SHORT COMMUNICATIONS

NUMBERS OF GIANT PETRELS IN WELLINGTON HARBOUR AND COOK STRAIT, NZ

McIlwaine (1964) discussed the fluctuations of numbers of Giant Petrels *Macronectes* spp feeding on refuse from the meatworks at Ngauranga, Wellington Harbour, from May 1958 to May 1962. The data were collected once a week, usually between 08:30 and 09:00. From 1 July 1967 to 31 July 1972 I recorded numbers at Ngauranga, to compare with her results. I counted the birds each day at 08:00 throughout the year as I passed the meatworks by train, except at weekends or when I was away for other reasons. I also counted the birds occasionally and irregularly in Cook Strait, including the outer part of Wellington Harbour, from ferry-boats, using methods already described (Secker 1969). I was eventually able to divide my transect of about 45 km across Cook Strait into three parts differently favoured by the birds. My aim was to decide whether the fluctuations of numbers in the Strait and at Ngauranga differed.

McIlwaine did her work before *M. giganteus* and *M. halli* were recognized as separate species and under the circumstances I was not able to distinguish between the two in my observations.

I have not been able to find published statistics of slaughtering at the meatworks, but Mr E. R. Dearnley (pers. comm.), said that periods of most killing in central New Zealand, including Ngauranga, during 1964-69 were as follows:

Lambs	November–December, when 29% of annual killing took place.
Sheep	January–February.
Cattle	May.
Calves	August.

He said that before this time the peak of killings of lambs tended to be later, and McIlwaine recorded it between 1958-62 as from December to March. During both McIlwaine's period and mine sheep were slaughtered mostly in January and February. Pigs were apparently killed in similar numbers throughout the year, but generally few pigs, cattle or calves are killed and they are not important.

The effluent from the meatworks comes from an export plant, where stock is killed mostly in late spring and summer, and from the municipal abattoir, where killing is regular throughout the year. I assume that the blood that goes into the sea in winter is mostly from the abattoir. Effluent from the export plant has been treated since 1967 to eliminate fatty solids. Fat from animals slaughtered at the abattoir is disposed of as tallow for soapworks. Thus, at present little refuse, suitable as food for petrels, is discharged.

NUMBERS AT NGAURANGA

The birds feed at any stage of the tide, and Table I gives daily averages for each month for each year. Evidently numbers have decreased steadily during the period; counts of one hundred, formerly not unusual, never occurred. Many years ago the closure of a whale-processing factory in western Cook Strait probably also affected the number of petrels in the area.

In addition, Table I shows that the numbers fluctuate during each year by normal dispersal. From a low in May numbers increase to a peak in November and decrease to May. This is much as recorded by McIlwaine, except that the peak of her numbers was spread over three or four months from November to February. Presumably the peak recorded in November after 1967 is artificial because more food

TABLE I

Daily average numbers by months of *Macronectes* spp at Ngauranga

	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr..	May	June
1967–68	2	7	12	8	27	13	10	10	10	4	1	6
1968–69	12	7	13	9	22	22	12	14	6	5	2	7
1969–70	7	9	9	10	28	19	10	10	6	1	0	5
1970–71	4	9	3	6	18	19	15	6	3	3	0	1
1971–72	2	1	3	2	16	11	7	8	3	1	0	0

TABLE II

Numbers of short-term fluctuations of *Macronectes* spp at Ngauranga

	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1967–68	4	1	4	4	4	3	3
1968–69	4	2	6	4	5	6	1
1969–70	3	2	–	3	5	5	2
1970–71	3	3	4	4	5	5	1
1971–72	2	2	4	5	3	3	1

becomes available in that month from the meatworks and thus it is not a reliable guide to numbers in Cook Strait, as I once thought.

Numbers also fluctuate over short periods. I noted such fluctuations mostly between September and March; in July and August numbers were generally more constant from day to day. This suggests that passage occurs in spring and summer in central New Zealand waters with birds continually coming and going. I judged the number of short-term cycles to be as shown in Table II.

