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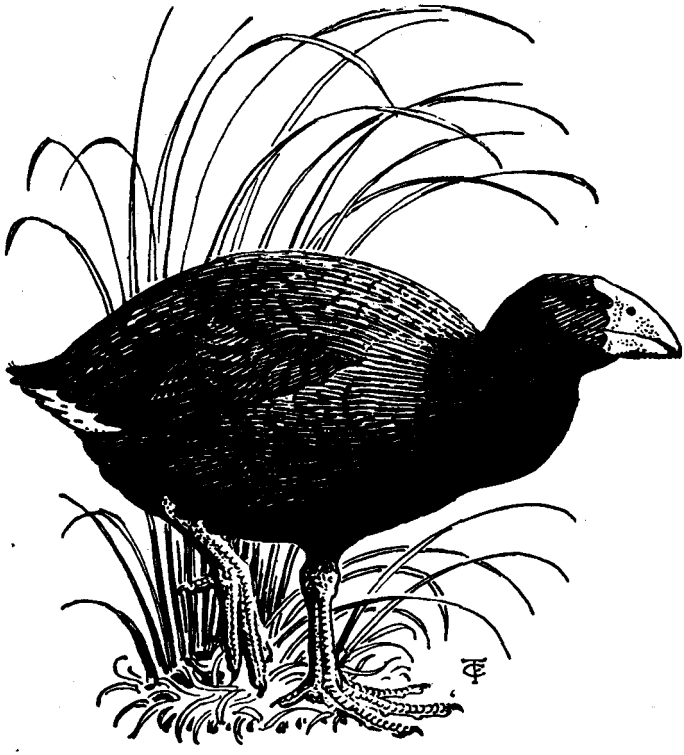
Journal of the Ornithological Society of New Zealand



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# NOTORNIS

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

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**Volume 33** **Part 3** **September 1986**


## NORFOLK ISLAND BIRDS: A REVIEW 1985


By NEIL HERMES, OWEN EVANS
and BERYL EVANS


This report brings together recent knowledge on the birds of Norfolk Island, updates previously published notes and presents unpublished material.

In 1978 the Royal Australasian Ornithologists Union held its annual congress in Norfolk Island. As a result of a mini-atlas conducted at the same time, a publication was prepared which reviewed available information, published records and recorded the status of the birds of the island (Schodde *et al.* 1983).

Since 1978 significant interest has been focused on the birds of the island. In 1979 an officer of the Australian National Parks and Wildlife Service (ANPWS) was stationed permanently on the island. The OSNZ South-west Pacific Islands Record Scheme was instituted in 1981 and this scheme has gathered data collected by New Zealand ornithologists. Moore (1985) reported on the data available in this scheme to 1984. In 1984 the Flora and Fauna Society of Norfolk Island began publishing a monthly Newsletter which includes many bird observations. This society published a checklist of the birds of the island (Hermes 1985, revised 1986). An illustrated field guide to the birds of the island was published in 1985 (Hermes 1985). In addition the island has been visited casually by many ornithologists from Australia, New Zealand, Germany and Canada and by consultant ornithologists engaged by the ANPWS.

As with previous publications on the birds of Norfolk Island, the names follow the *RAOU Recommended English Names for Australian Birds.*

Schodde *et al.* (1983) listed 100 species recorded for Norfolk Island. Moore (1985) increased this to 107 species, and this report increases the total to 120 species.


We thank the Norfolk Island residents and visitors who have contributed to this report. Observations are based on the following people's unpublished records.

Residents: Neil Hermes 1983-1985; Owen and Beryl Evans; Peter Coyne 1979-83; Helen Sampson; Angela Guymer; Derek Greenwood; George Southwell 1969-72.

Visitors: C.A. Fleming, November 28 - December 4, 1971; Victorian Naturalists Group September 1983; Warren Hitchcock November 20 1976 - January 7 1977; R. B. Sibson; Ian Enersby January 1985; Harry Wakelin February 1984; John Tarr March 6-24, 1983.

We would like to acknowledge the valuable comments on drafts of this manuscript by Jim Moore, Richard Schodde and Peter Fullagar.

## LAND AND FRESHWATER SPECIES

WHITE-FACED HERON *Ardea novaehollandiae*

During winter, flocks of up to 31 (OE, BE). Seen often on Philip Island coastline 1983-1985 (NH).

MALLARD *Anas platyrhynchos*

Of 100 adult and juvenile birds banded in 1982/83 season, four juveniles were recorded away from the island within one year – one in Vanuatu, two in New Caledonia and one in New Zealand. A fifth juvenile was recorded almost three years after banding, in New Zealand 1150 km from the banding place. All five birds were shot. This could indicate a regular north-south movement. Reports from Lord Howe Island are of fluctuations in numbers indicating possible movements (OE, BE). High level of apparent hybridisation with Pacific Black Duck *(Anas superciliosa)* and feral domestic ducks. Ducklings recorded in August and September (NH).

AUSTRALIAN KESTREL *Falco cenchroides*

Seen regularly and probably nesting on Philip Island (NH). Four birds on 9 April 1972 (GS).

FERAL CHICKEN *Gallus gallus*

Chicks late in August. Widespread and a potential problem if numbers build up in native forest and horticultural areas (NH).

SPOTLESS CRAKE *Porzana tabuensis*

Up to six came out to taped calls at Lower Cascade Creek in early 1980s (OE, BE).

PURPLE SWAMPHEN *Porphyrio porphyrio*

Adult and half-grown chick on 4 March 1983 (NH). Regular in Mission Chapel Swamp, Watermill and Cascade Creek (OE, BE).

FERAL PIGEON *Columba livia*

Regular on Philip Island. Sometimes large flocks of up to 50. Almost certainly nests on southern cliffs of Jacky Jacky (NH). Nesting on cliffs at Simons Water (OE, BE).

EMERALD DOVE *Chalcophaps indica*

Feeds regularly on olive seed. Nest in top of 3 m high pine contained two chicks on 11 February 1985 (NH). One nest with two eggs 2 m above ground on 17 July 1976 (OE, BE).

CRIMSON ROSELLA *Platycercus elegans*

Disease still prevalent. Breeding season appears to be extended. Flying juveniles observed in August and chicks in nest in November. Very numerous, especially in Norfolk Island National Park. One adult bird observed with extensive yellow on upperparts (NH).

RED-CROWNED PARAKEET *Cyanoramphus novaezelandiae*
Surveys since 1977-78 survey, which estimated the total population at between 17 and 30 birds, indicate a further decline in the population. In 1983 a programme was begun to breed this bird in captivity (NH).

SHINING BRONZE-CUCKOO *Chrysococcyx lucidus*
Active calling October to December 1983-1985 (NH).

LONG-TAILED CUCKOO *Eudynamys taitensis*
Rarely observed. Only recent record two single birds in 1982 (OE, BE).

NORFOLK ISLAND BOOBOOK OWL *Ninox undulata*
Regular censuses and casual observations between 1983 and 1985 indicated that birds call from April to December but are heard more frequently in June and July. One record from Burnt Pine in 1978. Records in 1983 came from Anson Bay, south-west corner of Norfolk Island National Park, and Mt Bates. The 1984-85 records all centred on the south-west corner of Norfolk Island National Park (NH, OE, BE).

SACRED KINGFISHER *Halcyon sancta*
Nests mainly in hollows in banks of road cuttings. Active at hollows in September. A large chick in one hollow on 13 January. Often observed on Philip Island 1983-1985 (NH).

WELCOME SWALLOW *Hirundo neoxena*
Records between 16 March and 10 October. Maximum 40 on 1 May 1983. Often seen on Philip Island. No local breeding records (NH, OE, BE).

GREY-HEADED BLACKBIRD *Turdus poliocephalus*
No records 1983-85 despite intensive searches and netting in Norfolk Island National Park. This species is almost certainly extinct on Norfolk Island (NH).

BLACKBIRD *Turdus merula*
Breeding records from 29 August (eggs) to 21 October (chicks). Nests in a variety of sites from fruit trees close to homes to native vines in thick forest. Partial albinism common, especially on wings and back. A few records for Philip Island 1983-1985 (NH).

SONG THRUSH *Turdus philomelos*
Breeding records from 13 September (chicks) to 21 October (chicks). Nests in *Meryta latifolia*, staghorn fern (NH) and garden plants. Also recorded on Philip Island and possibly nesting on Nepean Island (OE, BE).

SCARLET ROBIN *Petroica multicolor*
All observations 1983-1985 within the Norfolk Island National Park with the following exceptions: single observations near Melanesian Mission Chapel, Anson Bay, Red Road and Anson Road near Chapel (NH, OE, BE). Juveniles February 1984 (HW). Nest in *Dodonea viscosa*, Mt Bates Road, contained at least three chicks on 29 October 1978. Three males and five females seen on road on Mt Pitt on 16 March 1983. This species has declined since 1978 (OE, BE).

GREY FANTAIL *Rhipidura fuliginosa*
Nest with three eggs laid 12-14 September (OE, BE). In native forest it uses flowering palms as a perch to wait for insects (NH).

GREY GERYGONE *Gerygone igata*
Often feeds on the ground (NH). Bird caught in web of *Nephila* sp. spider (IE). Feeds on scale and flying ants (OE, BE).

SILVEREYE *Zosterops lateralis*

Often recorded on Philip Island in 1983-1985. In sample of 27 birds on Norfolk in October, average weight 12.1 g (range 10.5-13.5) and average wing length 62 mm (range 60-65) (NH).

WHITE-BREASTED WHITE-EYE *Zosterops albogularis*

One bird observed 21 December 1979 feeding on lantana at the base of the cliff on the northern side of Mt Pitt (PC). No further observations despite extensive observation and low-level netting in Norfolk Island National Park in 1983-1985 (NH).

LONG-BILLED WHITE-EYE *Zosterops tenuirostris*

Recorded frequently in 1983-1985 but almost always in Norfolk Island National Park (NH) and Rocky Point (Hundred Acres) Reserve (NH, VN). Feeds in noisy small flocks on branches, trunks and ground. Recorded feeding on pawpaw fruit (NH) This species was found to feed on native plant species rather than on a mix of native species, as the Silvereye does (Gordon 1983).

EUROPEAN GOLDFINCH *Carduelis carduelis*

Juveniles recorded in February 1984 (HW). Large flocks on Philip Island (NH).

EUROPEAN GREENFINCH *Carduelis chloris*

Recorded in small flocks on Philip Island (NH).

HOUSE SPARROW *Passer domesticus*

Recorded in small flocks on Philip Island. Largest number 40 on 17 May 1983 (NH).

COMMON STARLING *Sturnus vulgaris*

Large roosting flocks, especially in *Eucalyptus* plantations at Arthur's Vale, Bullock Hut Road and Rocky Point (Hundred Acres) Reserve. A roosting flock of at least 50 000 birds was seen at Headstone on 4 June 1983. Nests in cavities in walls, hollows in banks, ceilings of buildings and hollows in white oaks. Nests from August to November. Very common on Philip Island (NH).

## BREEDING SEABIRDS

PROVIDENCE PETREL *Pterodroma solandri*

First observed on Philip Island on 3-4 July 1985. Nest found 15 July containing one infertile egg. Estimated number at least 20 birds and at least four in nest burrows (NH, DG *et al.*). A full account is in preparation (NH).

BLACK-WINGED PETREL *Pterodroma nigripennis*

Arrives in October, and all birds leave by late May. Eggs are laid in January and the last record of a chick is 2 May. All nests recorded were on Philip Island, where several hundred birds breed (NH). Some birds still unsuccessfully attempt to breed on Norfolk Island, where cats take adult birds (OE, BE, NH).

WEDGE-TAILED SHEARWATER *Puffinus pacificus*

Arrives 17-22 October, and all chicks leave by the end of May (NH, OE, BE).

LITTLE SHEARWATER *Puffinus assimilis*

Arrives in April and May. Earliest egg date 7 July; chicks from 2 September. Nests on Philip Island and islets along the northern coastline of Norfolk Island. Nesting on Norfolk Island is now rare and feral cats take many (NH, OE, BE).

AUSTRALASIAN GANNET *Morus serrator*

The following data are for the 1977-78 to 1984-85 seasons (OE, BE, NH, PC). Egg dates 30 August-1 February. Chick dates 13 November-11 March. Earliest fledgling 22 January. No records at nest site after 11 March. Records at sea in May (NH).

| | No. Pairs | Max No. Fleglings |
|---|---|---|
| 1977-78 | 3 | 2 |
| 1978-79 | 3* | 1 |
| 1979-80 | 3 | 2 |
| 1980-81 | 2 or 3 | 1 |
| 1981-82 | ? | ? |
| 1982-83 | 2 or 3 | 1 |
| 1983-84 | 3 | 1 |
| 1984-85 | 3 | ? |

* This is at variance with Tarburton (1981).

MASKED BOOBY *Sula dactylatra*

Three chicks photographed in December 1971 at Rocky Point Reserve (CF). Four juveniles banded on 6 November 1976. Some birds shot in 1977. No breeding on main island since 1978 (NH). The following numbers of young were banded on Nepean Island in spring of each year. Except in 1977, a determined effort was made to band all chicks on the island each year and fluctuations can therefore be interpreted to indicate fluctuations in numbers of young raised.

| | | | |
|---|---|---|---|
| 1977 | 168 | 1982 | 639 |
| 1978 | 549 | 1983 | 382 |
| 1979 | 527 | 1984 | 668 |
| 1980 | 672 | 1985 | 111 |
| 1981 | 483 | | |

The following data are for Philip Island: egg dates 5 July-3 January; chick dates 5 September-29 March; earliest fledgling 2 January; peak of egg laying September. Four nests with eggs on Green Pool Stone 13 July 1984 (NH). Nesting seems earlier on Nepean than Philip Island (OE, BE).

RED-TAILED TROPICBIRD *Phaethon rubricauda*

Some birds are present all year but are more conspicuous in October and November. Eggs are laid in December-February and as late as 11 March. Chicks present 1 January-15 July. Birds nest on Philip and Norfolk Islands and the islets to the north of Norfolk Island. Schodde *et al.* (1983) underestimated nesting on Philip Island, where up to 1000 pairs breed (NH, OE, BE).

SOOTY TERN *Sterna fuscata*

The following data are from 1979 to 1985 (NH, PC). Birds arrive over Norfolk Island in late August and approach land only at night, when they are heard, not seen. From mid-September thousands descend on the nesting islands during the day and land occasionally. Laying starts in October but usually not until the second week. Because the eggs are harvested, laying continues. Protracted laying occurs to 30 November (the usual date of closure of the open season). The last egg date is 26 January. Chicks are present from 12 November to end of March but most chicks do not appear until January. Fledged young start to appear about the last week of January. In most years the birds leave in April and the latest records are late May.

The number of young produced on Philip Island in the 1984/85 season was estimated on 15 January 1985 to be about 8000 runners and flying young. Fullagar (1978) estimated more than 10 000 pairs in 1978 (NH).

COMMON NODDY *Anous stolidus*

The following data are for Philip Island. Adults arrive at the nest sites in October. Recorded laying dates 2 January-7 February; chicks 31 January-17 May. All leave in May. Nest sites are restricted to rocky ridges, e.g. near the Stool, above Moo-oo Beach, Jacky Jacky and some cliff sites. Several hundred pairs nest on Philip Island. This species also nests on Nepean Island and on islets north of Norfolk Island. The map in Schodde *et al.* (1983) does not show this species on Philip Island; however, this was an accidental omission (NH).

BLACK NODDY *Anous minutus*

Now breeds only at five discrete colonies on Norfolk Island and in small scattered groups on Philip Island. It may breed on islets north of Norfolk Island. Nest building starts in October and the first eggs are laid on 4 December. The peak of egg laying is over by the end of January, but some eggs are present until 11 March. Chicks are present 9 January-17 April. Birds are present all year in small numbers (NH).

GREY TERNLET *Procelsterna albivitta*

Nests on Nepean and Philip Islands and islets to the north of Norfolk Island. Probably nests on cliffs on Norfolk Island. Extended breeding season. Egg dates 1 October-3 January. Chick dates 1 October-11 March. Earliest flying young 2 January (NH).

WHITE TERN *Gygis alba*

Present all year but few in winter. Nests on Norfolk Island only. Pairing begins in August. Earliest egg date is 10 September and first hatching date 20 October. Incubation 35-36 days. Many hatchings in December and January. Birds fledge in March and April. Cold summer storms, heavy rain, 2-3 days of fog and drizzle in January can cause considerable chick mortality in some years (OE, BE, NH).

## PREVIOUSLY RECORDED VAGRANTS

GIANT PETREL *Macronectes* sp.

One seen in Philip Island Passage at a distance, 21 June 1985. Three birds present at Headstone rubbish outfall 14-16 July 1985 (NH).

CAPE PETREL *Daption capense*

Reported at sea in 1970s (GS), and reported by local fisherman on 8 August 1983 (NH).

LEAST FRIGATEBIRD *Fregata ariel*

A female seen regularly around Norfolk Island 1-8 January 1985. Observed at Emily Bay, Captain Cook Monument and Kingston Pier (NH).

CATTLE EGRET *Ardeola ibis*

Four birds in May-June 1982 (HW). One on 6 February-5 April 1983 (NH, JT). One on 5 April 1984 and two on 15 May 1985 (NH); 19 birds in 1984 (OE, BE). All observations at Kingston, Longridge, Watermill Valley or Headstone.

GREAT EGRET *Egretta alba*

One bird at Kingston in November 1976 (WH). Presumably same bird previously recorded March and July 1976 (Moore 1981, 1985) and three at Steeles Point in late 1950s (OE, BE).

LITTLE EGRET *Egretta garzetta*

One recorded in early 1970s (GS) and one at Kingston 17 March-15 May (NH).

ROYAL SPOONBILL *Platalea regia*

One bird seen irregularly at Kingston and Watermill Valley 24 June-18 December 1984 (NH).

AUSTRALIAN SHELDUCK *Tadorna tadornoides*

Adult female on Kingston Common and Watermill Dam from 29 November 1984 to 12 December 1985 (NH).

MARSH HARRIER *Circus aeruginosus*

Two present 4 May-30 September 1983 (DG, VN, NH). One record in July 1985 (OE, BE). Carcases of Grey Ternlets found on Philip Island were certainly prey of this species. There has almost certainly been confusion between reports of this species and the resident Australian Kestrel.

