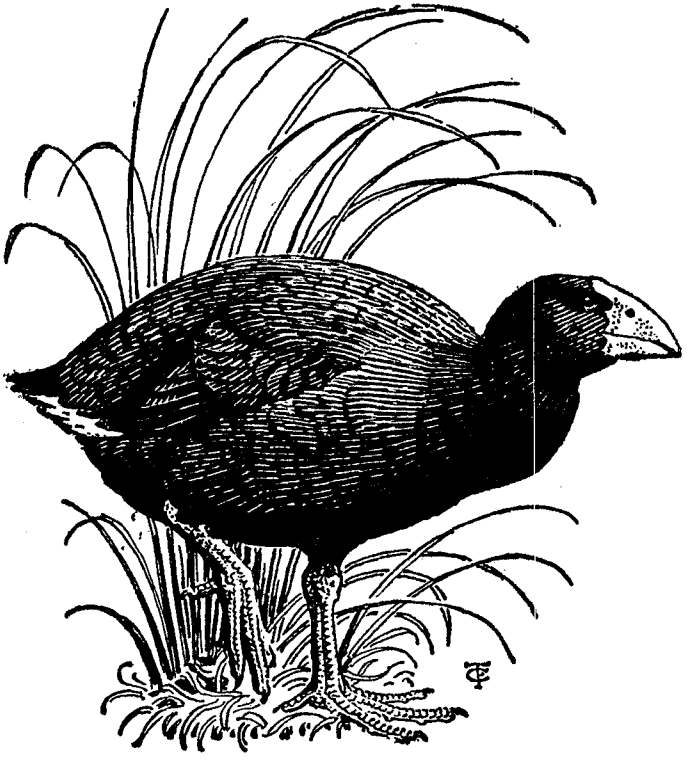
NOTORNIS

Journal of the Ornithological Society of New Zealand



Volume 26 Part 2 June 1979

OFFICERS 1978 - 79

President — Mr. B. D. BELL, Wildlife Service, Dept. of Internal Affairs, Private Bag, Wellington

Vice-President — Mr. M. L. FALCONER, 183 Miromiro Road, Normandale, Lower Hutt

Editor — Mr. B. D. HEATHER, 10 Jocelyn Crescent, Silverstream

Treasurer — Mr. H. W. M. HOGG, P.O. Box 3011, Dunedin

Secretary — Mr. H. A. BEST, Wildlife Service, Dept. of Internal Affairs, Wellington

Council Members:

Dr. BEN D. BELL, 45 Gurney Road, Belmont, Lower Hutt
Mrs. B. BROWN, 39 Red Hill Road, Papakura
Dr. P. C. BULL, 131 Waterloo Road, Lower Hutt
Mr D. E. CROCKETT, 21 McMillan Avenue, Kamo, Whangarei
Mr. F. C. KINSKY, 338 The Parade, Island Bay, Wellington 5
Mrs. S. M. REED, 4 Mamaku Street, Auckland 5
Mr. R. R. SUTTON, Lorneville, No. 4 R.D., Invercargill

Conveners and Organisers:

Rare Birds Committee (Acting): Mr. B. D. BELL

Beach Patrol: Mr. C. R. VEITCH, Wildlife Service, Dept. of Internal Affairs, P.O. Box 2220, Auckland

Card Committee: Mr. R. N. THOMAS, 25 Ravenswood Drive, Forest Hill, Auckland 10

Field Investigation Committee: Mr. B. D. BELL

Librarian: Miss A. J. GOODWIN, R.D. 1, Clevedon

Nest Records: Mr. D. E. CROCKETT

Recording (including material for Classified Summarised Notes): Mr. R. B. SIBSON, 26 Entrican Avenue, Remuera, Auckland

Representative on Member Bodies' Committee of Royal Society of N.Z.: Mr. B. D. BELL

Assistant Editor: Mr A. BLACKBURN, 10 Score Road, Gisborne

Editor of *OSNZ News:* Mr P. SAGAR, 38A Yardley St., Christchurch 4

SUBSCRIPTIONS AND MEMBERSHIP

Annual Subscription: Ordinary member $12; Husband & wife members $18; Junior member (under 20) $9; Life member $240; Family member (one Notornis per household) being other family of a member in the same household as a member $6; institution $20; Overseas member $2.00 extra.

Subscriptions are for the calendar year of first joining and are renewed by invoice each January. Please pay promptly to ensure receiving *Notornis* and *OSNZ News.*

Applications for membership, changes of address and resignations should be sent to the Treasurer.

Exchanges and library subscriptions should be sent to the Treasurer.

Editorial matters ONLY should be sent to the Eritor.

[Registered with the GPO Gisborne as a publication]

ISSN 0029 - 4470

CONTENTS

Printed by TE RAU PRESS LTD., Peel Street, Gisborne

REGIONAL REPRESENTATIVES

FAR NORTH: } D. E. Crockett, 21 McMillan Ave., Kamo, Whangarei.
NORTHLAND: } Ph. 50954.

AUCKLAND: Mrs S. Reed, 4 Mamaku St., Auckland 5. Ph. 547784.

SOUTH AUCKLAND: Mrs Beth Brown, 39 Red Hill Rd., Papakura. Ph. 2988157.

WAIKATO: Mrs B. Seddon, 11 Grey Street, Cambridge. Ph. 7761.

BAY OF PLENTY: R. M. Weston, 250 River Road, Kawerau. Ph. 8357.

VOLCANIC PLATEAU: R. W. Jackson, 9 Kenrick Road, Rotorua. Ph. 86907.

GISBORNE/WAIROA: J. C. Henley, 9 Mason St., Gisborne. Ph. 85181.

TARANAKI: R. E. Lambert, Taranaki.Museum,.Box.315,.New Plymouth.

MANAWATU: Dr L. J. Davies, DSIR, Private Bag, Palmerston North. Ph. 87680.

HAWKES BAY: N. B. Mackenzie, Wildlife Trust, Main Road, Westshore, Napier. Ph. 59451.

WAIRARAPA: D. Sim, Lake Ferry, R.D. 2, Featherston. Ph. 828 Pirinoa.

WANGANUI: L. C. Edlin, 5 Poutini St., Wanganui East. Phone 32452.

WELLINGTON: A. H. Gollop, 6 Dawn Grove, Akatarawa, Upper Hutt. Phone 268749.

NELSON: Mrs J. Hawkins, 772 Atawhai Drive, Nelson. Ph. 520151.

MARLBOROUGH: Mrs P. Jenkins, 30 Maxwell Road, Blenheim. Phone 83775.

CANTERBURY: P. M. Sagar, 38A Yardley Street, Christchurch 4.

WEST COAST: C. S. Lauder, 9 Winnie Street, Greymouth. Ph. 6349.

OTAGO: M. R. R. Foord, 39 Park St., Dunedin North. Phone. 776213.

SOUTHLAND: R. R. Sutton, Lorneville, No. 4 R.D., Invercargill. Ph. 358230.

LITERATURE AVAILABLE

From all bookshops:

A field guide to the birds of New Zealand, by R. A. Falla, R. B. Sibson and E. G. Turbott, new ed. $13.95

From B. D. Heather, 10 Jocelyn Crescent, Silverstream:

A biology of birds, by B. D. Heather. **$1.50**

From Mrs H. Hagen, 53 Minnehaha Street, Titirangi, Auckland 7:

Back numbers of 'Notornis': Parts of Vol. 1, 50c each; Vols. 2-13, $1.00 per part; Vols. 14-21, $1.50 per part; Vols. 22-, $2.00 per part; all plus 10% postage.

Reports and bulletins (1939-1942) **$2.00**

OSNZ Library catalogue (1976 ed) 17 pp. **$0.55**

Banding reports, Nos 8-14, 55c each.

Kermadec Expedition, 1964, by A. T. Edgar. **$0.50**

Guide to Identification of Shearwaters and Petrels in New Zealand waters (Auckland Museum), J. P. Croxall **$0.55**

From P. C. Harper, Dept of Extension Studies, University of Canterbury, Christchurch:

Southern albatrosses and petrels: an identification guide, by P. C. Harper & F. C. Kinsky, 1978 edition **$5.00**

From P.O. Box 1239, Wellington North:

Bird distribution in N.Z. A provisional atlas. **$6.00**

From B. D. Bell, 9 Ferry Road, Seatoun, Wellington:

OSNZ tie (mid-grey with Notornis motifs). **$6.00**

NOTORNIS

is the journal of the Ornithological Society of New Zealand (Inc.)

Editor: B. D. Heather,
10 Jocelyn Crescent,
SILVERSTREAM

VOLUME 26 PART 2 JUNE, 1979

A HISTORY AND ACCOUNT OF THE BIRDS OF THE HUNUA RANGES

By H. R. McKENZIE

ABSTRACT

The history of ornithological activity in the Hunua Ranges, south-east of Auckland, is outlined. An account is given of both native and introduced birds from 1888 to 1978.

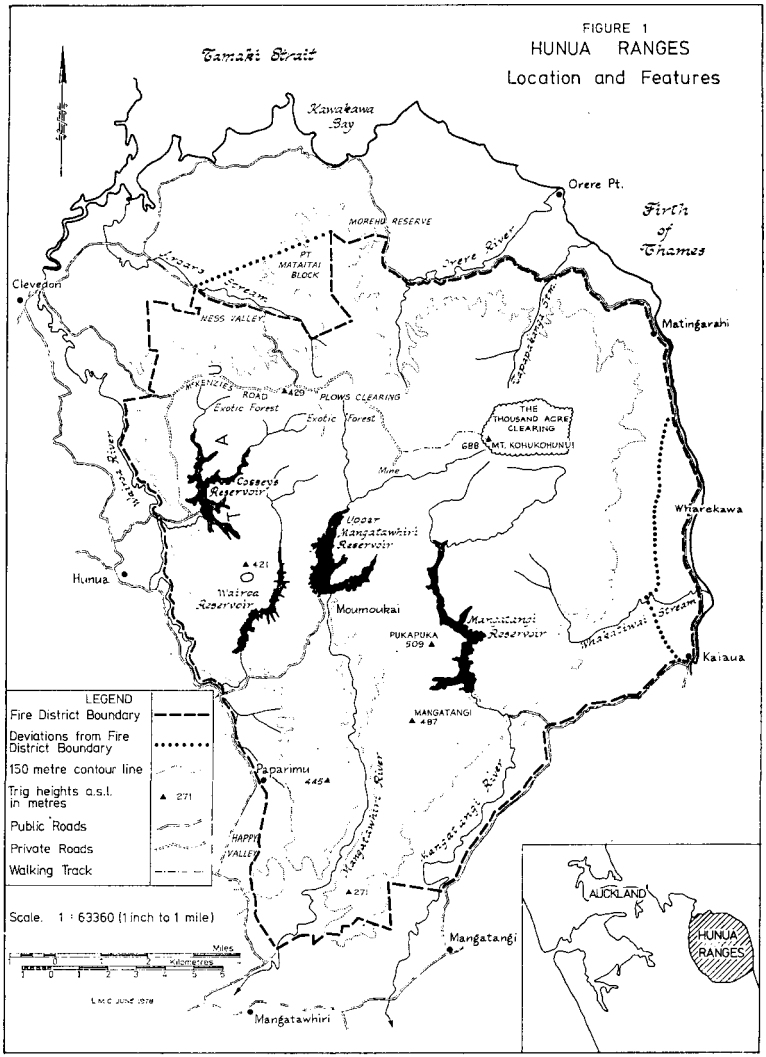
INTRODUCTION

Geography

The Hunua Ranges are bounded, for the most part, by the Hunua Rural Fire District, which is administered by the Auckland Regional Authority (Fig. 1). Deviations from the fire district are shown by dotted lines. The dotted line on the north includes a partly forested area, part of the Mataitai Block and the northern watershed of Ness Valley, while that on the east includes the foothills of the ranges, whether grassed or not and excludes the flat country and the shore, the birds of which do not normally go inland to the hills. This is a smaller area than that covered by Mead (1930) and Barton (1972; 1978) and is similar to that covered by St.Paul & McKenzie (1974).

The boundaries enclose the high Hunua Ranges which are a group of deeply dissected up-faulted blocks of Mesozoic greywacke and argillites (Schofield 1967). The upland area is separated from the adjoining lowlands in the south and west by well defined scarps (Mead 1930). To the north the hills dip gradually towards the Papakura-Clevedon lowlands and in the east more steeply to the Firth of Thames.

The highest point is Mt Kohukohunui (688 m) and the streams which drain the area radiate from it. Main streams are the Mangatawhiri and Mangatangi, which drain south to the Waikato River, and



the Wairoa flowing north to Tamaki Strait. The eastern side has several shorter and steeper streams discharging into the Firth of Thames. Rainfall varies from 1200 mm in the lower parts to over 2400 mm on the highest ground.

Much of the land above 150 m (Fig. 1) is clothed in native forest and shrubland and of this some 17 000 ha lie within the Auckland

Regional Authority water supply reserves. The predominant forest type is classed as tawa-podocarp, which probably comprises 75% of the total forest (Barton 1972). To the south and along the eastern side of the ranges are found several areas of kauri-beech forest. Barton (1972) described the various forest types in some detail.

A significant portion of the original forest within the ranges and around the fringes was cleared for farming in the 1880-1920 period (Barton 1972). Much of the land became uneconomic for farming and was bought for water catchment. It has reverted to some regrowth forest and much shrubland. Ness Valley, however, has largely stayed as farmland.

Silvester (1964) mentioned the important role that native birds played in aiding dispersal of tree and shrub seeds in the regeneration patterns of the Thousand Acre Clearing. The same has occurred elsewhere on other areas of former farmland.

Some 1500 ha of the regrowth shrublands in the north and north-western parts of the water supply reserve, consisting of Plows' Clearing, the eastern side of McKenzie Road and towards Cossey's Reservoir, have now been converted to exotic forest, mainly *Pinus radiata.*

Timber was removed without great harm to the present forest as it was done by means of winch and wire rope, or by bullock teams, before the day of the bulldozer. However, as indicated by Barton (1972), the bush is now mostly of poor quality, having suffered first from grazing of cattle, then pigs, goats and possum, so that its ornithological value has been greatly reduced.

Ornithological History

The Maori and his predecessors are known to have taken North Island Kiwi, Grey Duck, Brown Teal, New Zealand Pigeon, Tui, North Island Kaka, parakeets, North Island Weka and small passerines, and the European took ducks, New Zealand Pigeon and Kaka. The European brought predatory rats, cats, polecat ferrets, stoats and weasels, together with avian diseases with the birds he introduced. These factors, together with poor bush quality and habitat changes, have reduced most of the native bird life to small remnants, while some have been exterminated.

The Hunuas were apparently not visited by any of the early ornithologists except Reischek (1952) who merely wrote " Except for a few short excursions, as those of September 1888 and of January 1889 to ' Papakuru,' south-east of Auckland and to ' Hunu ' my work in New Zealand was finished."

The earliest documented information so far known of the Hunuas was provided by two young brothers, Hugh S. Munro and

George C. Munro of Clevedon, who in the late 1880s made comprehensive private collections of the local birds. They supplied considerable material to the Auckland Institute and Museum, where it is still held. George C. Munro moved to Hawaii at the age of 20 years. He either took his private collection with him or had it sent later. He sold it to a Miss Alexander who donated it to the Bernice P. Bishop Museum, Honolulu, Hawaii. He collected Hawaiian birds and these, together with a large quantity of material he bought from Hugh S. Munro's collection, he presented to this museum. He returned to New Zealand at one time for five years and farmed in Northland, where he collected further items for the Bernice P. Bishop Museum. Specimens listed by the Museum and still held there are recorded as having been received between 1926 and 1936. The museum has no record of any of this material having been sent elsewhere. Some of the purchase by G. C. Munro from H. S. Munro was a small lot of the Moa remains found at Clevedon (Wairoa South) in 1912.

When Hugh S. Munro died, much of the remainder of his private collection was donated to the Auckland War Memorial Museum but some is still held by members of his family. Almost all of the New Zealand collecting by the two brothers was done in the Wairoa South (now Clevedon) district, mostly on the then forested Otau hills, which are now included in the " Hunua Ranges."

It is likely that some Munro material is in the American Museum of Natural History, New York, under the name of the English collector, H. Palmer, in the collection bought from the British Lord Rothschild. When in New Zealand for a period up to 1890, Palmer must have acquired considerable material from the Munros but labelled it as collected by himself. In December 1890 Palmer persuaded G. C. Munro to assist him in a Rothschild-sponsored collecting venture to Hawaii. Some new species were obtained and Lord Rothschild in his *Air Fauna of Laysan* and elsewhere named these for his collector, but did not mention Munro. Obviously Munro, with his capabilities, must have made some of the new discoveries but Rothschild was not to know this. Sir Robert Falla kindly provided me with notes, made in January 1960, of a conversation with George C. Munro at Honolulu, which indicate that Palmer had used only his own name in his records, so that any Munro material cannot now be identified by the staff of the American Museum of Natural History. It seems that none of Palmer's items went to the Bernice P. Bishop Museum of Hawaii.

From about 1908 J. W. (Joe) St.Paul took an interest in the birdlife of the area while being brought up and working on the bush farm of his father, Joe St.Paul sen., later farming on the Moumoukai plateau, always in sight or sound of the Kokako, Tui and other birds, as part of both his father's and his farm ran into the forest. The Auckland City Council made its first purchase of land for water catchment in 1926 and gradually added more, including the rough hilly farms of local settlers. Joe worked for the Council at times from

1928 to 1944, then became a ranger, retiring in 1963 but continuing to study the birds of the area, roving every part of the water reserves. He did not keep notes but amassed an extensive knowledge, much of which has appeared in *Notornis*. His wife was a keenly interested helper. His brothers, Robert (Bob) and Ernest had similar interest and contributed substantially. Joe introduced R. B. Sibson and the writer to the North Island Kokako *(Callaeas cinerea wilsoni)* in 1941 and this led to prolonged study of this bird and all the others of the area by OSNZ members and their friends. G. M. Maning at his manganese mine in the bush and also officers of the Auckland Regional Authority Water Reserve have been of much assistance to local ornithologists in this period.

In the following species account, all references are personal communication, unless given otherwise. Much of the information is verbal and subjective, but this is the only information available apart from museum records and the small amount of published material.

After each species heading are summarised the Munro specimens and eggs whose whereabouts I have been able to trace. " Birds " = mounted specimens and/or study skins; " Auck. Mus." = the Auckland War Memorial Museum, New Zealand; " Bishop Mus." = the Bernice P. Bishop Museum, Honolulu, Hawaii; " Munros " = held privately by the New Zealand members of the family of H. S. Munro; " no specimens " = no Munro collection of the species has been found.

NATIVE BIRDS OF THE BUSH

NORTH ISLAND KIWI *Apteryx australis mantelli*

Auck. Mus. 5 birds, 3 eggs. Bishop Mus. 4 birds, 1 egg. Munros 3 eggs.

This species was once very plentiful in the area and in contiguous forest and scrub. In the Mataitai Block of bush which then adjoined the Hunua Ranges, the Munro brothers and a friend, John Luke, caught so many in one day that, not having time to kill and skin them before dark, they built a pen of tree-fern trunks to hold them. All escaped in the night. J. W. St.Paul recollects that as children they used to catch them to play with and states that dogs played havoc with them. Pig-hunters of recent years cannot recollect their dogs catching kiwi but this could be due to scarcity of the birds. Dogs in general show great antipathy to the species. The fading out of the Kiwi could have been accentuated by an epidemic or whatever agency wiped out the Weka *(Gallirallus australis)* in most of the North Island.

In the present century birds were seen by J. W. St.Paul in 1914, R. St.Paul in 1917, Mrs Alex. McKenzie in July 1955 and J. Bockman in September 1965 (one on a bush track in the Tapapakanga Valley in the north-east). Borings, calls and footmarks have been noted at odd times by J. W. St.Paul and D. L. Harding. In 1976 Ranger T. Marrett reported a call from near Cossey's Reservoir.. Fore-

man D. L. Harding reported that a young kiwi was seen on 16 March 1978 in the valley of the headwaters of the Wairoa River in the Otau area. It was disturbed at the edge of a patch of bush where a huge roller was flattening scrub and fern that was to be burned in preparation for the planting of pine *(Pinus radiata)*.

NEW ZEALAND FALCON *Falco novaeseelandiae*

Auck. Mus. 1 bird. Munros 1 bird.

J. W. St.Paul reports that, many years ago, he shot one that was chasing a pigeon. I have myself seen only one, on 8 April 1942, which was sitting on a post at the eastern edge of Plows' Clearing. Mrs Beth Brown, 1970, found a feather of this species on the road into the bush from Plows' Clearing. It was identified at the Auckland Institute and Museum.

NEW ZEALAND PIGEON *Hemiphaga novaeseelandiae*

Auck. Mus. 1 bird. Munros 1 bird.

Numerous in the nineteenth century and quite plentiful up to the first quarter of the twentieth, it is now much reduced owing to loss of habitat and illegal shooting.

NORTH ISLAND KAKA *Nestor meridionalis septentrionalis*

Auck. Mus. 1 bird, 1 egg. Bishop Mus. 3 birds. Munros 1 bird.

Once plentiful and breeding, it is now only a casual visitor. There are populations within range on Great Barrier, Little Barrier, Waiheke and Ponui Islands, the Waitakere and Coromandel Ranges.

RED-CROWNED PARAKEET *Cyanoramphus novaezelandiae*

Auck. Mus. 1 bird. Bishop Mus. 1 bird. Munros 1 bird.

The Munro brothers collected several in the late 1880s so that it evidently was resident then in the Hunua Ranges.

Three birds were definitely identified on 12 December 1974 in the bush east of Plows' Clearing by an experienced party consisting of Mrs Beth Brown, T. E. Lovegrove, S. M. Towle and G. Arnold. These birds were not seen again. Recently there have been reports of sightings in the eastern, central and southern parts of the area. The presence of the Eastern Rosella makes these reports somewhat doubtful, though odd visiting birds could have occurred. The St.Paul brothers and numerous other watchers have seen none in the 1908-1978 period.

YELLOW-CROWNED PARAKEET *Cyanoramphus auriceps*

No specimens.

Not known to have been a permanent resident of this forest, but a party was known to the St.Paul brothers for about a year in 1922. One was shot for identification and proved to be Yellow-crowned. None has been reported since so it may be presumed that this was a visiting party, probably from the ranges east of Thames.

LONG-TAILED CUCKOO *Eudynamis taitensis*

Auck. Mus. 1 bird. Bishop Mus. 1 bird. Munros 1 bird.

It is quite rarely seen or heard as it passes through on migration. The absence of the Whitehead *(Mohoua albicilla)*, the usual host of this parasitic bird, could account for its not breeding here.

MOREPORK *Ninox novaeseelandiae*

Auck. Mus. 3 birds. Bishop Mus. 2 birds. Munros 1 bird.

Loss of habitat has reduced the species but it persists in moderate numbers, often heard but seldom seen.

PIED TIT *Petroica macrocephala toitoi*

Auck. Mus. 3 birds. Bishop Mus. 1 bird. Munros 3 birds.

J. W. St.Paul has known the Pied Tit in the area for over 70 years and states that its numbers fluctuate fairly frequently. Since 1941 notes have been taken for the 4 km foot-track to the Kohukohunui Summit where it has gone as low as four or five seen or heard over a period of a few years and up to 12 or so for other similar periods. Barton (1972) considered the Pied Tit rare. From 1971 it increased up to 1978, T. G. Lovegrove counting 31 on 6 August 1977. It is notable that a similar upsurge has occurred at the same time in the Waitakere and Coromandel Ranges.

BELLBIRD *Anthornis melanura*

No specimens.

The Bellbird has a peculiar history in the area. The Munro brothers, who scoured the Hunua Ranges in the 1880s, did not see it. An aged Maori, Henare Turei, told me that he had seen one once, long ago. This would presumably be at or near Kawakawa Bay. It did not stay. He had been familiar with the species when on a bush-felling job in the King Country.

Hugh S. Munro, when over seventy, expressed a wish that he might see a Bellbird before he died. I made a mental note and later, with my two young sons, took him on a motor camping tour. He saw his first Bellbird in the Mamaku Bush, Rotorua, but the climax came when, on advice from the late Norman Potts of Opotiki, we made camp in the Waioeka Valley and enjoyed the most glorious dawn chorus I had ever experienced.

The first dated sighting known to me for the Hunua Ranges was of one seen by J. W. St.Paul on 10 October 1942. He had heard it at times for about six months before that date. In November 1942, two adults with two young were seen by E. St.Paul not far from the same place. Shortly afterwards some were seen and heard near Kawakawa Bay by Mrs R. Cashmore and others. In 1948 a few reached Clevedon but in a few years faded back to the Hunua Ranges, where it has remained in reduced numbers. R. St.Paul has suggested that

it may have crossed the Hauraki Plains from the ranges behind Thames while feeding on flax *(Phormium tenax)* bloom.

TUI *Prosthemadera novaeseelandiae*

Auck. Mus. 4 birds, 2 eggs. Bishop Mus. 3 birds. Munros 2 birds.

J. W. St.Paul is of the opinion that the Tui was once the most numerous bird in the bush of the Hunua Ranges. About 500 would come each year from the bush to the flowering kowhai *(Sophora tetraptera)* along the streams flowing into Kawakawa Bay, but on 19 September 1976 a large party of ornithologists doing a survey found only 95. The decrease was gradual but has greatly accelerated in recent years, apparently because of the spread of the Myna *(Acridotheres tristis)* throughout the bush. The Tui may become rare eventually in the Hunuas.

NORTH ISLAND KOKAKO *Callaeas cinerea wilsoni*

Auck. Mus. 2 birds, 1 egg. Bishop Mus. 2 birds.

The Hunua Ranges are one of the last refuges of this bird. Formerly known as the Blue-wattled Crow, it was plentiful before the bush was cleared away or spoiled by browsing mammals. The denser bush of the valleys in the ranges and of the Clevedon flats was the first to be felled and so the Kokako was forced back to the higher, less suitable habitat that would formerly have carried a lesser population than the richer lowlands.

From 1943 to 1953 only seven nests were found, mostly old but two were occupied. A further occupied nest was found in 1962 but intensive searches then and later have been fruitless (St.Paul & McKenzie 1974). The remaining birds may be too old to breed.

NATIVE BIRDS OF BOTH BUSH AND OPEN

AUSTRALASIAN HARRIER *Circus approximans gouldi*

Auc. Mus. 4 birds, 2 eggs. Bishop Mus. 1 bird. Munros 2 eggs.

This bird ranges over the whole area, mostly over open and rough country, though it patrols forest also. Barton (1978) recalls that it was very plentiful in the area when the rabbit population was at its height but dwindled when the rabbit was almost exterminated by poisoning. It nests in small swamps and occasionally in fern.

SHINING CUCKOO *Chalcites lucidus*

Auck. Mus. 2 birds. Bishop Mus. 3 birds.

Regular wherever there are trees or shrubs. Present from September to February or March.

KINGFISHER *Halcyon sancta vagans*

Auck. Mus. 2 birds, 3 eggs. Bishop Mus. 2 birds. Munros 1 bird.

Scattered rather sparsely. In the breeding season some resort

to the decayed trees in the bush to nest and return to the coast and lowlands to winter. Others nest in steep road cuttings and riverbanks in the area.

GREY WARBLER *Gerygone igata*
Auck. Mus. 2 birds, 4 eggs. Bishop Mus. 1 bird. Munros 3 birds.

NORTH ISLAND FANTAIL *Rhipidura fuliginosa placabilis*
Auck. Mus. 3 birds (one of black phase), 2 eggs. Bishop Mus. 2 birds. Munros 3 birds.

SILVEREYE *Zosterops lateralis*
Auck. Mus. 2 birds, 2 eggs. Bishop Mus. 2 birds. Munros 2 birds.

These three species occur in moderate numbers throughout, the Silvereye often in sizeable flocks in autumn and winter.

NATIVE BIRDS OF WATER AND SWAMP

NEW ZEALAND DABCHICK *Podiceps rufopectus*
Auck. Mus. 1 bird. Bishop Mus. 4 birds.

In recent years, the Dabchick has colonised and breeds on the farm dams in the upper farm lands about Wharekawa and Kaiaua. It has so far not been reported on the Auckland Regional Authority water supply reservoirs, which are probably too deep and steep-sided.

BLACK SHAG *Phalacrocorax carbo novaehollandiae*
Auck. Mus. 2 eggs. Bishop Mus. 2 birds.

PIED SHAG *P. varius*
Auck. Mus. 2 birds, 2 eggs. Bishop Mus. 4 birds.

LITTLE BLACK SHAG *P. sulcirostris*
No specimens.

LITTLE SHAG *P. melanoleucos brevirostris*
Auck. Mus. 2 eggs. Bishop Mus. 7 birds.

All of these shags occur sparingly about the area. The Black Shag has a small nesting colony at Cossey's Reservoir and it and the Little Shag occur about reservoirs, streams and dams. The Pied and Little Black Shags are seldom seen except at a tree roost at a farm dam at Wharekawa (J. W. Wootton).

CASPIAN TERN *Hydroprogne caspia*
Auck. Mus. 1 bird. Bishop Mus. 2 birds.
Odd birds sometimes cruise over the reservoirs.

AUSTRALIAN BITTERN *Botaurus stellaris poiciloptilus*
Bishop Mus. 1 bird.

Seen occasionally in small swamps. It has bred at Wharekawa (J. W. Wootton).

BLACK SWAN *Cygnus atratus*

No specimens.

An occasional visitor to reservoirs and dams (P. Andrews).

PARADISE DUCK *Tadorna variegata*

No specimens.

A few lived for a time in upper Ness Valley (K. V. Kelly). A pair has attempted to breed at Wharekawa (J. W. Wootton). A pair has visited the Upper Mangatawhiri Reservoir (P. Andrews).

GREY DUCK *Anas platyrhynchos*

Auck. Mus. 1 bird, 1 egg.

Once widespread, it has recently had to give way somewhat to the Mallard but is still in some numbers in the reservoirs, in dams and streams.

BANDED RAIL *Rallus philippensis assimilis*

Auck. Mus. 4 birds, 3 eggs. Bishop Mus. 4 birds. Munros 1 bird.

Once plentiful in the valleys but now rare. Cats are its worst enemy.

SPOTLESS CRAKE *Porzana tabuensis plumbea*

Auck. Mus. 1 bird. Bishop Mus. 1 bird. Munros 1 bird.

Relatively plentiful wherever there is dense growth of a swampy or semi-swampy nature. It is more often heard than seen.

PUKEKO *Porphyrio porphyrio melanotus*

Auck. Mus. 2 birds, 1 egg. Bishop Mus. 1 bird.

The first report known to me was made in 1940 by Mrs May Insley in Ness Valley. J. W. St.Paul first saw it in Moumoukai Valley in 1944. It is now fairly common about the lower fringes of the area.

NORTH ISLAND FERNBIRD *Bowdleria punctata vealeae*

Auck. Mus. 4 birds, 1 egg. Bishop Mus. 6 birds. Munros 2 birds.

The draining of swamp and near-swamp country has sadly reduced this bird but it persists in the gullies from Wharekawa to Kaiaua and in some odd little pockets elsewhere.

NATIVE BIRDS OF OPEN COUNTRY

WHITE-FACED HERON *Ardea novaehollandiae*

No specimens.

BANDED DOTTEREL *Charadrius bicinctus*

Bishop Mus. 4 birds.

PIED STILT *Himantopus leucocephalus*

Auck. Mus. 1 bird.

SOUTHERN BLACK-BACKED GULL *Larus dominicanus*

Auck. Mus. 2 birds, 1 egg.