NUMBERS IN COOK STRAIT

I recognized three areas in Cook Strait: one of cold subantarctic water westward from Wellington Harbour, an area of rip offshore between Sinclair Head and Cape Terawhiti, and the third from the end of this rip to Tory Channel with warmer water of the East Australian current. Petrels decrease westwards, first becoming fewer in the rip and decreasing further west of it. However, in winter 1972, which was cold, the birds were scattered evenly over all three areas. Also several always followed the ferry into Tory Channel where they used to be abundant when a whaling factory operated there. Table III demonstrates this pattern of distribution. Table IV gives total numbers seen during various trips across Cook Strait from 1967 to 1972 (no trips made in any June, December or January). The figures do not suggest any basic decrease during the period, though they show an annual fluctuation similar to that noted at Ngauranga. Numbers are lowest in May and evidently increase in late winter (July, August) just when they tended to increase at Ngauranga. Petrels are common in the late spring (November) but numbers do not, it seems, peak in a similar way as at Ngauranga in the Harbour, where doubtless the peak is caused by the temporary increase in food. Decrease at sea apparently begins in February and might start earlier there than at Ngauranga.

TABLE III

Numbers of *Macronectes* spp seen on six trips across Cook Strait

	Wellington-Sinclair Head (cold water)	Sinclair Head-Cape Terawhiti (rip, mixed)	Cape Terawhiti-Tory Channel (warmer water)
13. iii. 70	55	0	3
10. viii. 70	185	57	23
31. x. 70	31	44	18
21. vii. 71	72	38	1
26. ii. 72	15	10	5
24. vii. 72	15	15	13

TABLE IV

Total numbers of *Macronectes* spp seen in Cook Strait on thirteen crossings

	July	Aug.	Sep.	Oct.	Nov.	Feb.	Mar.
1967–68				100		10	
1968–69		60		70			
				50			
1969–70				34	92		58
1970–71		265		93			
1971–72	111					30	
1972–73	43						

ACKNOWLEDGEMENTS

I am grateful to Miss A. G. Hutson for counting at Ngauranga during my absence in November 1971 and to Mr E. R. Dearnley of the Biometrics Section, New Zealand Ministry of Agriculture and Fisheries, for details of slaughtering in central New Zealand.

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25 October 1972.

BREEDING SEABIRDS OF BOONDELBAH ISLAND, NSW

Boondelbah Island (Fig. 1) is about one kilometre east of Port Stephens on the central coast of New South Wales, and with Gould or Cabbage Tree Island, Broughton Island and several rocky islets forms the Broughton Group. Few ornithologists have visited it. Hull (1911b) landed on the Island 'after considerable difficulty', but found nothing except immense numbers of *Puffinus sphenurus* (= *P. pacificus* Wedge-tailed Shearwater). T. P. Austin visited Big Island, a local name for Boondelbah, also during December 1910 (North 1914), but it is not clear whether Hull and Austin made separate visits. Austin recorded the Wedge-tailed Shearwaters 'breeding in thousands'. D'Ombrain (1964) visited the Island several times to look for Gould Petrels *Pterodroma leucoptera*; he gave no dates and no details of birds found by him.

More recently, S. G. Lane and A. K. Morris were on the Island on 30 December 1967 for about twenty minutes; S. G. Lane, A. K. Morris and H. Battam and others on 5 December 1969 for about three hours; H. Battam, A. Rogers and B. Jones for a similar period on 11 January 1970. Later, we tried to stay on the Island overnight several times but could not do so because of bad weather and rough seas.

The Island is in the form of a mesa and is some 640 m long by 425 m at the widest part and in area about 9.3 hectares. The porphyritic cliffs on the north-west are some 55 m high, while those to the east and south are broken and fretted. A dyke runs north-south through the centre of the Island and has been much eroded at the southern end, to form a deep embayment (Fig. 2).

The soil is highly siliceous with a concentration of humic materials in the seepage areas on the lips of the central valley. The deeper sandy areas are dominated by sedge-tussocks, mainly *Lomandra longifolia*, with *Dianella* sp and *Juncus* sp in damper places. Coastal Rosemary *Westringia rosmarinifolius* occurs in banks round the exposed rocky tops and edges, with the grasses *Cynodon dactylon, Sporobilis virginicus* and *Carpobrotus glaucescens* as lawns where thin veneers of soil overlie horizontal beds of rock. A short-grassed sod-meadow covers the seepage areas. The exposed sea-cliffs and ridges are extensively covered in Prickly Pear *Opuntia stricta* but only isolated plants are found elsewhere.

Landing by dinghy, in the bay at the southern end, is very difficult and often impossible. Even a slight swell causes bad surges on the rocks and landing becomes dangerous. Landings are only possible during conditions of moderate north-easterly wind and a slight swell, or better.

NESTING SEABIRDS

EUDYPTULA MINOR Little Penguin

Nesting extensively about the lower parts in rocky crevices on the north side where there is easy access to the sea down a steeply sloping rockface. Some breed in the middle of the plateau among shearwaters. During our three visits birds were found on eggs, with young, and in January were moulting.