EURASIAN COOT *Fulica atra*

Winter 1971, one at Watermill (GS); one on 28 May 1978 (OE, BE).

SOUTH ISLAND PIED OYSTERCATCHER *Haematopus ostralegus finschi*

Two recorded at Second Sands, Watermill and airfield in 1970 (GS). One at Watermill 15-30 September 1983. Photographs of this bird were sent to R. B. Sibson, who confirmed identification as a South Island Pied Oystercatcher (NH).

MASKED LAPWING *Vanellus miles*

In February 1980 one bird observed at Watermill (HW), probably the same bird as seen in November 1980 (Moore 1981, Schodde *et al.* 1983); also at Mission Chapel Swamp. This bird was hit by an aircraft on the airfield (OE, BE).

DOUBLE-BANDED PLOVER *Charadrius bicinctus*

Up to 60 in June 1983 at airfield (NH).

BLACK-WINGED STILT *Himantopus himantopus*

About seven in 1957 on Kingston Common (OE, BE). One in early 1970s (GS). Two on Kingston Common on 17 September 1983 (NH).

RUDDY TURNSTONE *Arenaria interpres*

Winter records: 13 June 1984 at Philip Island and 50 at airfield during stormy weather, 4 June 1983 (NH).

MARSH SANDPIPER *Tringa stagnatilis*

One in December 1969 (GS).

TEREK SANDPIPER *Tringa terek*

One in early 1970 (GS).

LATHAM'S SNIPE *Gallinago hardwickii*

A few at Kingston November 1976 (WH).

BAR-TAILED GODWIT *Limosa lapponica*

Two at Emily Bay 12 June 1983 (NH).

RED KNOT *Calidris canutus*

One at Watermill in early 1970 (GS). Two on Kingston Common, 12 October 1984 (NH).

SHARP-TAILED SANDPIPER *Calidris acuminata*

Up to 20 birds recorded in early 1970s (GS). Flock of 8 on Kingston Common February and March 1983. Two on Kingston Common, 12 October 1984 (NH).

SILVER GULL *Larus novaehollandiae*

In 1979 or 1980, about 11 birds for a period of a few months (OE, BE). Two birds 6 March-5 July 1983 (NH, JT), and three arrived March 1985 and one remained 21 June 1985. One of these birds was shot. In 1983 and 1985, single birds were recorded on coasts of Philip Island (NH). A few were present for a few years up to 1967. One pair on Philip Island had a nest with 3 eggs in late 1967 (OE, BE) (reported in Turner *et al.* 1968).

WHITE-WINGED TERN *Chlidonias leucoptera*

One at airfield 1 December 1971 (CF). One bird on Kingston Common, 18 December 1984-7 February 1985, but two seen 5 and 8 January 1985 (NH).

TERN sp *Sterna* sp.

A bird which was either a Little or a Fairy Tern observed by George Southwell at Slaughter Bay in early 1970s (GS). One record in 1980 (OE, BE).

BARN OWL *Tyto alba*

Resident in 1972 (GS), and one record 19 September 1977 (OE, BE).

WHITE-THROATED NEEDLETAIL *Hirundapus caudactus*

Many observed December 1968 (GS) and over Mt Pitt in November 1976 (WH).

## NEWLY RECORDED VAGRANTS

SHY ALBATROSS *Diomedea cauta*

Single bird captured on land 22 October 1985; photographed and released (NH).

INTERMEDIATE EGRET *Egretta intermedia*

One on Kingston Common, 21 June 1985 (NH).

YELLOW-BILLED SPOONBILL *Platelea flavipes*

One record late 1960s (OE, BE).

BLACK SWAN *Cygnus atratus*

Two birds on Kingston Common, Watermill Dam and Cascade Dam on 26-27 August and one bird up to 18 October 1974. Island residents also report seeing one early this century (OE, BE).

HARDHEAD *Aythya australis*

Single unconfirmed record November 1971 (CF), and five on Watermill Dam in winter 1971 (GS).

COMMON SANDPIPER *Tringa hypoleucos*

One bird at Watermill Dam, 8 February-24 March 1983 (NH, OE, BE, JT).

CURLEW SANDPIPER *Calidris ferruginea*

Five birds in spring 1970 (GS), and one or two on Kingston Common, 23 September-12 October 1984 (NH).

KELP GULL *Larus dominicanus*

One record of dead bird on Kingston Common, March 1970 (GS), and one bird flying over Kingston Common, 17 September 1983 (NH).

WHITE-FRONTED TERN *Sterna striata*

One exhausted bird picked up in winter 1978 (OE, BE).

ROSE-CROWNED FRUIT-DOVE *Ptilinopus regina*

One bird found dead 13 September 1980 (now a specimen in the Australian National Wildlife Collection, Canberra), and two separate sightings were made one month later. No further records (OE, BE).

PALLID CUCKOO *Cuculus pallidus*

One bird at Steeles Point, 23 May and mid-June 1984 (HS).

MARTIN sp. *Cecropis* sp.

Several birds with swallows at Kingston 21 June-15 July 1985; possibly Fairy Martins (NH).

RICHARD'S PIPIT *Anthus novaeseelandiae*

Regular reports of pipits on the airfield from 1983 to 1985 were not confirmed by NH.

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# SHORT NOTE

## A Japanese Snipe at Mangere

The occurrence of several snipe in Southland during the 1984-85 summer has recently been reported (C. M. Miskelly *et al.* 1986, *Notornis* 32:327) in an account which includes previous records of snipe in New Zealand.

On 13 October 1985, while visiting the AMDB Mangere ponds, DGB and MJT were observing an area of shallow rainwater pools within a site of new construction, having stayed in our car so as not to disturb a flock of about 300 Pied Stilts in the nearest pool. Also present were 15 Knots and 10 Bar-tailed Godwits, and close to these, walking along the water's edge, was another bird which we both exclaimed could only be a snipe. The bird moved behind a clump of vegetation, but it soon emerged, flying low, and after briefly hovering close to the godwits alighted in a patch of dead weeds.

Here the snipe remained at rest with its head and upper parts in view, and in this position we were able to examine it through binoculars and a 22x telescope from 30 metres away for 20-30 minutes. A sketch showing proportions, bill length, and patterns of the head, back, and flanks tallied well with field guide illustrations and photographs of snipe. Also clearly visible between the tips of the folded wings was a small chestnut-orange patch of tail feathers.

Later that day, the bird was found in the same place by RJC, who took photographs, and on the following day it was studied for an hour by Stephen Davies, who also made notes. From these observations we decided that the species was *Gallinago hardwickii*, the Japanese Snipe, and this identification has been accepted by the Rare Birds Committee of OSNZ.

The bird showed three different types of behaviour when alarmed. When found by RJC, it was dozing close to the short broken remains of some reedy vegetation in company with 40-50 Pied Stilts. Several of the stilts became noisily agitated the moment RJC's head appeared above the skyline and one or two took to wing. When one of these swooped close overhead, the snipe shot up its neck and body until it was standing in a very alert posture, as if ready to fly. Later, when a Harrier passed over the sludge pit some distance away, putting up most of the stilts, the snipe was seen to crouch forward with its bill slanted down and to flick up its tail into a high vertical fan above its downward-sloping back. When increasingly agitated, the snipe moved a short distance into thicker cover and crouched down in the vegetation.

After several photographs of the bird at rest had been taken, a pebble was tossed so as to cause a minor alarm and the camera shutter was fired simultaneously with the sound of the pebble landing. The resulting photograph shows the crouched bird with its tail spread and only partly blurred by the movement. The tail feathers are dark with some barring for three-quarters of the length, and then chestnut, becoming paler towards the tip, and they are a reasonable match to the illustration in Slater (1970. *A Field Guide to Australian Birds; Non-passerines,* page 88). This compares the tail of *G. hardwickii* with those of *G. megala, G. stenura,* and *G. gallinago*. It depicts the last two with a dark band towards the tip of the tail, while *G. megala,* the Chinese Snipe, which seems the most likely alternative to *G. hardwickii* in New Zealand, is less brightly coloured and lacks the barred pattern in the tail.

The bird was seen again by RJC on 23 October 1985 in an adjoining sludge pit, when it got up from the bare edge of a lagoon, flew low over the vegetation, and dropped immediately into cover some 50 metres away. It was then easily seen from the other side of the lagoon to be dozing, head tucked well down, for the 15 minutes or so that it was under observation.

We are grateful to Stephen Davies for his prompt response in gathering details of the snipe. Several other OSNZ members sought the bird in vain during the following weeks.

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# FOOD OF THE CAPE PIGEON *(Daption capense)* FROM PRINCESS ELIZABETH LAND, EAST ANTARCTICA

By K. GREEN

ABSTRACT

Regurgitated food was collected from 73 Cape Pigeons nesting on coastal islands of Princess Elizabeth Land, Antarctica. Fish and euphausiids were the main food items, totalling more than 99% of the food by weight. The main euphausiid was *Euphausia superba*.

## INTRODUCTION

One of the least studied aspects of the ecology of Antarctic seabirds is their diet. Of the previous sources of dietary information for Cape Pigeons (*Daption capense*), only three consisted of more than 10 samples (Table 1). Beck (1969) collected regurgitated stomach contents from nine breeding adults and 85 chicks on Signy Island (60°54'S, 45°56'W). Bierman & Voous (1950) analysed the stomach contents of 17 adults collected at sea, and Mougin (1968) examined 11 stomach contents from Terre Adelie. Other reports of the diet of Cape Pigeons are concerned with at most three samples of regurgitated stomach contents with identifiable remains (Table 1).

In the present study I examined the diet of Cape Pigeons from coastal islands of Princess Elizabeth Land during part of the nesting season of 1983-84.

## METHODS

At first, I used water offloading (Wilson 1984) to try and get stomach contents. I inserted a 3 mm tube about 150 mm into the oesophagus and introduced warm fresh water from a 100 ml syringe. However, defensive regurgitation throughout the operation made water offloading difficult.

I then tried to collect food samples in a funnel 350 mm in diameter but failed. Finally I just collected samples from my clothing and the ground. I stored the samples in plastic jars in 70% ethanol and later removed the identifiable pieces, blotted them on filter paper, and weighed them.

Collections were made on Filla Island (Rauer Islands Group) and Bluff Island (Vestfold Hills).

## RESULTS

Ten samples were collected from adult Cape Pigeons at Filla Island on 26 January 1984 and 63 samples at Bluff Island between 30 January and 20 February 1984. Most birds were brooding or attending small chicks at this time. Table 2 gives the pooled results of these collections.

Of the 56 samples containing Euphausiaceae, *Euphausia superba* was identified in 34 (60.7%) and *E. crystallorophias* in four (7.1%). The most *E.*

TABLE 1 — Summary of foods reported for Cape Pigeon

| Reference | N | Crustacean | Cephalopod | Other Molluscs | Tunicate | Fish | Bird | Oil | Carrion | Vomitus of Giant Petrel |
|---|---|---|---|---|---|---|---|---|---|---|
| Clarke 1906 | * | +0 | | | | | | | | |
| Gain 1914 | 1 | +0 | | | | | | | | |
| Ardley 1936 | * | +0 | | | | | | | | |
| Murphy 1936 | 3 | +0 | + | | | + | + | | + | |
| Falla 1937 | 2 | | + | | | | | | + | |
| Bierman & Voous 1950 | 17 | + | + | + | | + | | | + | |
| Hagen 1952 | * | | | | | | | | + | |
| Paulian 1953 | 3 | + | | | | | | | | |
| Ealey 1954 | | + | + | | | | | | + | |
| Holgersen 1957 | 1 | | + | | | | ? | | | |
| Downes et al. 1959 | * | +? | | | | | | + | + | + |
| Mougin 1968 | 11 | +0 | + | | | + | | | | |
| Beck 1969 | 94 | +0 | | + | + | + | | | | |
| Humphrey et al. 1970 | 2 | + | | | | | | | | |
| Mougin 1975 | 1 | +? | | | | | | | | |
| Sagar 1979 | 3 | +0 | | | | | | | | |
| This study 1985 | 73 | +0 | | | | + | | + | + | |

* General observations

+0 Crustacean includes euphausiids

TABLE 2 — Composition of regurgitated stomach contents obtained in this study (n = 73)

| Contents | Frequency of occurrence (%) | Weight (g) min. | mean | max. | % contribution to total weight |
|---|---|---|---|---|---|
| Euphausiids | 76.7 | 0 | 3.43 | 15.9 | 75.9 |
| Unidentified crustaceans | 5.5 | 0 | 0.5 | 1.9 | 0.7 |
| Fish | 38.4 | 0 | 2.12 | 9.3 | 23.4 |
| Nematodes | 1.4 | | | | <0.1 |
| Unidentified | 9.6 | | | | <0.1 |

*superba* identified in a sample were 34 and the most *E. crystallorophias* were 11. Of the 28 occurrences of fish (38.4%), one was identified as *Trematomus* sp. and two as *Pagothenia borchgrevinki*. The fish were estimated from incomplete specimens to have been 70-100 mm long.

Intact carapaces of euphausiids were in 23 samples (31.5%). I measured from the tip of the rostrum to the posterior dorsal median margin to calculate body size. For 93 carapaces of *E. superba*, the mean was 13.7 mm (SD 1.8, range 7.2-17.5 mm). Three carapaces of *E. crystallorophias* measured 8.7, 7.0 and 8.5 mm (mean 8.07, SD 0.93 mm). The formula $y = 0.35x-0.919$ (Murano *et al.* 1979), where x is the body length and y the carapace length, was applied to the *E. superba* data. Derived body length averaged 41.7 mm (SD 5.4, range 23.2-52.6 mm).

On a few occasions I saw Cape Pigeons feeding on oil and particulate matter dispersing from Adélie Penguins (*Pygoscelis adeliae*) killed by leopard seals (*Hydrurga leptonyx*) and from the floating carcases of seals.

## DISCUSSION

The food of the Cape Pigeons collected in this study consisted almost entirely of euphausiids and fish. This was shown by both their frequency of occurrence (76.7% and 38.4% respectively) and their contribution to the total weight of the food sample (75.9% and 23.4% respectively).

Although Beck (1969) collected 85 of his 94 food samples from chicks at Signy Island, South Orkney Islands, a long way from my study area, the two major components in both studies were the same. Beck found that euphausiids were more frequent (97.9% cf. my 76.7%) and fish less frequent (15.9% cf. my 38.4%). Bierman & Voous (1950) reported frequencies of occurrence of 47.1% for euphausiids and 23.5% for fish.

Bierman & Voous found cephalopod material in 15 of their 17 samples (88%). However, no cephalopod material was found in the 94 samples studied by Beck or in my 73 samples. Beaks may have been retained in the stomach and not regurgitated, or the local availability of cephalopods may have differed. Samples I collected near the Vestfold Hills from Adélie Penguins, Emperor Penguins (*Aptenodytes forsteri*) (Green, in press), Southern Giant Petrels (*Macronectes giganteus* (Green 1986) and Weddell seals (*Leptonychotes weddelli*) also had fewer cephalopod remains than reported elsewhere, indicating a low availability of cephalopods.

Beck (1969) found only *E. superba*, whereas in this study *E. crystallorophias* was a minor component. It is of interest that, in the same period at Magnetic Island, I found that the euphausiid component of the food of the Adélie Penguin was also primarily *E. superba*, whereas in the previous season it had been primarily *E. crystallorophias* (Puddicombe & Johnstone, in press). The body length of *E. superba* taken by Cape Pigeons (mean 41.7, SD 5.4, range 23.2-52.6 mm) was similar to that taken by Adélies that I sampled at Magnetic Island (mean 40.7, SD 4.7, range 25.5-51.1 mm).

Both this study and that of Beck have shown that fish and euphausiids are important to breeding birds. Bierman & Voous considered crustaceans and fish to be "less favoured" components of the diet and stated that the normal food of Cape Pigeons was mainly cephalopods. Their samples, however, were

collected at sea up to 1860 km from land, from birds that included failed breeders (Beck 1969). General statements on the food of Cape Pigeons therefore cannot be made until sampling is conducted over a wider range and in all seasons.

## ACKNOWLEDGEMENTS

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# SOUTH POLAR SKUA BREEDING COLONIES IN THE ROSS SEA REGION, ANTARCTICA

By DAVID G. AINLEY, STEPHEN H. MORRELL and ROBERT C. WOOD

ABSTRACT

Using ground and aerial surveys between 1980 and 1983, we increased the number of known breeding sites of the South Polar Skua in the Ross Sea region from 21 to 55. Some 20 more sites may occur along parts of the coast which we did not survey, especially between Cape Adare and Cape Jones. We estimate that the Ross Sea region has about 15 000 skuas. Up to 20% of breeders do not nest in association with penguins.

Since the late 1950s, several colonies have increased, while others have decreased. Some colony changes have apparently been due to human activity. Information on banded birds indicates a low rate of exchange between colonies; some movement may be related to more food being available at refuse dumps at scientific bases.

## INTRODUCTION

Efforts have recently been directed toward assessing the numbers of penguins breeding in different regions of the Antarctic (e.g. Croxall & Prince 1979, Wilson 1983), the aim being to use trends in penguin numbers to assess changes in the Antarctic marine ecosystem. Little attention has been directed toward other birds because most are much harder to census. One species easy to census but ignored is the South Polar or Antarctic Skua (*Catharacta maccormicki*). Skuas nest in the open in discrete colonies, and they return year after year to the same breeding territory. Thus we do not expect to find erratic year-to-year fluctuations in numbers.

While looking for emigrants from Cape Crozier, we visited a large number of colonies in the Ross Sea region during the austral summers of 1980-81 to 1983-84. Most sites are in ice- and snow-free areas on the coast of Victoria Land and its offshore islands (Fig. 1 and 2).

## METHODS

We made ground counts at various colonies. Except as noted below, the following observations were made by parties of three or four experienced field biologists: December 1980-1983, at least 2 weeks each year at Cape Crozier, Ross Island; December 1981 and 1982, 1-3 days at other colonies on Ross Island as well as on nearby islands and the adjacent Victoria Land coast bordering on McMurdo Sound (Table 1: all sites listed below Cape Bernacchi); December 1982 and 1983, 1-2 hours at each of four sites farther north on the Victoria Land coast (sites Depot Island to Cape Bernacchi in Table 1); January 1982, 2-6 hours at each of eight sites northward along the remainder of the Victoria Land coast, including several islands (Table 1); December 1983, 2 hours at Gregory Island on the Victoria Land coast.