RED-BILLED GULL *L. novaehollandiae scopulinus*
Auck. Mus. 1 bird. Bishop Mus. 4 birds.

WELCOME SWALLOW *Hirundo tahitica neoxena*
No specimens.

None of these six species would have been present when the whole area was in bush and scrub.

NEW ZEALAND PIPIT *Anthus novaeseelandiae*
Auck. Mus. 2 birds, 4 eggs. Bishop Mus. 4 birds.

In the early days, this engaging little bird would have lived on landslips and rocky bare places in the bush. Clearance of bush from shingly creek-beds, roads and cuttings increased its habitat, later lost with the advent of motor traffic. It is now found mostly about Plows' Clearing and the less used roads of the pine plantation. It occurs also on the upper areas of farms in Ness Valley and Wharekawa.

INTRODUCED BIRDS COMMON TO BOTH BUSH AND OPEN

EASTERN ROSELLA *Platycircus eximius*
No specimens.

Originally a cage escape in New Zealand, the Rosella has become plentiful in parts of the area, small flocks occurring mostly about or near the bush edge but seen throughout. The first reported was in Moumoukai Valley in July 1943 by E. St.Paul. It is not welcome as it tends to prevent regeneration of native forest by destroying the seeds of some tree species, such as rimu *(Dacrydium cupressinum)*.

SONG THRUSH *Turdus philomelus*
Auck. Mus. 3 birds. Bishop Mus. 1 bird.

Plentiful in the open, it penetrates the bush where there are roads or open spaces.

BLACKBIRD *Turdus merula*
Auck. Mus. 2 eggs. Bishop Mus. 1 bird.

Plentiful and approachable in the open, it is not uncommon in deep bush, where it is wild and timid.

CHAFFINCH *Fringilla coelebs*
Auck. Mus. 5 eggs. Bishop Mus. 1 bird.

Mostly a bird of the open but found also throughout the bush.

STARLING *Sturnus vulgaris*
No specimens.

Common in the open, often in large flocks. It uses the dead trees of the bush for nesting.

INDIAN MYNA *Acridotheres tristis*
No specimens.

Numerous in the open but has recently invaded the native forest where it is known to take the eggs of New Zealand Pigeon and Tui.

INTRODUCED BIRDS OF THE OPEN

BROWN QUAIL *Synoicus ypsilophorus*
Auck. Mus. 2 eggs. Bishop Mus. 3 birds.
Prefers semi-swamp growth. Seen in forest occasionally.

CALIFORNIAN QUAIL *Lophortyx californica*
No specimens.
Found in dry places with little cover.

PHEASANT *Phasianus colchicus*
Auck. Mus. 3 birds. Bishop Mus. 1 bird.
Along roads in new pine plantings.

HEDGESPARROW *Prunella modularis*
No specimens.
About edges of scrub growth.

WHITE COCKATOO *Cacatua galarita*
No specimens.
An occasional visitor to the Kaiaua-Wharekawa area and has not been known to breed there. It is not popular as it damages crops.

SKYLARK *Alauda arvensis*
No specimens.
A bird of pastures and unsealed roads, it was once very plentiful but its numbers have been drastically reduced by the advent of the hedgehog and the White-backed Magpie.

YELLOWHAMMER *Emberiza citrinella*
Auck. Mus. 2 eggs. Bishop Mus. 2 birds.

GREENFINCH *Carduelis chloris*
Auck. Mus. 3 eggs.

GOLDFINCH *Carduelis carduelis*
Auck. Mus. 2 eggs. Bishop Mus. 1 bird.

REDPOLL *Acanthis flammea*
No specimens.

HOUSE SPARROW *Passer domesticus*
Auck. Mus. 3 eggs.
The last five are all birds of the open and scrub, sometimes frequenting forest edges. All flock in autumn and winter, especially when food is abundant in a restricted area.

WHITE-BACKED MAGPIE *Gymnorhina tibicen hypoleuca*
No specimens.
A few about farm pastures. It robs other birds' nests, particularly those of the Skylark.

ROOK *Corvus frugilegus*
No specimens.
An occasional visitor to the Kaiaua-Wharekawa area. It breeds in some numbers at Miranda, outside the Hunuas area.

BIRDS NOW EXTINCT IN THE AREA

BROWN TEAL *Anas aucklandica chlorotis*

Auck. Mus. 4 birds, 3 eggs. Bishop Mus. 1 bird.

Formerly plentiful throughout in and about the streams and swamps, it had disappeared by the early 1920s.

NORTH ISLAND WEKA *Gallirallus greyi*

Auck. Mus. 6 birds, 5 eggs.

The weka was plentiful throughout, mostly in scrub and swampy country, but had gone completely by about 1913. J. W. St.Paul blames dogs, loss of habitat and possibly an introduced virus.

KAKAPO *Strigops habroptilus*

No specimens.

The late Alex. Ashby, when at Orere, told me that in about 1912, when pigeon shooting in the Tapapakanga basin, he saw a large green parrot on a sloping tree trunk less than 1 m from the ground. His gun was empty and before he could load it the bird planed down from the tree trunk and disappeared into thick cover in a gully. A long search was fruitless. He would of course have been looking for it in the trees whereas it would most likely have gone into a burrow.

Sometime prior to 1943, I had a letter from George C. Munro, Honolulu, stating that he had some recollection of the late S. A. Browne, North Road, Clevedon, having claimed to have seen a Kakapo in the range near the upper part of the Wairoa (Clevedon) estuary. The location was approximately NZMS 1, Map N43, 553463. Towards the seaward end of this range, near Umupuia (" Duders' Beach ") approximately NZMS 1, Map N43, 565525, Rev. R. J. Fenton recalls some of his fellow boy scouts seeing, in 1949, a green parrot scuttling away through under-scrub. It did not fly. In 1944 an elderly Maori named Henare Turei told me that he had heard older Maoris talking about its being in that range, which is only 18 km from Tapapakanga.

MOA spp. (Dinornithiformes)

Auck. Mus., skeletal material of 40 or more birds. Bishop Mus., a small quantity of same.

Apparently no moa remains have been recorded in the Hunua Ranges. However there is evidence that moas must have lived there at some time. A cache of bones of five species and other material, found in a wet hole in a swampy patch at Clevedon, was only 7 km from the Otau part of the ranges.

The collection in the Auckland War Memorial Museum presented by H. S. Munro represented 40 or more birds of four or possibly five species, all taken from one wet hole in a marshy spot, located at Clevedon, 7 km from the edge of the area herein designated as " The Hunua Ranges." It obviously consisted of remains from a single feast. The bird must have been very plentiful for the Maoris (or Morioris) to be able to herd so many to one spot.

On the very hard soil of the top of the ridge running from Papakura to the Wairoa Gorge, I have seen moa crop-stones (as identified by H. S. Munro, to whom they were common). They were about 3.5 km from the Wairoa River gorge. It is therefore evident that, since this bird was a common resident nearby, it must have been present in the Hunua Ranges. The Wairoa River would have been no barrier as a child could easily ford it. There are no caves in the Hunua Ranges where bones could be preserved.

Tim Halliday (1978) p. 122, says " It is not easy to reconstruct the history of New Zealand's birds, chiefly because there is a dearth of fossils. This is probably due to the fact that most of New Zealand has long been covered by forests which create acidic soils in which corpses decompose very quickly. There are many more fossil remains of the birds that have lived around the archipelago's coasts." This would apply to the Hunua Ranges, which were totally covered in bush, as was the Clevedon area where the remains were found.

BIRDS OF WHICH NO EVIDENCE HAS BEEN FOUND

North Island Rifleman *Acanthisitta chloris granti,* North Island Bush Wren *Xenicus longipes stokesi,* Whitehead *Mohoua albicilla,* North Island Robin *Petroica (Miro) australis longipes,* North Island Saddleback *Philesturnus carunculatus carunculatus,* Huia *Heteralocha acutirostris,* North Island Thrush *Turnagra capensis tanagra* and Moa spp..

None of these were found when the Munro brothers assiduously collected birds in the late 1880s when the bush was of much greater extent and in much better order than now, so should have been suitable for all of these species.

J. W. St.Paul lived in the area from 1901, started to note birds about 1908 and retired from work there in 1963 but was continuing study of the birds in 1979. His brother Robert was brought up there and whenever he came home in later years he roved that bush, hunting and birding. Ernest St.Paul spent all his early and working life there. They saw none of these birds. I can offer no explanation for the apparent absence of these species from the early part of European settlement to the present.

ACKNOWLEDGEMENTS

Grateful thanks are tendered to A. J. Dakin and B. D. Heather for help with the script, to J. W. St.Paul for ornithological and other information from 1908 to 1978; to Lesley M. Clark who produced the map with the co-operation of A. J. Dakin and Mr Popham, all of the Auckland Regional Authority staff; to Mrs Sylvia M. Reed of the Auckland War Memorial Museum staff for much research of Munro files and material; to Dr Alan C. Ziegler for copies of records of George C. Munro study skins held at the Bernice P. Bishop Museum, Honolulu; to Dr John Farrand Jr. of the American Museum of Natural History for research; to the family of the late H. S. Munro, Mrs Winifred

Jackson, H. H. and A. J. Munro, for use of material held by them; to Miss Ruby Munro of Honolulu for information; and to all others who helped.

LITERATURE CITED

BARTON, I. L. 1972. On the vegetation of the Hunua Ranges, Auckland. NZ Jour. Bot. 10: 8-26.
BARTON, I. L. 1973. Auckland's south eastern bulwark, a history of the Hunua Ranges. I. L. Barton, Hunua, Auckland.
HALLIDAY, TIM. 1978. Vanishing birds. their natural history and conservation. Auckland: Hutchinson of New Zealand.
MEAD, A. D. 1930. Physiography and geology of uplands west of Firth of Thames. NZ Jour. Sci. Tech. 11: 310-318.
St.PAUL, J. W.; McKENZIE, H. R. 1974. The Kokako (**Callaeas cinerea wilsoni**) in the Hunua Ranges. Notornis 21: 205-218.
REISCHEK, A. 1952. Yesterdays in Maoriland. New Zealand in the eighties. Whitcombe & Tombs.
SCHOFIELD, J. C. 1967. Sheet 3 Auckland (Ed. 1) Geol. map of NZ, 250 000. Wellington: DSIR.
SILVESTER, W. B. 1964. Forest regeneration problems in the Hunua Ranges, Auckland. Proc. NZ Ecol. Soc. 11: 1-5.

H. R. McKENZIE, *21 Estuary Road, Weymouth, Manurewa.*

★

SHORT NOTE

PUZZLING BEHAVIOUR OF HARRIERS

During the Christmas break of 1977, my husband and I spent several days on a farm in Hawkes Bay. We noticed Harriers *(Circus approximans)* repeatedly flying low over three acres of remnant bush in cleared farmland. They flew over to an exposed ridge and watched the surrounding country. I taped the call which was a high-pitched, explosive whistle. They were much harassed by Starlings and Magpies.

In this bush under a Tawa tree *(Beilschmiedia tawa)* we found droppings and pellets and, on looking up, saw in the foliage two very large, bulky structures made of twigs, one 12 m and one 15 m from the ground which in our judgement could only be nests. We watched them for hours, concentrating on the upper one which seemed newer, although the lower was still intact. Eventually a flock of Silvereyes *(Zosterops lateralis)* hunting insects in the foliage came abreast of the upper nest and a Harrier's head appeared briefly which, by its dark colour, may have been a well-fledged juvenile. After that short glimpse no more was seen of the bird in the nest, although at dusk a Harrier circled down in that direction. We have pictures of the two nests and the Harrier in the upper one.

If these structures were indeed nests (and it is hard to know what else they could have been), this raises three questions.

1. As most records state that Harriers enlarge their nests each year, why were there two nests in this tree, both apparently intact?
2. As there was an island in a large swamp nearby, why should the Harriers choose to nest in the Tawa?
3. The Australian Spotted Harrier *(Circus assimilis)* nests in trees. Was *Circus approximans* nesting in the Tawa because of unusual circumstances or does it nest in trees more than is realised? Geoff Moon (pers. comm.) has seen a nest at 2.5 m.

JEAN F. SKINNER, *P.O. Box 60083, Titirangi, Auckland 7.*

SHORT NOTE

EARLY RECORD OF A STINT IN NEW ZEALAND

In 1902 Captain Hutton reported to Sir Walter Buller that E. F. Stead had shot a small sandpiper at Lake Ellesmere. The 'new' wader was included in Buller's Supplement (1905: 186), where it was published as *Limonites ruficollis*, Red-necked Sandpiper. This has been accepted as the first record in New Zealand of any form of Stint. It is interesting that after obtaining several more specimens, Stead (1923: 493) still believed as late as 1921 that two species of Stint, *minutus* and *ruficollis*, visited New Zealand.

In October 1978, in the library of the British Museum of Natural History at South Kensington, I was privileged to spend two mornings examining a large folder labelled "Original Drawings of the Natural History of New Zealand, 1863-1883." The artist was Richard Laishley; and the birds, reptiles, insects and flowers which he depicted were, in his own words, "Illustrated from Nature."

Before he left England in 1860, Laishley's early talent for drawing had been developed at the Royal Academy School and in 1858 he had published an illustrated book, *British birds' eggs*. On his arrival, he was appointed pastor of the newly established Congregational Church at Onehunga. In 1874 he became Congregational minister at Thames. In both pastorates he was well placed to pursue his hobby of natural history, both in the bush and along the shore. Laishley became known to Buller, who refers (1873) to Laishley's having a collection in which there was a Cook's Petrel.

The Laishley folder contains paintings of about 48 species of native birds; and among them are several items of unusual interest. Some of Laishley's birds are painted in a circular setting (diameter c. 12 cm). Plate 39 has two such rounded paintings set side by side. One is of a Banded Dotterel *(Charadrius bicinctus)*; the other is of a very small wader with a fine bill, black legs and the obvious proportions of a typical stint. Underneath is written "Charadrius minutus, Least Dotterel. From the Manukau N.I. 1866."

I had no hesitation in identifying this small wader as a stint in a phase of plumage which is commonly seen in New Zealand (Sibson 1968). The painting would seem to provide the first evidence of what is now called *Calidris ruficollis* in this country.

LITERATURE CITED

BULLER, Sir WALTER L. 1873. History of the birds of New Zealand.
BULLER, Sir WALTER L. 1905. Supplement 1.
STEAD, E. F. 1923. Notes on the migratory plovers of New Zealand. *Trans. NZ Inst.* 54: 490-495.
SIBSON, R. B. 1968. Red-necked Stints in northern New Zealand. Notornis 15: 241-243.

R. B. SIBSON, *26 Entrican Avenue, Remuera, Auckland 5.*

THE BIRDS OF ANTIPODES ISLAND, NEW ZEALAND

By JOHN WARHAM and BRIAN D. BELL*

ABSTRACT

Past information on the birds of Antipodes Island is reviewed and an account given of the findings of the first scientific party to live ashore, from 28 January 1969 to 12 March 1969. The bird list of 37 species includes 16 for which breeding is proven (11 seabirds and 5 landbirds); eight seabirds that almost certainly breed but whose eggs or chicks have yet to be seen; four seabirds and two landbirds that possibly breed and two seabirds and two landbirds that appear to be stragglers. Three seabirds known only from nearby seas complete the tally.

Dimensions are given of birds handled or collected. Most were petrels and included a sample of Soft-plumaged Petrels, previously unrecorded in New Zealand, the skins of which were compared with those of other populations and judged to belong to the nominate race. Skins of the Little Shearwaters, collected for the first time at Antipodes Island, agreed with examples of the subspecies *elegans* from the South Atlantic.

A census was attempted of the Wandering Albatross population, and the penguin and Northern Giant Petrel colonies were mapped.

The seabird fauna is compared with the seabird faunas of our other southern islands.

INTRODUCTION

Antipodes Island at 49°41'S 178°48'E is one of the few islands in the west-wind zone south of New Zealand that remain virtually unmodified by man. Alien species include a few self-introduced passerine birds, the house mouse *Mus musculus,* which is abundant, and a few plants like *Stellaria media* and *Poa annua,* which are rare. The mice and the plants were presumably introduced accidentally in stores and fodder carried ashore by sealers and other early visitors. None of these alien species appears to be having any significant impact on the native plants and animals which are of particular interest as components of ecosystems that have largely disappeared elsewhere. In recognition of this, the island has been a " reserve for the preservation of fauna and flora " the highest level of protection afforded under the New Zealand reserves system. Now it is a Nature Reserve under the Reserves Act 1978.

* University of Canterbury Antipodes Island Expedition, Paper No. 8.

Antipodes Island lies 730 km SE by E of the southern end of the South Island and some 220 km south of the Bounty Islands (Fig. 1 insert). It consists of the Main Island, about 2025 ha and some 6.8 x 5.1 km in extent; two smaller Bollons and Archway Islands (c. 65 ha), and a number of offshore stacks and islets (Fig. 1). All appear to be of volcanic origin. There are many eroded craters around the indented and cliffed coastline where lava flows and breccias are exposed. The coastal cliffs are pitted with small to large caves and there are some small caves inland.

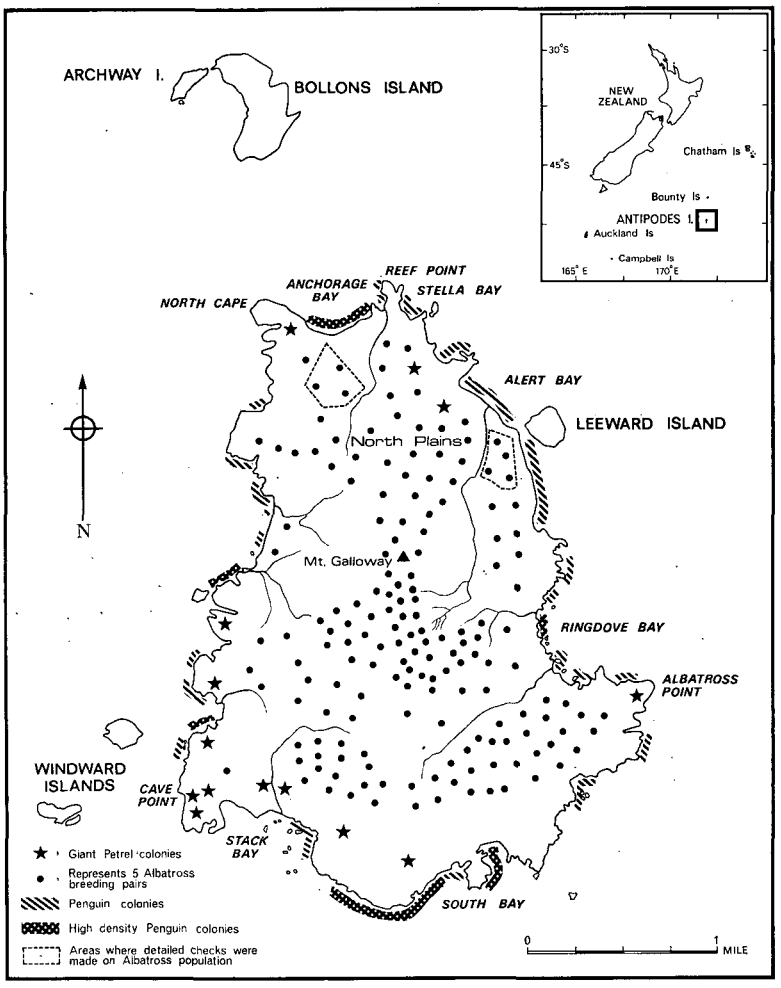


FIGURE 1 — The Antipodes Islands.

From the sea the island looks like a finely tufted carpet due to its covering of tussock grassland dominated by *Poa litorosa.* However, in many places at lower elevations, the tussock and ferns — particularly the shield fern *Polystichum vestitum* — grow exuberantly, rising above head height, so as to make one's passage both tiring and time-consuming. Furthermore, tussock and fern rise from big stools or " nigger-heads " whose crowns of live and dead leaves are often interwoven intimately from plant to plant. Between the pillars the ground is bared, forming a maze of narrow passages used as runways by petrels and by parrots. The activities in this super-terranean zone are almost impossible to observe, the pillars being so crowded together that birds may be heard but not seen.

The ground rises inland to form an undulating plateau at about 200 m where the vegetation is lower and less dense and walking is much easier, particularly along the many slight ridges. Grasses still predominate but there is much *Blechnum* fern, damp depressions filled with a sedge *Carex ternaria,* while the lines of watercourses are generally marked by dark green bands of *Polystichum* fern. Shallow gullies are often choked with dense wind-cropped *Coprosma antipoda* whose stout interlaced trunks and tough branches form an impenetrable barrier to progress: such gullies have to be outflanked.

The highest hills reach about 400 m. Their conical sides are scarred with natural slips where the peaty soil has slid from the underlying rock. Older slips bear almost pure stands of club mosses *(Lycopodium fastigiatum* and *L. varium)* and *Stereocaulon* lichen. The latter grows some 200 mm high and from a distance looks like snow. The climate is windy and wet with much local mist and winds predominantly from the west. What sparse meteorological data are available are given by Warham & Johns (1975).

Apart from the Bounty Islands, less is known of the birds of Antipodes Island than of any other of New Zealand's islands in the Southern Ocean. From 1886 to 1950 most visits of scientists were restricted to a few hours on shore while the crews of government steamers inspected a hut shelter and replenished supplies of food and clothing for the succour of castaways. Birds were captured alive and dead by the captains and passengers of these vessels and some of these specimens remain in various collections. Among the names on specimen labels from this period are A. Reischek, Dannefaerd and W. H. Travers.

In 1901 the Governor-General of New Zealand, the Earl of Ranfurly, visited the island in SS *Hinemoa* and collected or arranged the collection of birds at Antipodes and the other southern islands on behalf of the British Museum of Natural History (BMNH). These were described by Ogilvie-Grant (1905). Following this there were only sporadic landings by ornithologists until 1926 when the Whitney South Sea Expedition of the American Museum of Natural History

(AMNH) collected both off and on-shore between 16 and 23 February. Most of the specimens taken by Rollo H. Beck and his assistants J. C. Correia and Hicks are in the AMNH but a few are in collections in New Zealand and elsewhere. Some information on this material was published by R. C. Murphy, e.g. in his *Oceanic Birds of South America* (1936). One of us (JW) was kindly given access to Beck and Correia's logs in the AMNH and relevant observations on their activities at and around Antipodes Island have been incorporated into the present account.

Between 4 and 10 November 1950, R. A. Falla led an expedition to the island and some 89 bird specimens taken from the boat and from on land are in the National Museum of New Zealand (NMNZ), Wellington. Information gathered during that visit was included in books by Oliver (1955) and Falla *et al.* (1966). We have also drawn on the bird notes made by E. G. Turbott, which have been kindly made available to us.

The University of Canterbury Expedition, led by J.W., established its base at Reef Point on the Main Island on 28 January 1969 and worked there until 12 March 1969. A general account of this expedition has appeared (Warham & Johns 1975). This included a history of the islands, a bibliography, and descriptions of the climate, physiography and geology as well as outlines of the research programmes undertaken. An account of the flora is in preparation (E. J. Godley MS.).

Our work on birds included a general survey of the species present, together with detailed studies of the ecology of the penguins, petrels and parrots. Some of this has already appeared, e.g. that on the penguins *Eudyptes chrysocome* and *E. sclateri* (Warham 1972a; 1972b; 1975) as has some on the parrots (Taylor 1975 and *in* Forshaw 1973). Data on petrel body temperatures and wing loadings have also been published (Warham 1971; 1977). Ornithological collecting was not planned to be a major activity but 65 birds were taken and are in the NMNZ as skins or spirit specimens. We made no attempt to excavate (and hence destroy) petrel burrows, but some were accidentally broken into during excavations for our hut and tents. Most nocturnal petrels were caught after being lured to the ground with the aid of a torch or a 100-watt spotlight powered by a battery or portable electric generator. Spotlighting was carried out at four widely separated places.

In the following accounts means are given, ± one standard deviation for sample sizes of five or more. Weights, obtained with the use of spring balances, are accurate to ± 1%. Standard measurements follow the methods of Witherby *et al.* (1941). In referring to the remiges we have regarded that at the leading edge as the outermost or first functional primary, ignoring that on the thumb. Data for wing lengths either omit or mention any birds in moult with outer primaries still growing.

Names follow Kinsky (1970), but the nomenclature of the crested penguins, genus *Eudyptes,* is brought into line with recent findings and with the International Commission of Zoological Nomenclature's Opinion 1056 suppressing the use of *atratus.* Also the giant petrels, *Macronectes giganteus* and *M. halli* are treated as full species, in agreement with confirmatory work done since their separation by Bourne & Warham (1966).

SPECIES LIST

KING PENGUIN *Aptenodytes patagonicus*

A single bird was standing close to the shoreline at Anchorage Bay on 4 February. Although the pink area along the proximal half of the lower mandible was well developed, the almost white auricular patches and the poor development of the yellow suffusion below the throat showed that this was a sub-adult bird: it may have been a two- or three-year old, judging by Stonehouse's (1960) data. The bird was fat and its dorsal plumage faded to a brownish-grey. It stood higher up the slope for its moult which had started by 13 February. All the old feathers had been lost by 28 February and the bird was last seen on 6 March. This species is a fairly frequent straggler to the southern islands and has been recorded twice before at Antipodes Island — in February 1907 (Plunket 1912) and on 1 April 1923 (Archey 1923). The nearest breeding place is Macquarie Island. Lord Plunket's specimen went to the National Museum of Ireland.

ROCKHOPPER PENGUIN *Eudyptes crestatus (= chrysocome)*

An abundant breeding species. The annual cycle at Antipodes Island has not been described. The birds are believed to arrive about 7 October, a month later than the larger *E. sclateri,* to lay about 1 November and to hatch their eggs about 4 December after 33-34 days' incubation (Warham 1963; 1972a). E. G. Turbott *(in litt.)* noted that on 4-10 November 1950 these penguins were still in pairs on eggs, the larger clean and hence recently laid, so that incubation proper had only just begun.

When we arrived on 28 January the Rockhopper chicks were well advanced in growth and were feathering. Some had left for the sea by 9 February and most had gone by 20 February and by then the number of adults ashore had also dwindled. By about 15 February the yearlings had also moulted and gone, and on 12 March the whole Rockhopper population appeared to be at sea. At Macquarie Island these birds are absent for 28-35 days before returning to moult (Warham 1963) and so the breeding adults' return to Antipodes Island should occur around 5-10 April. That this is approximately correct is suggested by Oliver (1955: 69) who reported that on 4 April 1927 " the young were in their first plumage and the adults, many moulting, were standing about in thousands on the breeding ground." Oliver appears to have confused freshly moulted adults (thin, clean, light-weight and appearing

much smaller than those in " pre-moult fat " condition) for young in their first plumage. The young birds must have left nearly two months before.

We found difficulty in gauging the approximate numbers of breeding birds on the various colonies, as adults still feeding chicks spend most of the day at sea and birds in adult plumage ashore by day are probably non-breeders. However, during our stay Rockhoppers were considerably outnumbered by Erect-crested Penguins, although in November 1950 Falla (1953) thought the reverse was true. The Rockhopper colonies were scattered around the island in every suitable place, there being none only where the coast was sheer cliff (see Fig. 1).

All the colonies examined or observed from a distance contained both penguin species. Nevertheless, the Rockhoppers tended to be inland of and above the Erect-cresteds and in rougher terrain, as noted by Guthrie-Smith (1936). It appeared that the Rockhoppers chose places with overhead cover and some could be found under and around a rocky prominence in the middle of even the densest Erect-crested colony. Rockhoppers also occupied small caves and some nested among tussock grass, their sites generally being dirtier than those of the Erect-cresteds.

The work done on the Rockhopper Penguin dealt mainly with sexual dimorphism (Warham 1972a) and with vocalisations (Warham 1975). In general, the birds' displays and behaviour closely followed those described for the Macquarie Island populations (Warham 1963). We collected no specimens, but a few skins of adults, including a breeding pair, taken by R. A. Falla in 1950 are in the NMNZ and in the Auckland Museum, as are a few taken by Beck on 22 February 1926. The AMNH has most of Beck's material, some of which, labelled as adult but in full moult, are unlikely to have been breeding birds. Murphy (1936: 418) gave dimensions for four males and three females from the island. Data on larger samples of live adults, yearlings and chicks are given in Warham (1972a). The same collections also contain a few Rockhopper eggs from Antipodes Island, but we have seen no complete and authenticated clutches and know of no data on the size of the first (small) and second (large) egg laid by Rockhoppers at this breeding station.

SNARES CRESTED PENGUIN *Eudyptes robustus*

Although expected as a straggler, despite regular searches neither this nor the Fiordland Crested Penguin *(E. pachyrhynchus)* was seen. A specimen of *robustus* collected on 1 April 1923 by Gilbert Archey is preserved as a mounted skin (AV 3263) in the Canterbury Museum. It is labelled as male but is rather small-billed for an adult of breeding age (beak shape index 1588) and is probably a pre-breeder. A single bird was photographed by J. Ollerenshaw of the 1950 party; this too appears to have been a male.

ERECT-CRESTED PENGUIN *Eudyptes sclateri*

Antipodes and the Bounty Islands are the main breeding places for this distinctive crested penguin. Its annual cycle is believed to start with arrival about 10 September followed by the laying of the two eggs about 12 October (Warham 1972b). When we arrived, many chicks were still ashore but some were completely feathered and some seemed to have left. The mean departure date for the chicks was estimated as about 30 January. When we left on 12 March the colonies were almost full of birds standing in pairs at nest sites. These were almost certainly part of the breeding population, and many had begun their annual moult.

Many colonies (see Fig. 1) were just above high water on the boulder beaches backed by steep cliffs or by tussock-clad slopes. In some places, e.g. at Anchorage Bay and opposite Orde Lees Islet, the penguins had spread upwards on sloping ground to nest on any slight ledges that offered reasonably safe situations. In such areas the nesting sites extended to about 75 m a.s.l. Along the south coast there were extensive, almost level rocky flats on which were large colonies (see Fig. 8 in Warham & Johns 1975). Colonies on the Bollons and Archway Islands were visible through binoculars or telescope from North Cape.

Studies dealt mainly with sexual dimorphism, breeding behaviour and display activity (Warham 1972b) and with vocalisations (Warham 1975). We collected no specimens. A few skins brought back by R. A. Falla in 1950 are in the NMNZ and Auckland Museum collections, and others are in various New Zealand institutions. Those in the AMNH include eight skins collected by Beck or Correia on 17 and 22 February 1926. Eggs in these various collections are all single examples. The only data on the sizes of the small (first) and the large eggs typically laid by this and other eudyptids are for five clutches of infertile eggs laid by the same female nesting on the New Zealand mainland and measured by Richdale (1950).

ROYAL ALBATROSS *Diomedea epomophora*

A specimen in the NMNZ, collected by A. Reischek, is labelled "Antipodes Island." This is almost certainly an error in labelling, as we know of no evidence that this albatross has ever bred on the island. The surrounding seas are within its range, however, for we saw a bird of the northern race *sanfordi* at sea near the island on 6 January.

WANDERING ALBATROSS *Diomedea exulans*

Abundant at Antipodes Island. The birds breed in much darker plumage than do other populations of Wanderers, except for the very small number at Campbell Island where the common large albatross is *D. epomophora*. The Antipodes birds are also smaller than those from most other populations. A detailed description of the plumage

of New Zealand Wandering Albatrosses and a comparison with some other populations will be published (Warham & Robertson in prep.).