PTERODROMA LEUCOPTERA White-winged (Gould) Petrel

Hindwood and Serventy (1941) recorded that Hull had taken an egg among boulders near the waterline in a deep rock-strewn gully on the western side of the Island. None was located by us on Boondelbah nor did D'Ombrain (1964) find any. Perhaps a few birds, an overflow from the colony on Gould Island, may breed on Boondelbah but may be hard to find unless an overnight stay is made.

PUFFINUS PACIFICUS Wedge-tailed Shearwater

Most numerous species breeding on Boondelbah. Hull (1911b) and Austin (North 1914) recorded breeding

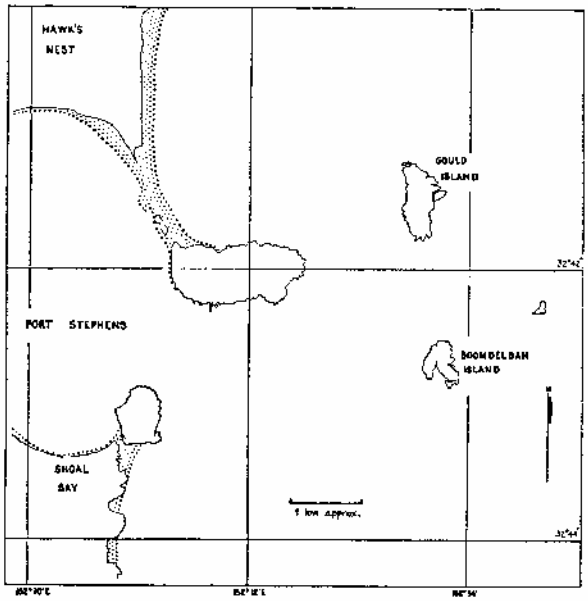

Figure 1. Map of Port Stephens area.

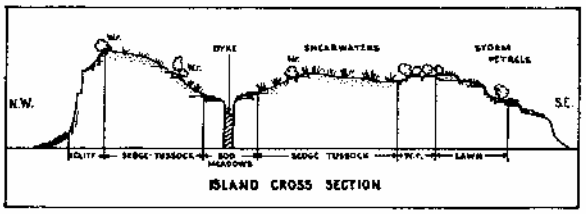

Figure 2.

in vast numbers. During our visits we found burrows all over the plateau, with the greatest concentration on the slope from the north-eastern corner to centre among the irongrass and sedges growing in the deep friable soil. From those burrows examined, this species outnumbered the other two shearwaters by nearly 7:1.

On our visits we found:

30.xii.67 14 birds each on egg, two birds in one burrow and no egg.
5.xii.69 44 birds each on egg.
11.i.70 41 birds each on egg.

PUFFINUS TENUIROSTRIS Short-tailed Shearwater

On 30 December 1967 two were found in a burrow without an egg in the depression near the centre of the Island. We could not search for long to confirm breeding. In December 1969 four were caught in burrows, each with an egg. Four more were found in January 1970, each also incubating an egg; their burrows were among those of the Wedge-tailed Shearwaters.

PUFFINUS GRISEUS Sooty Shearwater

In December 1969 two were found in a burrow with an egg, in the centre of a bare patch of sandy soil in a gully on the eastern side of the Island. Not found in January 1970.

PELAGODROMA MARINA White-faced Storm-Petrel

In December 1969 a small colony was found and three burrows examined; each contained an adult brooding an egg. Two chicks were banded in the same area in January 1970. The burrows were in areas of short grass on the south-eastern side of the Island.

DISCUSSION

Hitherto, Wedge-tailed Shearwaters and the White-winged Petrels were the only species known to breed on Boondelbah (Hindwood 1948), but all the other species have been recorded breeding on Broughton Island some 15 km north (Hindwood and D'Ombrain 1960). Hull (1911a) found Little Penguins nesting on Gould Island, and SGL found Sooty Shearwaters breeding there in 1967; D'Ombrain banded an adult there in 1962 and they have been banded on Muttonbird Island, Coffs Harbour (Lane 1970), but not found breeding there.

Sooty Shearwaters may have bred on Boondelbah for many years. Often they are found by luck or only after considerable search. They have been found only in small numbers on islands off the coast of New South Wales and may have been missed by Hull and Austin. Similarly the White-faced Storm Petrels, being few, could have been overlooked before, but perhaps Short-tailed Shearwaters ought to have been recorded if in similar numbers as during our visits.