NOTORNIS 33: 155-163 (1986)

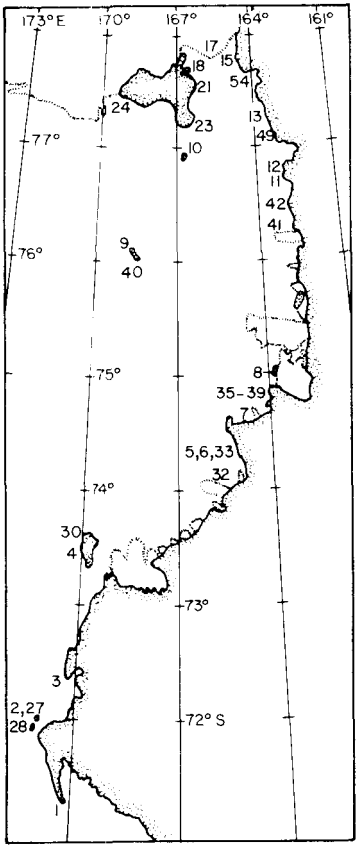


FIGURE 1 — The Victoria Land coast and adjacent islands; the locations of colonies are indicated by numbers which refer to those in Tables 1 and 2

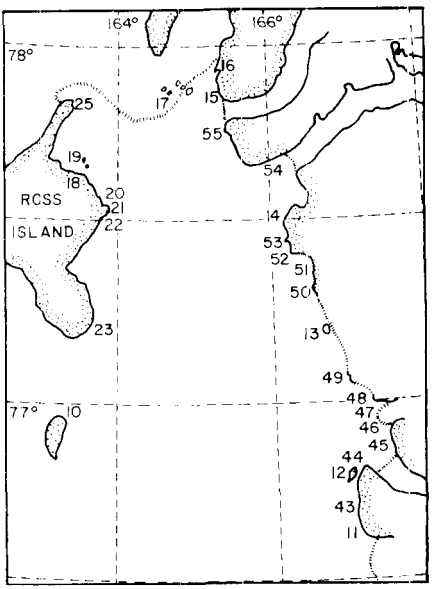


Figure 2 — The McMurdo Sound and southern Victoria Land Coast region; numbers as in Fig. 1

During ground surveys, we counted nests (with eggs or chicks) and/or defended territories. Thus, our estimates of breeding pairs reflect the number of defended territories that we encountered.

In addition to these ground counts, we overflew all the exposed coastal terrain of Victoria Land, between 74°00′ and 75°00′ and between 76°00′ and 78°00′, during January and December 1982 (Table 2). Little exposed coastal ground exists between 75°00′ and 76°00′. We flew by helicopter at altitudes of about 100 m, being careful not to fly over nesting penguins which, unlike skuas, are very sensitive to low-flying aircraft. At five sites we made both aerial and ground counts to estimate a factor by which to correct aerial counts (Table 3).

TABLE 1 — The number of breeding pairs of skuas at sites where ground censuses were conducted

| Site | Date | Number of Breeding Pairs |
|---|---|---|
| 1. Cape Adare | 26 Jan 1982[a] | 306 |
| 2. Possession Island | 9 Jan 1982 | 474 |
| 3. Cape Hallett | 17 Jan 1983[b] | 84 |
| 4. Coulman Island, Middle | 11 Jan 1982 | 55 |
| 5. Edmonson Pt, N[c] | 13 Jan 1982 | 56 |
| 6. Edmonson Pt, S | 13 Jan 1982 | 5 |
| 7. Markham Island | 13 Jan 1982 | 21 |
| 8. Inexpressible Island | 12 Jan 1982 | 60 |
| 9. Franklin Island, south end | 14 Jan 1982 | 184 |
| 10. Beaufort Island | 15 Jan 1982 | 209 |
| 11. Depot Point | 29 Dec 1982 | 72 |
| 12. Gregory Island | 28 Dec 1983 | 119 |
| 13. Dunlop Island | 29 Dec 1982 | 88 |
| 14. Cape Bernacchi | 29 Dec 1982 | 31 |
| 15. Blue Glacier | 9 Dec 1981 | 226 |
| 16. Cape Chocolate | 24 Dec 1981 | 35 |
| 17. Dailey Islands | 8-9 Dec 1981 | 77 |
| 18. Cape Evans | 7 Dec 1981 | 88 |
| 19. Delbridge Islands | 5 Dec 1981 | 49 |
| 20. Cape Barne | 23 Dec 1981 | 41 |
| 21. Cape Royds | 24 Dec 1981 | 76 |
| 22. Rocky Point | 24 Dec 1981 | 66 |
| 23. Cape Bird | 16-18 Dec 1981 | 399 |
| 24. Cape Crozier | Dec 1980 | 1000 |
| 25. Cape Armitage (Obs. Hill) | 25 Dec 1982 | 1 |
| Total pairs | | 3822 |

a
A survey in January 1982 revealed that the skuary occupied the same area as in 1961 (G. J. Wilson, pers. obs.)

b
Data from Pascoe, 1984.

c
Edmondson Point, N and S refer to small unnamed points immediately north and south of Edmonson Point

During January 1982, G. J. Wilson (pers. comm.) spent several weeks at Cape Adare but was only able to compare the extent of the colony relative to a complete census and mapping done by Reid (1962). Another New Zealand Antarctic Research Programme party surveyed the colony at Cape Hallett in January 1983 (Pascoe 1984).

In the following discussion, where possible we have defined colony sites according to maps or descriptions published by previous workers; diversions from these descriptions are noted.

TABLE 2 -- The number of breeding skuas at site censused from the air[a]

| Site | Date | Number Counted | Adjusted No. Breeding Birds |
|---|---|---|---|
| 26. Cape McCormick | 9 Jan 1985 | none | -- |
| 27. Sven Foyn Island | 9 Jan 1985 | 135 | 397 |
| 28. Bull Island | 9 Jan 1985 | 2 | 6 |
| 29. Heftyes' Island | 9 Jan 1985 | none | -- |
| 30. Coulman Island, near | | | |
| North Adélie colony | 11 Jan 1982 | 1 | 3 |
| South Adélie colony | 11 Jan 1982 | ? | -- |
| 31. Wood Bay coast (3 sites) | 13 Jan 1982 | 20 | 59 |
| 32. Edmonson Point | 13 Jan 1982 | 50 | 147 |
| 33. Tinker Glacier | 13 Jan 1982 | 9 | 26 |
| 34. Cape Washington | 13 Jan 1982 | none | -- |
| 35. Oscar Point | 13 Jan 1982 | 20 | 59 |
| 36. Northern Foothills coast | 13 Jan 1982 | 31 | 91 |
| 37. Gerlache Inlet coast | 13 Jan 1982 | 21 | 62 |
| 38. Cape Russell | 13 Jan 1982 | 10 | 29 |
| 39. Franklin Island, north end | 14 Jan 1982 | 50 | 147 |
| 40. Cape Day | 29 Dec 1982 | 7 | 21 |
| 41. Tripp Island | 29 Dec 1982 | 3 | 9 |
| 42. Cape Ross | 29 Dec 1982 | 48 | 141 |
| 43. Cape Archer | 29 Dec 1982 | 2 | 6 |
| 44. Lion Island | 29 Dec 1982 | 1 | 3 |
| 45. Point Retreat | 29 Dec 1982 | 15 | 44 |
| 46. Cuff Cape | 29 Dec 1982 | 1 | 3 |
| 47. Discovery Bluff | 29 Dec 1982 | 42 | 124 |
| 48. Cape Roberts | 29 Dec 1982 | 37 | 109 |
| 49. Spike Cape | 29 Dec 1982 | 21 | 62 |
| 50. Bay of Sails | 29 Dec 1982 | 7 | 21 |
| 51. Gneiss Point | 29 Dec 1982 | 10 | 29 |
| 52. Marble Point | 29 Dec 1982 | 23 | 68 |
| 53. New Harbor coast | 29 Dec 1982 | 45 | 132 |
| 54. Strand Moraines | 29 Dec 1982 | 52 | 153 |
| Total breeders | | | 1951 |

a Aerial counts adjusted based on data in Table 3: air counts ÷ 0.34

## RESULTS AND DISCUSSION

### Population size

Watson *et al.* (1971) summarised the literature and plotted 21 breeding sites of South Polar Skuas in the Ross Sea region. Skua colonies mainly exist along the Victoria Land coast and its offshore islands from 78° to 71° S. We directly surveyed almost all exposed ground along the Victoria Land coast from 78°00′ to 73°10′ S (except for three small moraines between 76° and 75°), including nearshore islands; we also surveyed all islets in McMurdo Sound, and all large offshore islands of the region, including Ross, Beaufort, Franklin, Coulman, Possession, Sven Foyn, Bull and Heftyes'. During our surveys we discovered 34 more breeding sites. Only 16 of the total 55 sites were associated

TABLE 3 -- Comparison of ground and aerial counts

| Site | No. Birds Counted From The Air | No. of Actual Territories[a] | Actual Colony Size[b] | Ratio- Air: Ground[c] |
|---|---|---|---|---|
| Depot Point | 46 | 72 | 144 | 0.32 |
| Gregory Island | 90 | 119 | 238 | 0.38 |
| Dunlop Island | 47 | 88 | 176 | 0.27 |
| Cape Bernacchi | 22 | 31 | 62 | 0.35 |
| Cape Chocolate | 29 | 35 | 70 | 0.41 |
| Total | 234 | 345 | 690 | 0.34 |

a Counted on the ground
b Number territories x 2
c Air counts ÷ figures in third column

with Adélie Penguin (*Pgyoscelis adeliae*) rookeries. Most breeding areas not associated with penguin rookeries were small, but together they contributed 20.6% of the estimated 4798 breeding pairs among the sites we surveyed. The occurrence of so many skuas elsewhere than at penguin rookeries supports the observation of Young (1963b, 1970) that South Polar Skuas do not depend on penguins for food. The fact that many skuas nest at penguin sites may only mean that both species are using the few available ice- and snow-free localities which are also near abundant marine food.

Undoubtedly, many skuas nest on that part of the Victoria Land coast which we did not census, as well as on the coast of King Edward VII Peninsula (Marie Byrd Land) in the eastern Ross Sea. There are also inland colonies (not listed in the tables) such as Crater Cirque in Victoria Land and the Rockefeller Mountains in Marie Byrd Land (Ricker 1964, Watson *et al.* 1971), where skuas have not been counted. At this point, we estimate that scientists have now visited about 70% of the skua colonies in the Ross Sea region. The Victoria Land coast between 75° and 76° is largely glacial, and probably no more than three colony sites exist in that stretch. The coast is covered by glaciers between 73°10′ and 74°, as well. North of 73°10′, however, much of the coast is exposed and could support as many as 20 breeding sites (i.e. between Cape Jones and Cape Adare). At least nine Adélie Penguin rookeries are along this stretch (Wilson 1983), but details of nesting skuas are known for only four of them. The majority of unsurveyed skua sites, however, are probably not associated with penguins.

Non-breeding skuas occur at most breeding sites. Reid (1962) for Cape Adare and Wood (1971) for Cape Crozier estimated that the ratio of breeding pairs to non-breeding skuas is 1.0:0.4. The ratio of 1.0 (0.98) non-breeders per breeding pair at Cape Hallett during late January 1983 (Pascoe 1984) is quite a different figure, and the difference could be due to many factors. Using the more conservative 1.0:0.4 ratio, and given a total of 4798 breeding pairs, we estimate a minimum of 11 515 skuas at known colonies in the Ross Sea in summer. Additional breeding birds would be associated with the uncensused

sites of Victoria Land and Marie Byrd Land. Skuas rarely visit colonies when under 3 years old, and many not until 4-5 years old (Ainley, Wood and Ribic, unpubl. data). Therefore, many young non-breeders probably also occur in the region during summer but remain at sea. Estimating their numbers during summer would be difficult. Considering approximately 25 sites not yet censused, plus the unknown number of non-breeders that do not visit colonies, we guess that an additional 3500 skuas could occur in the Ross Sea region during summer, or about 15 000 birds total. Ainley *et al* (1984), extrapolating from at-sea densities, estimated a total population of 13 500 skuas in the Ross Sea region during summer.

**Population trends**

We compared our census results with those of previous censuses (Table 4). The comparison gives some insight into changes of numbers at some sites. At Cape Hallett and the northern rookery at Cape Bird (based on colony map supplied by G. J. Wilson), numbers declined appreciably. The 1967 Cape Bird figure, however, may have been only a rough estimate, but near to Cape Bird, numbers at Horseshoe Lake and Rocky Point, after an earlier increase, seem also to have declined slightly after 1963. At Cape Royds numbers increased between 1960 and 1963, declined slightly, but have since remained fairly stable. Thus, numbers at all sites on the eastern shore of northern McMurdo Sound show a consistent downward trend or no growth after the early 1960s. Numbers

TABLE 4 - - A comparison of census results (breeding pairs) during different austral summers [a]

| Site | 1955 | '57 | '60 | '63 | '64 | '65 | '66 | '67 | '68 | '71 | '81-'83 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| C. Hallett [b] | >150 | | | 162 | | 147 | 113 | 105 | 98 | 98 | 84 |
| C. Crozier [c] | | | | | | | | 1000 | | | 1000 |
| C. Bird, N [d] | | | | | | | | 250 | | | 167 |
| Rocky Pt [e] | | | | | | 68 | | | | | 66 |
| Horseshoe Lk [f] | | | 18 | | | 23 | | | | | 17 |
| C. Royds [f] | | | 50 | 62 | 57 | 57 | | | | | 59 |
| C. Barne [f] | | | 21 | | | 30 | | | | | 41 |
| Delbridge Is [g] | | | | | | 0? | | | | | 49 |
| C. Evans [e] | | 52 | | 54 | 55 | | | | | | 188 |
| C. Armitage [e] | | | | 1 | 1 | 1 | | | | | 1 |
| Dailey Is [e] | | | | | | 16 | | | | | 77 |
| Gneiss Pt [e] | | | | | | 0 | | | | | 15 |
| Marble Pt [e] | | | | | | 20 | | | | | 34 |
| Blue Glacier [e] | | | | | | 20 | | | | | 226 |
| C. Chocolate [e] | | | | | | 25 | | | | | 35 |

a Austral summers identified by the initial year of each summer, even though some counts are from January of the next calendar year, e.g. January 1965 of the 1964-65 summer='64
b Eklund 1961, Johnston 1971, Trillmich 1978, Pascoe 1984
c Wood 1971
d Young 1970
e Spellerberg 1967
f Young 1963, Spellerberg 1971
g Young 1967, Spellerberg 1967

also declined at Cape Hallett. Although Johnston (1971) attributed the decline at Hallett to the disturbance from a scientific station, the colony apparently continued to decline, or at least did not recover, after the station was closed in 1971 (Pascoe 1984). Thus, factors other than human disturbance may have contributed to the decline of skua numbers at sites in the Ross Sea. The seemingly high ratio of non-breeders to breeders at Cape Hallett in 1983 (see above) may indicate that breeding numbers will increase there soon.

Numbers may have increased at eight other sites, all in the southern McMurdo Sound area. Though the trends may be real, we cannot validly assess the amount of increase by the available data. For instance, at the Delbridge Islands, Spellerberg (1967) noted no nesting skuas, but Young (1967) stated that an unspecified number did nest there. At Cape Evans, many of the nests we located were well inland (up to 1 km), and we do not know how thoroughly this inland area was checked in previous years. Thus, the increase may have been less than it seems. The same is true for the large colony at Blue Glacier, where most birds were up to 2 km inland in the recent survey. At this and other sites with apparent increases, Spellerberg (1967) could spend only about an hour at each (and some he may have just flown over), whereas we could have three or four biologists spending 1-3 days at each. There is also a seeming discrepancy at Cape Bird. Knox & Wilson (1979) reported 279 pairs in the entire area in 1978-79, but we found 399 pairs in December 1981, including many skuas breeding 1-2 km south of any penguin colonies.

A likely cause of the apparent increase in skua numbers at southern McMurdo Sound sites, especially in the late 1950s and early 1960s, was the human refuse at McMurdo Station dump. At all skua sites in southern McMurdo Sound the bones of chicken, lamb, and beef were common, brought by skuas from the dump. Jouventin & Guillotin (1979) proposed a similar cause for the doubling of the small skua breeding population at Pointe Géologie, Terre Adélie. The same may be true in the Antarctic Peninsula region, where South Polar Skua numbers are increasing at several sites as well as on the nearby South Orkneys (Hemmings 1984; W. Z. Trivelpiece, pers. comm.). These increases could well be the result of refuse from the increasing number of scientific bases in the region.

The stability of skua numbers at Cape Crozier is indicated by the little change apparent in the occupied breeding area. Nesting density has not changed either. Comparisons between 1967 and 1980 were done by RCW. The few Crozier skuas that visit MucMurdo and Scott bases do so only during the pre- and post-breeding seasons.

Among all the sites listed in Table 4, the best comparisons are for Cape Hallett, Rocky Points, Horseshoe Lake, Cape Royds, Cape Barne, and perhaps Cape Crozier. On the one hand, the changes in various South Polar Skua colonies, including those outside the Ross Sea region, and the direct link between changes and human activities, make skuas less useful than penguins for monitoring marine ecosystems. On the other hand, trends in the Cape Bird and Cape Hallett skua colonies indicate that changes in environmental factors other than human activity may have been at play. Thus, there is some utility in monitoring skua numbers.

**Interchange among populations**

Few South Polar Skuas breed away from their natal rookeries. The emigration rate in the Cape Crozier population is only about 0.3% (Ainley, Wood and Ribic, unpubl. data). What little interchange exists does not occur at the same rate at all sites, and rates and the direction of movement could be tied to population trends (Table 5). Cape Evans, where numbers may have increased substantially, received far more immigrants (six) than any other colony relative to its size (few chicks were banded at Cape Evans, and thus we know nothing of emigration there). The small but increasing colony at Pointe Géologie also contributed an immigrant to the Ross Sea region. Cape Crozier, where the breeding numbers remained stable, received six immigrants but sent forth five emigrants for only a slightly positive trade balance. Cape Bird, where the colony possibly declined, received no immigrants but sent forth seven emigrants. These data, and others in Table 5, indicate that sites in southern McMurdo Sound, i.e. Cape Evans and the Dailey Islands, as well as Cape Crozier, were localities of choice for emigrating skuas. In fact, four of the five Crozier emigrants moved to sites in the southern Sound. As with population trends discussed above, many of these shifts could be related to the availability of food, i.e. the garbage dump at McMurdo, with Cape Evans and Dailey Islands being the closest sites (except Cape Armitage). Cape Crozier could be attractive because of the extensive open water nearby early in summer.