According to Oliver (1955: 181), the birds were found at Antipodes Island in 1886 and photographs in his book, in the paper by Waite (1909) and in Guthrie-Smith (1936), show some of the salient plumage characters of the breeding birds.

We sexed none by dissection, but with pairs at nests with eggs one bird was always markedly paler than the other, and in the small samples measured the lighter-coloured bird was always the larger (see below) and, when copulation was seen, uppermost.

Pairs at nests without eggs in late February or March were probably younger birds that had not reached full breeding status as they were generally darker than incubating birds. Even in these one member was paler than the other, although there was a great deal of variation. Only a small sample of birds was measured as it was difficult to take them from nests without risking damage to the egg by the albatross itself or by marauding skuas. Six females and eight males were measured on 19 and 23 February (Table 1). The sample comprised three pairs with eggs, three pairs at nests without eggs, and two males from pairs without eggs or nests. The albatrosses were sexed without difficulty by the lighter plumage of the males. All had bare brood patches and those without eggs may still have laid that season. Probability values are from Mann-Whitney U-tests.

It will be seen that the male Antipodes Wanderers were larger and heavier than their partners. They segregated completely according to sex when bill lengths were plotted against bill depths.

Adult Wanderers at Antipodes Island sometimes had the white feathers near the ear coverts and at the side of the neck stained with pink, a phenomenon still unexplained although known for at least 119 years (Bennett 1860). This stain is not, as was believed by Hutton (1865), always seen on both sides of the neck, nor restricted to the period of June to August. Some of the birds we saw had been feeding chicks and the positions of the stains and the disarray of the stained feathers suggested that they had been soiled during allopreening when

TABLE 1 — Measurements of Live Wandering Albatrosses at Antipodes Island

No. & sex	Wt. (kg)	Wing (mm)	Tail (mm)	Bill (mm)		Tarsus (mm)	Mid-toe & claw (mm)
				Length	Depth at nail		
♂♂	7.35 ± 0.75	655 ± 17.0	203 ± 2.85	148.1 ± 2.32	41.4 ± 1.53	116.6 ± 3.24	176.6 ± 2.34
♀♀	5.67 ± 0.94	625 ± 5.0	199 ± 6.11	138.0 ± 4.55	37.0 ± 1.74	108.7 ± 2.87	167.0 ± 7.00
P	<0.01	<0.02	n.s.	0.005	0.002	<0.01	0.05

FIGURE 2 — A pair of Wanderers: many birds breed in similar plumage. The male is on the left. Photo: John Warham

the albatrosses fondle each other's heads and necks. The stains may have been due to carotenoids from food and/or stomach oil. According to Bennett the colour fades entirely after death, but feathers we removed still show pink stain eight years later.

Most of the adult Wanderers and their chicks had pale blue eyelids, but in some parents feeding young the eyelids were pink, evidently through flushing with blood. Except for pale yellow nails, the bill of some adults feeding chicks was bright pink and this again appeared to be due to the engorgement of blood vessels below the rhamphotheca, for finger pressure on the latericorns left pale yellow areas as though fluid had been forced away. Bennett (1860: 73) noted that Wanderers freshly hauled on to the ship's deck, had bills of a beautiful pink colour, except at the tips, which were yellowish white. The intensity of the pink hue of the bill subsided when the bird was reposing on the deck, and in the dead bird the beak became pallid. Such changes partly account for the different descriptions of beak and eyelid colour given by various observers, e.g. by Chapman (1891). Flushing may be related to heat shedding during or following strenuous exercise.

Throughout our stay groups of presumed non-breeders, the so-called " gams," were seen. Such groups, typically of three or four birds, sometimes more, tended to form in the afternoon and became very numerous over the higher ground by evening. Occasional gams were seen as early as 0745 hours. The gams appeared to comprise several males and fewer females, which performed many of the displays described by Matthews (1929) and others. We also saw occasionally an aerial display (Warham 1976) in which the wings were stiffened and downturned while the head was swung from side to side. This display appeared to be homologous to a similar action used by *D. epomophora* and *Macronectes* spp. (Warham 1962; 1976).

The activities of the albatrosses had a perceivable effect on the vegetation. Near their nests the ground cover was depressed by trampling and there were often well marked trails about 30 cm wide through the vegetation in areas where nests were plentiful. These trails ran up to and along the crests of the many short ridges which were probably used as departure points during calms.

Breeding and Density

Wandering Albatross nests were scattered over almost the whole of the island from the top of Mt Galloway (404 m), across the tussock-clothed rolling moors and down to about 100 m a.s.l. None was nesting on the flat top of Leeward Island (80 m a.s.l.) nor did we see any Wanderer activity on Bollons Island. Blank areas on the map (Fig. 1) indicate what we believe is habitat unsuitable for nesting, including steep coastal places, areas of heavy fern and tussock, and *Coprosma*-choked gullies. The sites chosen seemed to be where fairly open patches in the vegetation led to ridges or hillocks suitable for take-off.

Similar areas at lower heights, which were often more sheltered, were avoided.

R. J. Stanley gathered some information on the distribution of the albatrosses and their nests, old and new, on the North Plains. He marked out 20 quadrats of area 10 000 ft^2 (929 m^2) and counted and classified the birds and nests within each quadrat. The quadrats were not selected at random over the whole area. Dense *Polystichum* and *Coprosma* were avoided, and the quadrats were chosen to represent the rather varied habitats being used by the albatrosses. These habitats ranged from fairly level and open areas with light grass and fern to others on steeper ground with patches of *Polystichum* and heavy tussock. In general, the more open and lightly vegetated the ground, the greater the density of nests. Those that had been vacated recently could be identified by the absence of invading plants, the presence of trodden-down eggshells and/or down and " frass " from feather follicles. Old nests with old skeletons were mostly those where the chicks had died before fledging. The results of these counts are summarised in Table 2.

TABLE 2 — WANDERING ALBATROSS NESTS ON NORTH PLAINS, ANTIPODES ISLAND — 7 FEBRUARY TO 1 MARCH 1969

Category	Total for 20 quadrats	Range per quadrat	No/ 10 000 m^2
Birds on nests without egg	18	0 - 2	9.7
Birds on nests with egg	17	0 - 2	9.1
Chicks on nests	3	0 - 1	1.6
Old nests	175	4 - 16	94.2
Recently vacated nests	11	0 - 1	5.9
Old nests with skeletons	6	0 - 3	3.2

These figures suggest that in February 1969 there were on average about 26 recent nests and 97 old nests per 10 000 m^2 on the North Plains. The adults seldom, if ever, re-use their nests, and so 97 old nests can be regarded as the accumulation of about 3.7 (97/26) years' breeding. A complicating factor is the habit of some chicks to build their own, sometimes quite substantial nest away from the parental one in the months before they fly (Warham, unpubl.).

In late January and early February 1969, some chicks were still in down but most were well feathered and some probably flew by the end of January. At the same time the eggs of the new season's breeders were being laid, and so by 6 February many Wanderers were incubating. A sample of 14 eggs had mean dimensions 125.1 $\pm$ 5.12 x 78.1 $\pm$ 2.63 mm.

Precise data on the spread of laying were not obtained, but the timing of laying seems to have been similar to that at Campbell Island, judging by the figures in Bailey & Sorensen (1962). Yet the Auckland Island Wanderers seem to lay earlier on average, for Bailey & Sorensen quote C. A. Fleming's field notes recording 21 nests with eggs, some

incubated for up to a week, on 22 January 1943 at Adams Island. Likewise Chapman (1891) found eggs common at Adams Island on 12 January 1890 when 400 were collected, whereas at Antipodes Island a few days later (17 January), despite an abundance of birds, only 20 eggs were seen.

Tickell (1968) tabulated known laying dates for Wanderers at various islands and pointed out that the evidence suggested that the northern populations (at Antipodes, Campbell and Gough Islands) lay later than the southern ones (at South Georgia, Marion and Macquarie Islands). However, the position is complicated by the Auckland Island birds which, although nesting further north, lay earlier than those at Campbell Island.

Some fully feathered down-free chicks were still present when we left. In 1969 it was not unusual to find chicks dying on their nests towards the end of the season, often while in full feather. Two such birds weighed only 2.9 and 3.0 kg. Skeletons of chicks were also fairly frequently seen in deserted nests, suggesting that normally many young well-developed birds die. The skeleton was found of an adult which had evidently swallowed a piece of a weather balloon measuring 20 x 60 mm that had blocked the gullet.

Population Size

Even from offshore the number of birds seen leaving and flying to the island showed that the population of this albatross was a large one. North-westerly winds produced a channelling effect among the birds flying past Reef Point and a constant stream passed over the Expedition Base to and from the North Plains. Up to 40 birds could be seen in the air at one time and movement did not end at nightfall as our spotlight often picked out Wanderers sailing through the sky.

In an attempt to estimate the number of birds, the island was divided into blocks which could be readily identified by topographical features. The albatrosses were counted from a vantage point which gave a good view of the whole block. At times, however, counts had to be made from considerable distances.

Each nest with an attendant adult was taken to represent a pair of Wanderers, whether the nest had one (sitting or standing), a pair, or even three adults. Gams were excluded, as were nests containing chicks, which belonged to the previous summer's layings. Whenever possible, counts were made before 1500 hours as the number of unemployed birds built up steeply from then until dark. Furthermore, the total number of albatrosses ashore increased during our stay, presumably due to an increase in non-breeders towards the end of egg-laying. Hence counts made earlier in our visit probably contained a higher proportion of actual breeders than counts made later.

As a check on accuracy, two areas (outlined by dotted lines in Fig. 1) were examined closely, counts made from vantage points being

followed by ground searches to find every bird and occupied nest. These checks showed that counts from vantage points revealed only two-thirds of the birds actually present. The rest were hidden by tussock and fern. Only one-third of those found during the ground searches represented breeding pairs with well-built nests or egg; therefore only half of the visual count represented breeding pairs. The checks were made towards the end of our stay when total numbers were higher and a greater proportion of sub-adults was believed to be ashore.

The total count from visual checks was 1867 pairs which, using the above criterion, would represent about 930 nesting pairs. As the proportion of breeders could have been higher in the early counts, it is possible that as many as 1000 pairs may breed in any one year. On the other hand, we had no means of knowing how many had lost their egg or chick during the 1968 guard stage and were nesting again in 1969. Allowing for these unknowns, our best estimate for the total breeding population is between 1500 and 1800 pairs, of which only half will breed each year.

From the visual counts, we estimated that some 1800 non-breeders were present, a figure that could be low as gams were excluded. Also some birds could have been at sea when the counts were made — hence the increase in the late afternoon. The 1800 non-breeders were probably mainly 5-8 year olds ashore annually before breeding, as the biennial rhythm does not start until a bird has nested successfully. The total population of these non-breeders may be conservatively placed at between 2000 and 2500 birds.

Allowance must also be made for juveniles up to four or five years old not yet coming on land. Judging from the situation with the Royal Albatross, the number of juveniles is probably similar to that of the non-breeders, i.e. between 2000 and 2500 birds. Using these assumptions, the non-breeding and juvenile segments of the population are at least as high as, if not higher than the breeding segment. Perhaps the Antipodes Island birds, like several other subantarctic Wandering Albatross populations, are still recovering from exploitation during the sealing era.

Our estimate of the total Wandering Albatross population of these islands is thus between 7000 and 8500 birds (i.e. 1500-1800 pairs, 2000-2500 non-breeders and 2000-2500 juveniles).

Banding

During the Expedition 793 Wandering Albatrosses were banded, of which 37 were chicks, 150 adults with eggs and the remainder adults without eggs; some of the last could have laid later. We saw none of the 20 chicks banded above Ringdove Bay by the 1950 party (E. G. Turbott, *in litt.*). The one already-banded bird that we did find (0-1174) had been banded by E. W. Dawson on 29 January 1965, when he landed in the course of an oceanographic cruise.

Three birds banded by us have since been recovered. R-18908, thought to be " unemployed " when banded on 23 February 1969 (not a chick as stated in Robertson 1972a), was recovered alive off Malabar Head, New South Wales on 9 August 1969, while chick R-18931, banded on the same date, was also recovered alive off Malabar on 25 September 1971 (Robertson 1973). These records show that the assemblages of Wanderers off south-eastern Australia include birds from the Antipodes Island population. Another example, R-18693, banded on 1 February, was found dead at Taiaro Island, Tuamoto Archipelago, in late December 1971. This recovery has also been published (Robertson 1972b), but the bird was not banded on a nest; it was " unemployed " at the time.

BLACK-BROWED MOLLYMAWK *Diomedea melanophrys*

Although Captain Bollons long ago stated that no mollymawks bred at Antipodes Island (Hutton *in* Ogilvie-Grant 1905), we had hoped that we might find this bird nesting on the previously unexplored western cliffs. We found none despite the many apparently suitable sites. Large numbers of Black-brows followed in our wake as we left Campbell Island on 26 January heading north, but none remained as we neared Antipodes Island the next day.

E. G. Turbott *(in litt.)* refers to a small colony of this species mixed with Grey-headed Mollymawks that he saw from a boat on 11 November 1950. The birds were on the south-west side of Bollons Island, mostly singletons on cliff ledges, but a group of about ten was on the top of the island. R. A. Falla (pers. comm.) recalls a total of about 30 birds with at least two identifiable Grey-headed Mollymawks, sitting around on a spur, separate from the Black-brows. Bearing in mind Bollons's comments, it would seem that this small colony has become established fairly recently.

We had no boat but saw a few apparent Black-brows flying round the south-east of Bollons Island on 3 February. From Reef Point with a 36 x telescope on 1 March we also saw a bird, probably of this species, standing on the south-east slopes of Bollons Island not far from what appeared to be about six mollymawk chicks.

Kinsky (1970) followed Fleming (1953) in listing this albatross as breeding at Antipodes Island. Both ascribed the birds to the subspecies *impavida,* well known as nesting at Campbell Island and having a very distinctive honey-coloured eye (see Fig. 132 in Serventy *et al.* 1971). However, we know of no specimens taken at Antipodes Island: the only positive evidence for this subspecies seems to be the sighting in November 1950 of a few *impavida* flying just offshore (R. A. Falla, pers. comm.).

GREY-HEADED MOLLYMAWK *Diomedea chrysostoma*

Not seen by us at or near the island and the only references that associate this bird with the Antipodes that we know of are the

comments of Turbott and Falla mentioned above. Falla (1965) queried this species in his list of seabirds breeding south of New Zealand.

SALVIN'S MOLLYMAWK *Diomedea cauta salvini*

Two Shy Mollymawks, thought to be of this subspecies, were seen with giant petrels off the south-coast penguin colonies.

LIGHT-MANTLED SOOTY ALBATROSS *Phoebetria palpebrata*

A plentiful species but much less so than the Wandering Albatross. Chicks were being reared in nests on cliff ledges, some being as low as 20 m a.s.l. Adults were also seen sailing along the slopes of Bollons Island where chicks thought to be of this species were seen by telescope.

Light-mantled Sooty Albatrosses seemed particularly numerous around Ringdove and Stack Bays and near the creek opposite Orde Lees Islet where there appeared to be a wealth of good nesting sites among the encircling ramparts of cliff which protrude just below the general level of the plateau. Of four males collected by R. H. Beck on 16 and 17 February 1926, at least two were nesting and the others had enlarged testes.

NORTHERN GIANT PETREL *Macronectes halli*

Most previous visitors have recorded giant petrels, but the existence of two species of *Macronectes* was not then established. Most of those we saw were *halli* but it is most probable that examples of *M. giganteus* occur offshore from time to time as they do near other southern islands of New Zealand, and we saw one white-headed *giganteus* on 11 February.

The birds seen on the colonies by us, and the six specimens collected by Beck and Hicks all appear to be typical *halli*. The only bird that we collected (NMNZ 15941), a female from an empty nest on 25 February, was similar to other birds seen at nests. The bill was olive-green overall, lighter at the base and with the upper and lower nails dull reddish brown without prominent dark markings. The feet were grey, the claws darker; irides grey slightly flecked with blackish. The brood patch was completely feathered. The body plumage was generally grey-brown, the feathers of the crown slightly darker, but those of the cheeks, throat and around the base of the bill were more freckled due to the feathers having creamy-white centres but dark edges and tips. The chin and throat were the palest regions of the body. The contour feathers and wing coverts were a mixture of old (brown) and new (grey) feathers, while those of the belly were grey with paler edges, creating a somewhat scaled effect. The ovary measured 21 x 14 mm, largest oocyte 3 mm diameter. Although the colours of the bill plates altered after death, the measurements of the specimen after nine years' preservation had not significantly altered, except for a slight shrinkage of the wing.

Another bird examined in the hand on 12 February was in almost completely fresh plumage, being mostly shiny dark grey with only a few brownish feathers on the body and on crown, nape and jugulum. This bird's tail was a mixture of old and new feathers and there was a down-covered brood patch. The bill was greenish horn tinged brown, with the upper nail flushed reddish brown above and with a dark mark on the inner aspect. One eye was entirely grey, the other grey flecked with black. Such asymmetry of iris colour is common with *M. halli* (Warham 1962), although not referred to by Conroy *et al.* (1975) in their discussion of eye colours in *Macronectes.* According to the labels, the irides of the birds collected in 1926 were " whitish."

A third example examined on 1 February had similar bill colours to the first, but many of its body feathers were faded, creating a piebald effect. The bird's crown was an intimate mixture of grey, rusty brown and pale grey feathers. There was no brood patch and the bird was of very light weight, almost indifferent to us, and may have been dying.

All three birds were in various stages of wing and tail moult. The first had almost completed the regrowth of wings and tail; in the second, all the primaries were regrowing except the outermost (longest), which was still sheathed, while the tail was a mixture of old and new feathers. In the third bird, the four outermost primaries were old and abraded, the inner ones in various stages of regrowth and the tail contained a mixture of old and new feathers.

Some dimensions of these birds taken in life were: weight 3500, 4950 & 2300 g; wing length 448, 445 & 491 mm; tail length 168, — & 170 mm; bill length 87, 102 & 96 mm; bill width at gape 33, 34 & 31.5 mm; tarsus 84, 95 & 87 mm; middle toe with claw 140, 154 & 139 mm. From the sizes of their bills the last two specimens appear to have been males. The wing lengths of all three are short because of moult.

Macronectes halli is a common visitor to the main islands of New Zealand and typical adults with pale eyes and dark grey plumage, like that of the second specimen above, occur in harbours and in Cook Strait. Some of these come from Antipodes Island for we caught on a breeding colony a bird banded in Tory Channel, Cook Strait, on 23 July 1958, $10\frac{1}{2}$ years before (Robertson 1972a).

When we arrived, the breeding of this petrel was virtually completed and only a few fully feathered chicks in their blackish brown plumage remained on or near the nests. Their bills were olive-brown with a brownish tinge to the nails. They were timid and most fled when we approached them. Adult birds were still encountered on empty nests from time to time and so this species, like *M. giganteus* (Warham 1962), evidently visits its nests after breeding.

The breeding season of *M. halli* at Antipodes Island seems to be similar to that at Macquarie Island where many chicks left in early February (Warham 1962). If so, laying would occur in the last

week of August and the first week of September, and this agrees with Captain Bollons (*in* Ogilvie-Grant 1905) who stated that they began to breed early in September. The BMNH egg from the island dated 1 November 1890 referred to by Bourne & Warham (1966) may have been abandoned and have escaped skua predation among heavy tussock or nesting material. None of the chicks we saw could have come from October or November eggs.

We found Northern Giant Petrels' nests in small open colonies or groups of about 20 nests. Most of these groups were above penguin colonies where the ground sloped steeply seawards, affording convenient departure points (see Fig. 1). Most nests were well made from tussock grass and placed some 3-5 m apart. At North Cape and elsewhere they tended to be sited among quite deep vegetation, and so incubating birds must often have been hidden from one another.

Cockayne (1904) noted that the ground around the giant petrel colonies was bared, heavily manured, and supported a plant community dominated by *Senecio antipoda,* which he thought was restricted to this habitat. However, in 1969 this plant was also found in open places and less disturbed situations elsewhere (E. J. Godley, pers. comm.).

We banded 29 chicks and 50 adults and think that the breeding population would be about 320 pairs.

As obtains elsewhere, parties of Northern Giant Petrels waited close inshore by the penguin colonies, evidently to take young penguins as they fledged. None was actually seen to do that but the female collected had her gizzard and proventriculus crammed with penguin feathers. Up to 40 of these petrels, seemingly all *halli,* hung around off the large Anchorage Bay and Orde Lees colonies, parties of up to 20 were seen off Alert and South Bays, but none was noted off Stella Bay, perhaps because the penguin colonies there were rather small. Here and elsewhere, the petrels rested among the *Durvillea* kelp and on rock platforms at low water and fed on dead penguins near the shoreline.

Birds on the water were seen to use the mutual billing display usually associated with courtship and the threat display involving cocked tails and waved heads of birds contesting the ownership of a food source (Warham 1962). The aerial display first described from Macquarie Island where it was rarely seen was at Antipodes Island seen and heard quite frequently, even though the giant petrel population there must be much smaller than that of the two species at Macquarie, where *halli* is much less common than *giganteus.* Both have a similar aerial display (Warham 1976).

CAPE PIGEON *Daption capense*

Seen at sea all round the Main Island, at times in quite large groups, the largest a flock of about 40 feeding in rough seas off Reef Point on 6 February. We identified no birds on eggs or with

chicks, and know of no egg or chick taken at this island, but Cape Pigeons were seen flying into cliff fissures at several places around the coast, e.g. in gullies just south of North Cape, and we also saw a few birds sitting in coigns of the much eroded western flank of Leeward Island. White streaks radiating from some of these places suggested the presence of nests. Turbott *(in litt.)* also noted that the 1950 party saw these petrels landing on Leeward Island and on the north side of Albatross Point on 5 November and on Bollons Island on 10 November.

Beck and his colleagues collected some birds on 22 February 1926 at the island itself and a series on the same day about 65 km to the south. The birds from Antipodes are listed under subspecies *australis (=australe)* in New Zealand checklists, a race created by Mathews (1913) on account of its darker dorsal coloration.

WHITE-HEADED PETREL *Pterodroma lessoni*

One of the commonest petrels. Nests with chicks or eggs were seen mostly near Reef Point, but the birds appeared to be widely distributed over the island as evidenced by their calling after dark and by the plentiful skeletal remains of presumably skua-killed birds. Many wing girdles still had flesh attached, and R. H. Taylor heard and saw these petrels being attacked by skuas on the ground at night.

Despite their abundance, no White-headed Petrels were seen at sea from the island by day, but there is a long series in the AMNH collected by the Whitney South Sea Expedition on 16 February 1926 about 65 km north of the island. Likewise, at Macquarie Island, where it is common also, the bird is not seen from land by day (Warham 1967).

The breeding cycle at these two stations seems to be similar. Eggs inadvertently excavated when clearing for the camp site on 28 to 30 January contained very advanced embryos or were hatching. One egg measured 69.4 x 48.9 mm. Beck's chicks taken on 23 February 1926 were in down. At Macquarie Island, *lessoni* re-appears in late August, lays in late November and early December, hatches its egg in late January and early February and its chicks fly in May (Warham 1967).

The characteristic chattering *ti-ti-ti was* usually one of the most prominent calls after dark. The gruff, slurred notes described by Warham (1967) were also heard, but, as at Macquarie Island, the calling was virtually confined to flying birds. Indeed, grounded ones were seldom seen except when attracted to our lights and such birds were timid when approached.

The number of White-headed Petrels over land appeared to vary considerably from night to night, with more present on dark, misty evenings than on clear ones. This may have been due to a varying influx of non-breeders. No bird was seen in the air until well after dark. The night of 27 February was particularly productive

of petrels and many *lessoni* near our lights were disgorging small squid.

Nine birds had a mean weight of 574 ± 34 g and Table 3 summarises measurements of full-winged live or recently killed un-sexed adults.

TABLE 3 — MEASUREMENTS OF LIVE WHITE-HEADED PETRELS AT ANTIPODES ISLAND

(Number of birds in parentheses)

Wing (mm)	Tail (mm)	Bill (mm)	Tarsus (mm)	Mid-toe & Claw (mm)
302.6 ± 5.7 (22)	130.6 ± 5.5 (10)	36.7 ± 1.2 (25)	44.0 ± 1.5 (22)	64.2 ± 2.8 (16)

These dimensions are very similar to those for other populations (Mougin 1975) except for body weights. Our birds were much lighter than the mean for six of 750 g given by Mougin, and also lower than the mean for five unsexed birds from Macquarie Island of 606 g (Warham, unpubl.). The reason for these differences is not clear.

MOTTLED PETREL *Pterodroma inexpectata*

This petrel, widespread in New Zealand seas, is listed as breeding at Antipodes Island in New Zealand checklists, but not in Falla's list (1965). We saw no sign of the bird although it should have been hatching eggs and raising chicks if its breeding cycle is the same as elsewhere (Warham *et al.* 1977).

This bird could have been overlooked in view of the similarity of its calls to those of *P. lessoni,* its rather retiring habits and its restricted calling from the ground. However, the species is a frequent victim of skuas and we could find no skeletons, and so if present, *inexpectata* was evidently rare during our stay. The underwing pattern is striking (see frontispiece in Warham *et al.* 1977), shows well in disarticulated wings, and so its absence from the considerable amount of skeletal debris examined is remarkable if it really breeds on the Main Island.

We have located no specimens collected at Antipodes Island, with the possible exception of AMNH 528010. This is a chick with breast and belly in secondary down, wings and head feathering, the underwing with white lining and a dark band extending diagonally from the carpal joint towards the body, bill black, forehead with feathers pale edged producing a scaled effect. This is presumably the specimen referred to by Murphy & Pennoyer (1952: 23). It is undated and labelled " Large Blue Young Petrel *Oe. gularis,* Antipodes Island, ex Rothschild Museum." This seems to be an undoubted *inexpectata* chick and may well have been one of the many birds collected for Rothschild by H. H. Travers at the southern islands. Whether it really came from Antipodes Island is uncertain. Sir Robert Falla told us that despite the various dates on Travers' specimens, he is believed to have made only one trip to the south himself, had a standing

arrangement with some crew members to get specimens for him, and met the ship at Wellington to receive them. Thus the opportunities for mis-labelling were considerable and AMNH 528010 may well have come from the Snares Islands which were also on the steamers' itineraries and where the Mottled Petrel is common.

Mottled Petrels certainly inhabit seas near Antipodes Island and the AMNH collection includes two males taken by Beck about 64 km to the north on 16 February 1926, apparently in company with *lessoni* (see above). These seas would be well within the range of the Snares and Stewart Island populations of *inexpectata.* Beck also refers in his diary to seeing skeletons on the island on 17 February 1926 — "A few prions, but *inexpectata* and *lessoni* were the usual ones." As our much longer search for skeletal material at the same time of the year yielded no *Pterodroma* except *lessoni,* Beck may have mistaken some *lessoni* (or *mollis*) for *inexpectata.*

SOFT-PLUMAGED PETREL *Pterodroma mollis*

The discovery of this bird flying in some numbers after nightfall was unexpected as its nearest known breeding place at Iles Crozet is about 8300 km to the west and it had not been reported in New Zealand before, even as a beach derelict.

Our first specimen was caught by R. H. Taylor on the night of 12 February and subsequently these birds were seen or heard on most nights not far from our base camp. A few were also heard near the centre of the island but the Soft-plumaged Petrels appeared to be most plentiful above the shallow valley containing the stream draining the North Plains into Hut Cove.

The birds attracted attention by their mournful, low-pitched fluting cries which were distinctively different from the harsh chatterings of the White-headed Petrels. The Soft-plumaged Petrels were very readily dazzled by a hand torch as they circled overhead at high speed and were easily caught when they crashed into the vegetation. Otherwise they were not seen on the ground.

At other breeding stations in the Southern Ocean, for example, at L'Ile de L'Est, Archipel Crozet, the bird burrows in the flanks of valleys at medium altitudes and under the cover of vegetation (Despin *et al.* 1972). This is much the same sort of habitat as that above which we took two males and six females as specimens. No other evidence of its presence was obtained and no skua-killed remains found, although these petrels suffer such predation elsewhere, e.g. at L'Ile de L'Est where bones occur in skua middens even though *P. mollis* is not very abundant there.

Two of our specimens were directly compared at the BMNH with *mollis* skins from Marion and Gough Islands, from Tristan da Cunha, the Desertas and Madeira. In their plumage the Antipodes birds agreed very well with those from the South Atlantic populations

FIGURE 3 — A Soft-plumaged Petrel: note the wide band across the chest and the parti-coloured feet. Photo: John Warham

(subspecies *mollis*), whereas the Desertas birds *(feae)* were darker crowned, had less extensive scaled edges to the feathers of the forehead, and neck collars less well developed. Whereas the mottling on the flanks was more developed, tending to spread towards the midline, the birds from Antipodes, Tristan and Gough lacked any such mottlings. The Madeiran bird (subspecies *madeirae*) had more uniform grey-brown upperparts than the Antipodes Island birds, and lacked the light edges to the feathers of neck and mantle. Thus, in our opinion, the birds we collected belong to the nominate race.

All our specimens were of the light phase, fully described by Serventy *et al.* (1971), and for the first specimen from the New Zealand mainland, by Kinsky (1971). No dark-phase *mollis* was seen although such birds do occur among the South Atlantic populations as re-emphasised recently by Bourne (1975) and there are some skins of intermediate plumage (e.g. BMNH 1953.55.68) from Tristan da Cunha.

The eight specimens we captured had a mean weight of 276.2 ± 27.1 g and their dimensions after eight years as skins are given in Table 4, together with those of skins from the South Atlantic and Indian Ocean colonies measured by one of us at the BMNH.

TABLE 4 — MEASUREMENTS OF SKINS OF SOFT-PLUMAGED PETRELS OF MIXED SEXES FROM ANTIPODES ISLAND, TRISTAN DA CUNHA, GOUGH & MARION ISLANDS
(Number of birds in parentheses)

Wing (mm)	Tail (mm)	Bill (mm)	Tarsus (mm)	Mid-toe & Claw (mm)
Antipodes I. —				
255.8 ± 3.9 (6)	114.9 ± 4.0 (7)	28.7 ± 0.9 (8)	33.9 ± 0.7 (8)	48.0 ± 1.0 (8)
South Atlantic & Indian Ocean —				
252.8 ± 7.1 (18)	112.4 ± 3.2 (23)	27.7 ± 1.0 (23)	33.9 ± 1.0 (24)	46.2 ± 1.3 (18)
P (Mann-Whitney U-tests) —				
n.s.	n.s.	0.05	–	0.01

The birds in the Antipodes Island sample average slightly larger than those in the bigger sample from more westerly breeding stations, but only in bill and mid-toe-with-claw lengths are the differences significant. The mean body weight at 276 g is also higher than that given from some other samples e.g. Mougin's (1975) figure of 225 g (n = 156), but this evidently included Swales's weights from Gough Island (Swales 1965), which may have included fledglings. On the whole, the evidence suggests that while the Antipodes birds may be slightly bigger, in their plumage they resemble those from other southern populations.

The measurements of the young male found alive in Hutt Valley (Kinsky 1971) agree reasonably well with those of our Antipodes sample except for the bill length (35.8 mm) which is quite outside the range for *P. mollis*. However, Mr Kinsky advised us that this was a printing error: the correct bill length for this specimen when fresh was 27.4 mm and after six years' drying it is now 26.2 mm.

The characteristic calls of these birds, low musical moans, lasted for 1-2 sec and were often repeated several times. An analysis of these calls will be given later (Warham, in prep.). These low flutings and their intercalated squeaks were the only kinds of call we associated with *Pterodroma mollis*.

