Baudin Island.

In late November and early December 1966 Mr Henry Hall, before he became a member of this Authority, happened to be in the Bay and he made a brief call at Slope Island. At that time the causeway to the island had not been constructed, but a bull-dozer was at work levelling the top of the island. A quarter of the island was covered by rubble, crushed limestone and heaps of salt. Shearwaters were seen entering cavities and interstices in the rubble heaps.



Slope Island—showing the proximity of the salt workings to the breeding colonies on the cliffs slopes

Mr Hall was a member of the recent party from the Authority which visited the island on April 21-22, 1971. The other members were Messrs Angus Robinson, Neville Beeck, E. Dell, Dr Stephen Davies and myself. Mr Hall noted that the appearance of Slope Island was vastly different from what it was over 4 years previously. Not

only was a causeway now in operation, which enabled foxes to enter the island, but extensive works had been constructed—buildings, machinery, salt heaps, and a loading jetty. In 1966 an untouched cliff edge ran about three-quarters of the diameter of the island, facing the east. Now this slope was reduced to about one-tenth of the diameter of the island and was steeper. Patches of Nitre-bush which still survived on top of the island in 1966 had now disappeared.

The situation on the shearwater breeding islands in the Bay, as assessed by the visits of Dr Storr's party in 1965 and ourselves in 1971, is as follows:

Friday Island

This is a very small islet just north of Slope Island and is the furthest north breeding station of the shearwater in the Bay, so far as is known. When I landed on it in October 1947 I recorded no sea-birds nesting. However, on his visit on September 1, 1965 Dr Storr found eight shearwater burrows in the Nitre-bush jungle and considered there could have been more, say 50. We attempted a landing on April 21 by motor dinghy but a southerly suddenly blew up and we abandoned it. We accept Dr Storr's estimate of 50 burrows on the island.

A close up of the previous photograph showing breeding colony cavities on Slope Island

Slope Island

I did not attempt a population estimate on my visit in the 1940s. Dr Storr estimated there were about 150-200 breeding pairs still surviving on his visit on August 28, 1965. We agree that a population approaching this figure may still exist and accept an estimate of about 150 pairs. At the time of our visit the adult birds would probably all have left and many of the fledglings also. We located three live fledglings in the nesting crevices and a lady at the island said she saw one fly out the previous night. However, there were 10 dead fledglings around the rookery, all were very fresh with no visible signs of the cause of death. There were also two rather old adult corpses. The occurrence of these is perturbing as one does not see such a high proportion of dead birds in similar sized rookeries of *Puffinus tenuirostris* in Bass Strait, nor did we encounter anything similar on the other Shark Bay nesting islands. The deaths may be attributed to (1) the salt workings—perhaps collisions with the strongly illuminated installations on the island (the island is brilliantly lit all night), or (2) casualties due to fox predation. We identified fox tracks on the sandy beach of the island. It is obvious that there is a reduced survival of offspring on this island, compared with others in the Bay, though a sizeable population of breeding adults continues to occupy the available remnant of the island.

Freycinet Island

This island is now the one most densely populated by breeding shearwaters, but it is difficult to make a satisfactory population assessment as the birds use natural crevices on the slopes around the periphery of the island. The top of the island, being hard ground, and littered with rock piles left by the guano operatives of the last century is virtually not used by the birds. In 1947 I estimated there might be about 50 burrows on the western side. In 1965 Dr Storr considered there were 500 burrows on the south and west slopes though he did not actually handle any birds. On our recent visit our party made a thorough search and managed to pull out four fledglings from nesting cavities and found one dead young one. After the inspection the members of our party, who were not informed at the time of the previous population estimates, were asked to note down, independently, how many breeding burrows there might be on the island. The figures submitted were: 40, 113, 180, 200, 200 and 220. I think we may reasonably accept a figure of about 250 burrows for this island.

Double Island

In my 1947 visit I noted a "few" burrows on this island. Dr Storr failed to find any. On our recent inspection we found several burrows on the western side, among the Pied Cormorant colony, and some caved in as we walked. Two live fledglings were pulled out and one unhatched egg found. We estimated that there might be about 50 breeding burrows.

Baudin Island

On my 1947 visit I found no trace of muttonbird occupancy. I evidently overlooked them, for in 1965 Dr Storr's party saw burrows and caught an adult in one of them. They estimated that about 50 pairs nested in the Nitre-bush covered parts on the south-west face. Our recent party did not visit the island. This is the most southerly nesting station of the Shearwaters in Shark Bay.