ACKNOWLEDGEMENTS

We appreciate the logistical support provided by the U.S. Antarctic Research Programme, which included the efforts of the VXE-6 helicopter squadron and USCGC *Glacier*. R. P. Henderson, C. A. Ribic, S. R. Sanders, J. G. Sherburne, and L. B. Spear assisted in the field. Information on banded skuas was provided by NZ Dept. Internal Affairs (Wildlife Research Section), US Dept. Interior (Bird Banding Laboratory), and Centre de Recherches sur la Biologie des Populations d'Oiseaux. We appreciate the information supplied

TABLE 5 — Numbers of skuas, banded as chicks, which emigrated to breed away from natal colonies

| | Natal Site Where Banded [a] | | | | |
|---|---|---|---|---|---|
| Breeding Site | Pointe Geologie | Cape Hallett | Cape Crozier | Cape Bird | Cape Royds |
| Possession Is | 1 | | | | |
| C. Hallett | | -- | 1 | | |
| C. Crozier | | 2 | -- | 3 | |
| C. Bird | | | | -- | |
| C. Barne | | | | | 1 |
| C. Evans | | | 3 | 3 | |
| Dailey Is | | | 2 | | |

a A ranking of sites by the number of chicks banded: C. Crozier, C. Hallett, C. Bird, Pt.Geologie, C. Royds

by G. J. Wilson and the comments that he, B. D. Heather, W. Z. Trivelpiece, and E. C. Young made to improve our early draft. Financial support was provided by the US National Science Foundation. This is contribution No. 303 of Point Reyes Bird Observatory.

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# SHORT NOTES

## The syrinx of the Pukeko

The syrinx, the structure used in the production of sound, is in the Pukeko (*Porphyrio porphyrio melanotus*) at the tracheo-bronchial junction, enclosed in the interclavicular air sac. The end of the trachea is dorso-ventrally flattened, and the last five tracheal rings are fused to form a bony drum.

The main vibratory surfaces are the internal tympaniform membranes (ITMs). They stretch from the base of the pessulus, the median dorso-ventral rod of the drum, to the bronchidesmus, the connective tissue between the primary bronchi and the alimentary canal (Fig. 1). There are also two external tympaniform membranes (ETMs), between the third and fourth bronchial half-

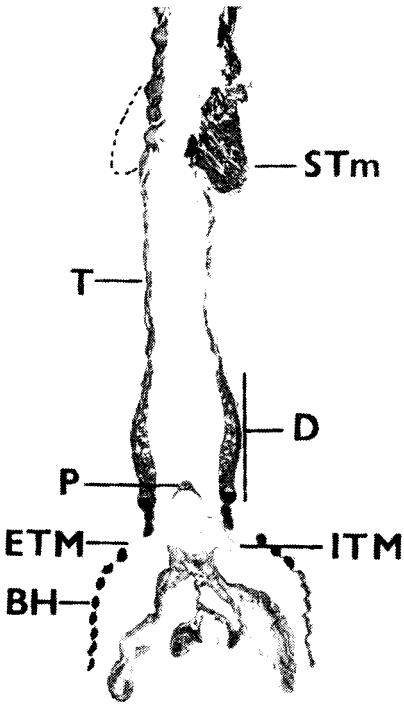


FIGURE 1.
Longitudinal section through the syrinx of a female Pukeko.
BH = bronchial half-ring, D = drum, ETM = external tympaniform membrane, ITM = internal tympaniform membrane, P = pessulus, STm = sternotrachealis muscle, T = trachea

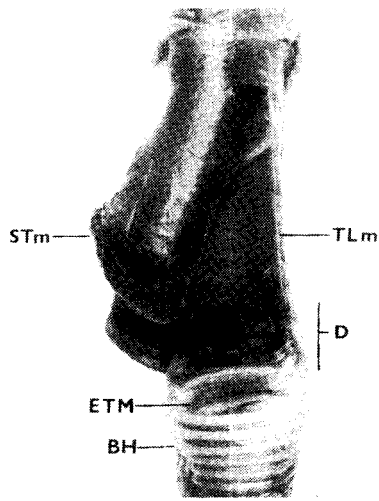


FIGURE 2.
Lateral view of the syrinx of a female Pukeko.
TLm = tracheolateralis muscle. Other labels as in Fig. 1

rings (Fig. 1, 2). These are as thin as the ITMs but of smaller area. There is no structure equivalent to the external labium found in oscine species.

Two pairs of muscles are associated with the syrinx, both of them extrinsic muscles: the sternotrachealis (STm) and the tracheolateralis (TLm). The STm originate on the rib cage and insert on to the lateral walls of the trachea, c. 1 cm (and 10 tracheal rings) above the drum (Fig. 1, 2). The section of the trachea between the edge of the air sac and the insertion of the STm is covered by a fascial sheath. The TLm, smaller muscle blocks than the STm, run along the trachea on its lateral surfaces to the dorsal side of centre (Fig. 2). They insert on to the first bronchial half-rings at the dorsal corners of the drum. None of the array of intrinsic muscles found in passerine birds are present in the Pukeko, a member of the Rallidae.

The only noticeable difference between the syrinx of male and female Pukeko is that the STm are thicker in the female (diameter = 2.5-5.0 mm, n = 8) than in the male (1.0-1.5 mm, n = 5). This is not a result of differences in body size because males are larger than females (Tunnicliffe 1965). Only one call of Pukeko shows marked sexual dimorphism (Clapperton 1983). There is no general tonal difference in calls of the sexes, as is seen in species of Rallidae with marked sexual dimorphism in syringeal structure such as the American Coot (Gullion 1950) and the Tasmanian Native Hen (Ridpath 1972).

The lack of complex muscular control over the action of the syrinx is reflected in the lack of intricate song in this species, a feature held in common with other birds of similar phylogeny. The Pukeko does, however, make full use of its sound-producing capabilities, having a large repertoire of calls (Clapperton & Jenkins 1984). It has enough control over sound production to produce calls of such consistency that they can act as an individual recognition system (Clapperton & Jenkins, *in press*).

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## Some Dunedin Bellbird flowers

The Bellbird (*Anthornis melanura*) is common in the Dunedin Botanic Gardens. From July 1983 to July 1985, when visiting the Gardens, I made a note of the flowers at which I saw Bellbirds feeding. They are listed below, together with the number of days on which they were recorded and the months.

**New Zealand native plants**

*Fuchsia excorticata* 37, May-Dec; *Metrosideros* spp. 13, Nov-Feb; *Phormium* spp. 9, Nov-Jan; *Pittosporum umbellatum* 4, Jul-Aug; *Pseudopanax* spp. 20, Jun-Sep; *Sophora* spp. 28, May-Oct; *Vitex lucens* 10, Apr-Aug

**Exotic plants**

*Albizia lophantha* 14, Apr-Aug; *Arbutus unedo* 18, Mar-Aug; *Arctostaphylos manzanita* 3, Jul-Aug; *Banksia* spp. 48, Feb-Oct; *Bomarea caldasii* 4, Apr-Jun; *Callistemon* spp. 10, Dec-Feb & May; *Camellia* x *williamsii* 4, Jul-Aug; *Chiranthodendron pentadactylon* 13, Nov-Mar & Jul; *Colquhounia coccinea* var. *mollis* 2, Mar; *Correa* spp. 5, Jun-Sep; *Crinodendron hookeranum* 4, Dec-Jan; *Cytisus proliferus* 1, Jun; *Erica* 'Wilmorei' 3, Jun-Jul; *Eucalyptus* spp. 41, Apr-Feb. *Fuchsia* 4, Mar & May; *Grevillea* spp. 21, Dec-Oct; *Hymenosporum flavum* 1, May; *Kniphofia* 8, Jan-Feb; *Lapageria rosea* 3, Apr-May; *Mahonia* spp. 7, Apr-Jun & Aug; *Melaleuca* spp. 17, Jan-Jun; *Protea* spp. 13, Jan-Jun; *Prunus subhirtella* 'Autumnalis' 5, Jun-Jul; *Rhododendron* 10, Jun-Aug; *Ribes sanguineum* 5, Aug-Sep; *Styrax japonica* 1, Mar; *Syzygium paniculatum* 1, Apr

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★

## A Kakapo at the Paringa River in 1965

Mr Chris Stephen of Warkworth, in the course of recent conversation about birds, mentioned to me that he and his brother John had seen a Kakapo in mid-August 1965 in the Paringa River valley, South Westland, some 10 miles upstream of the main road bridge. Until our conversation neither Chris Stephen nor his brother had fully realised the significance of such an observation. The brothers have since told me more. At the time they were camped on the true left bank some 30 metres from the river. Just after dawn they saw a large parrot quietly perched on a low moss-covered mound within 20 metres of their tent. The bird was light greenish-yellow and estimated to be 18-24 inches tall. The brothers moved on without approaching the bird more closely for fear of frightening it away.

The Stephen brothers have spent much time in the New Zealand back country and are familiar with the bird life around them. They well know Kakas and Keas. Both are certain that the parrot they saw in the Paringa 20 years ago was indeed a Kakapo (*Strigops habroptilus*).

D. G. MEDWAY

# IDENTIFICATION OF SOFT-PLUMAGED PETREL WINGS FOUND ON MACQUARIE ISLAND

by P. J. FULLAGAR, G. F. van TETS and J. A. BARTLE

The purpose of this note is to draw attention to the characters by which two rather similar petrels can be distinguished from limited material. Headless and much-decomposed carcases are often the only remains recovered for identification.

The determination of Soft-plumaged Petrel *(Pterodroma mollis)* from Macquarie Island, reported in Jones (1980) and Bourne (1983), was based on such material now in the Australian National Wildlife Collection (ANWC). They consist of a pair of fully feathered wings (No. 19558) and pectoral bones (No. BS2145), collected 14 January 1976 on a beach, and a fully feathered right wing with some pectoral bones (No. 19559), collected 18 January 1976 on a featherbed bog.

Since then we have found similar remains from Macquarie Island in the National Museum of New Zealand (NMNZ). Provisionally identified as Kerguelen Petrel *(P. brevirostris)*, they consist of a fully feathered left wing (No. 22880) and a right wing with some pectoral bones (No. 22888). These last specimens were collected by N.P. Brothers on 27 January 1979 at Saddle Point. The 1979 material was of a single bird (Brothers 1984) and, like the 1976 material, quite possibly the remains of predation by the Southern Great Skua *(Stercorarius skua lonnbergi)*.

All five wings are similar in length (Table 1). The sizes and shapes of the bones and the colour patterns and shapes of the feathers are all similar. Thus the remains appear to be from a medium-sized petrel with dark upper and lower wing surfaces.

The exposed bones with the wings show the following features. The coracoids lack a prominent anterior projection (Figure 1) at the dorsal end. This condition is typical of prions and fulmarine petrels, but not of puffinine petrels. On the sternum the anterior protrusion of the carinal apex (Figure 2) is much less than in medium-sized *Puffinus* and similar to that of medium-sized *Pterodroma*. The furculae (Figure 3) are relatively narrow and U-shaped,

TABLE 1 — Length (mm) of wings of Soft-plumaged Petrel *(Pterodroma mollis)* found on Macquarie Island

| Museum Number | Side | Length |
|---|---|---|
| ANWC 19558 | left | 251 |
| ANWC 19558 | right | 254 |
| ANWC 19559 | right | 251 |
| NMNZ 22880 | left | 252 |
| NMNZ 22888 | right | 253 |

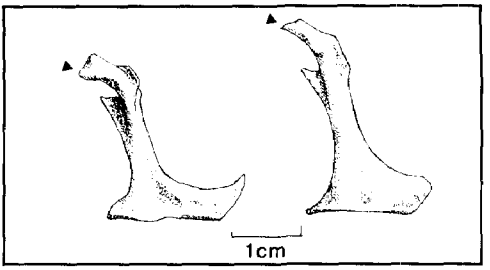


FIGURE 1 — Left coracoids, anterior view, of (left) Soft-plumaged Petrel *(Pterodroma mollis)*, ANWC BS3108, and (right) Fluttering Shearwater *(Puffinus gavia)*, ANWC BS843

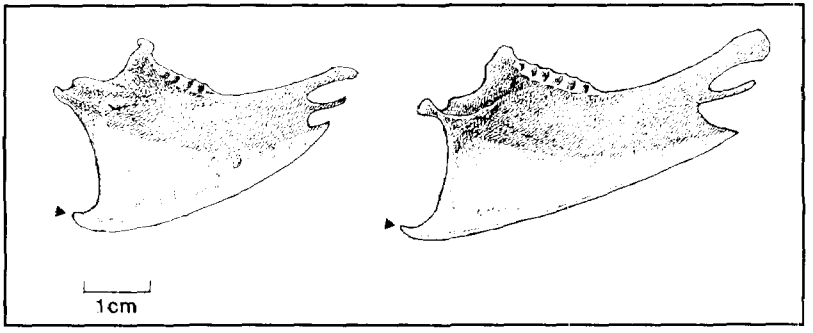


FIGURE 2 — Sternae, left view, of (left) Soft-plumaged Petrel *(Pterodroma mollis)*, ANWC BS3108, and (right) Fluttering Shearwater *(Puffinus gavia)*, ANWC BS843

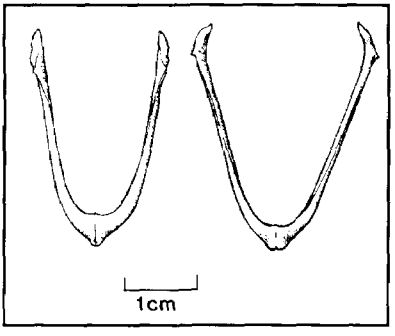


FIGURE 3 — Furculae, anterior view of (left) Soft-plumaged Petrel *(Pterodroma mollis)*, ANWC BS3108, and (right) Fluttering Shearwater *(Puffinus gavia)*, ANWC BS843

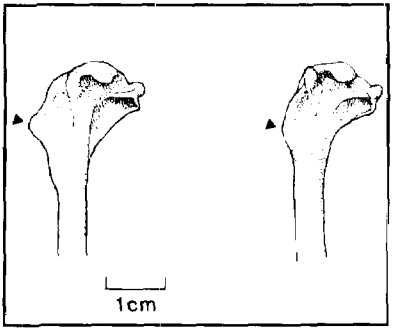


FIGURE 4 — Left humeri, dorsal view of proximal end of (left) Soft-plumaged Petrel *(Pterodroma mollis)*, ANWC BS3108, and (right) Fluttering Shearwater *(Puffinus gavia)*, ANWC BS843

as in *Pterodroma* and *Halobaena*, and not broad and V-shaped as in other fulmarine petrels, prions and puffinine petrels. The humeri have a prominent tubercle (Figure 4) at the tip of the deltoid crest, as in *Pterodroma* and most other kinds of petrel but not in *Puffinus*.

The bones indicate *Pterodroma*, but we did not have for comparison any bones of *Bulweria* or of *Pseudobulweria*, which some regard as a genus distinct from *Pterodroma*. The wing feathers failed to match those of a skin of *Bulweria fallax* BM. 1965.30.1 from the British Museum (Natural History), in shape and colour. The wings are much longer than those of *Pterodroma (Pseudobulweria) macgillivrae* as reported for the only measured adult by Watling & Lewanavanua (1985). Size, dark wings and bone shapes eliminate all petrels except *Pterodroma mollis* and the Kerguelen Petrel *(P. brevirostris)*. The wing measurements (Table 1) fall within the ranges of these two species as reported by Swales (1965). To verify that our reference material of the two species was correctly identified, we used the cranial differences associated with the eyes, those of *P. mollis* being much smaller than those of *P. brevirostris*, as clearly described and explained by Harper (1973:200) and illustrated for *P. (Lugensa) brevirostris* by Imber (1985; Figure 2e).

In both species, the upperwings are uniformly dark grey and, on the underwing, the lesser and median coverts are darker than the greater coverts and remiges. As indicated in Cox (1976) and Sinclair (1978), the underwing surface patterns (Figure 5) differ as follows. The marginal coverts along the leading edge of the wing are faintly scalloped by white edges to the coverts

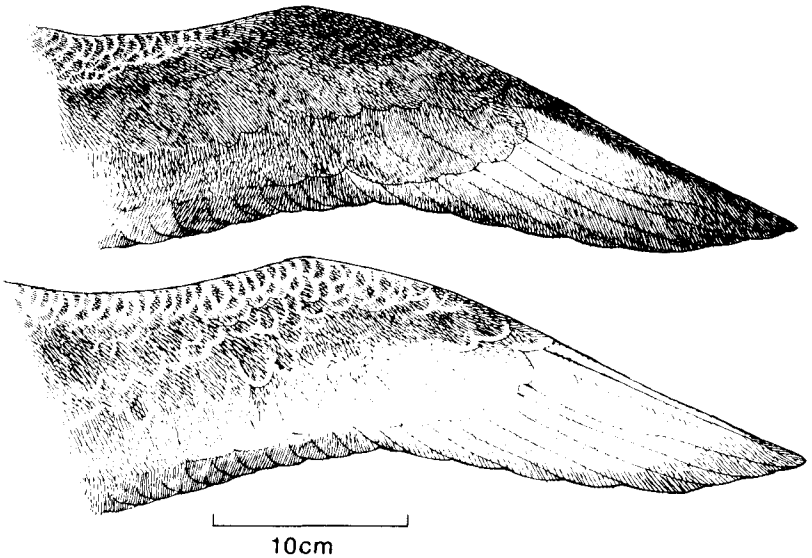


FIGURE 5 — Underwing surface patterns of (top) Soft-plumaged Petrel *(Pterodroma mollis)*, and (bottom) Kerguelen Petrel *(Pterodroma brevirostris)*, based on figures in Sinclair (1978) and on spread wings in the Australian National Wildlife Collection

only at the proximal end in *P. mollis*, whereas in *P. brevirostris* they are much paler because they are all more boldly scalloped by white edges. The lesser and median coverts have faint narrow white edges in *P. mollis* and broad prominent white edges in *P. brevirostris*. The primaries and greater primary coverts are darker in *P. mollis* than in *P. brevirostris*, and in *P. brevirostris* this difference is enhanced by a silvery white sheen. About two-fifths of the feather width on the leading edges of the outer two primaries is darker than the trailing three-fifths of the primaries in *P. mollis* and is lighter in *P. brevirostris*. The shafts of the outer two primaries are almost black in *P. mollis* and are pale grey in *P. brevirostris*. In all the above characters the wings found at Macquarie Island conform to those of *P. mollis* and differ from those of *P. brevirostris*.