FAIRY PRION *Pachyptila turtur*

Of uncertain status, although listed as breeding by Oliver (1955), Falla (1965) and Kinsky (1970). Hutton (*in* Ogilvie-Grant 1905) stated that it bred but we have found no positive records of birds in nests or of specimens of eggs or identifiable adults actually collected ashore.

On the other hand, there is material taken at sea nearby and Fairy Prions were among the " rain of petrels " attracted by searchlight to the deck of MV *Alert* when anchored off the east coast in thick fog on 4 and 9 November 1950 (E. G. Turbott, *in litt.*). Five of these birds are in the NMNZ collection and the males were in breeding condition. Oliver (1955) referred to a bird taken at the island on 31 July 1924 which he made the type of subspecies *subantarctica* on account of its small and deep bill, and he also stated that those brought back in 1950 were similar. It appears, however, that the smaller, shorter bill of this bird was that of a shrunken juvenile and that *subantarctica* is not a valid subspecies (R. A. Falla, pers. comm.).

Beck shot four unidentified prions quite close to the island on 15 February 1926 and we saw prions feeding offshore on several occasions, e.g. off Reef Point on 11 March. R. A. Falla (pers. comm.) found burrows above Ringdove Bay in November 1950 that had been freshly cleaned out and with feathers that seemed to be those of prions, and also heard prions of some kind crooning from the lower faces of Leeward Island. Beck found prion bones in skua middens. Yet we discovered only a few wing girdles of unidentified prions among the great amount of skua-killed material. Nor did we see any prions in our searchlight beam, even on nights when petrels were plentiful, and none of us identified their characteristic crooning cries: possibly most had bred and gone by the time of our arrival.

It seems unlikely that no prions nest at Antipodes Island, but as they usually experience heavy predation by skuas, the scarcity of skua-killed remains (in contrast to an abundance of larger species) argues against many breeding on the Main Island unless they use crevices in cliffs rather than burrows.

FULMAR PRION *Pachyptila crassirostris*

Also of uncertain status. Falla (1965) and Falla *et al.* (1966) did not list Antipodes Island as a breeding station and Kinsky (1970) queried the bird's status there.

Oliver (1955) stated that *crassirostris* was found nesting on the island in 1902. The only specimens labelled "Antipodes Island" we can find are three in the Canterbury Museum. Two of these (AV 1208, 1247) appear to be the skins that Mathews & Hallstrom (1943) thought were smaller than Kerguelen and Heard Island birds and for which they proposed the name *antipodes*. The first skin is undated and unsexed, the second sexed male and undated and with a note "probably collected by Hutton 1902." Actually, F. W. Hutton seems to have sailed with Lord Ranfurly on his first voyage south when a landing took place on 14 January 1901 (Chilton 1909; Ogilvie-Grant 1905).

The third specimen (AV 3246) is a female without date or collector's name. We can find no suggestion that any of these birds was taken from a burrow, nor that Mathews & Hallstrom's two birds were, as they stated, a pair. Beck collected none at the island. The long series in the AMNH taken by him at sea some 160 km to the north on 27 February 1926 seems most likely to have been from the Bounty Island population, about 24 km from the collecting point. The 1950 party obtained no specimens of this form and neither did we. Yet, as this is a crevice nester, it could easily have been overlooked if it were breeding on the sea cliffs or on the smaller islands and stacks.

GREY PETREL OR PEDIUNKER *Procellaria cinerea*

A winter breeder. The birds returned to the island during our stay, but we probably left before eggs had been laid. Our first bird was found freshly killed on 1 February, one was heard calling from a burrow on the night of 9/10 February, another was heard on the following night, and two flew overhead on the afternoon of 12 February. By 16 February it was usual to see them either arriving or departing in broad daylight. Pediunkers were first identified flying at sea on 21 February, whereas the White-headed Petrel, then equally common on land, was not seen off the island, a contrast noted also at Macquarie Island (Warham 1969). By 4 March, Pediunkers were the most numerous birds flying over the Reef Point area in the late afternoon and on 5 March some 100 Pediunkers and Shoemakers *(P. aequinoctialis)* were circling that general area, with the calls of the Pediunkers forming the dominant chorus after dark. Many were seen offshore from the ship on 12 March. Falla and Turbott *(in litt.)* saw fledglings flapping around in stream beds or in the sea during the first week in November 1950, some still with down adhering to their feathers, and saw one killed by giant petrels. If most chicks leave in late October and early November, then the timing of the breeding cycle at Antipodes

Island approximates that at Tristan de Cunha, where the birds return towards the end of February, the first eggs have been found in April, and the chicks depart in October and November (Elliott 1957).

Barrat (1974) has commented on the possibility that, by breeding in the winter, Grey Petrels at Iles Crozet may be able to occupy burrows used in the summer by Shoemakers and Despin (1976) gave one instance of this. This may not be true of the birds at Antipodes Island for, if the Pediunker lays there in *April,* many Shoemakers will still be rearing chicks.

These two *Procellaria* species were the only burrowing birds regularly flying over land and occasionally alighting in broad daylight. Skeletons of Pediunkers from previous seasons were fairly common on the ground and some were of adult birds, but it was noticeable that those flying around by day made no attempt to avoid skuas, which were never seen to attack them. On the other hand, the larger and more aggressive Shoemakers were often harried, perhaps because many of them were carrying food for their chicks and thus had something to disgorge, whereas the Pediunkers were only involved in pre-laying activities.

The few occupied burrows examined were dug at bases of, or between, tussocks and were fairly dry. Pediunkers appeared to be nesting widely around the island and many were sweeping along cliffs and steep, tussock-clad slopes, pausing momentarily at particular places where, after recircling, they eventually pitched down and promptly dived into the cover, presumably to their nests. Many were seen to alight on the slopes above Ringdove, Stack and Crater Bays, but we also found several nests on flat ground behind Reef Point only some 20 m a.s.l.

The call of this petrel was very distinctive. It consisted of a short, introductory, wheezy moan uttered on the intake of breath that led directly into a sustained, explosive bray. Hutton (1865) likened it to the bleating of a lamb. Some Pediunkers called from burrows by day but the main chorus did not develop until after dark, reaching a peak about one to two hours after sunset, then subsiding, only to increase again before dawn.

Sitting birds squatted on tussock crowns and with mouths wide open, swung their heads from side to side "hosing" their song far and wide. Such birds were easily approached. Presumably many were males but we took only one specimen (on 27 February), a female with a rather enlarged ovary (20 x 10 mm; largest ooctyte 3.5 x 5.0 mm), which appeared to be coming into breeding condition.

This bird's wing quills were fully grown except that the 3rd primary was slightly short and apparently still growing while four tail feathers were also new and growing. Neither it nor any of the other birds measured had bare brood patches. The wings and tails of most of the AMNH birds collected in February 1926 and of those examined

by us were in a similar condition, showing that on their return the breeders have still to complete the growth of their flight quills.

Beck's log for 23 February records that he found a pair of these birds in a hole that they were digging and also one downy young. It seems likely that this was a young *aequinoctialis,* as is clearly a chick in sooty-brown down he collected.

Table 5 gives the dimensions of five unsexed birds measured by us in life and 13 skins of both sexes taken by Beck or Hicks at or close to the island in 1926.

TABLE 5 — DIMENSIONS OF ANTIPODES ISLAND PEDIUNKERS
(Number of birds in parentheses)

Wing (mm)	Tail (mm)	Bill (mm)	Tarsus (mm)	Mid-toe & Claw (mm)
Live birds —				
334.8 ± 2.8 (5)	116.6 ± 3.0 (5)	46.6 ± 1.0 (5)	60.0 ± 1.9 (5)	82.0 ± 2.6 (5)
Male skins —				
340.2 ± 5.6 (13)	119.3 ± 3.9 (13)	47.5 ± 1.1 (10)	60.1 ± 1.5 (13)	76.7 ± 1.8 (11)
Female skins —				
339.1 ± 8:7 (13)	117.8 ± 3.1 (13)	46.3 ± 1.5 (10)	59.6 ± 1.8 (13)	75.8 ± 1.4 (6)

The five live birds had a mean weight of 1106± 93 g.

These dimensions agree well with those previously published, e.g. in Mougin's summary (1975: 16), but the wings are rather shorter on average as the primaries were still growing. Beck's males are slightly larger in all dimensions than his females, supporting the figures of Barrat (1974: Table 2), which suggest that males average slightly bigger and heavier than females.

One of only five adults banded by us was found freshly dead at the mouth of Karori Stream, west of Wellington, on 8 May 1977, over seven years after banding. The skin (19708) is now in the NMNZ collection.

WHITE-CHINNED PETREL OR SHOEMAKER *Procellaria aequinoctialis*

Shoemakers from Antipodes and the Auckland Islands have only a small amount of white on the chin and were therefore placed in the subspecies *steadi* by Mathews (1912: 114). The birds from Campbell Island are similar and are included in *steadi* by New Zealand checklists.

We found Shoemakers plentiful with breeding at its height. Some flew overhead and occasionally landed in broad daylight, even in sunshine, but most nest reliefs and visits occurred at dusk or after

dark. Repeated circuits were made before alighting. The main outward movement of adults took place at or before dawn.

Near the expedition base at about 20 m a.s.l., several of the Shoemaker's large burrows were found. They were tunnelled into the peat and well concealed among the 2 m high tussock and fern. A pair nesting deep in a small cave was easily observed (see Serventy *et al.* 1971: Fig. 66). However, as with the Pediunker, the major concentrations of burrows and of nocturnal activity were at higher altitudes. One big warren of burrows, some of which contained chicks, was towards the top of Mt Galloway. Here the entrances were unconcealed as the tunnels were dug into bare peaty terraces. This may be the colony referred to by Hutton (1895) who recorded that many burrows had pools of water at their entrances, as they had in 1969 and as seems normal for this species (see Hagen 1952).

The first chick was found on 2 February. It weighed 205 g and was being brooded. Two days later it was alone and weighed 165 g. Over the next 25 days it received food on at least six nights, but the meals were small and its weight never exceeded 295 g. It died on its 25th day (probably when 28 days old), weighing 179 g. It had several *Ixodes* ticks attached to its feet and nostrils.

On 1 February a Shoemaker, probably a female, was incubating in the cave site. Her egg measured 81.2 x 56.9 mm (125 g) and the same bird remained there until the night of 8/9 February. The chick hatched on 6/7 February (95 g), two days after the shell was first pierced. After being brooded for two days, the chick was left unguarded for a day, then brooded for days 4 and 5 by the other parent before being finally left unguarded. It was tick-free. During the 32 days over which this chick was weighed, it was fed on at least eight nights, fasting for 1-6 days (average 4 days) between meals. Some meals were huge. On the night of 19/20 February, the chick's weight rose from 250 to 490 g, but two days later it was back to 345 g. The maximum attained was 545 g. It weighed 430 g on day 32 when weighing ceased.

The chicks in their protoptile down were a uniform grey, their feet with flesh-grey webs, bill pale grey but slightly creamy towards the tip.

According to Hutton (1895), at Antipodes Island the eggs are laid in December and the chicks fully feathered in May. Adults were coming in at night in early November 1950, but there were already a few in burrows, cackling by day (R. A. Falla, *in litt.*). We saw small to medium-sized young in early February. These dates tie in well with the findings of Mougin (1970) who recorded that at Iles Crozet the last adult left on 7 May and the first returned on 16 September. The incubation period was about 58 days and the nestling period some 94 days. Hence an egg laid about 1 December should produce a chick about 27 January which should fledge about 4 May.

These were noisy birds. Their staccato cacklings vied with the brayings of the Pediunkers: occasionally the Shoemaker's chorus was

the louder. As with the Pediunkers, no Shoemaker was heard calling on the wing.

Daytime-flying Shoemakers were fairly often harried by skuas. Some of the petrels lost tail feathers, some disgorged food, but none was actually seen to be killed, although skeletons of adults lying around suggested that some birds did not escape. They may have been killed on the ground at night. On 25 February at 0530 hours one departing Shoemaker was chased by eight skuas. The petrel showed no obvious signs of alarm, nor appeared to alter its flight style of wing beats interspersed with short glides but, when attacked, the petrel thrust towards the skuas with its bill and rattled it loudly. The petrel escaped serious damage. Another grounded Shoemaker successfully beat off a single skua. Most skuas broke off the engagement when a petrel landed but began again when the petrel took flight. In contrast, at Iles Crozet, Mougin (1970) did not see skuas attacking Shoemakers although there too they fly around before dark. He surmised that they were too well armed and aggressive for the skuas.

The Shoemakers' numbers increased over land at dusk and on 13 February, with very calm seas, a small raft of dark petrels, almost certainly Shoemakers, rested off Reef Point in the late afternoon.

Apart from a few skeletons, we collected no adults. Two skins from the 1950 expedition are in the NMNZ (in spirit). The AMNH collection contains five birds labelled Antipodes Island and collected by Dannefaerd, two of these being dated March 1894 and one, male 527317, dated May 1894, collector H. H. Travers, lacks white on the bill plates and may have been a fledgling. Beck took a series at sea on 16 and 17 February 1926, most of which were presumably Antipodes Island birds as his log shows that he was just offshore.

Seven live birds measured by us weighed 1114 ± 92 g. Details of these, of dead and partly dried birds we found, and of skins in the AMNH are given in Table 6.

TABLE 6 — DIMENSIONS OF SHOEMAKERS FROM ANTIPODES ISLAND
(Number of birds in parentheses)

Wing (mm)	Tail (mm)	Bill (mm)	Tarsus (mm)	Mid-toe & Claw (mm)
Live birds, mixed sexes —				
401.2 ± 9.1 (6)	129.2 ± 3.1 (4)	51.4 ± 0.5 (5)	65.2 ± 2.4 (6)	90.4 ± 3.4 (5)
Dead birds, mixed sexes —				
387.6 ± 7.0 (7)	125.7 (3)	51.3 ± 1.4 (10)	64.3 ± 1.4 (11)	83.9 ± 3.2 (10)
Male skins AMNH —				
382.8 ± 5.8 (9)	124.8 ± 3.7 (9)	52.6 ± 2.4 (8)	65.3 ± 2.0 (9)	85.2 ± 2.1 (6)
Female skins AMNH —				
376 (3)	127 (3)	52.5 (3)	64.3 (3)	84.1 (3)

The dimensions in Table 6 differ little from those of other populations summarised by Despin *et al.* (1972), and they lie within the range given by Serventy *et al.* (1971), although the live birds were rather long-winged and had rather long mid-toes and claws.

Our birds were fully winged, and consistent in showing little white on the chin, usually just a patch filling the inter-ramal space and extending backwards from the symphysis for 10-20 mm. None showed any sign of a "spectacle," but AMNH ♂ 527312 from Antipodes has feathers of the neck, throat and particularly above and behind the eye and on the crown tipped with white, creating a scaled effect. All but one of Beck's birds had small gonads.

SOOTY SHEARWATER *Puffinus griseus*

Judging by the number seen and heard, Antipodes Island is a much less important breeding station than are many of the islands closer to Stewart Island. We saw Sooty Shearwaters flying out at dawn and heard some calling after dark but, even though we were ashore at the height of the breeding season and at a time when chicks were being raised and many non-breeders visit the land, this was one of the less obvious species.

Beck also did not find the birds in great numbers but saw them offshore on 16 and 21 February 1926 and, as darkness fell on 17 February and dense fog closed in, a flock appeared flying low over the water. Beck's series in the AMNH, taken on 16 February, has not been measured by us. The mean dimensions of three examined in life were: weight 807 g; wing 298.5 mm; tail 91 mm; bill 41 mm; tarsus 57 mm; mid-toe and claw 68.7 mm.

LITTLE SHEARWATER *Puffinus assimilis*

The status of the Little Shearwater at this island has been in some doubt and we were fortunate to see the return of the birds, which are winter breeders, and to collect five specimens. These are the first known to have been taken on the island. R. A. Falla *(in litt.)* refers to seeing "enough old remains of *P. assimilis* to indicate that they had bred," but no live birds were taken by the 1950 party.

Beck collected six specimens on 16 February 1926 (Murphy 1927) at 49°S 179°E (not 179°W as stated by Murphy). Beck's log on 16 February shows that he was in sight of Antipodes Island, and on the evenings of the 15th and 20th he saw these birds frequently as he approached the coast.

We saw none until 26 February when one appeared in the spotlight. On the following night, with many petrels in the beam, five Little Shearwaters were taken. No others were seen ashore, no further spotlighting was attempted, and only two old skulls of this bird were found among the numerous bird remains examined, but many flew near the ship on 12 March as we left.

The plumage of the birds collected agrees well with detailed descriptions of the subantarctic race *elegans* given by Murphy (1927) and by Fleming & Serventy (1943). The white tips to the feathers of the back and to the wing- and tail-coverts are prominent. The dorsal feathers are otherwise slaty-black with little suggestion of a brownish tinge. However, in one of our specimens (NZNM 19165), the white tips on the back are much reduced.

Two of the specimens collected were compared in the BMNH with examples of the subspecies *boydi, baroli, tunneyi, assimilis, kermadecensis* and *elegans.* Our birds agreed best with examples from Tristan da Cunha and Gough Island *(elegans),* although in these the pale edgings to the feathers tended to be less distinct than in the Antipodes Island specimens. The latter agreed precisely with one of Beck's birds *("P. a. kempi")* shot off the island on 16 February 1926 (BMNH 1959/23/3).

In life our birds had blue-grey mandibular rami and latericorns, the rest of the bill being grey-black. The insides of the legs and toes were grey-blue, the outer aspects of the tarsi grey-blue but becoming blackish behind, merging into the black of the outer aspects of the outer toes. The claws were black, the webs pinkish with the soles also pink but deep black along the toes and along the edges of the webs.

Table 7 gives dimensions of our five birds when freshly killed and also after seven years' storage as skins, and of six of Beck's birds shot off the island in 1926.

TABLE 7 — DIMENSIONS OF ANTIPODES ISLAND LITTLE SHEARWATERS

Sex & NMNZ No.		Wing (mm)	Tail (mm)	Bill (mm)	Tarsus (mm)	Mid-toe & Claw (mm)	Weight (g)
19166	male	183	70	24.0	38.5	49.0	235
19168	male	189	71	25.0	40.0	52.0	256
19165	male	189	70	26.0	41.0	53.0	246
20989	male	190	72	24.5	38.5	49.5	229
19167	female	187	72	23.0	41.0	50.0	226
In life		187.6 ± 2.5	71.0 ± 0.9	24.5 ± 1.0	39.8 ± 1.1	50.7 ± 1.5	238.4 ±11.2
Dried skins		184.4 ± 3.3	70.0 ± 0.6	24.9 ± 0.7	39.6 ± 1.1	48.1 ± 2.2	-
Beck's skins		187.0 ± 6.0	69.0 ± 2.2	24.7 ± 1.0	39.6 ± 1.1	47.4 ± 1.2	-

The samples are small, but Beck's birds and ours are of very similar dimensions, and the shrinkage of our birds has not been great during storage — except for mid-toe and claw which averaged 5% shorter than the mean for the live birds. The anomalous difference in bill length seems insignificant. It should be noted, however, that our

birds all had the outermost functional primary the longest whereas in Beck's birds the two outer primaries are either of equal length or the outermost is slightly shorter, suggesting that, had his birds been full-winged, the mean length would have been greater than 187 mm.

According to his labels, all Beck's specimens had small gonads except for one female marked " gonads swelling." Ours all lacked brood patches and the gonads were fairly small, the testes from 7 x 4 mm to 5 x 3.5 mm, the largest oocyte in the two females c. 2 x 1 mm. At least one male was coming into breeding condition with tubules of large diameter, little interstitial tissue and some evidence of spermatozoa.

GREY-BACKED STORM PETREL *Garrodia nereis*

This small petrel is reputed to breed at Antipodes Island according to many authors, e.g. Oliver (1955), Falla *et al.* (1966), but we know of no eggs or chicks taken there and the museum specimens of adults all appear to have been collected nearby at sea. The inclusion of Antipodes Island as a breeding place in the *Checklist of New Zealand birds* (Kinsky 1970), is because of the high probability that the birds taken off-shore were part of a local breeding stock.

Beck and Hicks collected four *Garrodia* on 16 February 1926 and 15 taken by R. A. Falla between 4 and 8 November 1950 are in the NMNZ. On the night of 4 November 1950, in heavy fog, these petrels " rained down " on the deck of MV *Alert*, attracted by the searchlight (E. G. Turbott, pers. comm.).

We saw these birds ashore quite frequently, and like Beck, who noted that the Black-bellied was the commoner off-shore, we found the Grey-backed the scarcer of the two storm petrels over land. Those seen were either sitting on tussock crowns or were picked out and often lured down by our spotlight. The birds were seen only after dark. We found no nests or young, nor did we hear any certain calls. The lack of direct evidence for breeding is understandable, bearing in mind the dense vegetation, the bird's non-colonial nesting and its generally secretive behaviour (Despin *et al.* 1972).

The first bird seen by us on 31 January had a brood patch measuring about 20 x 30 mm. All the others handled had completely or almost completely down-covered brood patches, suggesting that the breeding season was well advanced. If the annual cycle here is similar to that at Chatham Island, 700 km to the north, the successful breeders should have been feeding large chicks in January and February. Bones were found among skua-killed debris.

Seven out of eight sexed birds were males. Eleven of mixed sexes measured in life had a mean weight of 32.1 ± 5.0 g and had the following dimensions (in mm): wing 124.3 ± 4.3; tail 62.2 ± 4.1; bill 13.3 ± 0.3; tarsus 30.6 ± 1.7 and mid-toe with claw 27.3 ± 1.7. These dimensions are in line with those previously published e.g. by Despin *et al.* (1972). Our mean wing length is rather low, particularly

Photo: John Warham

FIGURE 4 — A Grey-backed Storm Petrel.

for birds measured live. This is partly due to two short-winged birds (117 and 118 mm), the mean for the remaining nine being 125.8 mm.

Three of the birds collected were in heavy moult and in one a few primaries were still growing. Otherwise there was little evidence for wing moult in the small sample examined.

BLACK-BELLIED STORM PETREL *Fregetta tropica*

As with Grey-backed, alleged breeding at Antipodes Island appears to have been based on the large numbers seen or captured offshore. Beck took six females and 20 males on 16 February 1926 at 49°S 179°E and noted that with low fog hanging over the island, Black-bellied Storm Petrels were common and feeding offshore, whereas the Grey-backed was scarce. The " rain of petrels " attracted on deck on the nights of 4 and 9 November 1950 (E. G. Turbott, pers. comm.) included Black-bellied, eight of which are in the NMNZ collection. The 1950 party also heard the characteristic whistle from under dense *Polystichum* fern while R. Litt saw one bird flying over the tussock by day (R. A. Falla, pers. comm.).

We caught a number over land. Most were females. We saw none on the ground, found no occupied burrows, and neither heard its far-carrying cries nor saw any skeletal remains. Nevertheless, six out of ten examined had brood patches measuring about 20 x 25-30 mm, suggesting that incubation may have been in progress. Some of the specimens appeared to be close to breeding condition, one male with free spermatozoa in the lumina of its testis tubules. A female with a convoluted oviduct, ovary 10 x 3 mm (largest oocyte 2.5 mm diameter), had probably laid as there were signs of post-ovulatory changes with large atretic follicles present. Stead (*in* Oliver 1955) found two birds on fresh eggs at the Auckland Islands on 1 February. It seems unlikely that laying would be much earlier on Antipodes Island.

Measurements of Beck's 26 skins collected on 13 and 16 February 1926, which were mostly males, were given by Murphy (1936:

TABLE 8 — MEASUREMENTS OF LIVE BLACK-BELLIED STORM PETRELS OF MIXED SEXES

Weight (g)	Wing (mm)	Tail (mm)	Bill (mm)	Tarsus (mm)	Mid-toe & Claw (mm)
Antipodes I.					
53.9 ± 3.8	164.3 ± 3.8	75.3 ± 2.7	15.2 ± 0.3	41.3 ± 1.7	30.2 ± 1.0
Signy I.					
57.5 ± 1.0	167.7 ± 6.0	78.9 ± 3.7	15.3 ± 0.7	40.1 ± 1.3	29.5 ± 1.3

Photo: John Warham

FIGURE 5 — A Black-bellied Storm Petrel showing the very elongated tarsus.

766) and the dimensions of ten live birds measured by us are given in Table 8, together with those of 36 live birds from Signy Island from Beck & Brown (1971).

Although our sample was small, our birds averaged shorter in the wing and tail then those from Signy Island and thus support Beck & Brown's suggestion that South Shetland birds have longer wings and tails than those of the New Zealand region.

COMMON DIVING PETREL *Pelecanoides urinatrix*

Plentiful but more often heard than seen. They were very readily attracted to light. The bird's low moaning *kua* cries, lasting about one second and slightly rising in pitch, were heard after dark from burrows and, more rarely, from the air. The chorus after dark faded in the middle of the night but resurged before dawn as the outward movement began. The departing birds could not be seen but their wings could be heard as the birds cut through the air like projectiles.

Oliver (1955) and others gave Antipodes Island as a breeding place but we have not found specimens of eggs or chicks. Thirteen birds collected by R. A. Falla between 4 and 6 November 1950 were taken at light and Beck collected one on 23 February 1926. Nevertheless, its abundance and burrow activity show that it does breed on the Main Island. We saw remains among skua castings.

Some of the males collected had quite large testes (up to 10 x 4 mm), with a new tunic below the old and with tubules showing active cell division but no spermatozoa or evidence of testis collapse. The one ovary examined (14 x 3 mm) showed all stages of follicular development, with conspicuous lipoidal cells, and the bird may have laid.

It seems likely that most of the birds collected were breeders as *P. urinatrix chathamensis* breeds in its second year (Richdale 1965). Our birds were presumably raising chicks, as the state of their gonads suggests.

The specimens taken near Antipodes Island have been ascribed to the subantarctic subspecies *exsul* which differs from other forms in minor characters such as its average greater width of bill, the mandibular rami not being quite parallel and the extensive grey suffusion of the jugulum (Murphy & Harper 1921). The birds we took showed these same characters. The mean weight of 19 was 119 ± 11 g. The dimensions of 14 birds measured in life and of these re-measured seven years later as skins are given in Table 9.

TABLE 9 — DIMENSIONS OF ANTIPODES ISLAND DIVING PETRELS

Wing (mm)	Tail (mm)	Bill (mm)	Tarsus (mm)	Mid-toe & Claw (mm)
Unsexed live birds —				
118.6 ± 3.2	39.4 ± 2.4	16.1 ± 0.8	25.0 ± 1.3	33.3 ± 1.6
Unsexed skins —				
117.3 ± 2.6	38.2 ± 1.3	15.8 ± 0.8	25.2 ± 1.1	32.2 ± 1.2

Evidently some shrinkage has accompanied preservation, but these measurements agree in general with those given by Murphy & Harper for a sample of 28 *P. u. exsul* and, apart from wing lengths (ours average shorter), they also agree with data for 36 skins of *exsul* summarised by Bourne (1968).

BOUNTY ISLAND SHAG *Leucocarbo campbelli*

Apart from the brief statement by Reischek (1889) that when he was off the island on 2 February 1888, " the magellanic shag busied itself upon the water," the sole record of shags at Antipodes Island stems from the 1950 expedition when on 8 November R. K. Dell saw two on a high ledge on the southwest side of Bollons Island. The birds had red on the face, white on the breast up to the throat, and a white wing-bar, and were evidently members of the subspecies *ranfurlyi,* previously known only from the Bounty Islands. The ledge was plastered with white droppings as if in regular use and the pair was on the same ledge two days later (E. G. Turbott, pers. comm.).

The 1969 party kept a sharp look out for shags. If present, these would almost certainly have flown up and down the coasts but none was seen.

MALLARD *Anas platyrhynchus*

A male and a female were feeding in a shallow pool on the flat rocky coastal platform just west of South Bay on 26 February. The male was in eclipse plumage and flew off. The female was in full moult and, being flightless, hid under large boulders nearby. The birds had obviously been living in the area for some time, judging by the excreta around the shore.

ISLAND SNIPE *Ceonocorypha aucklandica*

Apparently only four isolated populations of this snipe now exist, namely subspecies *pusilla* at the Chatham Islands, subspecies *huegeli* on the Snares Islands, subspecies *aucklandica* on the Auckland Islands, and subspecies *meinertzhagenae* on the Antipodes Islands.

Hutton (*in* Ogilvie-Grant 1905) reported the snipe rare on Antipodes Island but like Kirk (1891), we found it widespread from sea level to the summit. Bill probings were seen at the sodden mouths of Shoemaker burrows and on the edges of the penguin colonies. Because of its cryptic colouring and the thick ground cover, the bird was seldom seen. It was more often heard, giving a throaty reiterated *chip, chip* . . . (Fig. 2, A & B). These calls were heard at all times of the day but more often at dawn and dusk, also after dark.

Figure 7 shows calls from birds of unknown sex singing near Reef Point. As shown in A, the *chip* was repeated at a rate of 2.2 to 2.4 per second, each lasting about 0.15 sec. Although the calls had some complex overtones, they were basically " simple cries " (Davis 1964), the rise and fall of the frequencies during each *chip* probably resulting from the opening and closing of the bill, although the singers

FIGURE 6 — An Antipodes Island Snipe.
Photo: John Warham

FIGURE 7 — Spectrograms of calls of Antipodes Island Snipe.

could not be seen. Less often, as in Fig. 7 B, interspersed with the *chips* were three to five longer (0.5 sec.) calls which could be rendered as *chew-a-wa* and which, on analysis, showed a distinctive pattern of two linked and arched formants whose harmonics no doubt partly account for this call's more musical quality to our ears.

Both kinds of call showed some resemblance to those of the Common Snipe *(Capella gallinago)* of the Northern Hemisphere. The *chip* of *Coenocorypha* reminded one of us (JW) forcibly of a monsyllabic version of the spring call of *Capella — chip-per, chip-per —* usually given from the ground, often at night. The more complex *chew-a-wa* can be likened to another note of the Common Snipe, appropriately rendered as *chco-wee, choo-wee* by H. G. Alexander (*in* Witherby *et al.* 1941).

The Antipodes Island birds' long grooved bills were grey basally, darkening towards the tip. The tongue was long and lance-shaped. The rather short legs were pale grey, tinged yellowish behind, dark grey on the joints, the claws brown. The eyes were dark brown.

Most snipe when disturbed fled unseen beneath the foliage but some flicked into the air to fly for short distances and then pitched down to dodge out of sight. Despite this, the birds were fairly tame and most of those taken were caught with a hand net.

Island Snipe have very short, rounded wings, the wing span of *meinertzhagenae* being about 35 cm. The wing loading of a female (weight 122 g) was 0.78 g/cm^2, considerably in excess of figures for the Common Snipe (weight 165 g) of 0.45 g/cm^2 (Poole 1938) or 0.40-0.68 g/cm^2 (Fullerton 1911). The high wing loading helps to explain the bird's short flights and its apparent reluctance to fly at all.

No nests were found nor any chicks seen or heard. The only egg known to us is in the BMNH labelled " Antipodes Island ex Rothschild Museum, Tring." It measures 42.8 x 33.1 mm, according to Schonwetter (1963).

The British Museum also has one feathering chick (1939-12-9-43), without date or collector's name but labelled "Antipodes Island." It has down on the back of the head, on the nape and on the throat, bill 32 mm and wing 55 mm. One female collected by us had an unshelled egg in her oviduct, and at 129 g was the heaviest of the birds measured. This and one other female had partly bare brood patches but the others examined had none. Dimensions of the small sample measured in life are given in Table 10, together with data for sexed skins in the AMNH and BMNH.