Total Population

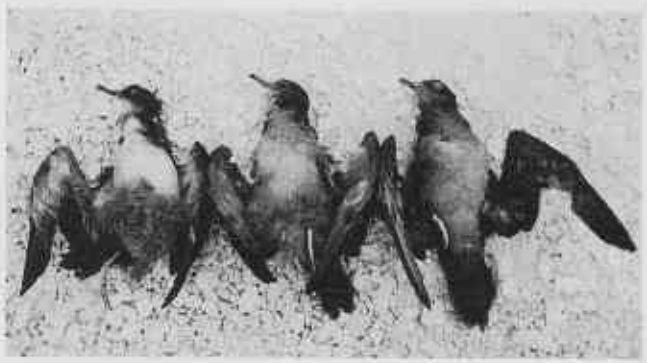
On present knowledge the following is the presumed population strength of the species on the breeding islands in Shark Bay.

	breeding burrows
Friday Island	50
Slope Island	150
Freycinet Island	250
Double Island	50
Baudin Island	50
Total	550

This is not a very large population and no doubt is a considerable reduction on what existed in the Bay before the salt works started in 1963.

The White-Breasted Phase

Until Dr Storr's survey of 1965 the white-breasted phase had only been met with on Slope Island. On that visit a white breasted adult was pulled out of a burrow on Baudin Island by Mr G. Dixon. On our recent visit Mr Neville Beeck pulled a white-breasted fledgling from a burrow on Freycinet Island. So now this phase has been noted on three of the five islands on which the species is known to breed in the Bay. It is reasonable to assume that it occurs on the other two as well.



Wedge-tailed Shearwaters—showing light and dark phase

The first attempt at assessing the ratio of dark to white birds in this dimorphic population was made by Dr Storr at Slope Island in 1965. By observing birds flying in at night, by torch-light, his party estimated that 30% had white underparts. On our visit we found seven dead dark fledglings and three white-breasted ones, the results thus tallying with Dr Storr's ratio. However, three live fledglings found on the island were all dark-phase birds. Thus, of the total fledglings seen by us on Slope Island, three out of 13 i.e. 23% were white-breasted. On Freycinet Island out of five fledglings noted, only one was white-breasted, i.e. 20%. On Double Island, only two dark-phase fledglings were seen.

So, on our recent visit, out of 20 fledglings (live and dead) examined on three islands (Slope, Freycinet and Double Island) 16 were dark-phase and four were white-phase (=20%).

In museum collections the only white-phase specimen which exists is the one originally collected by Tom Carter which is in the W.A. Museum. Photographs of white-breasted fledglings were taken on our recent visit.

The Future

It is clear that the salt operations on Slope Island, direct and indirect, are having a detrimental effect on the status of the Wedge-tailed Shearwater in Shark Bay. Dr Storr's party found the situation assuring on their 1965 visit, Mr Dixon reporting: "After satisfying ourselves that the species was in no danger on Slope Island, providing no further habitat is destroyed (which is unlikely) we returned to the **Vlaming.**" Unfortunately, the habitat **has** been materially reduced since that time, and, additionally, the construction of the causeway has allowed foxes access to the rookery.

It is recommended that:

(1) The company be asked to leave the existing undeveloped cliff slopes to remain as they are. Our party was gratified at the solicitude shown for the birds by the company's operatives on the site and we feel sure they will co-operate in any way to ensure the survival of the remnant of this important rookery.

(2) To minimise the possibility of foxes entering the island a suitable grid (such as the provision of moving rollers) be constructed along the causeway.

(3) The Department and the Authority continue annual surveys of the area with a view to adding to the store of information on the shearwater, so that more precise data may be accumulated on population strengths on the various islands and of the dimorph-ratio. A prudent collection of specimens, particularly of the white-breasted phase, should be permitted so that the Western Australian Museum may build up a useful reference collection of this population.

Other Nesting Sea-Birds

We found evidence that Bridled Terns *(Sterna anaetheta)* still breed on the eastern cliff face of Slope Island and did so during the 1970-71 season. On Freycinet Island a Pied Cormorant *(Phalacrocorax varius)* colony, of about 1,000 pairs, was just starting egg-laying on April 22. No other sea-birds were noted nesting.

Rock Parrots

Dr Storr's party found Rock Parrots still plentiful on Slope Island in 1965; they were absent on our visit. We questioned some of the salt company's workers but they did not know of them on the island. Rock Parrots were abundant on both Freycinet and Double Island.