Bourne (1981, 1983) suggested that a cranium found by K. Keith in 1956 on Macquarie Island and identified by Falla as of a Mottled Petrel *(P. inexpectata)* might in fact be *P. mollis* and therefore would indicate, together with the above-mentioned wings, the possibility of a small breeding colony of *P. mollis* on Macquarie Island. Brothers (1984) drew this same conclusion and reported the capture of a live bird 26 October 1982. However, there is no conclusive evidence of breeding by Soft-plumaged Petrels on Macquarie Island and it was not included among the breeding species on the island by Rounsevell & Brothers (1984). In February 1969 Soft-plumaged Petrels were discovered in breeding condition on Antipodes Island (Warham & Bell 1979).

## ACKNOWLEDGMENTS

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# SEABIRDS FOUND DEAD ON NEW ZEALAND BEACHES IN 1984 AND A REVIEW OF FULMAR RECOVERIES SINCE 1960

By R. G. POWLESLAND

ABSTRACT

In 1984, 5076 kilometres of coast were patrolled and 14 224 dead seabirds were found. A new species for the Beach Patrol Scheme was a Bird of Providence *(Pterodroma solandri)*. Four species found in greater numbers in 1984 than previously were the Black Petrel *(Procellaria parkinsoni)*, White-faced Storm Petrel *(Pelagodroma marina)*, Australasian Gannet *(Sula bassana)* and Pied Shag *(Phalacrocorax varius)*. A wreck of mainly Kerguelen Petrels *(Lugensa brevirostris)*, Blue Petrels *(Halobaena caerulea)* and Fairy Prions *(Pachyptila turtur)* occurred in August along the western coast and the northern half of the eastern coast of the North Island.

A summary is given of the coastal and monthly distributions for each of four genera of fulmar *(Macronectes, Fulmarus, Thalassoica* and *Daption)* found during the 1960-1983 period. The most frequently found fulmar was the Antarctic Fulmar *(Fulmarus glacialoides)*, a consequence of wrecks numbering hundreds of birds in 1975 and 1978.

## INTRODUCTION

This paper records the results of the Ornithological Society of New Zealand's Beach Patrol Scheme for 1984. All sections were patrolled except Wairarapa and Fiordland. Some beaches on the Chatham Islands were patrolled and the results are given under the heading Outlying Islands. In total, 680 Beach Patrol Cards and 43 Specimen Record Cards were submitted. Conventions used are the same as in previous reports (see Powlesland 1983), except that I have followed the nomenclature suggested by Imber (1985a) for the Kerguelen Petrel *(Lugensa brevirostris)*.

## RESULTS AND DISCUSSION

In 1984, the total length of coast travelled was 5076 km and 14 224 seabirds were found dead by 272 members of the Ornithological Society of New Zealand and their friends. The average number of birds per kilometre of coast covered was 3.06 (Table 1). The total distance travelled and the number of birds found in 1984 were much greater than the averages of 3961 km and 10 211 birds per year respectively for the previous 10 years (1974-1983). The average number of birds found per kilometre in 1984 (3.06) was, however, very similar to that for the previous 10 years (3.02). Table 1 also gives the kilometres covered and the number of seabirds found per month and in total for the various coasts, plus the number of birds picked up per kilometre covered for each coast. Table 2 gives the coastal and monthly distributions of the less commonly found seabirds

## TABLE 1 — Numbers of dead seabirds recovered and kilometres covered on each coast in 1984

| COAST | CODE | | MONTH JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL KM | TOTAL BIRDS | BIRDS/KM /COAST |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AUCKLAND WEST | AW | KM | 178 | 178 | 180 | 206 | 172 | 189 | 214 | 243 | 200 | 224 | 208 | 207 | 2399 | | |
| | | BIRDS | 428 | 358 | 187 | 187 | 205 | 156 | 148 | 4600 | 413 | 255 | 908 | 560 | | 8405 | 3.50 |
| TARANAKI | TA | KM | 9 | 12 | 29 | - | 19 | 10 | 15 | 15 | 7 | 5 | 2 | 11 | 125 | | |
| | | BIRDS | 40 | 20 | 21 | - | 19 | 16 | 6 | 162 | 8 | 12 | 1 | 45 | | 350 | 2.80 |
| WELLINGTON WEST | WW | KM | 34 | 42 | 21 | 18 | 55 | 83 | 46 | 94 | 17 | 51 | 42 | 42 | 545 | | |
| | | BIRDS | 335 | 202 | 11 | 10 | 91 | 103 | 47 | 333 | 19 | 325 | 281 | 135 | | 1892 | 3.47 |
| AUCKLAND EAST | AE | KM | 62 | 48 | 70 | 48 | 80 | 6 | 40 | 61 | 36 | 55 | 32 | 48 | 586 | | |
| | | BIRDS | 97 | 95 | 250 | 64 | 96 | 9 | 30 | 442 | 79 | 53 | 128 | 146 | | 1489 | 2.54 |
| BAY OF PLENTY | BP | KM | 1 | 5 | 36 | 2 | 5 | 10 | 65 | 24 | 25 | - | 25 | 13 | 211 | | |
| | | BIRDS | 1 | 9 | 65 | 4 | 3 | 13 | 95 | 141 | 174 | - | 311 | 88 | | 904 | 4.28 |
| EAST COAST NI | EC | KM | 9 | 8 | 4 | 8 | 9 | 7 | 10 | 17 | 11 | 16 | 27 | 10 | 136 | | |
| | | BIRDS | 16 | 2 | 1 | 5 | 3 | 7 | 9 | 11 | 30 | 86 | 79 | 16 | | 265 | 1.95 |
| WELLINGTON SOUTH | SW | KM | 2 | 62 | 1 | 3 | 5 | 3 | 25 | 48 | 4 | 17 | 3 | - | 173 | | |
| | | BIRDS | 2 | 37 | 2 | 0 | 5 | 1 | 12 | 36 | 6 | 12 | 4 | - | | 117 | 0.68 |
| NORTH COAST SI | NC | KMS | - | - | - | 1 | 1 | 2 | - | - | - | 25 | 4 | - | 33 | | |
| | | BIRDS | - | - | - | 1 | 9 | 4 | - | - | - | 9 | 4 | - | | 27 | 0.82 |
| WESTLAND | WD | KM | 3 | 5 | 6 | 4 | 3 | 5 | 3 | 2 | - | 3 | 15 | 4 | 53 | | |
| | | BIRDS | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | - | 0 | 6 | 0 | | 9 | 0.17 |
| CANTERBURY NORTH | CN | KM | 1 | 4 | 3 | 18 | 3 | 11 | 17 | 28 | 22 | 14 | 6 | 4 | 131 | | |
| | | BIRDS | 1 | 21 | 11 | 17 | 3 | 14 | 8 | 55 | 60 | 23 | 17 | 13 | | 243 | 1.85 |
| CANTERBURY SOUTH | CS | KM | 7 | 8 | 8 | 37 | 12 | 9 | 6 | 15 | 8 | 8 | 8 | 8 | 134 | | |
| | | BIRDS | 20 | 25 | 18 | 65 | 35 | 25 | 38 | 40 | 47 | 26 | 14 | 19 | | 372 | 2.78 |
| OTAGO | OT | KM | 5 | 7 | 8 | 7 | 5 | 8 | 6 | 5 | 8 | 13 | - | - | 72 | | |
| | | BIRDS | 0 | 18 | 7 | 1 | 0 | 2 | 5 | 3 | 4 | 3 | - | - | | 43 | 0.60 |
| SOUTHLAND | SD | KM | 6 | 1 | - | - | - | 3 | - | - | 7 | - | 2 | 2 | 21 | | |
| | | BIRDS | 28 | 1 | - | - | - | 2 | - | - | 5 | - | 4 | 5 | | 45 | 2.14 |
| OUTLYING ISLANDS | OI | KM | - | - | - | - | - | - | - | - | - | - | 10 | 16 | 26 | | |
| | | BIRDS | - | - | - | - | - | - | - | - | - | - | 22 | 41 | | 63 | 2.42 |
| TOTAL KILOMETRES TRAVELLED | | | 346 | 384 | 390 | 364 | 393 | 371 | 480 | 678 | 375 | 450 | 426 | 419 | 5076 | | |
| TOTAL KILOMETRES COVERED | | | 317 | 380 | 357 | 352 | 369 | 346 | 447 | 552 | 345 | 431 | 384 | 365 | 4645 | | |
| TOTAL SEABIRDS RECOVERED | | | 968 | 788 | 573 | 355 | 469 | 352 | 398 | 5825 | 845 | 804 | 1779 | 1068 | | 14224 | |
| BIRDS/KM COVERED/MONTH | | | 2.95 | 2.07 | 1.61 | 1.01 | 1.27 | 1.02 | 0.89 | 10.55 | 2.45 | 1.87 | 4.63 | 2.93 | | | 3.06 |

(1-15 birds in 1984), and Tables 3 and 4 give the same information for the more commonly found seabirds.

**Unusual finds**

A new record for the Beach Patrol Scheme is the Bird of Providence, a specimen of which was found between Maunganui Bluff and Glinke's Gully, west of Dargaville (AW), in September (Table 2). The only other record of this species in New Zealand was of a bird picked up on Muriwai Beach in January 1921 (Falla 1933). The Bird of Providence breeds on Lord Howe Island and in 1985 a small breeding colony was discovered on Philip Island, off Norfolk Island (Hermes 1985). Formerly it bred on Norfolk Island, but the depredations of introduced pigs and harvesting by the islanders caused the extinction of the population (Schodde *et al.* 1983). This petrel is a winter breeder, laying in May and the young fledging in November (Fullagar 1985). During the breeding season small numbers of this petrel have been regularly seen in the northern Tasman Sea (Cheshire & Jenkins 1981). It is noteworthy that only two Birds of Providence have been found on New Zealand beaches, even though more than 96 000 pairs breed about 1300 km away (Fullagar 1985). Presumably, they do not range widely to the east of Lord Howe Island.

Four species, the Black Petrel, White-faced Storm Petrel, Australasian Gannet and Pied Shag, were found in greater numbers in 1984 than in previous years. Thirty-nine Black Petrels were found, mainly on Auckland East beaches (Table 3). The previous highest total was 22 in 1981. Most of the 1984 birds were picked up in May, the month when many young leave their burrows (Imber 1985b). Fifty-five White-faced Storm Petrels were picked up in 1984, whereas the previous highest annual total was 25 in both 1976 and 1977. Most of the 1984 birds were on Auckland West (21) and Canterbury South (19) beaches. Seventeen were found in August-September, the period when this storm petrel returns to the New Zealand region to breed.

Generally, 100-200 Australasian Gannets are found each year, but 406 were found in 1984. The previous highest total was 303 in 1975. Most of the gannets (281) were picked up from Auckland West beaches. Although gannets were found in all months (Table 4), January-March and October-December were the periods of highest mortality. Gannet chicks leave North Island colonies during March-May (Robertson 1985) and so a peak in mortality might be expected then, not in January-March as occurred in 1984. Likewise, there is no obvious reason for the increased mortality in October-December 1984. In a few years' time, when more information is available about the ages of beach-wrecked gannets, a review of recoveries will show whether the peak periods of gannet mortality relate to the species' breeding biology.

Thirty-eight Pied Shags were found in 1984, whereas the previous highest annual total was 37 in 1981. Most of the 1984 birds were found on Auckland West and Auckland East beaches (Table 3). There was no obvious seasonal pattern in recoveries (Table 4).

While not the highest annual totals, three species were found in greater numbers than usual in 1984. In 1984, 213 White-headed Petrels *(Pterodroma lessonii)* were picked up, whereas the highest annual total was 278 in 1975. Almost all of the 1984 birds were on Auckland West and Wellington West beaches,

TABLE 2 — Seabirds of which 1 to 15 specimens were found in 1984

| SPECIES OR SUBSPECIES | NUMBER FOUND | COAST(S) | MONTH(S) |
|---|---|---|---|
| Megadyptes antipodes | 5 | WW,CS(3),OT. | FEB,MAR,APR,MAY,JUL. |
| Eudyptes pachyrhynchus | 3 | AW,CS(2). | MAR(2),DEC |
| sclateri | 1 | CS. | APR. |
| Diomedea exulans | 10 | AW(8),CN,CS | FEB,MAR,APR,MAY,JUN,SEP,NOV(2),DEC(2). |
| epomophora | 2 | AW,WW. | FEB,MAY. |
| melanophrys | 6 | AW(4),BP(2). | FEB,APR(2),JUL,AUG,DEC. |
| chlororhynchos | 1 | AW. | APR. |
| bulleri | 4 | AW(2),BP,SD. | JUN,SEP(2),OCT. |
| cauta subspp.* | 15 | AW(11),TA,WW,WS,SD. | JAN,FEB,MAR,MAY,JUN(3),JUL(3),AUG(4),DEC. |
| salvini | 3 | WW,WS,EC. | FEB,OCT,NOV. |
| Phoebetria palpebrata | 7 | AW(6),TA | FEB,APR,AUG(2),NOV(2),DEC. |
| Fulmarus glacialoides | 13 | AW(7),WW,EC(2),CN(2),CS. | JUN,AUG,SEP(4),OCT(3),NOV(2),DEC(2). |
| Pterodroma spp.* | 7 | AW(5),AE,OI. | JAN(2),APR,MAY(2),DEC(2). |
| solandri | 1 | AW. | SEP. |
| mollis | 1 | BP. | NOV. |
| pycrofti | 2 | AW,WW. | APR(2). |
| leucoptera | 1 | AE. | DEC. |
| Pachyptila crassirostris | 3 | BP,EC,CN. | AUG,SEP,OCT. |
| Procellaria spp.* | 1 | SD. | JAN. |
| cinerea | 8 | AW(5),WW,BP(2). | JAN,SEP,OCT,NOV(2),DEC(3). |
| westlandica | 4 | AW(3),WW. | OCT(3),NOV. |
| aequinoctialis | 9 | AW(9). | JAN(2),FEB(4),JUN,SEP(2). |
| Puffinus gavia/huttoni | 2 | WW(2). | AUG,OCT. |
| Oceanites oceanicus | 2 | AW,AE. | MAY. |
| Garrodia nereis | 1 | WA. | JUL. |
| Phaethon rubricauda | 1 | AW. | APR. |
| Phalacrocorax spp.* | 7 | AW(3),AE(2),NC,CN. | MAR,APR,MAY,JUN,JUL,NOV,DEC. |
| sulcirostris | 3 | AW,AE,EC. | JUL,AUG,OCT. |
| brevirostris | 8 | AW,AE(2),BP(2),EC,NC,CN. | FEB,APR,JUN(2),JUL(2),NOV(2). |
| Leucocarbo carunculatus onslowi | 1 | OI. | DEC. |
| Stictocarbo punctatus featherstoni | 2 | OI(2). | DEC(2). |
| Stercorarius skua lonnbergi | 3 | AW,AE,WW. | APR,JUN,OCT. |
| parasiticus | 3 | AW,EC,CS. | FEB,APR,JUN. |
| longicaudus | 2 | AW(2). | FEB,MAR. |
| Larus spp.* | 4 | EC,CN(2),OT. | FEB,APR(2),DEC. |
| Hydroprogne caspia | 8 | AE(4),TA,WW,EC,CS. | FEB,JUN(4),JUL,AUG,OCT. |
| Sterna albostriata | 1 | CS. | DEC. |
| fuscata | 1 | AW | AUG. |
| Procelsterna cerulea | 2 | AW(2) | MAR(2). |
| TOTAL | 158 | | |

• Species or subspecies could not be identified by the patroller.

especially in August-December, when White-headed Petrels are returning to their breeding sites (Antipodes Islands, Auckland Islands and Macquarie Island) and laying (Warham 1985a).

Usually patrollers find about 200 Buller's Shearwaters *(Puffinus bulleri)* each year, but they picked up 423 in 1984, mainly from Auckland West (211) and Auckland East (91) beaches. The highest annual total was 470 in 1978. Many of the Buller's Shearwaters were found in October-December (Table 4), the period just after their return from the North Pacific Ocean to the Poor Knights Islands to breed (Harper & Imber 1985).

In 1984, 532 Black-backed Gulls *(Larus dominicanus)* were picked up, whereas the highest annual total was 616 in 1978. Many of them were found on Auckland West (216) and Wellington West (110) beaches. About twice as many birds were found per month from February to June as during the rest of the year. Possibly, the increased deaths in autumn were mainly of young birds, which leave the colonies in February-March (Fordham 1964). Some patrollers noticed that more of the Black-backed Gulls found during this period had been shot than at other times of the year.

**Wreck**

A feature of the 1984 results was a wreck of Kerguelen Petrels, Blue Petrels and Fairy Prions in August. At the same time, large numbers of Antarctic Prions *(Pachyptila desolata)*, Narrow-billed Prions *(P. belcheri)* and Fluttering Shearwaters *(Puffinus gavia)* were picked up (Table 4). The birds were found in August after about a week of strong to gale force southerly to south-westerly winds in the central Tasman Sea and westerly winds on to the North Island coast (P. Bruce, New Zealand Meteorological Service, pers. comm.). Jenkins & Greenwood (1984) noted Blue Petrels off the North Island coast in July, but they saw no Kerguelen Petrels.

The 1984 wreck was not confined to New Zealand coasts. In June-July exceptional numbers of Grey-headed Albatrosses *(Diomedea chrysostoma)*, Antarctic Fulmars, Kerguelen Petrels and Blue Petrels were wrecked on western and eastern beaches of South Africa (P. G. Ryan, pers. comm.). Along the southern coast of Australia, from Perth to Victoria, thousands of petrels were blown inland and washed ashore during early August (Carter 1984). Most of these petrels were Kerguelen Petrels and Blue Petrels.