TABLE 10 — DIMENSIONS OF ANTIPODES ISLAND SNIPE

Sex	Weight (g)	Wing (mm)	Tail (mm)	Bill (mm)	Tarsus (mm)	Mid-toe & Claw (mm)
Male	87	105	-	57.0	27.5	34.5
Male	88	104	42	60.6	26.0	34.3
Male	97	107	40	59.8	26.5	36.0
Male	105	102	44	59.2	27.0	36.0
Mean Males	94.2	104.5	42	59.2	26.8	35.2
Female	115	113	41	64.0	26.0	36.0
Female	121	106	41	63.5	28.0	37.0
Female	129	102	38	58.3	26.0	35.0
Mean Females	121.7	107	40	61.9	26.7	36.0
Mean of 3 female skins	-	104.7	40	64.0	27.0	34.8
Mean of 12 male skins	-	102.4	40.9	57.8	25.4	33.3

It is still not known whether females are on average heavier in weight and longer in bill and wing than males, as with snipe generally (Tuck 1972).

SOUTHERN SKUA *Stercorarius skua*

The subantarctic form *lonnbergi* was a common breeding bird at Antipodes Island. A downy chick was collected there by R. A. Falla on 9 November 1950 but by the time that we arrived the young of the year were fully fledged. Some, although capable of flight, were still being fed by adult birds. Waite (1909), however, referred to apparently quite small young in February 1907 that attempted to hide when alarmed.

Skuas near Hut Cove had evidently fed on penguin eggs earlier in the year, for collections of shells around the fringes of colonies showed where eggs had been carried for eating. Skuas fed on penguin carcasses on the beaches, often showing territorial aggressiveness to other skuas and, with much wing lifting and calling, usually drove them off. Often these potential rivals were in rather darker plumage and were perhaps younger birds.

No skua was seen to attack live penguins but attacks on Shoemakers and White-headed Petrels have already been described. One skua made a half-hearted stoop at a parakeet.

A pale-headed, straw-coloured bird flew across Reef Point on 31 January. It was not seen well enough to be positively identified but could have been *S. s. maccormicki.*

ARCTIC SKUA *Stercorarius parasiticus*

A " Parasitic Jaeger " passed Beck's boat on 20 February 1926 when he was 3 km off the island.

SOUTHERN BLACK-BACKED GULL *Larus dominicanus*

Not common during our stay and the only evidence of breeding came from the occasional sighting of birds in the spotted plumage of 2-3 year old immatures. No birds of the year were seen. Southern Black-backed Gulls occurred in twos and threes around the coast. The greatest number seen at one time was eight on the sea off Reef Point on 6 February.

ANTARCTIC TERN *Sterna vittata*

In a revision by Murphy (1938), New Zealand Antarctic Terns were assigned to subspecies *bethunei* on account of the consistently shorter tails and feet of birds from Antipodes Island (five collected by Beck), Bounty, Snares and Campbell Islands. We found these terns in small numbers around the coast but the nests seen were all on rather flat, sparsely vegetated ground composed of loose breccia at Reef Point. Two single eggs, one downy chick and one fully feathered chick were seen there on 31 January and dual display flights were already common by then, often taking the birds high into the sky. Several adults and one large fledgling were on Leeward Island on 19 February and there were two more flying juveniles on 10 March at Reef Point. However, on that date four single-egg clutches were being incubated: evidently the breeding season is extended.

These terns plunge-dived often close inshore and apparently took small fish. The largest number seen feeding together was a group of 27 off Reef Point in heavy seas on 8 March.

ANTIPODES ISLAND PARAKEET *Cyanoramphus unicolor*

This distinctive parrot, restricted to this island, was plentiful, tame, and easily caught in a hand net. The birds were active and very inquisitive around the campsite. They flew well. Breeding appeared to have ended when we arrived and some family parties were about, with long-tailed adults feeding short-tailed immatures. The birds are said to nest in burrows underground or at the base of a tussock (Reischek 1889), and several recently used parakeet burrows were found in such situations.

The occurrence of thriving populations of two congeneric parrots on so small an island with a limited range of resources implies the birds' occupation of distinct niches. The ecologies of the two species were studied by expedition member R. H. Taylor (1975). His diagram of the food preferences of the Antipodes Island Parakeet showed that its diet was mainly of leaves, with some berries and seeds. The Red-crowned fed mostly on seeds, with flowers, berries and some invertebrates being of less importance.

It was common to see *C. unicolor* perched among *Poa litorosa* tussock and running individual leaves through its bill to express the juice. The leaves were not severed but each was left as a flattened strap of tissue criss-crossed with beak marks. It also fed in the penguin colonies, where it was seen picking at fat and dried flesh from penguin and petrel corpses on many occasions.

Three pairs were taken to New Zealand in the hope of breeding them in captivity but at Mt Bruce Native Bird Reserve one bird died. A further bird was captured in 1970, a small captive population has been established, and some birds have been distributed for further breeding by institutions and experienced aviculturalists.

This is not the first time that these parrots have been established in aviaries. The species was named from a specimen in the London Zoological Gardens (Lear 1831) and others were taken to New Zealand during the period of the government steamers' biannual searches for castaways. Buller (1893) reported the arrival of some such birds, noting that they often roosted upright, holding on to the wires of their cage by bill and claw. Attempts were even made to establish *unicolor* on Kapiti Island near Wellington (Chilton 1909).

RED-CROWNED PARAKEET *Cyanoramphus novaezelandiae*

The Antipodes Island form *hochstetteri* is one of six extant subspecies occurring from New Caledonia to the Auckland Islands (Forshaw 1973) and, as noted by Forbes (1892), the Antipodes form is larger than the typical race.

Photo: John Warham

FIGURE 8 — An Antipodes Island Parakeet perched among **Poa litorosa.**

It is plentiful at Antipodes Island. Less tame than *unicolor,* it was seen less often than that bird in areas with dense tussock, being more numerous where the sedge *Carex appressa* was in seed. Seeds formed the main food during our stay (Taylor 1975), but, like *unicolor,* the Red-crowned Parakeet was often on the penguin colonies where it scratched for fly larvae in the guano. These parakeets seemed particularly plentiful about the colonies along the south coast. According to Oliver (1955), it also cleans up eggs eaten by skuas.

Two nests were found (on 6 and 8 February), in the crowns of a tall tussock and a fern clump. Each contained a single down-clad chick. Towards the end of February other Red-crowned parents were still tending young in down, and so the breeding season was evidently later than that of *unicolor* (Taylor, *in* Forshaw 1973).

Three pairs were taken to New Zealand and a thriving captive population has been established.

Hector (1895) compared the sterna and pectoral girdles of the two Antipodes Island parakeets and concluded that there was evidence that the power of flight in *unicolor* had degenerated towards the condition of the Kakapo *(Strigops habroptilus).* We saw little evidence of a reduction in flying ability by *unicolor:* although it was less dashing than *hochstetteri,* this could have been a reflection of the latter's smaller size.

Buller's comment (1892) that the presence of two *Cyanoramphus* spp. on the one island, one only subspecifically distinct and the other specifically distinct, suggests a double invasion with *novaezelandiae* being the more recent arrival, still seems valid.

NEW ZEALAND PIPIT *Anthus novaeseelandiae*

Plentiful, widespread and tame. Reischek (1889) was the first to report pipits at Antipodes Island. He gave it full specific status as *A. steindachneri* on the grounds of its small size and distinctive fulvous-brown colouration. The races of the New Zealand Pipit have not been recently revised but *steindachneri* is now usually treated as only a subspecies. Five specimens collected by members of the Expedition are in the NMNZ collection. Fourteen adults caught by R. J. Stanley had a mean weight of 32.55 ± 2.97 g.

We saw no nests but a group of free-flying young was active near Reef Point on 1 February and one young bird unable to fly was seen elsewhere on 5 February. The pipits tended to feed in open areas, particularly on the beaches, among the penguins or at the foot of the cliff. Pairs were encountered along rocky-bottomed stream beds, on recent slips, rocky outcrops and at old albatross nests. Small moths and other insects were chased and the birds may also have taken insects from penguin carcasses as noted by Oliver (1955). One was seen pirouetting about the feet of an Erect-crested Penguin which was feeding its chick: the pipit snipped up food particles spilled

during the meal and once ran off with a small red crustacean. Another ate small red berries, possibly *Coprosma pumila.*

DUNNOCK *Prunella modularis*

About ten sightings of adult birds in various parts of the island. In view of their cryptic coloration and behaviour and the generally thick cover, Dunnocks may be more common than these sightings suggest. R. H. Taylor saw two adults with two flying young west of North Head on 4 February and one adult with two young near Base Camp on 12 February, so that breeding is confirmed.

SONG THRUSH *Turdus philomelos*

A single bird was seen near Ringdove Bay on 26 February and another was seen briefly but clearly close to the Expedition Base on 11 March.

BLACKBIRD *Turdus merula*

The listing in Falla (1965) was an error.

SILVEREYE *Zosterops lateralis*

About ten seen and one dead in widely separated places, but not common.

GOLDFINCH *Carduelis carduelis*

Not seen by us but Hutton reported two in 1900 on Bollons Island (Ogilvie-Grant 1905).

LESSER REDPOLL *Acanthis flammea*

Redpolls were the commonest self-introduced passerines during our visit. Although they had not been reported previously, we saw a male and three flying chicks near Hut Cove on 6 February, at least four birds on the slopes of Mt Galloway on 3 February, and others at Ringdove Bay, near Orde Lees Island and on the south coast.

STARLING *Sturnus vulgaris*

H. J. Ollerenshaw of the 1950 party saw one bird on Bollons Island (Williams 1953). We saw one on the south coast on 26 February, and R. H. Taylor saw a flock of six near Reef Point on 31 January and five on the south coast on 8 February.

DISCUSSION

For an island of only 2090 ha, with limited terrestrial resources, Antipodes Island supports a good range of birds. Although we identified no occupied nests of Black-browed Mollymawk, Soft-plumaged Petrel, Fairy Prion, Little Shearwater, Grey-backed Storm Petrel, Black-bellied Storm Petrel or Southern Black-backed Gull, they all probably do breed. Apart from the Fulmar Prion, which may breed, there are 25 breeding species. Of these, 20 are seabirds.

Except for the surface nesters, the sizes of the populations

geographical provinces on the basis of their seabird faunas, and that the first three be combined in a higher category of super-province. Earlier authors, working on other groups, have also tended to link these four islands, e.g. Skottsberg (1960) from a comparison of the plants and Knox (1960) from the littoral flora and fauna. However, more up-to-date information on the distribution of littoral and benthic organisms has partly modified previous ideas on relationships and the Antipodes, Auckland, Campbell and Bounty Islands have been grouped into one Antipodean Province by Knox (1975).

The conservation of the Antipodes Island flora and fauna is important, nationally and internationally. The island has three endemic plants — *Coprosma antipoda, Gentiana antipoda* and *Senecio antipodus,* one bird species — *Cyanoramphus unicolor,* and three bird subspecies — *Coenocorypha aucklandica meinertzhagenae, Cyanoramphus novaezelandiae hochstetteri* and *Anthus novaeseelandiae steindachneri.* The natural existence of these birds, and of the smaller petrels, depends on the absence of alien mammals bigger than mice. Unauthorised landings must therefore be prevented and authorised ones must be carefully controlled. No longer, as in the past, can the fauna of islands like this be protected primarily by their isolation and by their lack of adequate anchorages or shelter. The introduction of the 320 km exclusive economic zone may mean more careful monitoring of fishing boats and of other activity near the southern islands than happened in the past, but if oil should be discovered in the Great South Basin, new problems are likely to arise. Oil pollution is one obvious danger, but demands to establish manned navigational or other permanent facilities, probably serviced by helicopter, on islands such as Antipodes that lie near the wells, will put at risk both the vegetation and the birds.

ACKNOWLEDGEMENTS

Our expedition was partly financed by the Trans-Antarctic Expedition Research Fund. We are also indebted to the Royal New Zealand Navy for transport, and the senior author to the Committee of the Frank M. Chapman Memorial Fund for a grant to support his work at the American Museum of Natural History. We are also grateful to that institution and to Drs Wesley Lanyon and Dean Amadon and Mrs Mary LeCroy for much assistance including making available Beck and Correia's logs. At the British Museum of Natural History the help of Dr Snow and his staff is gratefully acknowledged. We thank fellow expedition members and the late Sir Robert Falla, Mr Graham Turbott and Dr W. R. P. Bourne for comments and advice on the manuscript.

LITERATURE CITED

ARCHEY, G. 1923. Notes on the birds of the sub-Antarctic islands of New Zealand. Rec. Cant. Mus. 2: 117-120.

BAILEY, A. M.; SORENSEN, J. H. 1962. Subantarctic Campbell Island. Proc. Denv. Mus. Nat. Hist. 10: 1-305

BARRAT, A. 1974. Note sur le Petrel gris **Procellaria cinerea.** Com. nat. fr. Rech. Ant. 33. 19-24.

BARRAT, A.; MOUGIN, J. L. 1974. Donnees numeriques sur la zoo-geographie de l'avifaune antarctique et subantarctique. Com. nat. fr. Rech. Ant. 33: 1-18.

BECK, J. R.; BROWN, D. W. 1971. The breeding biology of the Black-bellied Storm-Petrel **Fregetta tropica.** Ibis 113: 73-90.

BENNETT, G. 1860. Gatherings of a naturalist in Australasia: being observations principally on the animal and vegetable productions of New South Wales, New Zealand and some of the Austral Islands. Pp. 456. London: Van Voorst.

BOURNE, W. R. P. 1968. Notes on the diving-petrels. Bull. Br. Orn. Cl. 88: 77-85.

BOURNE, W. R. P. 1975. Some seabird records in **Notornis.** Notornis 22: 84-87.

BOURNE, W. R. P.; WARHAM, J. 1966. Geographical variation in the giant petrels of the genus **Macronectes.** Ardea 54: 45-67

BULLER, W. L. 1892. Notes and observations on New Zealand birds. Trans. Proc. NZ Inst. 24: 64-74.

BULLER, W. L. 1893. Further notes on the birds of New Zealand. Trans. Proc. NZ Inst. 25: 63-89.

CHAPMAN, E. R. 1891. The outlying islands of New Zealand. Trans. Proc. NZ Inst. 23: 491-522.

CHILTON, C. 1909. The subantarctic islands of New Zealand and the history of their scientific investigations. Pp. xiv-xxv in: CHILTON, C. (ed.). The Subantarctic Islands of New Zealand. Pp. 848. Wellington: Govt. Printer.

COCKAYNE, L. 1904. A botanical excursion during midwinter to the southern islands of New Zealand. Trans. Proc. NZ Inst. 36: 225-333.

CONROY, J. W. H.; BRUCE, G.; FURSE, J. R. 1975. A guide to the plumages and iris colours of the giant petrels. Ardea 63: 87-92.

DAVIS, L. I. 1964. Biological acoustics and the use of the sound spectrograph. Southwestern Nat. 9: 118-145.

DESPIN, B. 1976. Observations sur le Petrel gris **Procelleria cinerea.** Ois. Rev. Fr. Orn. 46: 432-433.

DESPIN, B.; MOUGIN, J. L.; SEGONZAC, M. 1972. Oiseaux et Mammiferes de L'Ile de L'Est. Archipel Crozet (46°25'S 52°12'E). Com. nat. fr. Rech. Ant. 31: 1-106.

ELLIOTT, H. F. I. 1957. A contribution to the ornithology of the Tristan da Cunha Group. Ibis 99: 545-586.

FALLA, R. A. 1965. Birds and Mammals of the Subantarctic Islands. Proc. Ecol. Soc. NZ 12: 63-68.

FALLA, R. A.; SIBSON, R. B.; TURBOTT, E.G. 1966. Field guide to the Birds of New Zealand and outlying islands. Pp. 254. London: Collins.

FLEMING, C. A. 1953 (ed.). Checklist of New Zealand Birds. Pp. 80. Wellington: A. H. & A. W. Reed.

FLEMING, C. A.; SERVENTY, D. L. 1943. The races of **Puffinus assimilis** in Australia and New Zealand. Emu 43: 113-125.

FORBES, H. O. 1892. Note on a species of **Platycercus (P. erythrotis.** Wagl.) from Antipodes Island. Trans. Proc. NZ Inst. 24: 190-191.

FORSHAW, J. M. 1973. Parrots of the world. Pp. 584. Melbourne: Lansdowne Press.

FULLERTON, J. D. 1911. First report of the Bird Construction Committee. Pp. 61. Aeronaut. Soc. Gt. Brit.: London.

GUTHRIE-SMITH, H. 1936. Sorrows and joys of a New Zealand naturalist. Pp. 252. Wellington: Reed.

HAGEN, Y. 1952. Birds of Tristan da Cunha. Results of the Norwegian Scientific Expedition to Tristan da Cunha 1937-1938. 20: 1-248.

HECTOR, J. 1895. On the anatomy of flight of certain birds. Trans. Proc. NZ Inst. 27: 284-287.

HUTTON, F. W. 1865. Notes on some of the birds inhabiting the Southern Ocean. Ibis (New Series) 1: 276-298.

HUTTON, F. W. 1895. On **Majaqueus aequinoctialis** from Antipodes Island. Trans. Proc. NZ Inst. 27: 177.

KINSKY, F. C. (Convener). 1970. Annotated checklist of the birds of New Zealand including the birds of the Ross Dependency. Wellington: OSNZ.

KINSKY, F. C. 1971. Recent occurrences of rare petrels in New Zealand. Notornis 18: 215-216.

KIRK, T. 1891. On the botany of Antipodes Island. Trans. Proc. NZ Inst. 23: 436-441.

KNOX, G. A. 1960. Littoral ecology and biogeography of the southern oceans. Proc. Roy. Soc. Lond. Series B. 152: 577-624.

KNOX, G. A. 1975. Marine benthic ecology and biogeography. Pp. 353-403 **in** KUSCHEL, G. (ed.). Biogeography and ecology in New Zealand. Pp. 689. The Hague: Junk.

LEAR, E. 1830-1832. Illustrations of the family Psittacidae or Parrots: the greater part of them hitherto unfigured, containing forty-two lithographic plates, drawn from life, and on stone. London (no text). Part 4 (1831): plate 25 — **Cyanoramphus unicolor.**

MATHEWS, G. M. 1912-1913. The Birds of Australia. Volume 2. Pp. 305. London: Witherby.

MATHEWS, G. M. 1913. Additions and corrections to my reference list. Aust. Av. Rec. 1: 187-194.

MATHEWS, G. M.; HALLSTROM, E. J. L. 1943. Notes on the Order Procellariiformes. Pp. 62. Sydney: Verity Hewitt Bookshop.

MATTHEWS, L. H. 1929. The birds of South Georgia. Disc. Rep. 1: 563-592.

MOUGIN, J. L. 1970. Le Petrel a menton blanc **Procellaria aequinoctialis** de l'Ile de la Possession (Archipel Crozet). Ois. Rev. Fr. Orn. 40, Special Number: 62-96.

are extremely difficult to assess. The majority are petrels, but their burrows are patchily dispersed and, in areas heavily covered with fern and tussock or in *Coprosma*-choked gullies, are impracticable to count. However, nowhere were burrow densities comparable with those at some of the islands around Stewart Island or in Bass Strait where nests may average one/m^2 (Warham 1960 and unpubl.). We doubt whether either the biomass or the number of resident birds is as great on these 2090 ha as it is, for example, on the 280 ha of the Snares Islands.

The seabird fauna is reasonably balanced — a large and a small crested penguin; a large and a small albatross; the northern, warm-water giant petrel; large and medium sized summer-breeding and large and small winter-breeding petrels (Shoemakers/Sooty Shearwaters and Pediunkers/Little Shearwaters), and a good variety of smaller petrels. Our inability to find nests of the storm petrels (one medium sized, one small) is not surprising as both nests and birds are notably cryptic. It is more surprising that we saw so little of Fairy Prions, despite the many taken offshore: perhaps it does not breed on the Main Island. Likewise, no prions have been recorded nesting on the main island of the Campbell group, which, though much larger (10 000 ha) and seeming to offer many suitable habitats, is infested with rats. The absence of the Bounty Island Shag is less surprising for the Antipodes coastline lacks inlets, deep indentations or shallows, and so suitable inshore fishing may be lacking. Also missing is the Yellow-eyed Penguin *(Megadyptes antipodes)* which does breed further south at Campbell and the Auckland Islands. Its absence at Antipodes may be due to the scarcity of open sandy beaches adjacent to suitably vegetated nesting sites. The only beach, at Alert Bay, is tiny; the slopes above are steep, with their lower levels occupied by Rockhoppers and appear to be unsuitable for *Megadyptes*. Perhaps for similar reasons this species is also absent from the Snares: the one beach there is but a few metres long.

Two other widespread New Zealand birds might have been expected — the White-faced Storm Petrel *(Pelagodroma marina)* which nests further south in small numbers (at the Auckland Islands), and the Red-billed Gull *(Larus novaehollandiae)*, which also breeds to the south at both Campbell and the Aucklands. We could easily have overlooked the former but not the latter.

We saw little evidence that man has affected the avifauna, despite the activities of the sealers between 1804 and about 1820 and the government's liberation of Snares Crested Penguins, goats, sheep and cattle (Warham & Johns 1975). All seem to have died out naturally. The thriving Wandering Albatross population also suggests that the direct impact of man has been slight, for at Macquarie Island, the presence of many skulls in caves suggests that marooned sealers relied heavily on these birds for food, which may be why their population is still small and evidently recovering only slowly.

The Northern Hemisphere passerines seen have previously shown their dispersive abilities and presumably reached Antipodes Island down wind from New Zealand. Only Redpoll, Dunnock and Starling seem likely to survive without further immigration.

The seabird fauna of the island has closest affinity to those of the two nearest islands with soil cover — the Auckland and Campbell Islands. Although the Aucklands are much bigger and offer more varied terrestrial habitats, only five more seabirds are known to nest there than at the Antipodes. The two island groups have 15 species in common. Slightly less alike are the seabirds of Antipodes and Campbell Islands. The latter supports nineteen species of which thirteen also nest at Antipodes. With an equal number of breeding species, Macquarie Island shares only twelve with Antipodes, while the Snares Islands, with 14 breeding seabirds, shares only seven with Antipodes Island.

Similar comparisons were made by Winterbottom (1971) and, although his species lists were partly defective as he lacked the latest information, we agree with his general conclusions regarding the seabird affinities of the New Zealand southern islands. Thus when Jaccard community coefficients (CC)[1] and Simpson's coefficients (CS)[2] are calculated comparing the Antipodes Island seabird fauna with those of the Aucklands, Campbell, Macquarie and the Snares Islands, the CC(CS) values are 50(75), 50(68), 43(60) and 26(50) respectively.

The higher the value for these two coefficients, the greater the similarity between their faunas, a CC or CS value of 100 indicating complete homogeneity and the CS value being most useful where there are marked differences in the sizes of the compared faunas. The values calculated above are appreciably lower than those calculated by Winterbottom and emphasise that, although the seabirds of Antipodes Island most resembled those of its nearest neighbours, the Aucklands (950 km away), Campbell (850 km away) and Macquarie Islands (1500 km away), the Antipodes Island seabird fauna is nevertheless rather distinct.

This viewpoint is stressed in an elaboration of Winterbottom's analysis by Barrat & Mougin (1974). These authors also pointed out that the seabird faunas of New Zealand's southern islands resemble each other more than they resemble those of more distant Southern Ocean islands, and even proposed that Antipodes, Auckland, Campbell and Macquarie Islands should be given the status of separate zoo-

---

1. $CC = \frac{100C}{n1 + n2 - C}$ 2. $CS = \frac{100C}{n1}$

where C = no. of species in common; $n1$ = no. in the smaller fauna and $n2$ = no. in the larger fauna.

MOUGIN, J. L. 1975. Ecologie comparee des Procellariidae antarctiques et subantarctiques. Com. nat. fr. Rech. Ant. 36: 1-195.
MURPHY, R. C. 1927. On certain forms of **Puffinus assimilis** and its allies. Am. Mus. Nov. 276: 1-15.
MURPHY, R. C. 1936. Oceanic birds of South America. Pp. 1245. New York: Macmillan & Am. Mus. Nat. Hist.
MURPHY, R. C. 1938. Birds collected during the Whitney South Sea Expedition XXXVII. On Pan-Antarctic Terns. Am. Mus. Nov. 977: 1-17.
MURPHY, R. C.; HARPER, F. 1921. A review of the diving petrels. Bull. Am. Mus. Nat. Hist. 44: 495-554.
MURPHY, R. C.; PENNOYER, J. M. 1952. Larger petrels of the genus **Pterodroma.** Am. Mus. Nov. 1580: 1-43.
OGILVIE-GRANT, W. R. 1905. On the birds procured by the Earl of Ranfurly in New Zealand and the adjacent islands. Ibis (New Series) 8 (5): 543-602.
OLIVER, W. R. B. 1955. New Zealand Birds. 2nd. Ed. Wellington: Reed.
PLUNKET, LORD. 1912. The outlying islands of New Zealand. United Empire (London) 1912: 18-28.
POOLE, E. L. 1938. Weights and wing areas in North American birds. Auk 55: 511-517.
REISCHEK, A. 1899. Notes on the islands to the south of New Zealand. Trans. Proc. NZ Inst. 21: 378-389.
RICHDALE, L. E. 1950. Further notes on the Erect-crested Penguin. Emu 49: 153-166.
RICHDALE, L. E. 1965. Biology of birds of Whero Island, New Zealand, with special reference to the Diving Petrel and the White-faced Storm Petrel. Trans. Zool. Soc. Lond. 31: 1-86.
ROBERTSON, C. J. R. 1972a. Preliminary report on bird banding in New Zealand 1964-1971. Notornis 19: 61-73.
ROBERTSON, C. J. R. 1972b. Two unusual albatross recoveries. Notornis 19: 91.
ROBERTSON, C. J. R. 1973. Preliminary report on bird banding in New Zealand 1971-1972. Notornis 20: 59-70.
SCHONWETTER, M. 1963. Handbuch der Oologie 7 (7): 410
SERVENTY, D. L.; SERVENTY, V. N.; WARHAM, J. 1971. The handbook of Australian sea-birds. Pp. 254. Sydney: Reed.
SKOTTSBERG. C. 1960. Remarks on the plant geography of the southern cold temperate zone. Proc. Roy. Soc. Lond. B 152: 475-490.
STONEHOUSE, B. 1960. The King Penguin **Aptenodytes patagonica** of South Georgia 1. Breeding and development. Falk. Is. Dep. Sur. Sc. Rep. 23: 1-81.
SWALES, M. K. 1965. The sea-birds of Gough Island. Ibis 107: 17-42.
TAYLOR, R. H. 1975. Some ideas on speciation in New Zealand parakeets. Notornis 22: 110-121.
TICKELL, W. L. N. 1968. The biology of the great albatrosses **Diomedea exulans** and **Diomedea epomophora.** Ant. Res. Ser. 12: 1-55.
TUCK, L. M. 1972. The Snipes: a study of the genus **Capella.** Can. Wildl. Ser. Mon. 5. Pp. 429.
WAITE, E. R. 1909. Vertebrata of the subantarctic islands of New Zealand. Pp. 542-600 **in** CHILTON, C. (ed.). The subantarctic islands of New Zealand. Pp. 848. Wellington: Govt. Printer.
WARHAM, J. 1960. Some aspects of breeding behaviour in the Short-tailed Shearwater. Emu 60: 75-87.
WARHAM, J. 1962. The biology of the Giant Petrel **Macronectes giganteus.** Auk 79: 139-160.
WARHAM, J. 1963. The Rockhopper Penguin. **Eudyptes chrysocome,** at Macquarie Island. Auk 80: 229-256.
WARHAM, J. 1967. The White-headed Petrel **Pterodroma lessoni,** at Macquarie Island. Emu 67: 1-22.
WARHAM, J. 1969. Notes on some Macquarie Island Birds. Notornis 16: 190-197.
WARHAM, J. 1971. Body temperatures of petrels. Condor 73: 214-219.
WARHAM, J. 1972a. Breeding seasons and sexual dimorphism in Rockhopper Penguins. Auk 89: 86-105.
WARHAM, J. 1972b. Aspects of the biology of the Erect-crested Penguin **Eudyptes sclateri.** Ardea 60: 145-184.
WARHAM, J. 1975. The Crested Penguins. Pp. 189-269 **in** STONEHOUSE, B. (ed.). The Biology of penguins. Pp. 555. London: Macmillan.
WARHAM, J. 1976. Aerial displays by large petrels. Notornis 23: 255-257.
WARHAM, J. 1977. Wing loadings, wing shapes and flight capabilities of Procellariiformes. NZ Jour. Zool. 4: 74-83.
WARHAM, J.; JOHNS, P. M. 1975. The University of Canterbury Antipodes Island Expedition 1969. Jour. Roy. Soc. NZ 5: 103-131.
WARHAM, J.; KEELEY, B. R.; WILSON, G. J. 1977. The breeding of the Mottled Petrel **Pterodroma inexpectata.** Auk 94: 1-17.
WILLIAMS, G. R. 1953. The dispersal from New Zealand and Australia of some introduced European passerines. Ibis 95: 676-692.
WINTERBOTTOM, J. M. 1971. The position of Marion Island in the subantarctic avifauna. Pp. 241-248 **in** VAN ZINDEREN BAKKER, E. M. SNR.; WINTERBOTTOM, J. M.; DYER, R. A. (eds.). Marion and Prince Edward Islands. Report on the South African Biological and Geological Expedition 1965-1966. Pp. 427. Cape Town: Balkema.
WITHERBY, H. F.; JOURDAIN, F. C. R.; TICEHURST, N. F.; TUCKER, B. W. 1941. The handbook of British birds. Vol. 1. London: Witherby.

JOHN WARHAM, *Department of Zoology, University of Canterbury, Christchurch 1* and BRIAN D. BELL, *NZ Wildlife Service, Department of Internal Affairs, Wellington.*

SHORT NOTE

SECOND RECORD OF WHITE-TAILED TROPIC BIRD IN NEW ZEALAND

Photo: Taranaki Newspapers Ltd.

The first accepted record of the White-tailed Tropic Bird *(Phaethon lepturus)* in New Zealand was based on a skull with a malformed bill found near Whakatane in January 1973 (Brown 1973, *Notornis* 20: 380-1). On 17 February 1979 we found a very freshly dead immature specimen in near perfect condition in the course of a beach patrol near Okato, Taranaki. The presence in New Zealand of this bird, no doubt of the subspecies *dorotheae* which breeds on many South-west Pacific islands, is probably explained by the tropical cyclone that occurred a short time previously. It is perhaps of some interest that this species is a regular though rare visitor to eastern Australia and that most specimens collected there have been juveniles. We propose to deposit our specimen in the National Museum.

D. G. & J. C. MEDWAY, *P.O. Box 476, New Plymouth.*

SOME BIRD OBSERVATIONS FROM WESTERN SAMOA

By PETER CHILD

ABSTRACT

Some bird observations for late August-early September 1978, are summarised. The Siberian Tattler is recorded for the first time in Western Samoa and two seabirds (Crested Tern and Little Tern). A new breeding record for the Brown Booby is also described. Some brief comments are made on comparative behaviour with Fijian land birds.

INTRODUCTION

My wife and I visited Western Samoa for the three weeks 21 August to 8 September 1978, during which we spent most of each day visiting areas of likely ornithological interest.

