PREDATION ON SOOTY TERNS AT RAOUL ISLAND BY RATS AND CATS

By R. H. TAYLOR

ABSTRACT

Recent observations and counts of chicks suggest that predation by rats and cats may be destroying the Sooty Tern *(Sterna fuscata)* colony at Denham Bay, Raoul Island. Aspects of this predation and of a comparable situation on Ascension Island are discussed. More management-oriented research is needed on the Sooty Tern at Raoul Island, and an annual assessment of breeding success and population trends is proposed.

INTRODUCTION

Since the earliest visits of naturalists in the nineteenth century, Sooty Terns *(Sterna fuscata)* have been reported as breeding in large numbers at Denham Bay beach on Raoul Island in the Kermadecs (Oliver 1955, Merton 1970).

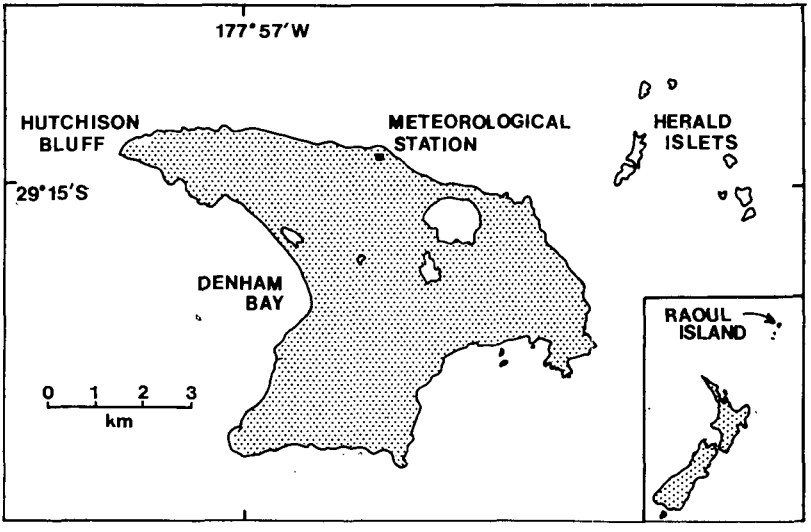

FIGURE 1 — Raoul Island, Kermadec Group.

Nearly all other seabird colonies on Raoul Island (Fig. 1) have been destroyed by predation in recent times, and ten bird species are now virtually confined to off-shore islets for breeding (Merton 1970). There are no avian predators on Raoul, but kiore *(Rattus exulans)*, Norway rats *(R. norvegicus)* and feral cats are all present. Kiore

presumably reached the island with early Polynesian visitors (Oliver 1910) and Norway rats appeared following a shipwreck in 1921 (Watson 1961). Cats were introduced probably before the middle of last century (Merton 1970).

1966-67 CENSUS

The first census of the Sooty Terns of Raoul was carried out by the Ornithological Society of New Zealand's Kermadec Islands Expedition in 1966-67 (Merton 1970). This expedition reported approximately 40 000 pairs at Denham Bay in December 1966 and similar numbers nesting along the southern coast of Hutchison Bluff. It was found that cats and Norway rats were preying on both colonies, the cats taking adults and chicks and the rats, eggs. In 1966, egg-laying at Denham Bay started on 1 December. A study made there that season by J. A. Peart was based on 5537 marked eggs and showed that only 28.5% hatched — over 20% being lost to rats. Of the chicks, 21.3% died before 24 January (when the expedition left) giving a total egg and chick mortality of 77.5% (Merton 1970). Since Sooty Terns invariably lay only a single egg, this indicates that there must still have been about 9000 chicks alive then. Further deaths would of course have occurred before fledging in March. One would expect the young to be less likely to die from predation or other causes after their first three weeks of life, and Merton (1970) presented evidence from banding showing that only 7.5% of the chicks alive in mid-January 1967 died before fledging. This gives an overall mortality (laying to fledging) of 79.2%. Therefore at least 8500 of the chicks should have survived to 13 February 1967, giving a maximum egg and chick mortality to that date of 78.8%.

1978 CENSUS

Raoul Island was visited on 8-15 February 1978 by Lands and Survey Department personnel and members of the Outlying Islands Reserves Committee. The opportunity was taken to assess the present status of the Sooty Tern on Raoul, although only the Denham Bay colony could be surveyed. The Hutchison Bluff colony was not visited, but nothing was seen or heard of it from the cliff tops. It would be useful to check on its fate, but access can be gained only by helicopter or small boat.