Twice as many Kerguelen Petrels and Blue Petrels were picked up from New Zealand beaches in 1984 as in 1981, the previous year with greatest numbers of both species. The proportion that each of these species formed of their combined total was not significantly different in these two years; Blue Petrels made up 59% of the 1481 birds in 1984 and 55% of 623 in 1981 (chi-squared = 3.36, $p > 0.05$).

Most of the New Zealand beach-wrecked petrels were picked up from Auckland West, Taranaki and Wellington West beaches: 80% of the Kerguelen Petrels and 87% of the Blue Petrels. Whereas in 1981 no Blue Petrels and only five Kerguelen Petrels were found on Auckland East and Bay of Plenty beaches, in 1984 104 Blue Petrels and 100 Kerguelen Petrels were found there.

Both petrels nest on subantarctic islands of the South Atlantic and Indian Oceans; in addition Blue Petrels breed about Macquarie Island and on the

TABLE 3 — Coastal distribution of the seabirds more commonly found dead in 1984

| SPECIES OR SUBSPECIES | COASTS AW | TA | WW | AE | BP | EC | WS | NC | WD | CN | CS | OT | SD | DT | TOTAL BIRDS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eudyptula minor subspp.* | 492 | 23 | 106 | 185 | 28 | 4 | 5 | 4 | - | 6 | 7 | 5 | 1 | 8 | 874 |
| albosignata | - | - | 1 | - | - | - | 1 | 1 | - | 10 | 8 | - | - | - | 21 |
| Diomedea spp.* | 9 | - | 10 | - | - | - | 4 | - | - | 1 | - | - | 1 | 1 | 26 |
| chrysostoma | 26 | 1 | 3 | 1 | - | - | - | - | - | - | - | - | - | - | 31 |
| cauta cauta | 11 | - | 5 | - | - | - | - | - | - | - | - | - | 1 | - | 17 |
| Macronectes spp.* | 27 | - | 3 | - | - | - | 2 | - | - | 3 | - | - | - | 1 | 36 |
| Daption capense | 53 | - | 19 | 9 | 5 | 2 | 4 | - | - | 8 | 20 | 1 | 1 | - | 122 |
| Lugensa brevirostris | 390 | 36 | 53 | 14 | 86 | 1 | 2 | - | 1 | 16 | 1 | - | - | - | 600 |
| Pterodroma macroptera | 47 | - | 2 | 21 | 4 | - | - | - | - | - | - | - | - | - | 74 |
| lessonii | 181 | 2 | 27 | 1 | - | 1 | - | - | - | 1 | - | - | - | - | 213 |
| inexpectata | 28 | - | 2 | - | 1 | - | - | - | - | - | 5 | - | 1 | - | 37 |
| cookii | 11 | 1 | - | 26 | - | - | - | - | - | - | - | - | - | - | 38 |
| nigripennis | 12 | 1 | 1 | 2 | - | 1 | - | - | - | - | - | - | - | - | 17 |
| Halobaena caerulea | 661 | 47 | 55 | 16 | 88 | 3 | 1 | - | - | 8 | 1 | - | 1 | - | 881 |
| Pachyptila spp.* | 310 | 39 | 616 | 10 | 1 | 6 | 8 | - | - | 4 | 3 | 1 | 10 | 13 | 1021 |
| vittata | 41 | 5 | 18 | 1 | - | - | - | - | - | 1 | 36 | - | 2 | - | 104 |
| salvini | 84 | 5 | 19 | 6 | - | 1 | - | - | - | 3 | - | - | - | - | 118 |
| desolata | 329 | 11 | 12 | 6 | 6 | 2 | - | - | - | - | 2 | - | - | 1 | 369 |
| belcheri | 623 | 12 | 49 | 9 | 10 | 4 | 4 | - | 1 | 8 | 23 | - | - | - | 743 |
| turtur | 2775 | 40 | 457 | 363 | 105 | 96 | 21 | 6 | - | 24 | 15 | 3 | 4 | 3 | 3912 |
| Procellaria parkinsoni | 8 | - | - | 31 | - | - | - | - | - | - | - | - | - | - | 39 |
| Puffinus spp.* | 9 | 2 | 17 | 3 | - | - | - | 2 | - | - | - | - | - | - | 33 |
| carneipes | 27 | - | 2 | 99 | 19 | - | - | - | - | - | - | - | - | - | 147 |
| bulleri | 211 | 7 | 29 | 91 | 58 | 21 | 4 | - | - | - | 1 | 1 | - | - | 423 |
| griseus | 462 | 26 | 81 | 99 | 271 | 60 | 8 | 2 | 3 | 13 | 16 | 5 | 7 | 9 | 1062 |
| tenuirostris | 136 | 15 | 24 | 13 | 5 | 2 | - | - | - | - | 12 | 1 | 3 | 1 | 212 |
| gavia | 526 | 31 | 33 | 173 | 56 | 3 | 6 | 1 | - | 4 | 8 | - | - | 1 | 842 |
| huttoni | 19 | - | 30 | 5 | 1 | - | - | 1 | - | 15 | 3 | - | - | - | 74 |
| assimilis | 19 | 1 | 12 | 23 | 26 | - | - | - | - | - | - | - | - | 1 | 82 |
| Pelagodroma marina | 21 | - | 1 | 6 | 6 | - | - | - | 2 | - | 19 | - | - | - | 55 |
| Pelecanoides urinatrix | 201 | 6 | 45 | 99 | 49 | 3 | 6 | - | - | - | 1 | - | 3 | 1 | 414 |
| Sula bassana | 281 | 13 | 14 | 57 | 30 | 10 | - | - | 1 | - | - | - | - | - | 406 |
| Phalacrocorax carbo | 3 | 1 | 4 | 5 | - | 3 | 2 | - | - | - | - | - | - | - | 18 |
| varius | 15 | - | - | 18 | 3 | - | - | - | - | 2 | - | - | - | - | 38 |
| Stictocarbo punctatus | - | 1 | - | 3 | - | 1 | - | 1 | - | 23 | 121 | 15 | 2 | - | 167 |
| Larus dominicanus | 216 | 7 | 110 | 55 | 14 | 24 | 31 | 5 | 1 | 25 | 36 | 5 | 2 | 1 | 532 |
| novaehollandiae | 23 | 7 | 10 | 15 | 15 | 2 | 5 | 2 | - | 55 | 1 | 2 | - | 2 | 139 |
| bulleri | - | - | 1 | - | 1 | 3 | - | - | - | 3 | 12 | 2 | 3 | - | 25 |
| Sterna striata | 39 | 7 | 9 | 11 | 7 | 3 | - | - | - | 2 | 10 | - | - | 16 | 104 |
| TOTALS | 8326 | 347 | 1880 | 1476 | 895 | 256 | 114 | 25 | 9 | 235 | 361 | 41 | 42 | 59 | 14066 |

* Species or subspecies could not be identified by patroller.

southern tip of South America (Brothers 1984, Clark *et al.* 1984, Mougin 1975, Watson 1975).

Adults of both species visit burrows intermittently all winter (Brothers 1984, Imber 1984) and therefore seem to be relatively sedentary. On Possession and East Islands in the Crozet group, Kerguelen Petrels laid within a few days of 10 October in 1968 (Mougin 1969) and within a week of 15 October in 1981 (Jouventin *et al.* 1985). Similarly, Blue Petrels lay in October on Marion and Prince Edward Islands and in late October at the Iles Crozet (Imber 1985b, Jouventin *et al.* 1985). Thus, as most Kerguelen Petrels and Blue Petrels on New Zealand beaches are found in August-September (Table 4, Powlesland 1983), when adults are courting and mating on the nesting islands, most of the beach-wrecked birds are likely to be non-breeders. Indeed, examination of the moult and feather wear of these beach-wrecked petrels shows that most are non-breeders, many being first-year birds (Imber 1984).

As well as the large number of petrels, 2682 Fairy Prions were found in August (Table 4). In total, 3912 Fairy Prions were found in 1984. Only in 1975 have more Fairy Prions been found in a year: 5118. In August 1984 the species was found at a greater rate on Auckland West beaches (7.3 per kilometre of beach travelled) than on Auckland East (4.7) or Wellington West beaches (0.4).

**Miscellaneous birds**

Miscellaneous birds recovered in 1984, but not considered to be seabirds, totalled 256. There were 62 magpies, 21 Mallards, 15 each of Rock Pigeons and Blackbirds, 14 Starlings, 13 Black Swans, 10 Variable Oystercatchers, eight each of Paradise Shelducks and Pukekos, six each of Canada Geese and Indian Mynas, five each of domestic geese and Grey Ducks, four each of New Zealand Shovelers, Australasian Harriers, Pheasants, domestic fowl and Pied Stilts, three each of duck species, passerine species, Skylarks, New Zealand Pipits, North Island Fantails, and Chaffinches, two each of White-faced Herons, Cattle Egrets, domestic turkeys, Buff Wekas, South Island Pied Oystercatchers, Banded Dotterels, Welcome Swallows, Song Thrushes and House Sparrows, and one each of North Island Brown Kiwi, Reef Heron, Brown Quail, California Quail, New Zealand Dotterel, Bar-tailed Godwit, Knot, New Zealand Pigeon, Shining Cuckoo, New Zealand Kingfisher, Goldfinch and Redpoll.

## FULMAR RECOVERIES 1960-1983

The term fulmar, as in Imber (1985a), refers to the genera *Macronectes, Fulmarus, Thalassoica, Daption* and *Pagodroma*. No Snow Petrels *(Pagodroma nivea)* have been found by beach patrollers. The following is a summary of the coastal and monthly distributions of the fulmars found in the 24 years 1960-1983. To test whether the annual pattern of recovery for each species, depicted in Figure 1, differed from the theoretical situation whereby an equal number of birds were found each month, the Kolmogorov-Smirnov one-sample test was used (Siegel 1956, p.47).

GIANT PETREL (*Macronectes* spp.)

Two species are present about New Zealand (Falla *et al.* 1979), but they were not distinguished by patrollers. In general, the Northern Giant Petrel *(M. halli)* breeds and feeds north of the Antarctic Convergence, and the Southern Giant Petrel *(M. giganteus)* does so south of the convergence (Serventy *et al.* 1971,

TABLE 4 — Monthly distribution of the seabirds more commonly found dead in 1984

| SPECIES OR SUBSPECIES | MONTH JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL BIRDS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eudyptula minor subspp.* | 197 | 125 | 143 | 49 | 65 | 29 | 24 | 92 | 34 | 21 | 37 | 58 | 874 |
| albosignata | 1 | 5 | 4 | 2 | 1 | 1 | - | 1 | 2 | - | 2 | 2 | 21 |
| Diomedea spp.* | 1 | 4 | 1 | - | 1 | 2 | 3 | 3 | 1 | 2 | 6 | 2 | 26 |
| chrysostoma | 1 | - | - | 1 | 3 | 6 | 7 | 6 | 2 | 4 | - | 1 | 31 |
| cauta cauta | 2 | 3 | - | 2 | 3 | 1 | - | 2 | - | 1 | 2 | 1 | 17 |
| Macronectes spp.* | - | 2 | - | - | 2 | 10 | 2 | 5 | 7 | 4 | - | 4 | 36 |
| Daption capense | 1 | 2 | - | - | 1 | 10 | 7 | 34 | 24 | 16 | 17 | 10 | 122 |
| Lugensa brevirostris | - | - | - | - | - | 1 | 6 | 378 | 199 | 10 | - | 6 | 600 |
| Pterodroma macroptera | 9 | 7 | 10 | 6 | 3 | 1 | 5 | 19 | 3 | - | 6 | 5 | 74 |
| lessonii | 11 | 7 | 3 | 4 | 10 | 10 | 3 | 23 | 21 | 33 | 65 | 23 | 213 |
| inexpectata | 11 | 13 | 1 | - | 1 | - | 1 | 2 | 1 | 1 | 6 | - | 37 |
| cookii | 3 | 5 | 13 | 4 | - | - | - | - | - | - | 4 | 9 | 38 |
| nigripennis | 2 | 1 | 4 | 8 | 1 | - | - | - | - | - | - | 1 | 17 |
| Halobaena caerulea | 1 | - | - | - | - | 5 | 16 | 721 | 109 | 14 | 11 | 4 | 881 |
| Pachyptila spp.* | 183 | 108 | 3 | 5 | 29 | 31 | 13 | 245 | 55 | 166 | 143 | 40 | 1021 |
| vittata | 13 | 2 | 1 | 3 | 12 | 3 | 15 | 39 | 8 | 4 | 2 | 2 | 104 |
| salvini | - | - | - | - | 10 | 8 | 5 | 86 | 6 | 3 | - | - | 118 |
| desolata | 3 | - | - | 4 | 21 | 5 | 10 | 299 | 13 | 6 | 3 | 5 | 369 |
| belcheri | - | - | - | 1 | 5 | 4 | 38 | 662 | 17 | 5 | 9 | 2 | 743 |
| turtur | 83 | 53 | 2 | 1 | 23 | 23 | 92 | 2682 | 141 | 183 | 383 | 246 | 3912 |
| Procellaria parkinsoni | - | 2 | 8 | 1 | 21 | - | - | 3 | - | - | 2 | 2 | 39 |
| Puffinus spp.* | - | 4 | 2 | 2 | 6 | 1 | 1 | 4 | 2 | 3 | 6 | 2 | 33 |
| carneipes | 9 | 10 | 53 | 13 | 6 | 3 | 1 | 2 | - | - | 28 | 22 | 147 |
| bulleri | 38 | 36 | 73 | 11 | 29 | 6 | - | 1 | 11 | 44 | 121 | 53 | 423 |
| griseus | 54 | 48 | 13 | 22 | 25 | 7 | 4 | 1 | 9 | 57 | 559 | 262 | 1062 |
| tenuirostris | 100 | 23 | 8 | 8 | 26 | 11 | - | 2 | 3 | 8 | 8 | 15 | 212 |
| gavia | 75 | 83 | 41 | 38 | 18 | 12 | 37 | 220 | 52 | 69 | 130 | 67 | 842 |
| huttoni | 7 | 5 | - | 2 | 1 | - | - | 18 | 5 | 16 | 15 | 5 | 74 |
| assimilis | 7 | 3 | 8 | 1 | 9 | 6 | 14 | 13 | 2 | 3 | 5 | 11 | 82 |
| Pelagodroma marina | 3 | 4 | - | - | 4 | - | 1 | 5 | 12 | 3 | 11 | 12 | 55 |
| Pelecanoides urinatrix | 43 | 17 | 6 | 3 | 23 | 6 | 27 | 147 | 21 | 31 | 39 | 51 | 414 |
| Sula bassana | 37 | 52 | 57 | 31 | 15 | 19 | 7 | 21 | 13 | 35 | 72 | 47 | 406 |
| Phalacrocorax carbo | 1 | 2 | 1 | 1 | - | 2 | - | 3 | 3 | 1 | - | 4 | 18 |
| varius | 1 | 2 | 8 | 1 | 1 | 2 | 1 | 7 | 4 | 1 | 5 | 5 | 38 |
| Stictocarbo punctatus | 7 | 24 | 14 | 37 | 16 | 14 | 9 | 14 | 14 | 7 | 6 | 5 | 167 |
| Larus dominicanus | 39 | 80 | 56 | 56 | 55 | 72 | 33 | 28 | 24 | 28 | 28 | 33 | 532 |
| novaehollandiae | 5 | 29 | 17 | 10 | 6 | 11 | 4 | 21 | 8 | 4 | 15 | 9 | 139 |
| bulleri | 6 | 2 | 3 | - | - | 2 | - | 1 | 3 | 2 | 2 | 4 | 25 |
| Sterna striata | 7 | 9 | 11 | 11 | 8 | 12 | 1 | 2 | 4 | 5 | 17 | 17 | 104 |
| TOTALS | 961 | 772 | 564 | 338 | 460 | 336 | 387 | 5812 | 833 | 790 | 1765 | 1048 | 14066 |

* Species or subspecies could not be identified by patroller.

Harrison 1983). In the New Zealand region, *M. giganteus* nests on islands off Antarctica and on Macquarie Island (Warham 1985b). The Northern species nests on Macquarie Island; Motuhara and the Sisters in the Chatham Islands; Antipodes Island; Rose, Ocean and Adams Islands of the Auckland Island group; Campbell Island; and Nelly Island in Port Pegasus of Stewart Island (Warham 1985b).

Both species, particularly their fledglings, disperse widely from the nesting colonies during the non-breeding season. Immatures spend their first 2-3 years at sea, ranging downwind and northward as far as 10°S in cool-water zones off western America and Africa, and regularly reach the tropics elsewhere (Harrison 1983). Thus, both species frequent New Zealand's coastal waters and are beach-wrecked. However, in May-June the Southern Giant Petrel is scarce in New Zealand waters; beach-wrecked specimens are usually found from July to December (Warham 1985b).

In total, 711 Giant Petrels have been found at a rate of 1.31 birds per 100 km of beach covered from 1960 to 1983. The highest rate of recovery was from beaches of Outlying Islands (2.09), mostly Chatham Island beaches (Table 5). Mainland beaches on which Giant Petrels were most often found were Auckland West (1.85) and Southland (1.65).

The monthly rate of recovery changed significantly during the year, from a low of 0.31 birds in February to a high of 2.96 birds in July ($p < 0.01$) (Fig. 1). The period of greatest mortality (June-September) is well after the fledglings of Northern Giant Petrels have left their colonies in February (Warham 1985b), but it coincides with an influx into New Zealand coastal waters of fledgling Southern Giant Petrels, which leave their nesting colonies in March-April. Of 77 banded Southern Giant Petrels found on New Zealand beaches, mostly from colonies in the southern Atlantic Ocean, 72.7% were found in June-September and 89.6% were less than a year old. Only 13 dead Northern Giant Petrels banded as nestlings have been found on New Zealand beaches. Of these birds, 45.5% were found in June-September and 46.2% were less than a year old.

ANTARCTIC FULMAR *(Fulmarus glacialoides)*

During summer, this fulmar's range extends only a short distance north of the Antarctic pack ice (Oliver 1955). Antarctic Fulmars breed on the Antarctic continent and offshore at Bouvetoya, Peter I Island, South Shetland, South Orkney, South Sandwich and Balleny Islands (Robertson & Kinsky 1985). In winter they move north from the pack ice to about 45°S, but some birds frequently disperse into the subtropics following cold currents north along the western coasts of South America, South Africa and Australia (Harrison 1983, Robertson & Kinsky 1985). Before 1970 patrollers had found only nine beach-wrecked Antarctic Fulmars but since then they have regularly straggled to New Zealand waters, 10-20 birds being picked up in most years.