Breeding islands for the Short-tailed and Sooty Shearwaters were summarized previously (Lane 1965). Sooty Shearwaters breed on Broughton (Rohu 1914), Lion (Keast and McGill 1948), Montagu (Robinson 1964), Bird (Lane 1965), Gould and Boondelbah Islands.

Short-tailed Shearwaters breed on Tollgates (Davies 1959), Broughton (Hindwood and D'Ombrain 1960), Five (Lane 1961), Montagu (Robinson 1962), Brush (Lane 1962), Bird (Lane 1965) and Boondelbah Islands.

We saw no landbirds on the Island. No doubt some species visit the Island because it is near Gould Island and Yacaaba or North Head (Fig. 1). D'Ombrain (pers. comm.) says that he has occasionally observed Banded Landrails, Brown Quail and Little Grassbirds there,

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'WRONG-WAY' MIGRATION OF THE KOEL IN WESTERN AUSTRALIA

The Koel *Eudynamys scolopacea* does not occur in Western Australia south of the Kimberley Division. Accordingly when Mr Edward Le Souëf brought me a specimen that had been taken at Wamenusking, near Quairading (just under 160 kilometres east of Perth), on 4 April 1971, the occurrence seemed quite extraordinary.

The bird, an immature female, was found exhausted on the verandah of the homestead by Mr Alexander Anderson, manager for Messrs R. T. & M. J. Stone, farmers of Wamenusking. It was made into a study-skin by Mr A. G. Mathews and is now in the Western Australian Museum (Reg. No. A11768).

The following particulars were taken: length in flesh, 406 mm; wing-span, 560 mm; beak, dark-grey; legs, bluish grey (gun-metal grey); iris, light-brown, lighter peripherally. No moult of body or quills. Immature; tiny ovary with no differentiated oocytes; thin, straight unconvoluted oviduct. In stomach a few beetles' legs. Very emaciated. When the skin had dried the following measurements were made: wing, 193 mm; tail, 196; culmen, 27 (exp.), 32.5 (to base of skull); tarsus, 29. Though the beak is normal in size, all the other measurements are abnormally short.

The forehead was extensively white, the rest of the head and hindneck being black, blotched with chestnut and light-buff. The feathers of the remainder of the back and the secondary wing-coverts were black, barred buff, each feather tipped whitish. Upper tail-coverts light-buff barred brown. Tail buff, broadly barred brown dorsally and with narrower bars ventrally. Sides of throat chestnut, bordered dorsally by a whitish streak. Underparts whitish narrowly barred brown, with the sides of the body light-buff.

This migratory cuckoo occurs in Australia between September and April. After completing breeding it moves to the islands north of Australia. The bird found at Wamenusking was a bird of the year, which, instead of flying north, was somehow diverted south. Quite obviously the cause was Cyclone 'Mavis'. Mr R. Vollprecht, of the Commonwealth Bureau of Meteorology, has kindly summarized for me the weather pattern during the relevant period. Cyclone 'Mavis' originated off the north-western coast, moved parallel with the coast until off Carnarvon and passed inland at Hamelin on 29 March. On 23 March winds from the Kimberley Division to Onslow were east-north-east at 10–20 knots. There was little change of direction during the next four days over this section, and winds averaged 25–35 knots on 24, 30–40 on the Hedland-Carnarvon section on 25, 30–40 on the Hedland-Geraldton section on 26, 30–50 on the Onslow-Carnarvon section on 27 March, slackening to 20–30 in the afternoon. During the early morning of 28 March the storm approached the western coast, winds at Carnarvon increasing to northerly at 40–50 knots. After it passed inland at Hamelin Pool, winds were variable, mainly north-north-west inland and southerly on the coast. The cyclone moved rapidly across the southern part of the State and by 18:00 was in the Bight where it merged with a southern depression. At 18.00 winds west of a line from Eyre to North-West Cape were mainly south-south-west.

Mr Vollprecht concluded his summary: 'Wind speeds quoted are those measured by pilot balloon, and for a good deal of the time there would be lighter winds near the surface. If the birds fly high when migrating they would in general have encounted stronger winds than in the first hundred feet or so. Off the north-west coast there would have been a larger northerly component than over the land, during most of this period.'

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12 November 1972.