We spent a large part of the time in the vicinity of Apia, but also visited forest margins on the hills above the town, Lake Lanoto'o, coastal areas on the north from Lufilufi to Manonouta, and the south-east from Lotofaga to Salea'aumua. We had a one-day trip by launch to the island of Manono (which we walked right around), a one-day trip by launch to the Salelologa area of Savai'i, and a three-hour visit by canoe to the eastern island of Fanuatapu.

Our reference for place names is the Lands and Survey map number 15 " Western Samoa," scale 1:200 000, 2nd ed. 1966, repr. 1977.

Nearly all birds other than ducks, pigeons and doves, which Samoans continue to hunt relentlessly with gun and " shanghai," were less afraid of man than their Fijian equivalents, and illustrated some interesting comparative behaviour patterns.

The conspicuousness of birds like the Samoan Starling *(Aplonis atrifuscus)* on tree-tops, or the Banded Rail *(Rallus philippensis)* in open spaces and on roadsides, can probably be partly attributed to the lack of predators. In Fiji, predators such as the Fiji Harrier *(Circus approximans)*, Goshawk *(Accipiter rufitorques)*, Peregrine Falcon *(Falco peregrinus)* and mongoose are widespread, whereas in Samoa the only common large predator is the Barn Owl *(Tyto alba)*. As further evidence of this, the large fruit bat is relatively common during the day in Samoa, whereas in Fiji it is mainly nocturnal.

Whereas in Fiji the Island Thrush *(Turdus poliocephalus)* and Golden Whistler *(Pachycephala pectoralis)* are rather secretive shy birds in the dark recesses of the forest foliage, in Samoa they are frequently to be seen more or less in full view on fairly open branches, or even on open ground in the case of the thrush.

NOTORNIS 26: 171-179 (1979)

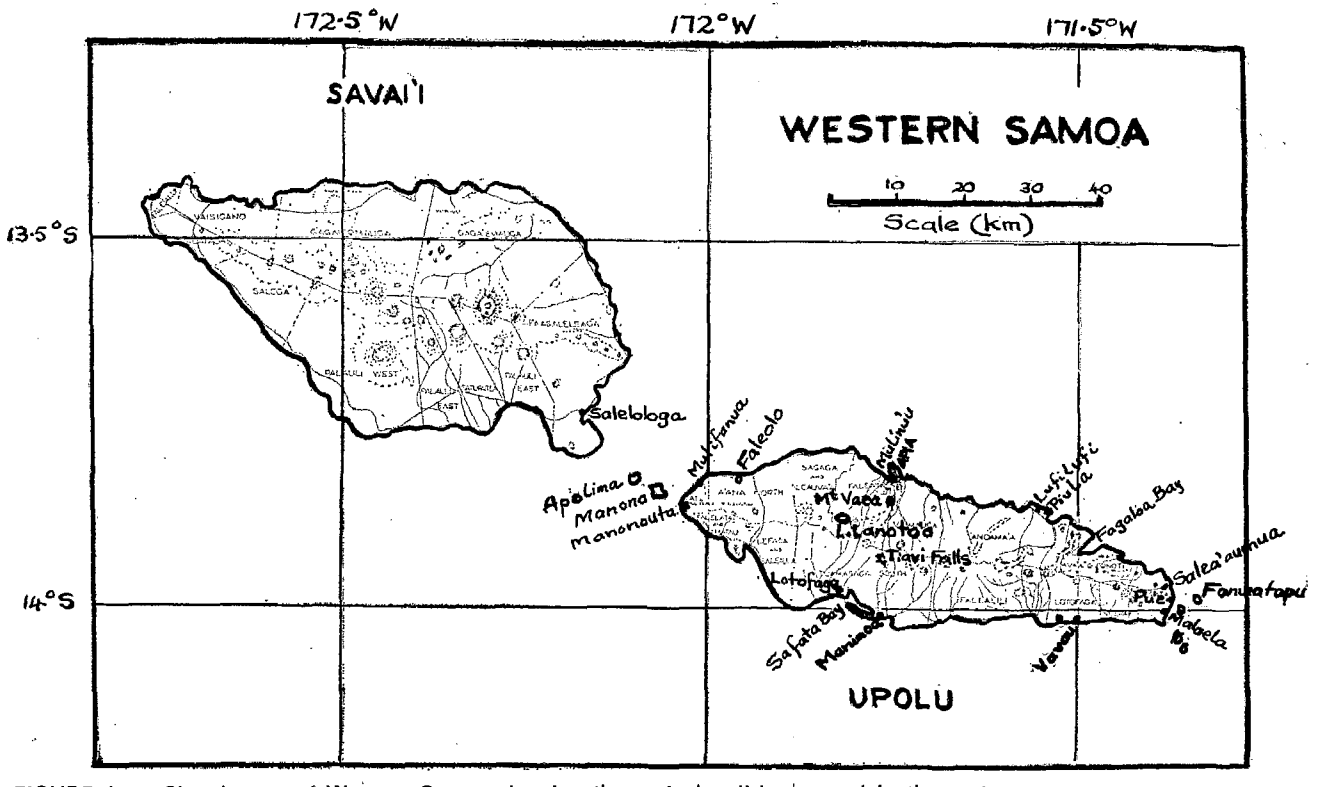


FIGURE 1 — Sketch map of Western Samoa showing the main localities named in the text.

In Samoa, the Red-headed Parrot Finch *(Erythrura cyanovirens)* is apparently associated only with shrub and forest habitats well away from civilisation, where it may be found feeding along twigs or among epiphytes, whereas in Fiji they occur not only in similar habitat but are also commonly seen on grassy suburban clearings feeding on the ground.

The Polynesian Triller *(Lalage maculosa)* is a common noisy species in both countries, but whereas in Fiji it tends to be seen in shrubs, thickets and savannah-type country, in Samoa it is also common in small flocks in gardens and grassy places, even street verges, and often feeding on the ground. So ' domesticated ' is this triller in Samoa that it could be said to be occupying some of the niches filled by the House Sparrow *(Passer domesticus)* in similar habitats in New Zealand.

A good summary of the present birdlife on Upolu is given by Dhondt (1976), and it is not proposed to repeat those observations in a general way; we agree with most of his comments as to status and distribution, with the exceptions noted below.

To Dhondt's list of literature should be added a short paper by Green (1965).

LAND BIRDS

REEF HERON *Egretta sacra*

As Dhondt remarked, this species is common all around the coasts and occasionally slightly inland up some of the larger streams. We agree with his observations that the white phase must be very rare. Of the 38 birds we recorded, none was white. This total included observations on the islands of Manono, Savai'i and Fanuatapu. None of our native informants had ever seen a white-phase bird.

ROCK PIGEON *Columba livia*

Dhondt commented only that this species " seems to have become feral in the Apia region." The origin of these birds is obscure, but we recorded 22 in one flock on a reclaimed flat east of Apia, 5 on a roof-ridge in the Apia wharf area, at least 2 about halfway around the coast to Lufilufi, and two singletons in different villages along the south-east coast (Vavau and Malaela).

LONG-TAILED CUCKOO *Eudynamis taitensis*

We did not record this species, although it should have been present in the hill forests at the time of our visit. It is also strange that Dhondt made no record of it during two spells of several months each. According to Ashmole (1963), it has been recorded from all islands except Savai'i.

SAMOAN TRILLER *Lalage sharpei*

Dhondt's comment is contradictory since near the beginning he states that " everybody agrees that this species is very rare," while at the end he says " it is not a common bird but is certainly not very rare."

We agree with the latter observation, having found a pair or more on each excursion to the forest margins. One morning we recorded nine birds within two hours. It seems to prefer secondary growth or the shrub layer in this habitat.

Calls heard from a pair on a tree above Tiavi Falls were a quiet *tchick* and a rather subdued *zeez-zeez*.

SAMOAN WHISTLER *Pachycephala flavifrons*

Unlike Dhondt, we found this species to be common in all types of forest, calls being heard throughout the day but especially numerous in early morning and evening. It was much less wary than its counterpart in Fiji, allowing good views on several occasions.

POLYNESIAN STARLING *Aplonis tabuensis*

Much commoner than Dhondt suggested but rather inconspicuous compared with the Samoan Starling, tending to remain under the cover of leafy twigs. It was well distributed at all altitudes from sea level to high in the mountains. On 31 August a pair in the grounds of the NZ High Commissioner was feeding young in the hollow crown of a broken tree-fern.

JUNGLE MYNA *Acridotheres fuscus*

We confirm the observation by Watling (1978) that the myna present is of this species and not the Common Myna *(A. tristis)* reported by Dhondt.

We saw only a few small groups of up to six birds in the environs of Apia, feeding on grassy clearings and on the flowers of tall trees. None was seen elsewhere around the coasts or in the hill forests. It does not appear to be "spreading rapidly," as Dhondt predicted; in fact, it seems to be rather uncommon and localised. As Watling suggested, competition with the large, aggressive Samoan Starling *(Aplonis atrifuscus)* is probably restricting the myna's colonisation of further habitat.

MARINE BIRDS

TROPIC-BIRDS

As Dhondt observed, the White-tailed Tropic-bird *(Phaethon lepturus)* was commonly seen flying around hillsides over the forest canopy and out over the coastal reef in all areas visited. Several were soaring back and forth on updraughts around Mt Vaea (near Apia) every day. On one occasion, we met two young men coming down a track from the summit of Mt Vaea, carrying two that they had caught by climbing a forest tree on which the birds were asleep (mid-morning). They tried unsuccessfully to sell them to a local hotelier who kept a small aviary containing Samoan Starlings, Blue-crowned Lories and a few others. Both birds were the same size and had full adult markings but had only one fully developed white tail "streamer," the other being about half-size. The men believed they were a pair and that the female was the one with the paler bill (pale horn colour with a greyish-yellow tinge) while the supposed male's was plain dull yellow.

The red-tailed species *(P. rubricauda)*, however, appears to be rare, at least around Upolo; we could find none ourselves and none of our native informants had any knowledge of it.

BROWN BOOBY *Sula leucogaster*

On 1 September, three singletons were seen from the ferry between Mulifanua and Salelologa (Savai'i), two flying low over the waves and the third resting on a floating log near the island of Apolima.

On 4 September during our visit to Fanuatapu Island, we had magnificent close views of at least five adults and one immature as they planed about close to the eastern cliffs. On exploring the south-eastern crest, we found an adult sitting on a single egg in a rough nest on a grassy ledge a few metres below the ridge. The egg was pale watery blue, covered with a thick coat of chalky white material. According to King's (1967) list, this is a new breeding record for Samoa.

RED-FOOTED BOOBY *Sula sula*

Also from Fanuatapu on 4 September, we had good views of one adult white-phase bird and at least four or five birds of an intermediate phase. The latter were more distant than the Brown Boobies and appeared to be cruising back and forth close to the ocean surface so that it was difficult to determine exactly how many there were. Most appeared immature, with speckled upper wings and some mottling around the neck but otherwise mainly white and with white tails.

FRIGATE BIRDS *Fregata* spp.

On the morning of 31 August, three arrived at the Malifa Primary School grounds (Apia); one landed on the playing field, another settled on the branch of a tree, and the third circled overhead. We did not see these but from the description given (including whitish heads with rusty colouring) they were obviously immatures.

During the afternoon of 6 September at Piula, four were soaring high beyond the reef above a flock of fishing noddies and terns. The closest one, entirely black, was an adult male Greater *(Fregata minor)* but the others were too distant for certain recognition.

On 4 September five adult males of *Fregata minor* arrived and soared on trade winds low over Fanuatapu Island, allowing splendid viewing and positive identification of this all-black frigate bird. When we left the island about 2.30 pm, we noticed them roosting on trees overhanging a cliff on the northern side, and as we watched, a single female of this species (with black head but white throat and breast) arrived and settled on a palm frond near one of the males. The red skin of the males' gular pouches was visible but not inflated. Our canoe-men said the frigates did not breed on this island.

WHITE TERN *Gygis alba*

Common around the coasts, with large flocks seen fishing out beyond the reef, usually in the company of noddies, and small numbers over the forest canopy in many districts. Birds were often coming and going between the ocean and the forest, and so there was no possible confusion with the Black-naped Tern *(Sterna sumatrana)*, which is very uncommon at Upolu. In two places on and near Mt Vaea, birds were seen to settle in trees but no nesting was observed. However, on 23 August one was seen in this area carrying a fish.

Several were seen over forest at Tiavi Falls on 3 and 4 September. According to one native informant, this species nests in forest trees inland at quite high altitude, rather than near the coast.

NODDIES

The Common Noddy *(Anous stolidus)* is the commonest seabird everywhere, although we could not find any breeding at the time of our visit. On Fanuatapu Island, about 90 were coming and going from the northern and eastern cliffs but no breeding was in progress.

The White-capped Noddy *(Anous tenuirostris)* is apparently rather uncommon. We saw only two for certain, over the lagoon near Maninoa on the south coast on 3 September. Another in an inaccessible niche in a volcanic cliff on Fanuatapu Island seemed to be of this species.

CRESTED TERN *Sterna bergii*

King (1967) listed this species as a vagrant for the " Samoan Islands " but I can find no record of it for Western Samoa. On the afternoon of 31 August, we found a single bird fishing on the incoming tide at the Mulinu'u inlet, west of Apia. Although the black crest was formed, the crown itself was not pure black and the upper wings were mottled grey and whitish, suggesting an immature. It caught four or five fish in a spell of 20 minutes. The same bird was still present on subsequent visits on 5 and 8 September.

LITTLE TERN *Sterna albifrons*

At the mangrove mudflat near Parliament House (see under "waders") on the morning of 8 September, a tiny whitish tern was noticed resting on the mud above the incoming tidemark among scattered turnstones, tattlers and plovers. It was approached to within 15 metres and identified as this species with its characteristic black cap and black line through the eye to the base of the bill, which itself was a light brownish-horn shade. The upper mantle and wings were light grey with a faint brownish tinge, slightly darker at the tips; rump, tail and underparts were pure white.

When disturbed, it flew off and fished for a few minutes before returning to rest again on the mud. No calls were heard. It had not been present on our earlier visits to the same area.

WADERS

Although occasional birds, especially tattlers and Golden Plovers, may be seen at almost any suitable stretch around the Upolu coast, there seem to be rather few really 'rich' wader areas. The best discovered was just west of the Parliament House at Mulinu'u, west of Apia — an area of tidal inlet with mangrove mudflat and shingle dredge scrapes which left some shallow depressions and brackish pools, with grassy areas nearby inland (visited by Golden Plovers).

Another fairly rewarding but drier, partly grassed area was just east of the town on a reclaimed flat near the Royal Samoan Hotel. A likely looking area was north from a jetty under construction along the lagoon side near the east coast village of Pu'e, although there was considerable disturbance from children, dogs and fisherfolk. From the air, Fagalca Bay looked a likely habitat, as did the peninsula on the south coast at Safata Bay.

It is certain that careful searching at appropriate seasons of these and other areas, and also around Savai'i coasts will add new species to the Samoan list. Our short visit provided one new one, as detailed below.

WANDERING TATTLER *Tringa incana*

Tattlers were as common as Golden Plovers around the coast, being found in singles, twos and threes at all places, including rocky reefs and wave-splashed boulder beaches not frequented by plovers, but not on inland grassy areas.

On 24 August at Mulinu'u Inlet, we found a flock of 73 which we guessed had just arrived on migration south, as most of them were squatting on their bellies on the mud. The biggest flock counted was at the same locality on 28 August when there were 89 at high tide.

We also saw a few on Manono, Fanuatapu and Savai'i coasts.

SIBERIAN TATTLER *Tringa brevipes*

Among the flock of *T. incana* on 24 August were at least five birds considered to be *T. brevipes* — slimmer in build, with sleek silky-grey plumage, no barring on the underparts, legs a different shade of yellow, and the diagnostic double call heard three times from different individuals. Although we studied the waders at this area on five subsequent visits, we saw no more of this species; perhaps the group moved on south in their migration, because our observations of other species showed that the flocks were changing. This is a new species for Western Samoa.

PACIFIC GOLDEN PLOVER *Pluvialis dominica fulva*

A very common wader. Singles, pairs or small flocks could be seen at almost any suitable stretch of sandy or muddy coast. They were also frequently encountered on grassy areas, playing fields and the like. Any day, up to 20 could be found scattered over about 2 ha

of grassy foreshore seawards of the busy main thoroughfare at Apia. (On one such visit there were two birds missing a right foot!) On two occasions we even had a Golden Plover on the house lawn at about 400 m (1300') a.s.l., 8 km from the coast.

The biggest single congregation recorded was on 31 August at Mulinu'u mudflat when 66 were counted on the incoming tide. It was estimated that nearly 100 singletons were dotted over the short grass surrounds of Faleolo airport runway on 9 September. During our visit these birds were in all stages of plumage, from the very palest eclipse to full breeding plumage.

TURNSTONE *Arenaria interpres*

Contrary to Dhondt's comment, we found turnstones fairly common, as follows:

24 August (am):	Nine at Mulinu'u with Golden Plovers and Wandering Tattlers.
24 August (pm):	One flock of 23, one of 3, and two singles in the Samoan Hotel reclaimed area.
28 August:	16 at Mulinu'u.
29 August:	Three seen at one point from a bus en route to Manonouta.
2 September:	Two flocks of 14 and 5 feeding on a gravelly reclaimed jetty area near Malaela (east coast).
5 September:	Still 12+ at Mulinu'u.
5 September:	One with a Golden Plover on the lawn in front of Parliament House, and another with several Golden Plovers on the grassy foreshore opposite the Chief Post Office, Apia.

Undoubtedly there were others around the coast, but as they are fairly inconspicuous when feeding among rocks and exposed reef at low tide, they have to be carefully searched for. As with Golden Plovers and Wandering Tattlers, all stages of plumage from complete eclipse to full breeding dress were noted.

BAR-TAILED GODWIT *Limosa lapponica*

Four very pale birds of this species were feeding at the edge of the incoming tide at Mulinu'u inlet on 24 August. One (presumed female) was noticeably larger than the other three, with a longer bill. They were still in the same area at the end of our visit. None was seen elsewhere.

BRISTLE-THIGHED CURLEW *Numenius tahitiensis*

Seven of these curlews were among the other waders at Mulinu'u on 24 August. They were rather more wary and less approachable than the others, possibly passing through on migration. On the 28th, only five remained in the area and by 5 September only one was left. It was still there, among the Asiatic Whimbrels, on our last visit on 8 September.

ASIATIC WHIMBREL *Numenius phaeopus variegatus*

At Mulinu'u on 5 September, seven whimbrels with pale backs and rumps were seen for the first time, associating loosely with the Golden Plovers, four godwits and the one remaining Bristle-thighed Curlew. Comparison for size, colouring and body markings were thus readily made. The characteristic " seven-whistler " calls were heard three times when the birds were flushed. Viewed in good light, the legs were noticeably bluish-grey. The length of the bill seemed to vary a little among individuals but was shorter than that of the godwits and the curlew.

While feeding, they tended to keep to themselves, wading further out into the incoming tide than the others, until water was lapping their belly feathers, and keeping a few metres apart from each other.

On 8 September at the same area, eight whimbrels were present feeding as above. At peak high tide, two of them sat down on the mud!

CONCLUSION

There is obviously plenty of scope both for the professional ornithologist and the amateur bird-watcher for further field investigation into the present status, distribution, ecology and breeding of almost all the birdlife of Western Samoa. The rather scant observations recorded over the last 25 years by Yaldwyn, Dhondt, Green and a few others have been mainly on the island of Upolu, to the neglect of Savai'i with its high mountains and forests.

Some areas needing particular attention include —

(a) Dense primary forests — for Tooth-billed Pigeon, Ma'o, Silver-eye and others.
(b) Swamps and drainage basins — for rails.
(c) Coastal cliffs and groves — for seabird colonies.
(d) Inlets and other tidal reaches — for waders and their seasonal movements.

LITERATURE CITED

ASHMOLE, M. J. 1963. Guide to the birds of Samoa. 21 pp. Honolulu: Pac. Sci. Inf. Centre, Bernice P. Bishop Mus.
DHONDT, A. 1976. Bird observations in Western Samoa. Notornis 23: 29-43.
GREEN, R. H. 1965. Western Samoan bird notes. Elepaio 26: 19-21.
KING, W. B. 1967. Seabirds of the tropical Pacific Ocean. Prelim. Smiths. Ident. Man. Washington: Smiths. Inst.
WATLING, D. 1978. A Myna matter. Notornis 25: 117.
YALDWYN, J. C. 1952. Notes on the present status of Samoan birds. Notornis 5: 28-30

PETER CHILD, *10 Royal Terrace, Alexandra.*

FALCONS BREEDING IN THE RIMUTAKA RANGE

Referring to the comment of Fox (1978, *Notornis* 25: 317-331) that there is little information on the New Zealand Falcon *(Falco novaeseelandiae)* from the Rimutaka Range, I offer these rather casual observations that seem to confirm breeding in the area. The observations were made by myself and Mr N. Taylor and family during weekend and holiday trips to a hut in the Orongorongo River valley over the summer of 1978/79.

Falcons were seen on each visit in a group of large emergent trees on the slope above a small bush terrace on the true right bank of the river, about 5 km upstream of the DSIR Ecology Division field station. The birds had not been present in the previous spring and summer.

We first noticed the birds during the weekend of 2-3 December, when their noisy behaviour attracted our attention. Our observations at this time were limited to noting a falcon returning at intervals to a large dead rata with thick clumps of *Collospermum* and other epiphytes in the crooks of its otherwise bare branches. As it returned to what we presumed was its nest tree the bird made the *hek-hek-hek* . . . call. Falcon screams were also heard.

On 3-7 January, we saw three birds. One bird, presumed to be a juvenile, remained in the nest tree, occasionally flying up on to the bare branches where it exercised its wings and preened in the sun. Much screaming was heard, the presumed juvenile being particularly vocal. On one occasion, a bird swooped at us as we stood in a windfall clearing about 50 metres from and level with the top of the nest tree.

On 20-22 January, I again saw three birds. One still remained close to the nest tree but all three birds were regularly perching on the dead branches and the more exposed live branches of several nearby rimu trees. Occasionally, all three birds would circle above the trees with much chasing and screaming. I observed the following sequence of events on two occasions. Odd calls between birds in separate trees erupted into much agitation and screaming. One or two birds then flew off while the third remained alertly on a prominent perch. Within a few minutes, a falcon returned carrying a small prey item in its talons, was met in the air by the third bird, screaming loudly, rolled sideways and flicked the prey into the air. Both birds then dived screaming after the falling prey but disappeared out of my sight behind some trees.

On one occasion only, on 21 January, I saw four birds circling the nest area chasing and screaming.

We did not see a nest or a bird which we could recognise by appearance as a juvenile but the numbers and behaviour of the birds round the site seemed to indicate successful breeding.

K. MOYNIHAN. *Wildlife Service, Department of Internal Affairs, Private Bag, Wellington.*

NOTES ON THE MA'O (Gymnomyza samoensis), A RARE SAMOAN HONEYEATER

By RONALD I. ORENSTEIN

The Ma'o *(Gymnomyza samoensis)* is the largest and rarest of the three Samoan honeyeaters (Meliphagidae). Little has been recorded about it. Armstrong (1932) found it uncommon. More recently, Clapp & Sibley (1966; summary of Pacific Ocean Biological Survey Program expeditions) and Kaigler (1973) failed to find it on Tutuila, where it may be extinct. Dhondt (1976) did not definitely record the species during sixteen months' residence on Upolu.

It is therefore useful to record two brief observations I made of the Ma'o during a visit to Upolu, Western Samoa on 23-25 June 1974. Both sightings were in the hill forest near Tiavi Falls, south of Apia. The first bird was found on the 24th and 25th. I saw presumably a single individual both days in the same large tree at the extreme end of a side road running west of the road to Tiavi Falls. My attention was attracted to it by its distinctive calls, a series of low, hoarse, nasal mewing notes at times rising in pitch and developing into loud upslurred clear yelps, then falling back again. Bouts of calling lasted at least a minute, producing an effect not unlike a cat-fight. These were presumably the ' peculiar wailing ' calls Whitmee (1875) mentioned as an inspiration for the superstitious attitude of the Samoan towards the Ma'o. The bird kept to the interior of the tree, moving from branch to branch in hops. It kept its head low, and continuously waved the tail slowly and regularly up and down through at most an estimated thirty-degree angle. This tail movement did not ' keep time ' with the calls. In shape the bird recalled a friar-bird *(Philemon)*, with its large head, thin neck and long tail.

A sequence of calls of this bird was recorded with a cassette tape recorder. Figure 1 gives sonagrams of characteristic notes. For comparison I include a sonagram of the duetting call of *Gymnomyza viridis brunneirostris,* the Giant Forest Honeyeater of Viti Levu, Fiji (cf. Diamond 1972). While calling, this bird bends forward, as did *G. samoensis,* with the tail raised and fanned (Blackburn 1971). *G. v. viridis,* on Taveuni, gives varied calls including " loud melodious whistling gurgles with rapid mellow notes " (Blackburn *op. cit.*). Delacour (1966) describes the voice of the third species of the genus, the Crow Honeyeater *(G. aubryana)* of New Caledonia, as " strong and melodious."

The second bird, observed at closer range, was seen at the highest point on the road to Tiavi Falls (over 600 m a.s.l.) on 25

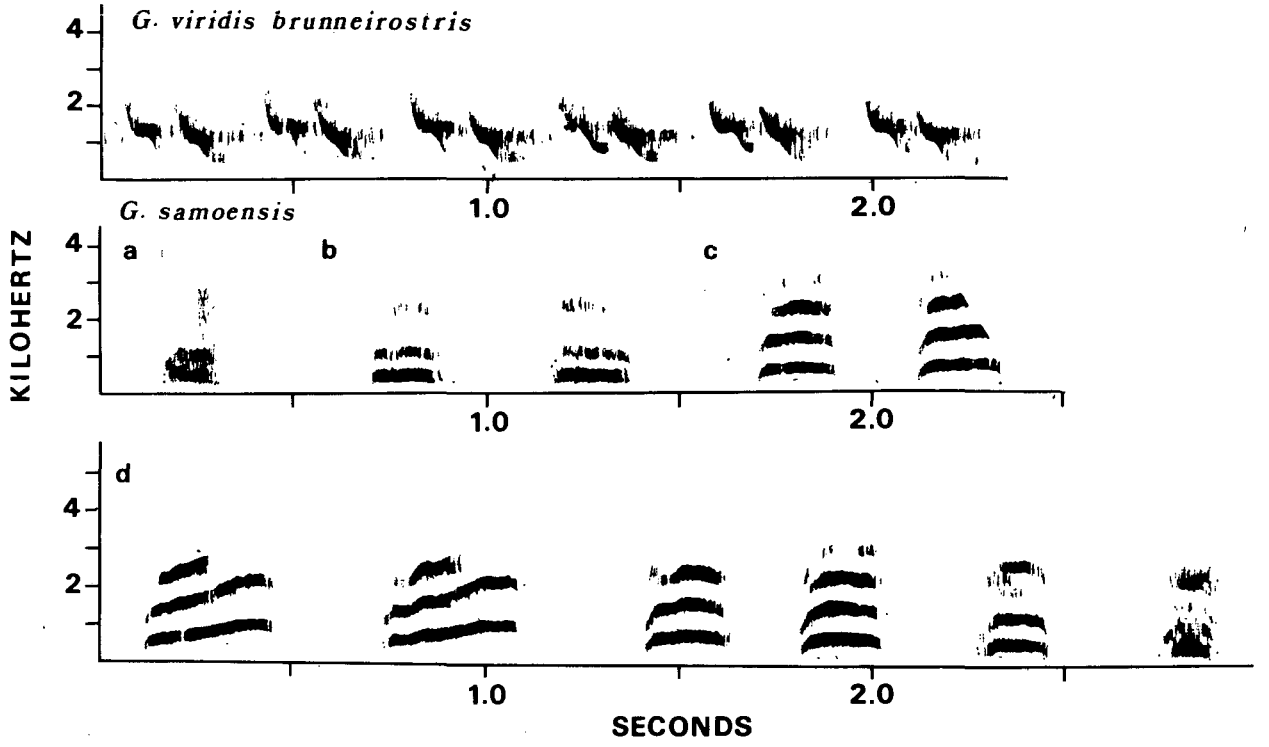


FIGURE 1 — Vocalisations of **Gymnomyza** spp. **Top:** Giant Forest Honeyeater **(Gymnomyza viridis brunneirostris.** Recorded on 19 June 1974 at Nailagosakelo Creek, southern Viti Levu, Fiji. Presumably a duet (cf. Diamond 1972); both birds not seen. **Middle and bottom:** Ma'o **(Gymnomyza samoensis).** Recorded on 25 June 1974 on Upolu, Western Samoa. Portions of a sequence of over 55 notes. Approximately 35 low, hoarse notes (a) were followed by eight clearer, higher-pitched phrases (b, c) leading to six loud yelps and subsiding again (last two yelps and four ensuing calls shown in (d)). All recordings made with a National Panasonic portable tape recorder.

June. It also kept to the interior of a tree, foraging in moss covering the limbs. Occasionally it hung upside down or completely circled a branch. Like the first bird, it kept up a continuous up-and-down tail-wagging. It called with a nasal, down-slurred *yaaw*. When it flew off, its flight was direct. In flight the bird reminded me of a miniature hornbill (Bucerotidae), with its elongate neck, rounded wings and long, spread tail.

Though both my observations were of single birds, Armstrong (1932) and Ashmole (1963; presumably quoting Armstrong) reported that the Ma'o associates in small parties. My observations may indicate a low population level for the species on Upolu. It seems unlikely that a bird with calls as loud and distinctive as has *G.*

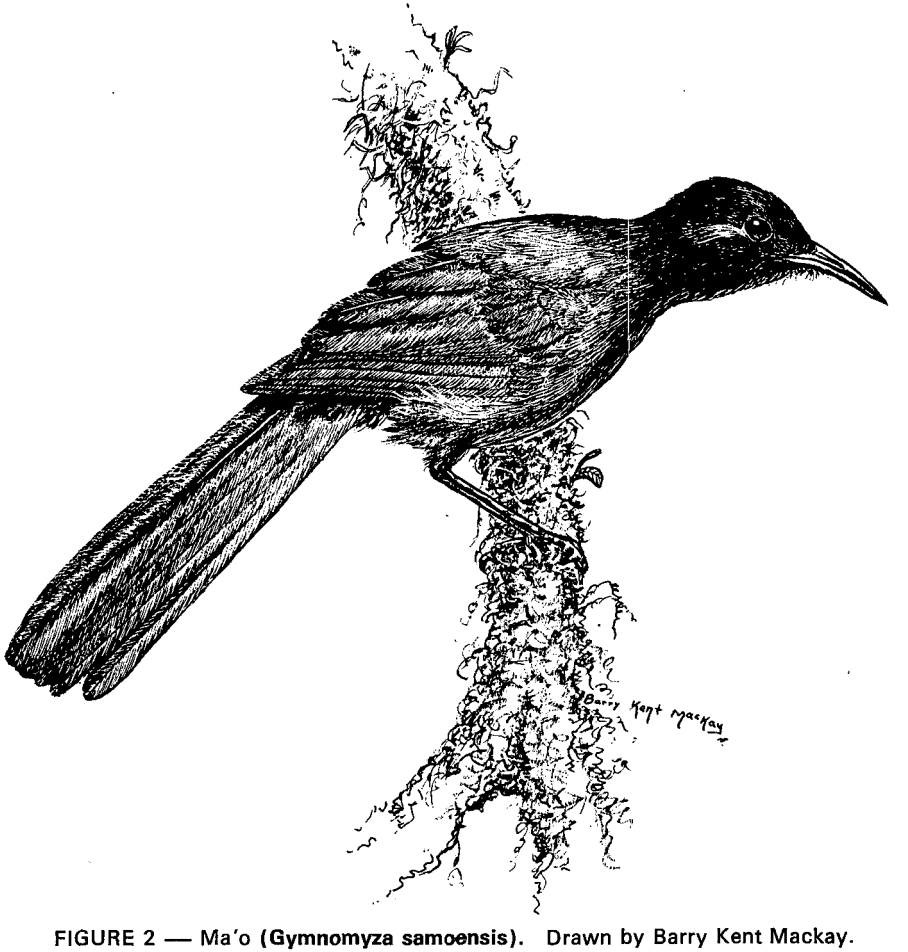


FIGURE 2 — Ma'o **(Gymnomyza samoensis).** Drawn by Barry Kent Mackay.

samoensis would be so rarely observed if it were not indeed rare, at least on Upolu and Tutuila.