From 1960 to 1983, 1343 Antarctic Fulmars were found at a rate of 2.48 birds per 100 km of beach covered. Nearly 82% of these birds were picked up in two wrecks: 639 in 1975 and 458 in 1978. Auckland West had the highest rate at 4.73 birds per 100 km of beach covered. The next highest were Taranaki with 2.78 birds per 100 km of beach covered and Wellington West with 1.86 (Table 5).

TABLE 5 — Rate of recovery (number found per 100 km of beach covered) of four genera of fulmars on each coast during 1960-1983

| | COAST | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SPECIES | AW | TA | WW | AE | BP | EC | WA | WS | NC | WB | CN | CS | OT | SD | CI |
| Macronectes spp. | 1.85 | 0.96 | 0.92 | 0.84 | 0.14 | 0.96 | 1.44 | 1.32 | 0.36 | 0.62 | 1.23 | 1.36 | 0.60 | 1.65 | 2.09 |
| Fulmarus glacialoides | 4.73 | 2.76 | 1.86 | - | 0.05 | 0.58 | - | 0.43 | 1.80 | 0.41 | 0.35 | 0.08 | 0.07 | 1.65 | 0.46 |
| Thalassoica antarctica | 0.29 | 0.14 | 0.07 | 0.01 | - | - | - | - | - | - | - | - | - | 0.44 | - |
| Daption capense | 3.27 | 2.34 | 2.35 | 0.78 | 0.82 | 0.96 | 1.30 | 4.39 | 0.36 | 0.67 | 1.29 | 3.92 | 0.43 | 2.76 | 0.23 |

The monthly rate of recovery of Antarctic Fulmars changed markedly during the year ( $p < 0.01$). Fewer than 0.5 birds per 100 km of beach covered were found each month from December to July, but the rate was much greater from August to November, with a peak in September of 15.7 birds (Fig. 1). As the birds lay in late November to mid-December and the young fledge in mid-March (Robertson & Kinsky 1985), the spring peak in mortality is not the result of recently fledged young dying about our coasts. Most of the birds found in September and October died during the 1975 and 1978 wrecks. It seems that most of these fulmars were first-year birds and that the spring peak in mortality stems from a combination of the birds being weakened by poor food supplies in winter and being subjected to severe storms (see Veitch 1980, Imber 1984).

ANTARCTIC PETREL *(Thalassoica antarctica)*

This species has a circumpolar distribution, breeding at several widely scattered sites on the Antarctic continent and nearby islands. Birds return to their nesting sites in October, the eggs are laid in late November and early December, and the chicks leave in late February (Serventy *et al* 1971). After breeding, Antarctic Petrels disperse around the continent in the zone of pack ice and icebergs, seldom venturing north beyond 50°S. To date, patrollers have found only 81 Antarctic Petrels, the first in 1973, and 73 were picked up in 1978.

During 1960-1983, 0.15 Antarctic Petrels were picked up for every 100 km of beach covered. They have been found on beaches of only five coastal regions (65 on AW, 4 on TA, 6 on WW, 1 on AE and 5 on SD), the highest rate of recovery being from Southland beaches (Table 5). The monthly rate, as shown in Figure 1, changes significantly through the year ($p < 0.01$) to an abrupt September peak because of the 1978 wreck. At this time hundreds were seen from Preservation Inlet, Fiordland, to Stewart Island (Barlow 1979), well north of their usual range.

CAPE PIGEON *(Daption capense)*

Beach patrollers did not distinguish between the two subspecies of Cape Pigeon found on New Zealand beaches. The Cape Pigeon *(D. c. capense)* breeds on the Antarctic continent and its neighbouring islands and on many subantarctic islands in the southern Indian and Atlantic Oceans (Sagar 1985). Outside the

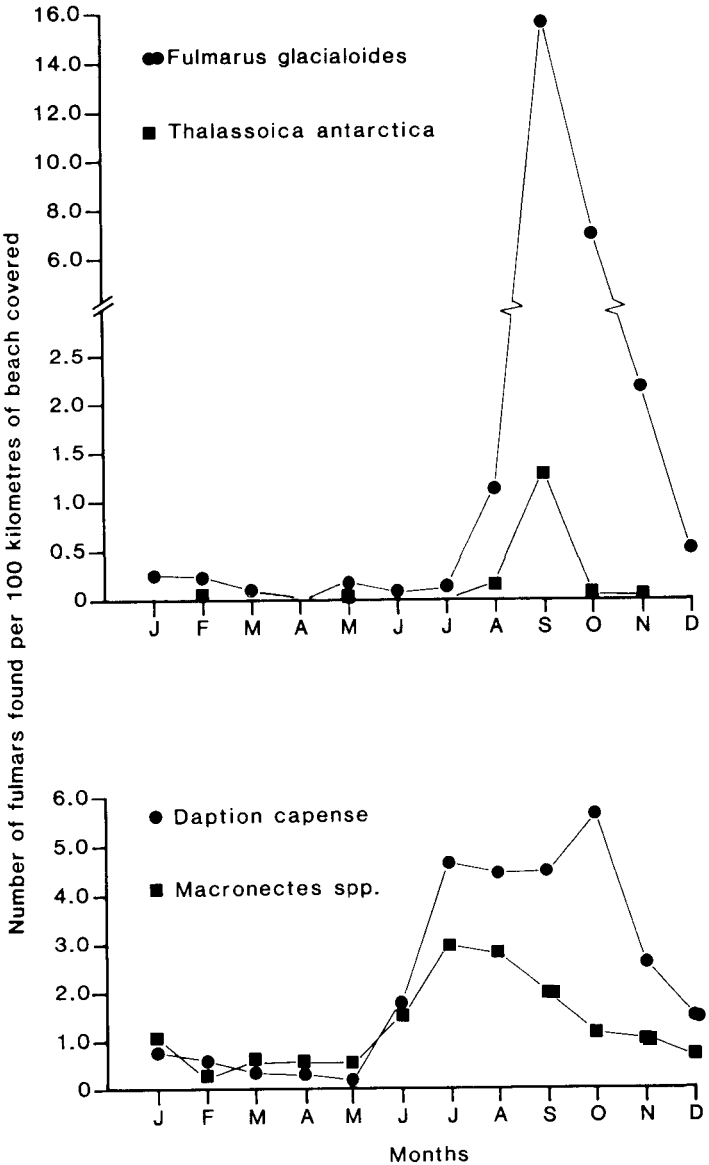


FIGURE 1 — Monthly rate of recovery (number found dead per 100 km of beach covered) of four genera of fulmars during 1960-1983

breeding season it has a circumpolar distribution, ranging north to about 25° S, but some disperse as far as the equator up the cool Humbolt Current (Harrison 1983). The Snares Cape Pigeon (*D. c. australe*) nests on The Snares, on the Antipodes, Bounty and Campbell Islands, and on Beacon Rock of the Auckland Islands (Sagar 1979, Kinsky 1980). At The Snares, eggs are laid in November and the chicks leave their nests in mid-February (Sagar 1979). The breeding season of *D. c. capense* is 2-4 weeks later than that of *D. c. australe* at The Snares (Sagar 1979). Observations of the Snares Cape Pigeon by Horning & Horning (1974) show that some birds remain near The Snares in the non-breeding season.

During 1960-1983, patrollers found 1311 Cape Pigeons. About 50 birds were found in most years from 1970 to 1983, the highest annual total being 306 in 1975. Overall, the average rate of recovery was 2.42 birds per 100 km of coast covered. Of the coastal regions, Wellington South had the greatest rate of recovery (4.39), followed by Canterbury South (3.92), Auckland West (3.27) and Wellington West (2.35) (Table 5).

Figure 1 shows that the monthly rate of recovery for the Cape Pigeon changed during the year ($p < 0.01$). In summer and autumn few Cape Pigeons were picked up, but the rate of recovery increased five-fold in winter and remained at that level through to October, after which it decreased markedly in November-December. The high rate of recovery in winter-spring may be the result of an influx of Cape Pigeons into New Zealand coastal waters from higher latitudes. The marked drop in numbers from October to December coincides with when the birds move back to their colonies to lay in November-December.

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E. & O.E.

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# SHORT NOTES

## Cattle Egret numbers in New Zealand in 1984

In the three years 1981-1983, the numbers of Cattle Egrets *(Bubulcus ibis)* wintering in New Zealand were, in most localities, well below the previous maximum in 1980 (Heather 1982) and national counts were not made. In April-May 1984, however, it was evident that, especially in the North Island, more were arriving from Australia even than in 1980. A national count was organised for late August, as in the years 1977-1980.

Table 1 gives the results, together with those of the 1980 count for comparison. The New Zealand total was more than double that of 1980, but most of the large increase was in all the North Island regions and in Southland. Numbers were well down in the traditional Canterbury sites for Cattle Egrets.

The overall total is a minimum because the larger flocks are counted conservatively, being hard to count accurately while the birds mill about among

TABLE 1 — Numbers of Cattle Egrets in New Zealand, from counts made in late August 1984; 1980 figures included for comparison

| | 1980 | 1984 |
|---|---|---|
| Northland | 91 | 220 |
| Auckland | 18 | 129 |
| S. Auck/Waikato | 157 | 356 |
| Bay of Plenty/ Volcanic Plateau | 0 | 45 |
| Taranaki/Wanganui | 31 | 72 |
| Gisborne | 26 | 38 |
| Hawke's Bay | 4 | 40 |
| Manawatu/ west Wellington | 77 | 211 |
| Wairarapa | 0 | 15 |
| North Island total | 404 | 1126 |
| Marlborough | 32 | 50 |
| Nelson | 55 | 29 |
| West Coast | 25 | 42 |
| Canterbury | 167 | 59 |
| Otago | 55 | 59 |
| Southland | 33 | 166 |
| South Island total | 367 | 405 |
| New Zealand total | 771 | 1531 |

cattle and in and out of ditches and low spots on a field. In several districts, notably Far North, Bay of Plenty, Kaikoura and South Canterbury, flocks were smaller than they had been in July and some flocks could not be found at all.

The main features of Cattle Egret movement were the same as in previous years (Heather 1978, 1982): an early influx during April in some western regions, a major influx in May, the return of birds mainly to the same traditional farms, and a piecemeal departure to Australia mainly during November.

Two Australian-banded birds were recovered, both banded as chicks by S. G. Lane on 17 December at Lawrence, New South Wales (29°30', 153°06'). The first was found dead at Waitotara, South Taranaki, on 30 April. The second was found very weak and thin at Te Horo, west Wellington, on 23 April; it was cared for by Peter McKenzie at Nga Manu Sanctuary, where it thrived on a diet of earthworms. It was dyed with picric acid and released in late May; within several days it had found the nearest Cattle Egret flock, north of Lake Horowhenua, Levin, where it remained for the winter (W. R. Jackson, pers. comm.).

In addition, five were found dead during a beach patrol on Ninety Mile Beach, Far North, on 28 April.

Other arrival dates recorded in the Far North were 15 April, 5 birds at Herekino Harbour; 30 April, 11 at Pukepoto; and late April, c.60 at Ahipara. Events elsewhere up to 30 June 1984 are in Howell & Gaze (1985) and from 1 July 1984 in Howell & Gaze (1986). At Grovetown, Blenheim, were 1 on 11/4,

TABLE 2 — Flock movements and changes in number at three neighbouring sites near Kaitaia, Northland

| Date | | Unahi | Waimarori | Waiharara |
|---|---|---|---|---|
| May | 2 | c.44 | | |
| | 8 | 33 | | |
| | 9 | | | c.94 |
| | 19 | | | 75 |
| | 27 | | | 78 |
| Jun | 5 | | | 0 |
| | 13 | 11 | Present | |
| | 24 | 20 | 102 | |
| | 26 | | 120 | |
| Jul | 3 | 126 | | |
| Aug | 13, 18 | 80 | | |
| Sep | 1 | 80 | | |
| | 30 | 96 | | |
| Oct | 21 | 68 | 112 | |
| | 23 | 29 | 9 | |
| | 27 | | 55 | |
| | 30 | c.100 | | |
| Nov | 9 | | c.100 | |
| | 17 | 0 | 49 | |
| | 23 | 10 | 0 | |

13 on 21/4, 27 on 12/5, and 37 on 18/6 (Jenkins and Bonniface *in* Howell & Gaze 1985). In early and mid April, over 120 were known on the West Coast, South Island, but many had gone by early May, especially from South Westland (O'Donnell *et al. in* Howell & Gaze 1985). The Te Anau district seems to have been a staging point for some birds passing south of the Southern Alps: at Milford Sound were 16 on 11-20/4, at Te Anau 4 on 14/4, 5 on 16/4, 8 on 21/4, and at Manapouri 3 on 8-10/5; of these, only one stayed on (Morrison *in* Howell & Gaze 1985). A May build-up was recorded at Aka Aka, Waikato: 19 on 3/5, then 46 and later 70, but none by 29/5 (Brown *in* Howell & Gaze 1985). These birds had presumably joined the large Rangiriri flock.

Table 2 shows the events recorded (L. Howell *et al.*, pers. comm.) at and near the traditional Unahi site near Kaitaia, Far North, after the initial arrival records given above. The changing numbers as birds shifted about among three favoured farms, some perhaps passing through after arrival or before departure, illustrate the difficulty of interpreting the counts at some places. Arriving during April and May, the birds established first at Waiharara for about 3 weeks and then moved to Waimarori and Unahi; most left over 3 weeks in November and none oversummered. An account is in preparation (W. R. Jackson & M. Olsen) of several years' events at Lake Horowhenua, where regular observations and lack of birds on passage have made the annual trends clear.

## REGIONAL RESULTS OF THE AUGUST COUNT

**Northland:** Unahi 80, Ruawai 135, Kokapu (12 km SW of Whangarei) 5.

**Auckland:** Tapora 7, Parakai (Helensville) 101, Orewa 21. The 4-5 birds at Mangere in June-July could not be found.

**South Auckland/Waikato:** Piako (Firth of Thames) 69, Port Waikato 12, Aka Aka 30, Rangiriri 210 + , Lake Ngaroto 30, Forest Lake, Hamilton 4, Hautapu 1.

**Bay of Plenty:** Opotiki 15, Awaiti Wetlands Reserve 26.

**Volcanic Plateau:** Lake Aniwhenua (Galatea) 4.

**Taranaki:** Barrett's Lagoon, New Plymouth 32, Nukumaru (Waitotara) 17, Kai-iwi 10, Whangaehu 13. The last three figures were recorded in September by B. D. Heather (Nukumaru) and O. C. Torr, no one being available to count there in August.

**Manawatu/west Wellington:** Lake Horowhenua 82, Foxton (farm south of Foxton + Manawatu Estuary) 80, Woodville 14, Linton 14, Kakariki (at Feltex wool-scour effluent ponds) 4, Flock House area 17 (Forest Rd 11, Raumai Rd 6).

**Gisborne:** Gisborne district 25, Tolaga Bay 1, Awamate, Wairoa, 12.

**Hawke's Bay:** Lake Hatuma (Waipukurau) 8, Swamp Road (Hastings) 14, Maraekakaho 2, Meeanee 6, Dannevirke 10.

**Wairarapa:** Masterton 5, Te Hopai 1, Kumenga 9.

**Nelson:** Appleby 6, Takaka 23.

**Marlborough:** Grovetown (Blenheim) 50. Reports of 14 at Kaikoura not confirmed.

**West Coast:** Karamea 11, Arahura 6, Totara Flat 25.

**Canterbury:** Culverden 1, Kaiapoi district 9, Ashburton 19, Taumutu-Lakeside (Ellesmere) 30. Unconfirmed reports of flocks in Clandeboye and Otipua-Adair districts.

**Otago:** Berwick 21, Outram 7, Balclutha 21, Clinton (near Wairuma) 5, Hildethorpe (Oamaru) 5.

**Southland:** Te Anau 1, Croydon 3, Wyndham 54, Centre Hill 1, Hokonui 6, Papatotara 11, Orepuki 1, Waianiwa 12, New River Ferry 24, Makarewa 32, Waimatua 7, Rimu 14.

This report is the result of the co-operative effort of many OSNZ members, most of whom were acknowledged in the OSNZ newsletter of September 1984.

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★

## Shining Cuckoo carrying an egg

On 3 November 1985, at about 2 p.m., my husband saw a Shining Cuckoo (*Chrysococcyx lucidus*) sitting at 1.2 metres in a eucalypt at the side of our drive. A strong southerly wind was blowing, and the tree was getting very blown about.

When he was within 1 metre of the bird, he was surprised to see that it had an egg in its beak. This egg was off-white, slightly pink, and completely filled the bird's gape. The cuckoo seemed undisturbed by human presence and sat there for about a minute before flying 30 metres to the bush, still carrying the egg. The egg was estimated to be 14 mm in diameter and 19 mm long and was held with the pointed end into the gape.

I am not presuming that the egg was that of the Shining Cuckoo, although the colour and size can be variable (Buller p.81, Oliver p.534). To which species did it belong? It seems to be generally accepted that the hen cuckoo removes an egg from the chosen nest, and this is either dropped some distance away or is eaten.

Why, then, was the bird sitting in a eucalypt in the open with the egg in its beak and, when it flew off towards the bush, where a number of Grey Warblers were nesting, why was it still carrying the egg?

JEAN F. SKINNER, *Hikurangi, RD4*

[Michie (*NZ Bird Notes* 2 (8):196; 1948) reported two cases of Shining Cuckoo in the open carrying an egg, crushing it, swallowing the contents, and dropping the shell. The eggs were of Chaffinch and Grey Warbler. The egg in Mrs Skinner's note matches the description of a Grey Warbler's but could have been of some other passerine; the Shining Cuckoo's, however, is olive-green (Gill 1982, *Notornis* 29(3):219). November is the peak month for laying by Shining Cuckoos (Gill 1982:216). — Ed.]