THE ORIGIN OF THE APPARENT SPECIATION IN EASTERN CENTRAL AUSTRALIA

Serventy (1972) has pointed out the problem raised by the occurrence of a group of species confined to a fairly arid region where Queensland, Northern Territory, South Australia and New South Wales come together. The species that he cites are *Ashbyia lovensis, Pomatostomus halli* and *P. ruficeps,* and *Amytornis barbatus.* The babblers and grass wren are closely related to species with a wide distribution in similar habitat in the drier regions of western and middle Australia. Serventy states that none of the refugia mapped by Keast (1961) offers a satisfactory solution to the origin of these eastern forms, and concludes that the existence of a central Australian Lake Dieri during the pluvial peaks of the Pleistocene provided the isolating factor for speciation.

I think an additional factor should be taken into account when this hypothesis is considered. In a recent study of the distribution of the red-shouldered forms of the blue wrens, *Malurus* spp (Harrison 1972) I came to the conclusion that the present pattern of distribution was compatible with Keast's refugia, but that to explain it satisfactorily it was

necessary to assume that the various refuge areas had differed in the amount of climatic mitigation that they offered during the more extreme arid periods, and that the degree to which the birds present became adapted to heat and aridity may have differed accordingly.

I suspected *Malurus assimilis* (including *mastersi*) to have originated in a drier warmer refuge in the Hamersley region and to have become sufficiently adapted to these conditions to have spread rapidly into the interior once some degree of amelioration in climate had occurred. Similarly I suspect *M. pulcherrimus* to have occupied a refuge in Eyre Peninsula and to have shown similar adaptation, although to a lesser degree, that enabled it to occupy the mallee belt north of *M. elegans,* which appears to have become adapted to a cooler moister refuge area of the South-west.

If this were so, then it could have affected other species-groups. Keast has suggested that a refuge area existed round the Mount Lofty region of South Australia. If this, or a part of it, had also been a drier refuge of the Hamersley type it could have produced forms with some adaptation to arid conditions. If populations of a species had been isolated in such drier western (Hamersley?) and eastern (Mount Lofty region?) refuges, then with the beginning of amelioration of climate the western isolate could have spread back into the extensive arid regions of the interior. Climatic amelioration, though improving conditions in the interior of the continent, is likely to have made not only the coastal regions less suitable for such species but also the Lake Torrens–Lake Eyre region where Pleistocene Lake Dieri was. The eastern form would then be forced to spread into the only available drier region: that to the east of the lakes.

This hypothesis appears to reconcile the refugia with the lake barrier. It also helps to explain the apparent paucity of isolates at some of the drier refuge areas because forms evolving in isolation in such areas might by now have retreated into the drier interior. I think it should also be borne in mind that refuge areas of the type suggested by Keast would not necessarily terminate at an abrupt border with an inhospitable and arid interior region; and that a refuge, offering richer vegetation of a type that would support forest species, might also have at its periphery a zone that would accommodate forms requiring only a partial modification of arid conditions.

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10 February 1973.

ERRONEOUS RECORD OF BROWN-HEADED HONEYEATER ON KING ISLAND, TASMANIA

Mathews (1912, Novit. zool. 18: 394) on the basis of one specimen from King Island in Bass Strait described a subspecies of the Brown-headed Honeyeater *Melithreptus brevirostris insularis* for that island. Abbott (in press, Proc. R. Soc. Vict.) showed that Mathews's specimen was the only known record of the species from King Island, so that the RAOU Checklist (1926), Cayley (1958, What Bird is That?), Leach (1968, An Australian Bird Book), Gannon (1962, Emu 62: 148) and Salomonsen (1967, Peters' Check-list of Birds of the World 12: 394) erred in following Mathews by listing the species for King Island as though it were resident.

Since writing my paper referred to above, I have personally examined the specimen, which is Reg. No. 691686 in the American Museum of Natural History collection, New York. The label states that the specimen was collected on 27 December 1897 at Pt Morrison, King Island. No other details are given. The lengths of wing and culmen (to base of skull) as measured by me are 70.0 and 15.9 mm respectively.

There is no Port or Point Morrison on King Island. However, on Kangaroo Island (SA) there is a Point Morrison between Kingscote and Kangaroo Head. Furthermore *M. brevirostris* is the only resident *Melithreptus* honeyeater on Kangaroo Island, where it is common.

It is easy to envisage how the mistake came about. The collector of the skin (probably J. B. Cleland who in the last week of December 1897 was near Point Morrison; Cleland 1906, Emu 5: 207) presumably wrote Kang. Island on the label, which Mathews read as King Island. My conclusion is that *Melithreptus brevirostris* should be expunged from the King Island list. It should also be noted that *M. brevirostris insularis* Mathews becomes a synonym of *M. brevirostris magnirostris* North, instead of a synonym of the nominate race as treated by Salomonsen.

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11 January 1973.