The drawing of the Ma'o in Figure 2 was prepared by B. K. Mackay from my rough field sketch and a specimen lent by the Royal Ontario Museum, Toronto. The species has seldom been illustrated.

I am grateful to Peter Maddison and Andre Dhondt for their guidance in the field on Upolu. R. B. Payne provided access to sonagraph facilities, and Mark Orsen advised me in the preparation of Figure 1. The manuscript was read by R. W. Storer.

LITERATURE CITED

ARMSTRONG, JOHN S. 1932. Hand-list to the birds of Samoa. 91 pp. London: John Bale, Sons & Danielsson.
ASHMOLE, MYRTLE J. 1963. Guide to the birds of Samoa. 21 pp. Honolulu: Pac. Sci. Inf. Centre, Bernice P. Bishop Mus.
BLACKBURN, A. 1971. Some notes on Fijian birds. Notornis 18: 147-174.
CLAPP, ROGER B.; SIBLEY, F. C. 1966. Notes on the birds of Tutuila, American Samoa. Notornis 13: 157-164.
DIAMOND, JARED M. 1972. Further examples of dual singing by southwest Pacific birds. Auk 89: 180-183.
DELACOUR, JEAN 1966. Guide des oiseaux de la Nouvelle-Caledonie et de ses Dependences. 172 pp. Neuchatel: Delachaux et Niestle.
DHONDT, ANDRE 1976. Bird observations in Western Samoa. Notornis 23: 29-43.
KAIGLER, CHARLES G. 1973. Birding in Samoa. Elepaio 33: 96-98.
WHITMEE, S. J. 1875. List of Samoan birds, with notes on their habits. Pt. I. Landbirds. Ibis (3) 5: 436-477.

RONALD I. ORENSTEIN, *Division of Birds, Museum of Zoology, University of Michigan, Ann Arbor, Michigan, U.S.A. 48109.*

★

SHORT NOTE

GOLDEN PLOVERS SETTLING ON ROOFS

At Pago Pago, American Samoa, on 14 November 1976, three Eastern Golden Plovers *(Pluvialis dominica fulva)* in worn plumage were noticed first on the end of the oil-wharf, then on cargo containers on board a ship, and later on the flat roof of the Rainmaker Hotel. Here two of the three were running this way and that in some sort of a chase.

All reefs near this harbour are covered at high tide; and if the nearby sports fields are thronged with people, there are no quiet grassy places where waders may roost.

When this was mentioned to Dr N. W. Cusa, an English naturalist and painter who has twice visited New Zealand, he was able to provide from his diaries two more instances of Golden Plovers frequenting roofs in the Pacific: (a) Pago Pago 13/12/71. " Two Golden Plovers on the roof of the harbour shed." (b) Honolulu 8/12/71. " Golden Plovers on many public lawns and even two on a low flattish roof on the outskirts of the town."

J. A. F. JENKINS and R. B. SIBSON.

THE WHISKERED TERN IN NEW ZEALAND — FIRST RECORDS

By B. D. HEATHER and E. B. JONES

ABSTRACT

The circumstances are given of the first recorded Whiskered Terns *(Chlidonias hybridus)* in New Zealand, at Lake Horowhenua, Levin in 1977 and 1978. Reasons are given why the birds were probably from Australia *(C. h. javanicus)*. The field characters of the non-breeding adult plumage of the Whiskered Tern, Black Tern *(C. niger)*, White-winged Black Tern *(C. leucopterus)* and Black-fronted Tern *(C. albostriatus)* are compared. The nomenclature of Mees (1977) is used, at species level.

THE BIRDS

During 1977, EBJ had been continuing his regular visits to Lake Horowhenua, Levin, in the Manawatu district of the North Island. On 21 August, he mentioned in a letter to BDH that for three weeks at the public domain on the north-west shore of the lake there had been three small terns, two of which he thought were White-winged Black Terns *(Chlidonias leucopterus)*. On 4 September, W. F. Cash and BDH visited the lake and were joined by EBJ. Two terns on fence posts in the water at the northern end of the domain were examined by telescope. Both birds were clearly of the same species, in complete non-breeding plumage but without markings to suggest immaturity. On the basis of their plain grey and white plumage, shallow-forked tails, and bill and legs blackish with crimson tinge, they were provisionally identified as White-winged Black; but did not " look " right for that species. They seemed rather large, rather long in bill and leg, lacking the darker wing- and mantle-markings usually seen on White-winged Black Terns in New Zealand, and had a totally unfamiliar head pattern. From literature consulted in subsequent weeks, they were identified as Whiskered Terns *(C. hybridus)*.

Description

Upper surface, including hind-neck and tail, plain light or silvery grey. Grey so pale as to look almost white, so that it was difficult to decide whether there was any white on neck, rump or tail. Primaries darker grey.

Under surface wholly white.

Tail square or at most very shallowly forked.

Bill fairly long, with noticeable gonys, black with a strong tinge of crimson about the gape.

Legs blackish but with strong crimson tinge at certain angles of light. Long (for a tern), even when body hunched while facing into the wind.

Head white, with black arc round rear of upper nape, tapering forward to eye and slightly on to lores but not reaching bill. Within the arc, on top of crown, an area of black and white mottling with white predominant, not extending forward of the eyes. This head pattern is shown in Smythies (1960, Plate 8), Frith (1969, Plate 14) and Slater (1970, Plate 48).

Further observations

On 17 September, EBJ saw the birds distantly on fence posts one bay further north along the shore. On 1 October, BDH and EBJ visited the lake independently. BDH saw the two perched on the original posts. One bird was apparently unchanged, plain pale grey above, white below; black C from eye to eye round upper nape, broader at rear and perhaps extending further down the nape; extensive mottling on crown; tail square-ended when fanned for balance during wind gusts, with a shallow fork when partly closed. However, the other bird looked dusky on the belly; this was seen by telescope to be a dense scattering of sooty feathers around and forward of the legs. When on one occasion the wings were stretched upwards, a few dusky feathers were seen along the line of the humerus but the underwing was otherwise white. A crimson tinge was particularly noticeable on the blackish legs. Evidently moult into breeding plumage was beginning. EBJ noted that the whole crown, including forehead, was dark grey to black but BDH did not note so extensive a change. EBJ also noted that in flight this bird showed white underwings, except for a narrow grey line along the front edge and small grey tips to the flight feathers; that the breast was white, shading to grey on the lower breast and that, when it stood on a post, a distinct dark grey patch could be seen on the belly. On 5 October, EBJ saw the two birds distantly on posts. This was the last occasion when two were seen together.

On 10 October, EBJ saw one bird well and noted a blackish nape and cap, with some white on the crown, grey breast and a distinct rectangular dark patch on the belly. On 15 October, BDH saw one briefly on one of the usual posts, facing into the usual wind. It was standing back-on so that the colour of the belly could not be seen. The black of the head now had a precise lower margin which ran from the lores, below eye level to well down and across the nape, clearly a definite cap developing. The top of the crown was still mottled but showing much less white than previously, and the black did not quite reach the bill. There was now a bold contrast between the black through the eye and the white below it, which did not form a distinct white streak but extended down the cheeks to merge gradually into light grey, well down the sides of the neck. On 16 October,

BDH examined this bird again from back-on but at a slightly better angle so that much sooty feathering could be seen around and immediately behind the legs, contrasting rather sharply with the white undertail. The tail showed again as slightly forked, the whole upper surface seemed a uniform pale grey and the bill was an overall reddish grey. When the wings were stretched upwards once, the underwing was seen to be wholly white. It seemed that this was the bird which had not shown signs of moult on 1 October and that the other, which should have developed much more breeding plumage after two weeks and had had a few dusky feathers near the leading edge of the underwing, had gone.

On 19 October, A. H. Gollop saw the bird briefly and confirmed the even light grey upper surface, white underwing and undertail, and black cap not yet reaching the bill.

All observers saw something the the terns' feeding, although the winds made detailed views very difficult. The birds fed well out into the lake, sometimes joining the few Black-billed Gulls *(Larus bulleri)* present, which were very similar in colouring. No hawking at or near the surface was seen, the birds flying steadily into the wind some 3-4 m up, dropping occasionally in a splash dive with wings raised, not plunging like Caspian Terns *(Hydroprogne caspia)*.

No further visits could be made to the lake until mid-November when there were no terns to be found.

Previous years

Among his field notes, EBJ has records of birds at the lake in 1975 and 1976 which may have been Whiskered Terns. A field sketch of a bird seen twice in late August 1976 shows a complete black cap from bill to nape, with lower margin running from gape to eye, down beneath eye, back up to a point behind the middle of the eye, then back to fairly well down the nape. The bird was noted to look very white below the black cap. The bill was black with a slightly reddish tinge, slightly downcurved on top, the gonys visible about half-way along the lower mandible. The legs were dark purplish-red, looked rather long, with the hind toe overhanging the perching post. The wings when folded showed no dark lines but the primary tips were dark grey. In flight, the upper surface looked white, without black markings; the primaries and secondaries showed dusky tips on the underside. Its flight was reminiscent of a Caspian Tern but the bill was held at an angle rather than vertically and it fed by splashing on to the water.

In 1975, there were two birds in late June, one in July, up to four late July to mid-September, three from 15-19 September, two on 4 October. Details noted were inadequate for positive identification but suggest Whiskered rather than any other tern.

The 1978 bird

As vagrants sometimes return to the same place for several years in succession, Lake Horowhenua was watched with interest in 1978. No terns were seen up to and including the week of 20-27 May, when the lake was visited twice by A. H. Gollop and on the 27th by EBJ. On 28 May, BDH found a single Whiskered Tern preening and washing at the lake edge among resting Mallards *(Anas platyrhynchos)* and later roosting on the same most-favoured post as in 1977. The bird was in typical non-breeding plumage which remained unchanged throughout the winter months. It was seen closely on various dates by some 20 OSNZ members from Wellington and Manawatu regions and a good series of colour photographs was taken by H. A. Robertson (see Fig. 2). It was last seen on 28 September by A. H. Gollop, when its plumage was apparently unchanged.

During the winter months an unusually large number of Black-billed Gulls (over 100 on occasions) was on and about the lake, up to 30 resting on the grass verge of the lake in the centre of the public domain. Between feeding sessions, the tern frequently rested among these gulls and, although more wary than the gulls, could be studied closely from parked cars. Moreover, unlike in 1977, it was seen often on windless days and its characteristics could be better studied.

Although there was a selection of stakes, fences and buoys round the lake, the 1977 birds competed for an isolated stake well out in the water of the small bay at the northern end of the public domain. The 1978 bird began its stay using this stake but, with the arrival of wintering Black-billed Gulls, apparently preferred to rest among them on the domain turf, returning to the stake only if there were no gulls or if, on Sundays, there were too many people and dogs on the domain. From early August onwards, it was sometimes at the southern end of the lake on the outermost of a line of fence posts that extended into the lake. For example, on one day of cold westerly wind, G. A. Woodward and BDH at first saw the tern feeding with several gulls over the bay immediately south of the domain, later found it resting on the post at the southern end and, after the wind had dropped late in the day, found it on the usual stake north of the domain. Occasionally it rested elsewhere; once on the outermost of a line of fence posts at the southern end of the domain (P. M. Sagar & BDH); once on a small log floating near the domain (H. A. Robertson; Fig. 1); once, when the lake and the domain were being used for a regatta, the tern was found standing on a floating log in the quiet north-western arm of the lake.

A distinctive feature of the Whiskered Tern was its long legs, clearly visible even when it was hunched to face a strong wind. When alert or perching in windless conditions, its legs gave it a gull-like stance (see Fig. 1), quite unlike any other tern seen in New Zealand.

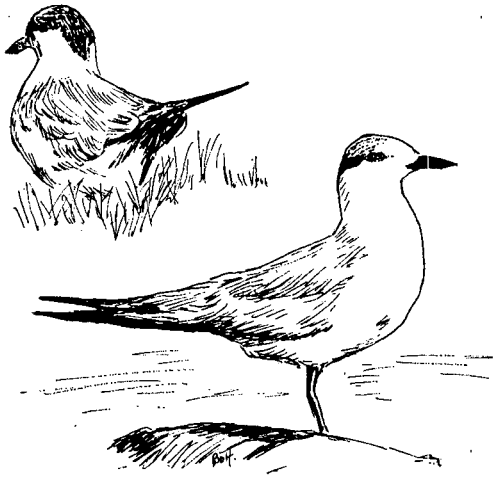


FIGURE 1 — Whiskered Tern at Lake Horowhenua, 1978, based on colour slides by H. A. Robertson. Note the longish legs and gull-like stance when alert. Leg-length obtained by superimposing the main slide, in which legs are partly obscured by grass, on a more distant view of the bird in same stance on a log offshore — legs accurate but feet too blurred to be exact. Upper sketch shows nape patch when head is bent forward.

Greater leg-length seemed to confer greater confidence, even a preference, to perch on the narrow top of a stake or fence post than has the conventional short-legged tern. The Black-fronted Tern *(C. albostriatus)*, for example, rests on the ground and will fly rather than walk even the shortest distances (C. Lalas, pers. comm.). When being observed too closely, the Whiskered Tern would walk, with waddling gait, through short grass or shallow puddle (Fig. 2) to a new position among the gulls. EBJ, wishing on one occasion to put it quietly to flight, found that it merely kept walking 10 m ahead of him.

In a wind, the bird would work up-wind steadily to feed, then fly quickly down-wind and start again. This is typical of all marsh terns. In calm conditions, it would often work a bay by repeated haphazard circling. Its flight was steady and direct, not buoyant, and at 3-6 m height. On seeing prey, it would stall and, with tail fully fanned, turn and fall lightly to the water, its body breaking the surface with a gentle splash, wings held upraised. No instance was seen of typical marsh tern feeding in which they drop to the water, hover briefly, then swoop or dip to pick an item from the surface, dabbing with the bill or immersing no more than bill and head. Whiskered Terns normally feed in this way but are known also to splash-dive, doubtless depending on the clarity of the water and the nature of the food. Swift (1960), while studying the Whiskered Tern

in the Camargue in southern France, found that splash-diving was the general rule (see also Ferguson-Lees 1969: 1044; Serventy *et al.* 1971: 203). Splash-diving is characteristic also of the Black-fronted Tern of New Zealand during periods of low prey abundance (C. Lalas, pers. comm.). The Horowhenua bird was seen to take small fish from time to time; presumably it was feeding mainly on fish in the lake's clear water rather than on insects on the surface.

Description of 1978 bird

Upper surface uniform pale silvery grey from hind-neck to tail; under surface, including axillaries and underwing, dull or slightly " dirty " white. General colouring very like that of Black-billed Gulls and, like them, often looking almost wholly white when in flight. Where the scapulars overlapped the coverts of the folded wing there was sometimes a misleading shadow which, from a distance, looked like a dark line across the wing. Primaries distinctly dark grey when folded but somehow not noticeable in flight. Tail much shorter than folded wing; precisely fan-shaped when fully expanded. A scattering of grey feathers on each side of the breast produced blurred grey patches below the leading edge of each wing. These feathers, presumably unmoulted breeding-plumage remnants, remained unchanged throughout the winter.

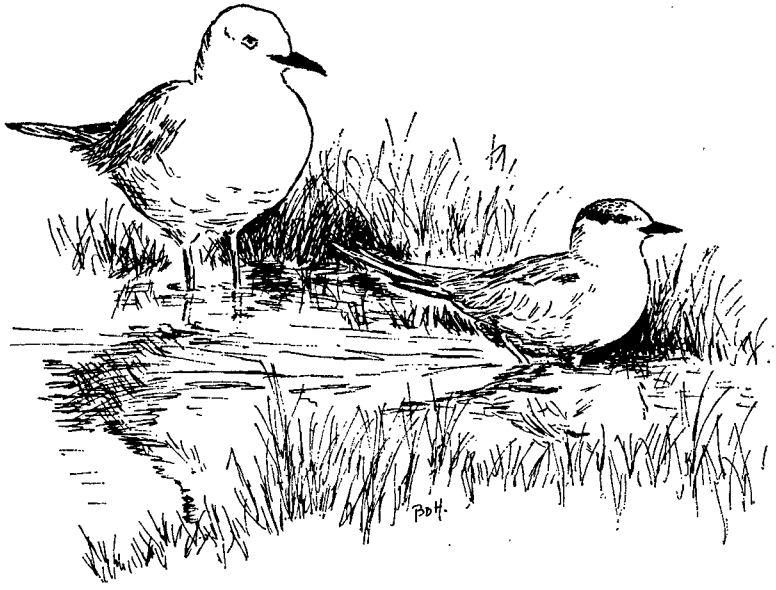


FIGURE 2 — Whiskered Tern with a Black-billed Gull at Lake Horowhenua, 1978. It is shifting position by walking agilely through a rainwater pool on the mown lakeside grass. From a colour slide by H. A. Robertson.

Unlike the 1977 birds, there was no clear sign of a start of moult into breeding plumage — for example, development of a more sharply defined black cap, of grey on lower neck and upper breast, of sooty belly-patch, of crimson bill or legs.

Apart from the white forehead and fore-crown, a complete "shadow" cap was visible. The only truly black areas were from lores to ear coverts, a broad band with blurred edges and noticed by EBJ to be interrupted with white when the bird's eyes were closed. When the head was held erect and during preening movements, the nape was seen to be heavily mottled blackish, ending in a sharp point (Fig. 1). When the head was held drawn into the shoulders in the hunched resting posture and also during flight, the mottled nape-feathers were compressed to produce the distinctive C-shaped black band from eye to eye. At close quarters it could be seen that the crown was not mottled but had a series of interrupted, longitudinal, blackish streaks (Fig. 1 & 2), characteristic of the species in winter.

The bill was fairly long and heavy, with a distinct gonys. Looking dark at a distance, at close quarters it was seen to be reddish-brown to blackish, depending on the light. The legs looked dark reddish-brown at a distance but at close quarters were distinctly dull red. The crimson tone seen in 1977 is typical of breeding plumage — crimson (Witherby *et al.* 1942); wine red (Serventy *et al.* 1971).

ORIGIN OF THE NEW ZEALAND BIRDS

The Whiskered Tern in its various forms is known to breed or have bred from Mediterranean Europe and Africa eastward through southern Russia to Kazakhstan and Iraq and perhaps Iran; in the lowlands of northern India; in China and Manchuria; in southern and eastern Africa and Madagascar; and in south-eastern Australia (Mees 1977). The detailed research of Mees (1977) shows that the true breeding and migratory ranges, the geographical variations and thus the nomenclature of the various populations of the Whiskered Tern are all far from clear. In this paper, the nomenclature of Mees (1977) at species level is used and also his adoption of *hybridus* as a masculine adjective rather than as a noun in apposition, *hybrida* (on the grounds that Pallas originally intended it to be an adjective).

Two races could conceivably reach New Zealand. The East Asian population, traditionally called *C. h. javanicus* but considered by Mees to be synonymous with the nominate Eurasian race *hybridus*, winters south to South-east Asia, the Philippines, Borneo, Java and, less commonly, the Celebes. It has not been recorded further east in the Moluccas and New Guinea, nor in Australia. Its occurrence in New Zealand is highly unlikely, especially as its period in breeding plumage, April to August, rules out all but a succession of first-year birds at Lake Horowhenua.

The Australian population is known to breed mainly in south-eastern Australia, partly in coastal areas but largely inland from October to February. Traditionally named *C. h. fluviatilis* Gould

1843, it has been concluded by Mees (1977: 45-47) that Horsfield's type specimen of *C. h. javanicus* is in fact a bird of the Australian race, collected in Java. This means that the Australian race becomes *C. h. javanicus* Horsfield 1821 and that the name *fluviatilis* Gould 1843 lapses. The Australian Whiskered Tern is the smallest and by far the palest race — in winter, whitish grey above (Light Gull Grey in Ridgway's 1912 colour standards), according to Mees (1977: 6), and slightly darker in summer plumage. It is in non-breeding plumage from roughly March/April to August/September. The remarkable paleness of the Horowhenua birds supports the view that they were Australian birds, as do the months in which they were present and the fact that visible moult into breeding plumage began in early October, perhaps delayed somewhat by the unusually southern latitude (40°37'S) at which they had wintered, roughly that of northern Tasmania. The Whiskered Tern is absent from Tasmania, the first record being of a vagrant in breeding plumage in late September 1967 (Wall 1970).

The Australian birds are strongly migratory, almost completely leaving southern Australia after breeding and moving northward to northern and north-eastern Australia, and beyond to New Guinea, the Moluccas, Celebes, Borneo and Java, straggling to the Philippines (Mees 1977). Apart from ample specimens, there is the evidence of a bird banded as a chick in New South Wales and recovered in Java and of another banded as a chick in western Victoria and recovered in New Guinea. In part of the winter range they overlap the non-breeding range of Asian birds and in Java at least both races occur in similar numbers, though largely at different times. Whereas Asian birds are present (judging from specimen records cited by Mees) from October to May, Australian birds are present from May to September. However, many first-year birds may retain their 'winter' plumage and remain in the region during the adults' breeding seasons. Mees cites J. van den Assem (1960, *Ardea* 48: 178-182) as having observed the Whiskered Tern in northern New Guinea in 1957-1959 between April and early November, with breeding plumage being assumed towards the end of their stay. Collecting dates of the 13 specimens from New Guinea in Leiden Museum of Natural History range 13 May to 19 September (Mees 1977).

The New Zealand birds, wintering in a contrary direction and in very different climatic conditions from the majority, would be considered vagrants were there not signs that they may occur with some regularity. For example, a further bird was recorded in 1978 in the South Auckland district (see Brown & Habraken, elsewhere in this issue).

MARSH TERNS IN WINTER PLUMAGE

BLACK-FRONTED TERN *Chlidonias albostriatus*

So obviously different in the field from Whiskered Tern as barely to deserve comparison. Immediately distinguished by its dark

grey upper surface, with vividly contrasting white rump in all plumages (C. Lalas, pers. comm.); its grey undersurface, including underwing; its orange bill; its short legs which, in all plumages, are orange (C. Lalas, pers. comm.). Non-breeding plumage, worn January/February to April/May (C. Lalas, pers. comm.), changes mainly about the head: the bill darkens, the forehead, fore-crown and throat become white, the cap becomes mottled, looking overall grey, with a smudgy blackish line extending from lores through eye to nape.

BLACK TERN *Chlidonias niger*

Breeds in Eurasia from Spain to Yenesei River in western Asia and also across central North America. It is the least likely of marsh terns to occur in New Zealand, although there have been two sightings in New South Wales (Serventy *et al.* 1971). Breeding plumage distinctive: upper surface uniform smoky grey, head and body black, underwing and undertail white, bill black, legs reddish-brown. In full non-breeding plumage, it is uniform brownish-grey above, darker than the others, white below, with a diagnostic dark patch that extends from the leading edge of the mantle down on to the white shoulder in front of the wing. There is a fairly large black patch on crown, nape and ear-coverts and a small one in front of the eye; forehead white. A white collar crosses the hind-neck between black cap and brown mantle.

WHITE-WINGED BLACK TERN *Chlidonias leucopterus*

Breeds from eastern Europe to central Siberia; a separate population in eastern Siberia, presumably the source of migrants to Australasia. The breeding plumage is well known in New Zealand (Sibson 1954, Pierce 1974): black on head, mantle, body and under wing-coverts; grey on flight feathers; white on upper wing-coverts, rump, tail and under tail; bill dark red, legs reddish-black.

Whereas the general sequence of change into breeding plumage of the Australian Whiskered Tern is " the black cap and some darker shades on the belly appear first, then the belly darkens and the bill turns red," that of the White-winged Black is " (a) black underwing coverts (b) black head and body (c) white upperwing coverts (d) red bill " (Hansen 1976).

It is the Whiskered and White-winged Black Terns that have traditionally been indistinguishable in winter plumage. This tradition probably dates from Witherby *et al.* (1949) who stated that they are " probably not separable . . . in the field." This comment has been echoed by European and African texts ever since. However, Williamson (1960) and Ferguson-Lees (1969) have shown that, with care and close observation, they can be distinguished in Europe — mainly by the white hind-neck " collar," almost square tail, white rump and tail during moult and black ear coverts isolated from streaked crown in the White-winged Black Tern. The bill of White-winged Black is short and stubby, much shorter than the head, whereas the male Whiskered Tern has a much longer bill, almost as long as the head,

with a pronounced gonys similar to that of sea-terns *(Sterna)*, while the female has a much shorter bill, only slightly longer and more robust than that of White-winged Black (Williamson 1960).

These authors were working with European and African birds. From records published in Australia and New Zealand, it seems that field differences are greater in the populations of both species that occur in Australasia than they are in Europe. The Australian Whiskered Tern has the distinctive head pattern already described, apparently the same as in European birds, but its upper surface is very pale. The White-winged Black Tern seen in Australasia seems to differ in head pattern from European birds, although no comparative study is available. Plate 8 in Smythies (1960) shows the different head pattern of the two species, even though the text makes the usual remark that they are not separable in the field. Hamilton (1957) gave a clear sequence of plumage stages seen during the 1956-57 irruption of White-winged Black Terns into southern Queensland. On arrival in October, there was only a black patch around the eye, which had disappeared by early December, so that the birds were merely pale grey and white. By late December, black head markings had re-appeared in the form so familiar to New Zealand observers, in which there is a small triangle of black in front of the eye, making the eye look larger and smudgy, and a broad black band from the ear-coverts of one side straight up and across the hind-crown and down to the ear-coverts on the other side. There is also a black band that runs from the black on the hind-crown down to the nape where it becomes slightly wider. This marking appeared on all Queensland birds and lasted through to March when the development of black, which had begun on under wing-coverts and later on the body, merged with the head markings (see series of photographs in Hamilton 1957, Plate 16).

Birds described in New Zealand have shown not only these distinctive head markings but also a dark band across the forward edge of the mantle, another slightly behind the leading edge of the upper wing, dusky primaries and inner secondaries and a prominent white leading edge to the wing when seen in flight from in front, interrupted by dark at the carpal bend, visible also on the folded wing (see sketches in Sibson 1954, Fleming 1955 and Plate XXV in Wakelin 1968; also Hamilton 1957, Plate 16). These birds were not immatures in their first year. They may have been second-year birds but it is not known whether the markings are really features of non-breeding adults of the East Siberian population.

" SEA-TERNS " IN TAIL MOULT

There is little chance of confusing Whiskered Tern with Arctic *(Sterna paradisaea)* or Common *(S. hirundo)* Terns in non-breeding plumage, even when a tail moult may deprive them of their normal deeply forked tails. These terns are distinctly larger in size and proportionately shorter and weaker in leg. The white of their underparts extends as a collar across the hind-neck, contrasting, as do the white

upper tail-coverts and tail, with the grey of mantle, back and wings. Black is extensive on nape and crown, white being confined mainly to forehead and fore-crown. Their flight is light and buoyant and they feed often by diving from a considerable height. The habitat of the Common is both coastal, including harbours and estuaries, and maritime and of Arctic largely maritime.

LITERATURE CITED

FERGUSON-LEES, I. J. 1969. **In** GOODERS, J. (ed.) Birds of the world 4 (2), 38: 1038-1045.
FLEMING, C. A. 1955. White-winged Black Terns at Waikanae. Notornis 6: 69-71.
FRITH, H. J. (ed.) 1969. Birds in the Australian high country. A. H. & A. W. Reed.
HAMILTON, F. M. 1957. The White-winged Black Tern in Moreton Bay, Queensland. Emu 57: 147-150
HANSEN, J. 1976. Notes on the field identification of terns in Papua-New Guinea. Part 2. New Guinea Bird Soc. newsletter 125: 14-18.
MEES, G. F. 1977. The subspecies of **Chlidonias hybridus** (Pallas), their breeding distribution and migrations (Aves, Laridae, Sterninae). Zoologische Verhandelingen, Leiden 157: 1-64.
PIERCE, R. J. 1974. Presumed attempted breeding of the White-winged Black Tern in New Zealand. Notornis 21: 129-134.
SERVENTY, D. L.; SERVENTY, V.; WARHAM, J. 1971. The handbook of Australian sea-birds. A. H. & A. W. Reed
SIBSON, R. B. 1954. White-winged Black Terns near Auckland. Notornis 6: 43-47.
SLATER, P. 1970. A field guide to Australian birds. Non-passerines. Rigby.
SMYTHIES, B. E. 1960. The birds of Borneo. Oliver & Boyd.
SWIFT, J. J. 1960. Notes on the behaviour of Whiskered Terns. Brit. Birds 53: 559-572.
WAKELIN, H. 1968. Some notes on the birds of Norfolk Island. Notornis 15: 156-176.
WALL, L. E. 1970. Whiskered Tern in Tasmania. Emu 70: 142.
WILLIAMSON, K. 1960. Juvenile and winter plumages of the marsh terns. Brit. Birds 53: 243-252.
WITHERBY, H. F.; JOURDAIN, F. C. R.; TICEHURST, N. F.; TUCKER, B. W. 1940. The handbook of British birds. Vol. 5. London: H. F. & G. Witherby.

BARRIE D. HEATHER, *10 Jocelyn Crescent, Silverstream;* ERIC B. JONES, *94 Weraroa Road, Levin.*

★

SHORT NOTES

WHISKERED TERN ON LOWER WAIKATO RIVER

An unusual tern first seen on 27 August 1978 by Anton Habraken and a junior member, Ian Southey, stayed for about a month near Hood's Landing, on the lower Waikato River. It was seen by a woman whitebaiter in mid-August and remained until 17 September.

In the lower reaches, 8 km from its mouth, the river is tidal and about 3 km wide. Many islands covered in tangled willow, alder, reeds and weeds divide it into a maze of channels. The tern frequented a blind channel close to the boat ramp and parking area of Hood's Landing, which is on a main channel. It could be watched from the landing without difficulty. Many boats are launched and landed there. The banks are dotted with whitebaiters' shelters, one of which gave us a vantage point.

AH returned with B. Brown on 29 August, when we were fortunate in having the bird present for about 40 minutes. During half this time it rested 30 m distant on water weed in sunlight. Telescopes of X 75 and X 15 - 60 were used, full notes and sketches made and the bird identified as a Whiskered Tern *(Chlidonias hybrida).*

It was studied again on 30 August and 7, 9 and 17 September by various members including M. S. Field, K. J. Fisher, A. J. Goodwin, H. R. McKenzie, G. J. H. Moon (who took movie photographs), R. B. Sibson and J. Trollope.

The bird was of medium size, larger than a Little Tern *(Sterna albifrons)*, pale grey above, white below, had short squarish tail, black cap much reduced, legs long and red, bill reddish.