At Denham Bay much sign was found of very high mortality of eggs and chicks, and of the feeding of rats and feral cats. Dead and dying chicks were common; many dead chicks had been partly eaten by cats and most of those wounded had obviously been savaged by rats.

On 13 February 1978 an attempt was made to count the live chicks with the aid of other members of the party (L. M. Kenworthy, J. S. Ombler, W. R. Sykes and L. B. Wickham). The tally was 2801. Allowing for chicks missed, this can be taken to indicate a maximum

of about 3000. The stage of fledging was such that only a very few young birds were capable of sustained flight, and most would not have flown until several weeks later.

The survey was too late in the season to estimate the size of the breeding population at Denham Bay in 1977-78, but it is clear that far fewer live chicks were produced from the colony than in 1966-67, when an estimated 8500 survived to the equivalent stage. This indicates either that the population was smaller in 1977-78 than in 1966-67, or that egg and chick mortality was higher, or both.

DISCUSSION

Sooty Tern colonies have notoriously high egg and chick mortalities regardless of predation (Ashmole 1963, Merton 1970). At Denham Bay, eggs and young chicks are often deserted during rain (Oliver 1955), and high seas may wash nests away. In some seasons many chicks die of starvation (Guthrie-Smith 1936). The low count of chicks in February 1978 may be attributed to such factors, but predation seems the most likely cause in view of the large number of killed and wounded chicks seen. If this low count was the result of cat and rat predation, then the Sooty Tern may soon disappear as a breeding species on Raoul Island.

It is interesting that on Raoul Island Sooty Terns have survived predation so much longer than the many other species of sea-birds that once nested there. A parallel is found on Ascension Island in the Atlantic, where rats and feral cats became established before 1820 and where, 140 years later, three-quarters of a million Sooty Terns continued to breed despite heavy predation by cats. This predation has annihilated previously large breeding populations of frigate birds, boobies, petrels, tropic birds and noddies from all accessible parts of the island (Stonehouse 1962). Stonehouse suggested that the continued success of Sooty Terns on Ascension may be due to their extremely large numbers and to their habit of breeding *en masse*. He pointed out that present-day cat numbers are kept low by starvation during the three-month period when terns desert the island between breeding seasons.

There are several obvious major differences between Ascension and Raoul in the predation pressure on the breeding Sooty Terns. On arid and relatively barren Ascension Island, rats (species not identified) are now scarce and are not serious predators (Stonehouse 1962, Ashmole 1963), whereas on forested Raoul Island rats are numerous and are important predators of both eggs and chicks. In particular, the Norway rat could be the most damaging predator of Sooty Terns on Raoul. Along with the varied and plentiful land birds, the rats on Raoul are also an alternative source of food for cats, and help maintain a relatively large cat population during the

winter when the terns leave the island. Thus, despite similarities such as original vast numbers and social breeding behaviour, the Sooty Terns on Raoul Island are probably much more vulnerable to mammalian predation than are those at Ascension.

What is urgently needed is a yearly count of Sooty Tern chicks at Denham Bay comparable to the one carried out in February 1978, so that the annual fluctuations and long-term trends in breeding success can be monitored. Also of great interest would be a detailed study of breeding success at the Denham Bay colony and of the relative effects of cat, Norway rat, and kiore predation on the terns, along with comparative observations at colonies on Raoul's off-shore Herald Islets, where introduced predators are absent.

If the Denham Bay Sooty Tern colony is being destroyed by predation, then intensified control of cats and rats in the area will be required urgently.

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SHORT NOTE

DUNLIN IN THE FIRTH OF THAMES

Further to the record of a Dunlin *(Calidris alpina)* at Tapora, Kaipara Harbour (Brown 1974, *Notornis* 22: 241), birds seen at Taramaire and Miranda in the Firth of Thames provide more records of this species in New Zealand.

J. H. Seddon wrote to me after seeing a puzzling small wader at Taramaire on 12 March 1977, asking that South Auckland members be alerted to look for it as he thought that it might be a Dunlin. His notes read: " Noticed when looking at Curlew Sandpiper, a very similar bird but with a straighter bill. In fact, bill black and about the same length but heavier and only slightly downcurved near tip, twice as thick at base. Bird Curlew Sandpiper size but stocky, short-necked and with more horizontal attitude. Black rump and upper tail surfaces. Dark legs. Upperparts grey-brown, with fawn-edged feathers. Superciliary line white. Neck and breast grey, upper breast with fine rufous striations like shallow V's on grey streaks."

On 29 March 1977 Joan Trollope and I were joined at Miranda