## Food of the Morepork *(Ninox novaeseelandiae)* on Lady Alice Island (Hen and Chickens Group)

Moreporks *(Ninox novaeseelandiae)* are common on Lady Alice Island (138 ha), the largest of the Chicken Islands (35° 50'S, 174° 48'E) in the Hauraki Gulf Maritime Park. The abundance of Moreporks, of which an estimated 30 pairs were present in February 1984, has been attributed to the presence of kiore *(Rattus exulans)* (Chambers *et al.* 1955, Skegg 1964, Whitaker 1978, McCallum *et al.* 1984), which make up the bulk of the diet of Morepork chicks (Chambers *et al.* 1955).

Tuatara *(Sphenodon punctatus)* also occur on Lady Alice Island, but almost all are adults, indicating a failure of recruitment, and the density is lower than on rat-free islands (Crook 1973, 1975). Moreporks include some lizards, especially geckos, in their diet (Turbott & Buddle 1948, Chambers *et al.* 1955, Ramsay & Watt 1971), and it is possible that they could contribute to the low tuatara recruitment rate by preying on the young. To investigate this possibility, pellets cast by Moreporks were collected between August 1981 and February 1984 and analysed to determine whether tuatara remains were present and, if so, the likely impact of predation on the tuatara population. A secondary aim was to record the main foods of Moreporks, as revealed by examination of pellets.

We could not determine precisely the number of Morepork pellets collected because Moreporks cast pellets from branches where they perch and those that are composed mostly of insect remains are very friable and break easily when they hit the ground. It is exceptional to collect whole pellets, unless they consist of rodent or bird remains. Fur or feathers make a thick felting which protects the undigested bones and prevents the pellets from splitting. We estimate that about 60 pellets were examined.

Pellets were inspected under a low-magnification binocular microscope. In view of the objectives of our study, we did not attempt to identify invertebrates below ordinal level. Many larval exoskeletons were found on and near broken pellets but never inside the few whole ones, suggesting that these insect fragments may not have been disgorged by Moreporks.

No reptile remains were found in the pellets and only a few fragments of birds. Parts of a bird's foot and feathers were recovered from pellets collected in July 1982. Invertebrate remains were present in every sample of pellets and kiore remains in most. Insects, especially Coleoptera and Orthoptera, and kiore appear in the diet throughout the year. From counts of mandibles, at least 16 kiore were recovered, 6 juveniles and 10 adults.

Our findings are consistent with information previously available on Morepork diet. The bulk of their food, in frequency if not weight, consists of insects (mainly Coleoptera, Orthoptera, Lepidoptera) and spiders. Few birds are caught, except in urbanised environments, and in some places rodents are taken (Cunningham 1948, Hogg & Skegg 1961, Lindsay & Ordish 1965, Daniel 1972, Imboden 1975, Bellingham *et al.* 1982). Chambers *et al.* (1955) examined Morepork nests on Lady Alice Island in summer and noted that kiore made up the bulk of the chick diet. They also reported the frequent occurrence of large Orthoptera and the absence of birds in Morepork nests.

This study was carried out with the assistance of the NZ Wildlife Service, the Scientific Research Distribution Committee of the NZ Lottery Board and the Zoology Department, Victoria University of Wellington. We thank Malcolm Crawley and Philip Moors for commenting on drafts of the manuscript. Tony Axelrad translated the original draft from French.

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## House Sparrows taking insects from car radiators

Simmons (1984) and Bankier (1984) described how House Sparrows (*Passer domesticus*) have learned to search for insects trapped on car radiators in England. The same habit occurs in New Zealand, where JECF has several times since the mid-1970s seen both male and female sparrows working along a line of parked cars, flying up from the ground to between the radiator and grille, at two car parks in Lower Hutt. In the USA also, House Sparrows now search car radiators for insects in the same way at Normal, Illinois (CFT). House Sparrows were introduced successfully into New Zealand in 1859 and America in 1853, well before the introduction of cars, and so the habit must have developed independently. Recent reports are probably associated with the development of car parks and the increased time birdwatchers spend sitting in them. According to Layne & Woolfenden (1958), gray squirrels in Florida had learnt the trick by 1956, a record Dr H. Moller kindly drew to our attention.

We would be interested to know how widespread this behaviour is at present among sparrows in other parts of New Zealand, and whether species such as Starlings or Mynas copy them. Many new Japanese cars have a shield below the radiator, and access for sparrows could be more restricted in future. If you have any records, please let JECF know.

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## Red-necked Phalarope at Mangere, Manukau Harbour

Prompted by a report of a suspected Marsh Sandpiper seen flying with stilts, we spent the afternoon of 6 June 1985 at the ponds of the AMDB and, after a normal round, concentrated our attention on an area of extensions beside pond No. 4. Here earthworks have been in progress for some years. Formerly, much of this area was a mangrove creek and swamp, tidal but spring-fed, and running up to the lower slopes of Mangere Mountain. Among the new stopbanks were several pools, which recent heavy rains had enlarged and freshened. There was a lush growth of aquatic plants, especially willow weed (*Polygonum persicaria*); and despite the proximity of mid-winter's day, there were fully open flowers among the scattered patches of bachelor's button (*Cotula* sp.). TGL noted that the pools were alive with *Daphnia*, copepods and the larvae commonly known as bloodworms (*Chironomus* sp.).

These pools are much frequented by stilts, and seemed to offer the most likely chance of finding one of the shanky waders. From the top of a stopbank, a small grey wader was just glimpsed at the far end of one of the larger pools, before it was lost to view among the willow weed. When, at length it emerged swimming, TGL at once exclaimed "phalarope", even though he had never seen one before. Of course he was right. But the important thing now was to make certain of its identity because, *mirabile dictu*, all three species of phalarope are on the official New Zealand list. The car was driven closer by slow stages; and shortly, with the sun at our backs, we were able to take our time examining what was clearly a very alert and active Red-necked Phalarope (*Phalaropus lobatus*). In size it was comparable with a Wrybill (*Anarhynchus frontalis*). Of special note were its fine straight bill, a patch of red on the side of the middle neck, and its habit of swimming high in the water with a jerky bobbing motion with sudden turns and darting stabs to the right and left. Above the eye was a dab of white, not worthy of being called a stripe.

Disturbed by a workman's heavy rumbling vehicle, the phalarope took off, springing like a teal from the water. For a short while it flew with some stilts, easily keeping pace with them, and sometimes in the lead. Then it set off alone on a towering flight, covering several miles and reaching an estimated height of 1000 feet, before returning with a swift descent to a larger adjacent pool. Here it swam and bobbed in the open, but the water was ruffled by the wind and it soon took off again. After a second extensive flight before our straining eyes, it came back to the more sheltered pool where we had first found it. Even small isolated clumps of *Polygonum* or *Cotula* could conceal it effectively. Some stilts had also returned, but the phalarope tended to keep to itself. Occasional Welcome Swallows appeared to go out of their way to swoop low over it. A soft call from the phalarope was written down as *chet-chet*.

Red-necked Phalaropes must be among the most versatile of birds. Though essentially waterfowl, and pelagic in their winter quarters, they are known to be capable of long, non-stop overland flights, which may take them from the subarctic to the tropics or vise versa. We were held amazed at our 'lost waif's' speed, strength and manoeuvrability in the air. Aerodynamically a Red-necked Phalarope must be superbly designed. RBS has seen many Red-necked Phalaropes, but never one flying as this bird did over Mangere.

This bird is known to have stayed at the same pools for at least four days. After its presence was noised abroad many went to see it. Human beings, laden with optical equipment, and speaking in hushed tones, were treated with indifference. On 7 June Gillian Eller, Joan Sibson and RBS watched it actively feeding at the same pools, especially liking the still water alongside a low, newly made scoria road. On 8 June Robin Child had little difficulty photographing it in colour. Among at least a dozen admirers on the afternoon of 9 June were Ken Bond, Mr and Mrs K.P. Duff, and Karen Duff, Nola Dyson, Brian Gill, Mike and Sharon Graham, Dr and Mrs Gordon Nicholson, Michael Taylor and Geoff Moon, who naturally was very usefully employed with his camera. When the first of us arrived that afternoon, the local stilts had been joined by other unusual visitors, namely a near all-black stilt and four Spur-winged Plovers. So many people so close was too much for them, and they smartly left, but the phalarope stayed on feeding with purposeful unconcern, while most of its audience stayed till the winter sun began to sink behind the Waitakeres. On 10 June Stephen Davies and Simon Towie spent some time closely watching it in the same place. It was not seen again.

In June adult Red-necked Phalaropes should be on their far distant breeding grounds. Remembering that the adult females are more brightly coloured than their mates, some who were able to take notes on this bird tentatively concluded, from the extent and pattern of the red on the neck, that it was an immature female, probably about a year old, or possibly two. How old are Red-necked Phalaropes normally when they first breed? Do flocks of immature non-breeders remain in equatorial waters when the adults go north? This appears to be only the fourth record of a Red-necked Phalarope in New Zealand.

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## Black-fronted Tern breeding at high altitude

On 12 January 1986, during a tramp along the summits of the Pisa Range, Central Otago, I was surprised to see four Black-fronted Tern (*Sterna albostriata*) flying about and occasionally hawking moths over the tundra zone at c.1860 m (6100ft) near the head of the Leopold Burn, and an hour later four were seen near Mt Dottrel (*sic*) at c.1700 m (5580ft), 4 km SW of the first sighting. The weather was poor with a cold easterly drizzle drifting across the range and thick cloud enveloping the eastern escarpment. I thought at the time that the birds had probably been swept up on this easterly from the Clutha River valley below, where small flocks are scattered along the river's shingly reaches and often feed over adjacent irrigated pastures. My previous highest sighting for this species was at c.1070 m (3500ft), when several were hawking moths over tussock-covered slopes of the Hawkdun Range on a very warm summer evening in 1971 (*Notornis* 22:148).

The previous highest breeding records in Central Otago were on the upper Manuherikia River above Falls Dam, and in the Nevis valley, both at c.690 m (2250ft); elsewhere I have recorded breeding on the upper Cass River, Lake Tekapo, at c.1040 m (3400ft).

My wife and I returned to this Pisa Range area on a very warm fine day (19.1.86). Near the headwaters of a small unnamed tributary of the Colour Burn, about 2 km SW of the original sighting, we came upon a breeding colony of about 50 terns.

*The site*: Map reference: NZMS 1, sheet S 124 Cardrona; grid: 960857. The colony was scattered over an area of about half a hectare, at c.1720 m (5650ft), on a north-facing gentle slope of 15-20°; obviously a relatively warm face giving good drainage (with a substrate of mica schist gravels and slabs) to the headwater seepages of a tiny tributary of the Colour Burn, which itself drains into the Roaring Meg stream and thence into the Kawarau River. There were a few minor rock outcrops nearby but none of the areas of shingle with which one usually asociates this tern's breeding habitat. The surface was of hummocky terrain typical of much of the Central Otago 'tundra' with one or two more even-surfaced patches further down the slope.

*The vegetation*: The characteristic tundra association of *Dracophyllum muscoides/Hebe hectori* dominates the hillside, interspersed with many small species of alpine lichens, mosses and flowering herbs, notably *Celmisia viscosa*. There were a few small clumps of the high-altitude snow-tussock *Chionochloa macra*, here nearing its upper altitudinal limit.

*The colony*: It was difficult to determine just how many pairs were still breeding. At least eight of the group were immatures from the previous season. Some pairs could have already lost eggs or chicks to local predators, of which the Black-backed Gull (*Larus dominicanus*) is probably the most persistently threatening, but others include the New Zealand Falcon (*Falco novaeseelandiae*), stoat (*Mustela erminea*), and Australasian Harrier (*Circus approximans*). We thought it significant that, on this unusually warm day, we saw three individual Harriers above 1830 m (6000ft) because the Harrier is not often recorded at very high altitude in Central Otago. We found no Black-fronted Tern nests with eggs, but we noted at least three pairs with

nestlings ranging in age from one day to one week. All were situated in the dead hearts of clumps of the low-growing alpine daisy *Celmisia viscosa*, where they would gain considerable protection from the winds and storms of this mostly inhospitable environment (e.g. a week after we found this colony, a southerly storm dumped a liberal coating of snow on the range-tops).

Scattered throughout the colony area and environs were a post-breeding flock of more than 100 Banded Dotterels *(Charadrius bicinctus)* and a few South Island Pied Oystercatchers *(Haematopus finischi)*. One or two Skylarks *(Alauda arvensis)* were singing nearby.

*Food sources*: Lizards and fish are obviously absent from the tern's diet at these altitudes. The invertebrate food items would be mainly day-flying moths, dipterous flies, cicadas and other aerial insects and their larvae, including some aquatic stoneflies and caddisflies; also some large black ground beetles and weevils, which are a feature of this habitat type; and a very large form (possibly a subspecies) of the common Main Divide grasshopper *Sigaus australis*. Brian Patrick, a Dunedin entomologist, estimates (pers. comm.) about 60 species of resident moths and an equal number of beetles. In most years insects would be available from about mid-October to early May.

Although a local runholder told us that the tern had been breeding there for 'a number of years' it is worthwhile speculating whether the species has been forced to these altitudes through increasing loss of habitat (caused by adventive weed species) on the smaller riverbeds below, e.g. Cardrona, Lindis, over the past 20 years or so.

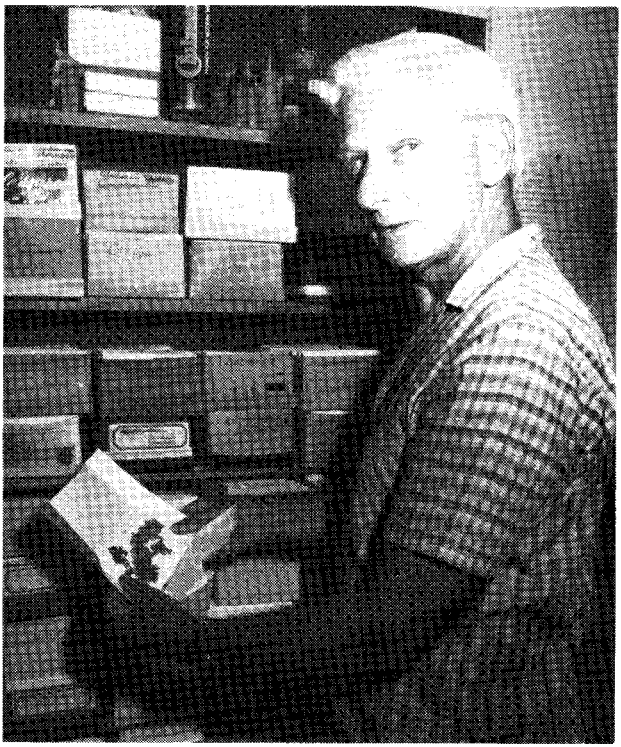
PETER CHILD, *10 Royal Terrace, Alexandra*

# OBITUARY

## PETER CHILD

**BSc, Dip. Ed., Dip. Wildlife Management**

## 1923-1986



Peter Child, Central Otago's amiable naturalist, died suddenly in Alexandra on 7 April 1986. Ornithological Society members join with Peter's family in mourning his untimely death for, in his 63rd year, he was still in full stride on the schist ranges and gravel riverbeds of his beloved Central.

A southerner to the fore, but with intermittent tropical excursions, Peter spent his school years at Lawrence. During the late 1930s he trained with the Post Office at Awarua Radio Station and Milford Sound before serving as a radio operator in the Gilbert and Ellis Islands (now Kiribati and Tuvalu) during World War II.

After the war, Peter attended the University of Otago, where he gained his BSc in Physics. Soon after, the Pacific beckoned again and he returned to the Gilbert and Ellis Islands, this time as Education Officer with the Education Department, accompanied by his wife Margaret. Bird observations during his stay gave rise in 1960 to the Pacific Science Board's bulletin *Birds of the Gilbert and Ellis Islands Colony.*

Returning to New Zealand, Peter took up brief teaching positions in Wanaka and Geraldine, before moving to Alexandra in 1960. There he was head of the science department, then deputy principal until his retirement in 1981. In his spare time, he preferred to be climbing in alpine meadows or surveying river birds, clocking up mile after mile with relentless ease. His trained eye, however, recognised the correct time to pause, observe and record, often to the relief of less fit companions. At other times, the dependable black billy was drawn from his pack to "boil up for a brew".

Over the years Peter built up an unrivalled knowledge of Central Otago's birds. Evenings saw the observations meticulously filed, and many records were subsequently published – local topics formed the bulk of his impressive total of 35 contributions to *Notornis* (and more to *OSNZ news*). But for some holidays, the mountains and rivers were forsaken for equally profitable ventures to Fiji, Western Samoa, Cook Islands, Tuvalu and Kiribati.

Not satisfied with weekends and holidays alone, Peter took one year's leave of absence from teaching to complete a Diploma of Wildlife Management at the University of Otago, presenting a dissertation on riverbed birds. Another major contribution was his survey of birds of Mt Aspiring National Park, published in 1981 (Nat. Pks. Sci. Series No. 4). The field work for this daunting task occupied much of his spare time in summers from 1971 to 1976, and very few of the Park's valleys remained unvisited. In acknowledging field assistants, Peter wrote ". . . often in rather rugged terrain and under difficult conditions", understating the frequently arduous climbing conditions and days of torrential rain. His ability in the hills and his air of confidence reassured many a tired and drenched companion.

During his retirement ("liberation", as he put it) Peter pursued natural history and conservation projects with renewed vigour. The lichen collection flourished. With Margaret, the challenge of nesting Black-fronted Dotterels became a successful study. In the 1985-86 season, Peter was an outstanding participant in the Banded Dotterel project. His efforts resulted in 100 Central Otago dotterels being colour-banded, the quest for the 100th being fulfilled on his favourite range – the Old Man. One painstaking job, which Peter delegated to himself and Margaret, was to prepare a master index for all *Notornis* volumes.

Peter's interests extended well beyond ornithology. His late brother, John, inspired his interest in lichens. Peter's collection of over 3000 lichen specimens, all carefully catalogued, is the result of long hours in both field and laboratory and is an everlasting asset to the country. His environmental awareness extended from schools' outdoor clubs to the fight against the proliferation of nuclear weapons. Always he was ready to listen, and to share his vast knowledge.

Yet, we will remember him as an ornithologist, outstanding in his support of OSNZ camps, projects, the journal and newsletter. The Society has acknowledged this support in awarding Peter posthumously the Falla Memorial Award. The geographical isolation of Alexandra was no barrier to his influence and achievements – ". . . an advantage my boy" he would have insisted, his hand waving emphatically across the richness of Central. He will be sadly missed.

R. J. Pierce