Upper surfaces except head: even, very pale grey, no defined collar but whitish across nape. Undersurfaces: white, "very lightly smudgy on belly" (HRMcK), "faint mottling on flanks" (BB), "at close range odd dark feathers showed along belly to legs" (AH). Head except cap: white. Cap: incomplete; entire crown with grey effect but in fact closely streaked black on white. Lower edge of cap had solid black band starting as a narrow line from a little above centre of bill, widening behind eye to meet at the hind crown with a downward dip and point. White of cheek met eye and went forward to lower mandible. Eye showed below cap-line giving upward curve to lower edge of cap at and just behind eye. Eye: large, brown. Eye streak darkest part of bird (GJHM). Forehead: less spotted than crown, looked whiter. Wings: upper, pale grey, darker grey primaries. At rest, primaries showed white quills plainly. Underwing: white, with tips of primaries grey. Wings extended far beyond tail. Tail: pale grey, short, squarish, with only a hint of fork; white on outer tail seen in flight. Undertail: white. Outer tail feathers had rounded ends (AH). Tail when spread, fan-shaped, seen just before bird dropped to take food.

Bill: heavy, long, deep for about two-thirds of length, then tapering rapidly to tip, upper mandible decurved. Brownish-red upper and deeper red lower mandible. Bill appeared blackish in poorer light conditions. Gape: bright orange-red.

Legs: bright red at close range in good light, but at times seemed brownish, very long for size of bird; "length (of legs) at least twice that of White-fronted Tern *(Sterna striata)*." (GJHM).

Stance: hunched at first in windy conditions but later, in calm weather and especially on 17 September, upright, when the long legs showed markedly.

Voice: a sharp *keeet* uttered when a Welcome Swallow *(Hirundo neoxena)* repeatedly dived at it as it rested on weed.

The bird fed regularly over its beat, resting nearby unless disturbed, when it flew down-river and out of sight for varying periods. The flight was direct with deliberate wing-beats. At first it fed by flying into the stiff breeze partly in the lee of a 9-m high willow tangle. It dipped from a height of about 6 m to pick (? insects) from the still surface of a semi-stagnant side channel and would then sweep downwind, to begin again. In calmer weather it fed, at times in both directions, as low as 2-3 m above the water, with an altered technique. Flight was more leisurely. It would stall, execute a half-

twist with fanned tail, dropping in a bounce on to the water. The feet seemed to touch the surface lightly. Bill and head went under 50% of the time. It did not hover, but flew in on to prey. The back arched at lift-off. The tail was flicked after a splash-dive (AJG) and the bird was once wet to the mantle (KJF). Doubtless tide height, as well as wind strength, influenced feeding technique. A Caspian Tern *(Hydroprogne caspia)* also fished the same reach at high water, providing a useful size comparison. The short squarish tail gave the bird a compact look in flight. AH noted that the second primary was missing from the left wing so that the bird may have been in moult. It was seen to rest on a willow log, on aquatic weed at low water and on a tangle of dead vegetation about 60 cm above high water level, when the long-legged upright stance was most apparent.

Identification was made after careful examination of the literature. In addition to the text, we found the illustrations in Slater (1970, *A field guide to Australian birds,* Sydney: Rigby), King, Woodcock & Dickinson (1975, *A field guide to the birds of South-East Asia,* London: Collins) and Ferguson-Lees & Hayman *in* Gooder (1969, *Birds of the World,* 4 (11), London: IPC Magazine) of the three species of *Chlidonias* very helpful. The distinctively streaked cap joined on hind-crown (as previously described), clearly defined facial pattern, heavy reddish bill, long red legs, the pale even-grey upper surfaces and short blunt tail excluded all but Whiskered Tern. Both AH and BB are familiar with the Black-fronted Tern *(C. albostriatus)* and BB has studied White-winged Black Terns *(C. leucopterus)* in the Firth of Thames. RBS had watched Whiskered Terns in Spain during the previous (northern) summer. He saw the bird on 30 August and agreed with the identification.

BETH BROWN, *39 Red Hill Road, Papakura;* ANTON HABRAKEN, *Harrisville Road, R.D. 2, Pukekohe.*

★

ALBINO WHITE-FACED STORM PETREL

A completely albino White-faced Storm Petrel *(Pelagodroma marina)* was brought into the Museum by Mr Ray Froggatt of Dargaville. It had been found by a farmer on 5 March 1979 about 1 mile inland from Bayleys Beach after a period of strong westerly winds.

Measurements: Culmen 16.6, wing 15.2, tarsus 40.7, mid toe & claw 38, tail 82.3.

Bill yellow with a few reddish patches on both mandibles. Legs dull yellow shading to red on tarsal joint. Webs bright yellow as in normal specimen.

If proved suitable for mounting, this bird will be displayed at the Dargaville Museum.

SYLVIA M. REED, *Auckland Institute & Museum.*

WHITE-FACED HERONS ON THE CHATHAM ISLANDS

The White-faced Heron *(Ardea novaehollandiae)* was first recorded at the Chatham Islands by Travers (1882, *Trans. N.Z. Inst.* 15: 187); but, according to B. D. Bell, it has been established only since 1966 (Carroll 1970, *Notornis* 17: 23).

In a survey of Te Whanga Lagoon by members of the Chatham Island Taiko Expedition on 16 January 1978, 69 White-faced Herons were recorded. This was considered to be a low count as roughly one-third of the lagoon shore was not searched, a stretch where birds were seen on other dates. Most of the birds were found on the rocky or shelly parts of the lagoon shore, rather than on the extensive mudflats in the north-eastern region. A further 65 White-faced Herons were recorded from many rocky coastline localities during January 1978. Flocks of up to 20 birds, but normally small parties of two to five, inhabited rock platforms, particularly around the northern coast and near Owenga. A few birds were normally found on the shores of the small coastal lakes in Petre Bay, e.g. one at Lake Huro and two at Lake Marakapia. None was seen on marshy pasture or inland creeks, both habitats commonly used by the White-faced Heron in New Zealand. This pattern of distribution was again noted during a visit in November-December 1978.

Although the White-faced Heron has colonised the island only recently, it seems that several factors may restrict its distribution on the island. Most of the small lakes and water-courses are peat-stained, making heron prey difficult to see, and the high mineral content in the water may limit the fauna. The absence of some potential prey species, such as frogs, from the Chatham Islands may have limited the spread into inland areas. Also, most of the mudflat area of Te Whanga Lagoon is fouled by excrement produced by thousands of Black Swans *(Cygnus atratus)*.

The finding of a White-faced Heron nest in a rocky cleft in January 1978 (Gordon 1979, *Notornis* 26: 46) and the common occurrence of this species on rocky shorelines seem to indicate that the White-faced Heron is exploiting a niche more typical of the Reef Heron *(Egretta sacra)* in mainland New Zealand. Edgar (1978, *Notornis* 25: 57), when discussing the decline of the Reef Heron in New Zealand, stated " There is no competition for nest sites — the Reef Heron is a crevice-nester, the White-faced Heron a tree-nester." Reef Herons have been recorded as rare stragglers to the Chatham Islands, and apparently none has been seen recently (Edgar 1978, p. 56).

It is not clear whether the White-faced Herons on the Chatham Islands are in fact exploiting their preferred habitat in the absence of competition from Reef Herons or have been forced into coastal areas because of limiting factors inland.

HUGH A. ROBERTSON, *No. 1 R.D., Aokautere Drive, Palmerston North;* MICHAEL D. DENNISON, *129 Renall Street, Masterton.*

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).

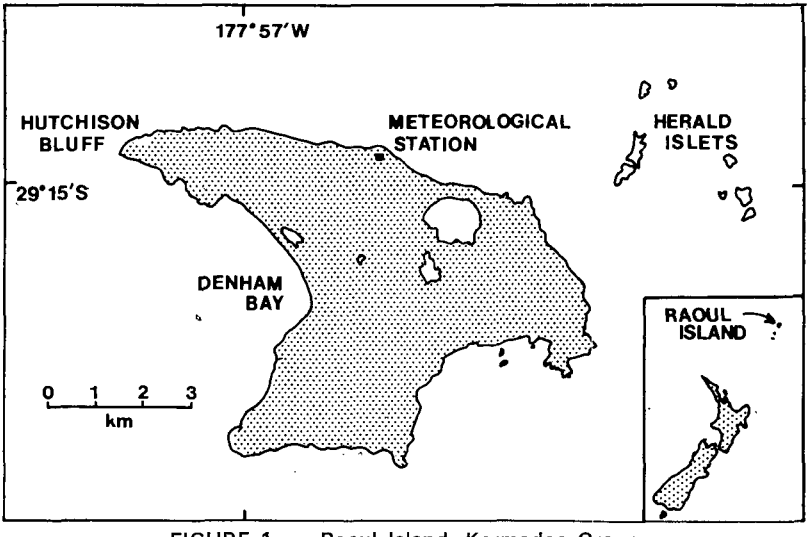


FIGURE 1 — Raoul Island, Kermadec Group.

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.

LITERATURE CITED

ASHMOLE, N. P. 1963. The biology of the Wideawake or Sooty Tern **Sterna fuscata** on Ascenion Island. Ibis 103b: 297-364.
GUTHRIE-SMITH, H. 1936. Sorrows and joys of a New Zealand naturalist. Coulls, Somerville, Wilkie, Dunedin.
MERTON, D. V. 1970. Kermadec Islands Expedition reports: A general account of birdlife. Notornis 17: 147-199.
OLIVER, W. R. B. 1910. Notes on reptiles and mammals in the Kermadec Islands. Trans. N.Z. Inst. 43: 535-539.
OLIVER, W. R. B. 1955. New Zealand birds. 2nd ed. Wellington: A. H. & A. W. Reed.
STONEHOUSE, B. 1962. Ascension Island and the British Ornithologists' Union Centenary Expedition 1957-59. Ibis 103b: 107-123.
WATSON, J. S. 1961. Rats in New Zealand: A problem of interspecific competition. Proc. Ninth Pacific Sci. Cong. 19 (Zoology): 15-16.

R. H. TAYLOR, *Ecology Division, DSIR, Private Bag, Nelson.*

★

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

by Sylvia Reed, Mrs M. Levick, Douglas Haddow from Vancouver in Canada, Einar Rogge from Sweden and Mr & Mrs G. Haines. In a flock of about 500 Wrybills *(Anarhynchus frontalis)*, 14 Curlew Sandpipers *(C. ferruginea)* and 4 Red-necked Stints *(C. ruficollis)*, I saw a bird with a black belly-patch. After I had confirmed this with a x 15 - 60 telescope, other members of the party were directed to its position and the bird was watched through a similar telescope and binoculars at distances of 12 to 15 m for about 20 minutes.

All following comparisons were made with Curlew Sandpipers. Body size a little slighter; stance somewhat unnatural, slightly lopsided to left with right leg suspended and foot hanging limp just off ground. Later seen to be lame. Bird mainly sleeping but sometimes as head was brought round from rest position it would be dropped and held well forward. Neck shorter and thicker. Bill broader at base; a little heavier and shorter, tapering rapidly to end, no pronounced droop, though downcurved. Crown browner, pale at nape. Upper surfaces grey-brown. Face greyish. Underparts white, with small black patch on lower breast irregular but distinct, its size varying with stance and possibly affected by a light wind, but larger and most evident in flight (DH, who sees this species regularly in Canada). Faint super-ciliary. Upper breast with some vertical streaking (unlike the lateral scalloping or smudging of Curlew Sandpiper at the start of breeding plumage), markings bigger, stripy, giving somewhat darker, more suffused effect. Legs shorter, dull grey. Rump imperfectly seen during brief preening but dark centred. Curlew Sandpipers on either side showed white rumps between folded wings as their bodies swung gently sideways in the one-legged resting stance. A detailed examination of the colour of the lower-breast patch was prompted by DH who at first thought that it might be dark grey, but all agreed that it was indeed black.

The fawn-edged feathers of the upper surfaces and some colour showing on the streaked breast cast some doubt on the bird seen by JHS on 12 March but it may have been in its first year. The Miranda one, seen 17 days later, seemed to be in winter plumage apart from the small black belly patch. The two birds were therefore different individuals.

The Miranda bird seemed to me to be smaller than the Tapora one. In a packed resting flock its lesser height and quieter behaviour among the more excitable Curlew Sandpipers (which in autumn in New Zealand indulge in chivvying, chasing and sudden flights), plus the problems of identification when the black patch is absent, could all too easily cause a Dunlin to be overlooked completely.

BETH BROWN, *39 Red Hill Road, Papakura.*

RECORDS OF BIRDS AT FAREWELL SPIT, 1974 - 1978

By M. D. DENNISON and H. A. ROBERTSON

INTRODUCTION

Farewell Spit is a slightly curved finger of consolidated sand extending 25 km eastwards from the north-west tip of the South Island (see Fig. 1, Robertson & Dennison 1979). At high tide the Spit is about 1 km wide, but at low tide sand-flats extending southwards widen the Spit to 8 km in parts.

Farewell Spit Nature Reserve (administered by the Abel Tasman National Park Board) is one of the most important wader localities in New Zealand and, as such, has been visited by a number of ornithological expeditions since 1961.

Edgar (1974), who summarised all major census figures up to 1974, listed 95 species recorded between Freeman's (now Lands & Survey) Farm and the tip of Farewell Spit. We have updated this list by the addition of new species (asterisked) and noteworthy records from recent expeditions. The area was visited in March 1976 (Edgar 1976), January 1977 (OSNZ/Wildlife Service course, attended by the authors), February 1978 (see Robertson & Dennison 1979), March 1978 (Bell 1978a), and October 1978 (Bell 1978b). Observations made by B. Robertson, the manager of the Lands & Survey Farm at the base of Farewell Spit are also included.

Localities and habitat zones mentioned in the text are shown in Figures 1 and 2 of Robertson & Dennison (1979).

*FIORDLAND CRESTED PENGUIN *(Eudyptes pachyrhynchus)* A bird came ashore in September 1975 near the lighthouse. It was released about one week later (Edgar 1976).

*ANTARCTIC FULMAR *(Fulmarus glacialoides)* Several were wrecked on both the Ocean Beach and the Bay Flats during October 1978.

*CAPE PIGEON *(Daption capense)* One seen offshore in January 1977.

*NARROW-BILLED PRION *(Pachyptila belcheri)* Two found beach-wrecked on 13 February 1978.

*REEF HERON *(Egretta sacra)* W. F. Cash saw one flying along Ocean Beach towards Fossil Point on 10 February 1978. Previously recorded at Puponga Inlet, about 10 km away (Edgar 1978).

*GLOSSY IBIS *(Plegadis falcinellus)* Up to four seen in late summer 1976 (Edgar 1976); three on 14 March 1978.

ROYAL SPOONBILL *(Platalea leucorodia)* March 1976, 16; May 1976, 21 (Edgar 1976); January 1977, two; July 1977, 17 (Falconer 1977); February 1978, five arrived on the 12th; March 1978, nine.

CANADA GOOSE *(Branta canadensis)* One in May 1975 and one in March 1976 (Edgar 1976).

*SPUR-WINGED PLOVER *(Vanellus novaehollandiae)* First seen at the base of Farewell Spit in April 1975 (Robertson 1976a). Up to three have been seen regularly since March 1976.

GREY PLOVER *(Pluvialis squatarola)* A flock of four was seen in January 1977, and four were seen on most days between 13 km and Mullet Creek during February 1978. March 1978, five; October 1978, two.

NEW ZEALAND DOTTEREL *(Charadrius obscurus)* March 1976, two; January 1977, two, including one in breeding plumage; single birds in breeding plumage were recorded in February 1978, March 1978 and also in October 1978.

MONGOLIAN DOTTEREL *(C. mongolus)* Two on 14 March 1978.

LARGE SAND DOTTEREL *(C. leschenaulti)* Two in January 1977. Two were seen in February 1978 regularly roosting with Bar-tailed Godwit *(Limosa lapponica)* flocks near the 14 km mark (upper Mullet Creek catchment).

WRYBILL *(Anarhynchus frontalis)* January 1977, 27; October 1978, one.

ASIATIC WHIMBREL *(Numenius phaeopus variegatus)* March 1976, seven; January 1977, 19; February 1978, 14, normally at the western end of the Runway; March 1978, 23; October 1978, five.

AMERICAN WHIMBREL *(N. p. hudsonicus)* One in January 1977.

BLACK-TAILED GODWIT *(Limosa* sp.*)* Brief sightings of single birds at Mullet Creek on 10 February 1978 (A. Palliser) and at 5 km on the Ocean Beach, 11 February 1978 (W. F. Cash).

LESSER YELLOWLEGS *(Tringa flavipes)* One bird was closely examined feeding with Knots *(Calidris canutus)* and Golden Plovers *(Pluvialis dominica fulva)* at 10 km in January 1977.

SIBERIAN TATTLER *(T. brevipes)* One in March 1976 and two in January 1977. February 1978, two (nasal groove clearly seen); March 1978, one.

*TEREK SANDPIPER *(Xenus cinereus)* One in January 1977 at the Runway.

SHARP-TAILED SANDPIPER *(Calidris acuminata)* March 1976, five; January 1977, seven. On 9 February 1978, four at the 8 km roost; March 1978, 10.

*PECTORAL SANDPIPER *(C. melanotus)* One at the 8 km roost in January 1977 with Sharp-tailed Sandpipers.

CURLEW SANDPIPER *(C. ferruginea)* January 1977, five; February 1978, three; October 1978, one.

RED-NECKED STINT *(C. ruficollis)* March 1976, four, possibly six; January 1977, seven; February 1978, 10; October 1978, eight.

SANDERLING *(C. alba)* March 1976, one, possibly two.

POMARINE SKUA *(Stercorarius pomarinus)* January 1978, one; February 1978, two (one pale phase and one dark phase); March 1978, one.

*KEA *(Nestor notabilis)* Between September 1975 and March 1976, two, possibly three, visited the Lands & Survey Farm and the lighthouse (Robertson 1976b).

*SWIFT sp. *(Apus* sp.*)* One was seen by a member of the March 1976 party.

AUSTRALIAN TREE MARTIN *(Hylochelidon nigricans)* One near the base of the Spit, October 1978.

BELLBIRD *(Anthornis melanura)* March 1976, one at the farm.

*TUI *(Prosthemadera novaeseelandiae)* Seen by B. Robertson around the base of Farewell Spit when nectar-producing plants are in flower (Edgar 1976).

*CIRL BUNTING *(Emberiza citrinella)* One male at the 4 km mark, October 1978.

*ROOK *(Corvus frugilegus)* One visited the farm in December 1975 and remained three or four weeks (Robertson 1976c).

DISCUSSION

The checklist for Farewell Spit continues to grow, from 79 species in 1962, to 95 in 1974 and 109 in 1978. In addition Edgar (1976) listed three more species which have occurred between Puponga Inlet and Taupata Stream, 3 km to the south; these are: Little Egret *(Egretta garzetta)*, Cattle Egret *(Bubulcus ibis)*, and Fernbird *(Bowdleria punctata)*.

ACKNOWLEDGEMENTS

We gratefully acknowledge the assistance of B. D. Bell and A. T. Edgar who supplied unpublished reports of ornithological expeditions to Farewell Spit. W. F. Cash and A. Palliser provided invaluable assistance in the field during February 1978. B. Robertson, farm manager, helped with transport and made our stay in February 1978 a very pleasant one. We thank the Abel Tasman National Park Board for allowing the various parties to work and stay at Farewell Spit.

LITERATURE CITED

BELL, B. D. 1978a. Bird records, Farewell Spit, 13-16 March 1978. Unpubl. report, Wildlife Service, Dept. of Internal Affairs.
BELL, B. D. 1978b. Bird survey, Farewell Spit, 28 September - 6 October 1978. Unpubl. report, Wildlife Service, Dept. of Internal Affairs.
EDGAR, A. T. 1974. Farewell Spit, March 1974. Notornis 21: 250-259.
EDGAR, A. T. 1976. Bird records, Farewell Spit, 20-28 March 1976. Unpubl. report.
EDGAR, A. T. 1978. The Reef Heron in New Zealand. Notornis 25: 25-58.
FALCONER, M. L. 1977. Royal Spoonbill in Classified Summarised Notes, Notornis 24: 246-279.
ROBERTSON, B. 1976a. Spur-winged Plover in Class. Summ. Notes. Notornis 23: 323-353.
ROBERTSON, B. 1976b. Kea in Class. Summ. Notes. Notornis 23: 323-353.
ROBERTSON,B . 1976c. Rook in Class. Summ. Notes. Notornis 23: 323-353.
ROBERTSON, H. A.; DENNISON, M. D. 1979. The roosting and feeding behaviour of some waders at Farewell Spit. Notornis 26: 73-88.

M. D. DENNISON, *129 Renall Street, Masterton;* H. A. ROBERTSON, *No. 1 R.D., Aokautere Drive, Palmerston North.*

★

LETTERS

The Editor, 11 April 1979

Sir,

Mr Sibson writing on the correct scientific name for *Daption* (*Notornis* 25, p. 149) states that the authors of the current Checklist examined the question of genders very carefully. In view of the confusion which is everywhere apparent it might well be considered that their time would have been better spent replacing vernacular names for the 130 or so species from which they were removed by the 1953 committee.

Due presumably, to this lack of guidance most authors now ignore the Checklist and derive their own vernaculars, often with ambiguous and sometimes quite misleading results. In the resulting chaos it is frequently not possible, when a vernacular name is used, to know whether the reference is to full species or merely to a race.

When competent and careful professional scientists are forced into making such confused statements as " Pied Tit *(Petroica macrocephala)* . . . this species " (*Notornis* 23 p. 315) there is I feel something seriously amiss.

Those ambiguous birds " Australian Gannet *(Sula bassana)*" and " Black-fronted Tern *(Chlidonias hybrida)*" are now so regularly reported and unquestioningly accepted that it seems only a matter of time before they join " Black Shag *(Phalacrocorax carbo)*" and " Pukeko *(Porphyrio porphyrio)*" as permanent members of New Zealand's avifauna.

I would earnestly suggest therefore that urgent consideration be given to a further revision of the NZ Checklist with the object of providing for all species both a scientific and a vernacular name irrespective of gender.

JAMES L. MOORE

32 Brook Street, Lower Hutt.

The Editor,
Sir,

The apparent confusion which concerns Mr Moore is entirely the result of incorrect usage by authors, and does not reflect inconsistencies in the 1970 *Checklist.* Everyone knows that *Sula bassana* is widely distributed outside Australasia. Thus the correct scientific name for the Australasian Gannet is, in fact, *Sula bassana serrator.* Authors contributing to *Notornis* are required to follow the 1970 *Checklist* except where taxonomic questions are being discussed. A list of amendments to the 1970 *Checklist* has already been prepared and will shortly be published in *Notornis.* Readers will be pleased to learn that, except in a very few cases, vernacular names (i.e. names in local usage) are not being changed to conform with international (? English) usage. Conformity is already attained by the use of scientific names.

In 1953 and again in 1970 the Checklist Committee of the Ornithological Society decided it would be best to provide vernacular names for subspecies, many of which, like the Pied Tit *Petroica macrocephala toitoi,* are easily recognised in the field. Mr Moore does not, in fact, advance any argument in support of his proposed change in policy.

F. C. KINSKY; J. A. BARTLE

The Editor, 19 March 1979
Sir,

In 1955 Berger proposed that the small glossy cuckoos of both the African and Indo-Australian regions should be united in one genus *Chrysococcyx.* The submerging of *Chalcites* was advocated also by Friedman in 1968. Now Brian Gill has recently suggested (*Notornis* 25: 194) that the New Zealand Checklist Committee erred in retaining the generic name *Chalcites.* Admittedly, in the *Checklist of the birds of Australia* (1975) *Chalcites* is displaced by *Chrysococcyx;* but with reservations and the comment " This lumping of the Australian species in one genus is probably too severe." Perhaps the Australian authors acted over hastily. Berger's proposal has not been universally accepted and the opposition favouring the retention of *Chalcites* is fairly formidable. Among the champions of *Chalcites* are: B. E. Smythies *Birds of Borneo* (1960); A. Landsborough Thomson, *Dictionary of Birds* (1964); C. Vaurie, *Birds of the Palearctic Fauna* (1965); A. L. Rand and E. T. Gilliard, *Handbook of New Guinea Birds* (1967); Salim Ali and S. Dillon Ripley, *Handbook of Birds of India and Pakistan* (1969).

The small glossy cuckoos fall into two widely separated groups. The four African species *Chrysococcyx (sensu stricto),* well illustrated in Bannerman's *Birds of West and Equatorial Africa,* Vol. 1, plate 34, belong to equatorial and southern Africa. They do not seem to have crossed the Sahara and none qualified for mention either in Nicoll's *Birds of Egypt,* edited by Meinertzhagen (1930) or in the much more recent *Birds of North Africa,* R. D. Etchecopar and F. Hue (1967).

However two species have braved the narrows of the Red Sea or the Gulf of Aden to earn a tenuous inclusion in Meinertzhagen's *Birds of Arabia,* pp. 309. 310 (1954).

Between India and New Zealand there are about ten species of small glossy cuckoos *(Chalcites)* and several sub-species. Their point of origin, the heartland from which they have spread and diversified,

BASIC DISTRIBUTION OF CHALCITES

Species of Chalcites	India and Burma	Thailand	Malaya	Indonesia and Borneo	Papua New Guinea	Australia	New Zealand
maculatus	X	X	X				
xanthorhynchos	X	X	X	X			
malayanus		X	X	X	X	X	
basalis			X	X	X	X	
crassirostris				X	X		
ruficollis					X		
meyerii					X		
osculans					X	X	
russatus					X	X	
L. lucidus					X	X	X
L. plagosus					X	X	

must surely lie in the region of eastern Indonesia, New Guinea and northern Australia as shown by the accompanying table. Some species of *Chalcites* are strongly migratory and do not hesitate to cross wide spaces of open sea. Is it significant that when Indian Emerald *maculatus* and Violet *xanthorhynchos* Cuckoos drift on their autumn migrations they tend to go south-east rather than south-west ?

The great deserts that lie between Pakistan and north Africa have long acted as an effective barrier between *Chrysococcyx* and *Chalcites.* Yet this vast area is crossed every year by tens of thousands of small passerines on their spring and autumn migrations. If *Chrysococcyx* and *Chalcites* are one and the same genus, why does e.g. *Chalcites*

maculatus migrate yearly to the high Himalayas and *lucidus* to ocean-girt New Zealand, whereas no species of *Chrysococcyx* bursts out of central Africa to reach Europe or the benign and fertile Mediterranean basin ?

Is it not therefore reasonable to suppose that the morphological similarity of *Chrysococcyx* and *Chalcites* is the result of convergence ? May not these two groups of small glossy cuckoos have evolved independently in what were far-separated but virtually unlimited areas of tropical rain forest, the one across equatorial Africa, the other around Indonesia ? These richly diversified forests, both lowland and montane, encouraged a veritable explosion of genera and species not only among the passerines but also among the cuckoos which depend largely upon them. Mere morphology is not enough; yet even in this respect, *Chalcites* as a general rule, is more heavily barred on the underparts. The pattern of behaviour also seems to differ, *Chrysococcyx* being land-tied and comparatively sedentary, *Chalcites* much more boldly dispersive.

In the light of present knowledge — one is tempted to say ignorance — of the relations between the small glossy cuckoos and the host species which they victimise, it is surely wiser to retain *Chalcites* and *Chrysococcyx* as separate genera.

R. B. SIBSON

26 Entrican Avenue, Auckland 5.

★

REVIEWS

Seminar on the Takahe and its habitat. Proceedings, Te Anau, 5-6 May 1978. Prepared and published by the Fiordland National Park Board.

The proceedings contains a mass of information in its 273 pages. The papers presented at the seminar included such aspects as the history of the Takahe, population and feeding studies, and the Takahe at Mount Bruce. The vegetation of the Murchison Mountains in relation to the habitat of the Takahe, the significance of deer and stoats in the area, the impact of helicopter hunting, and the use of poisons all came in for review and discussion.

The seminar emphasised the complexities of establishing an effective means of protecting the Takahe, which is declining in numbers, and the necessity of much more research. However, it appears that the greatest predatory pressure comes from deer, which compete with the Takahe for food, and from stoats, especially in periods of peak numbers.

A paper on the effect of 1080 poisoning for opossums revealed that many birds are killed in the process and most unfortunately, such important insectivorous birds as the native Whitehead, Tomtit, Robin and Rifleman are among the victims. In view of the early assurances given by the State Forest Service and repeated by Pest Destruction

Boards, that 1080 had little effect on bird life, this disclosure is rather disturbing, though it must be stated that steps have now been taken to remove the " chaff " from the poisoned bait, the chaff being mainly responsible for the high death rate. It appears, however, that even with the elimination of the chaff, some mortality among birds is inevitable.

A three-year experimental project aims at improving the habitat by the application of nitrogen and phosphorus in selected areas with the ultimate aim of increasing the breeding success of the Takahe. This technique, it is claimed, has been successful overseas with the Red Grouse. The results will be awaited with interest.

— R. H. D. STIDOLPH

Endangered birds — management techniques for preserving threatened species. Edited by Stanley R. Temple. 466 pp. University of Wisconsin Press. 1978. $US9.50.

This publication contains the proceedings of a 1977 international symposium concerned with new developments in active management techniques for threatened species. It is divided into ten parts: endangered bird problems and the concept of managing threatened species; increasing reproductive effort and success by reducing nest site limitations; alleviating problems of competition, predation, parasitism and disease; supplemental feeding and manipulation of feeding ecology; manipulating aspects of nesting biology; captive breeding of endangered species; genetic aspects of managing dwindling bird populations; reintroducing endangered birds to the wild; integrated approaches to management of endangered birds; summary.

Among the contributors are two of special New Zealand interest — Donald V. Merton on controlling introduced predators and competition on islands; and J. A. Douglas Flack on interisland transfers of New Zealand Black Robin.

Success or partial success is being achieved in many of the techniques indicated but the outcome is by no means assured as the pressures of the human population explosion, oil pollution, and the relentless worldwide destruction of natural habitat continue at an ever-increasing pace. As it is, some of the endangered species are being maintained in a semi-artificial state and are still at risk from the effects of agricultural and forestry chemical spraying. As the tropical forests continue to shrink, so will many more species be added to the endangered list. Some of the techniques being adopted are more or less specialised for one species and it is doubtful that, as the number of threatened species grows, adequate steps could be taken for each one individually. Desirable as these conservation efforts are, they are really at the wrong end of the ladder. The only effective means of preserving many species is by retaining their natural habitat — the whole environment — from the devastating effects of man's inter-

ference; areas that need to be big enough to keep a whole ecosystem intact.

In the past, one of the greatest impediments to planned conservation efforts has been the tardiness of the cogs of state departments to get moving. As a case in point, the declining population of the Kakapo was drawn to the attention of the authorities 40 years ago and 20 years were to elapse before any practical steps were taken to try to rescue this bird from probable extinction. The fact that birds placed on Kapiti Island in 1912 had a survivor 24 years later seems to have been ignored, as it would appear that if the bird had managed to survive for that period, the environment must have been suitable. Moreover, one of the birds seen in 1930 was considered to be a young one. In view of this evidence, one would have thought that the island would have been considered for further liberations. Little Spotted Kiwis introduced about the same time may now be the only colony of that species left in New Zealand.

Endangered birds is an invaluable source of information on the various techniques being used in attempts to save birds threatened with extinction, and it is compulsive reading for those engaged or interested in these tasks.

— R. H. D. STIDOLPH

Printed by TE RAU PRESS LTD., Peel Street, Gisborne