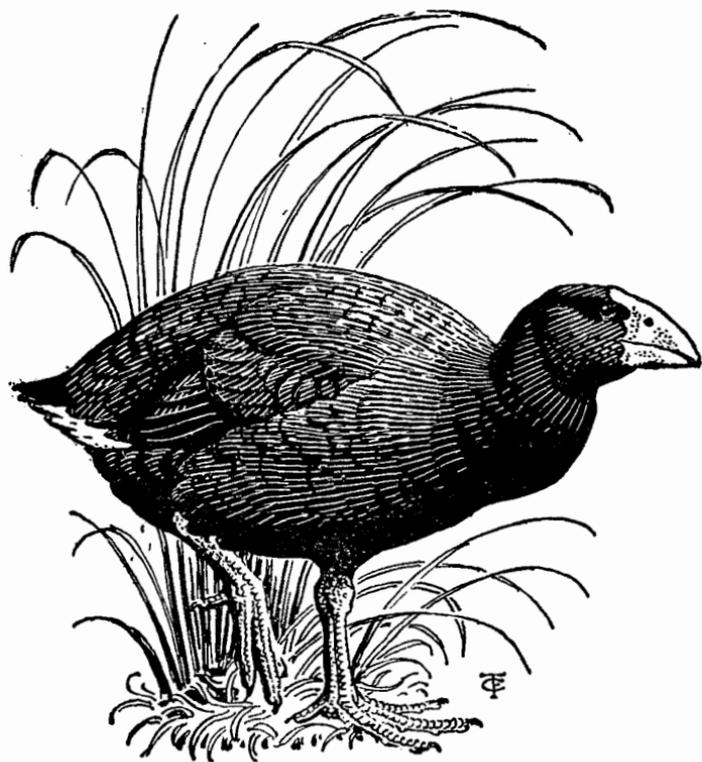


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of the

Ornithological Society of New Zealand  
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*Volume Fifteen, Number Three, September, 1968*

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# NOTORNIS

*In continuation of New Zealand Bird Notes*

Volume XV, No. 3

SEPTEMBER, 1968

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JOURNAL OF THE ORNITHOLOGICAL SOCIETY OF NEW ZEALAND  
(Incorporated)

Registered with the G.P.O., Wellington, as a Magazine

Edited by R. B. SIBSON, 26 Entrican Avenue, Remuera, S.E. 2

Annual Subscription: Ordinary Member, \$2; Endowment Member, \$3

Life Membership, \$40 (for members over thirty years of age)

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# AN UNUSUAL SEABIRD MORTALITY IN THE SOUTHERN NORTH ISLAND (NEW ZEALAND) APRIL, 1968

By F. C. KINSKY, *Dominion Museum*

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## ABSTRACT

An account of 588 birds found dead or alive on beaches and some inland areas of the southern North Island and Hawkes Bay. An unusually high mortality of albatross was recorded, with 110 Royal and 26 Wandering Albatross being found in the Wellington area. Other notable records were of Grey-faced and Black-winged Petrel, two sub-tropical species, not usually recorded in the Cook Strait area.

## INTRODUCTION

A tropical cyclone of unusual force hit the North Island of New Zealand on 9 and 10 April 1968, causing storm force southerly winds in the Wellington area and along the south west coast of the North Island. Severe property damage occurred in Wellington, including the sinking of the Wellington-Lyttelton ferry steamer "Wahine" inside the Wellington Harbour entrance.

The first indication that pelagic birds were affected came from Epuni (Lower Hutt) 2½ miles inland, where M.J. Imber and many other Wellington commuters were stranded while going to work on Wednesday, 10 April. Michael reported to the Dominion Museum at 9.30 a.m. that numerous Grey-faced Petrels and prions were battling the storm, unable to make headway against the wind, in the vicinity of the Epuni railway station. This was followed by a call from J. A. (Sandy) Bartle at the Victoria University Marine Biological Station in Island Bay, reporting that petrels were being blown inland "backwards" in an unsuccessful attempt to fly against the wind. From late afternoon Wednesday, through Thursday and Friday, live birds were brought into the Dominion Museum, mainly by officers of the Wellington R.S.P.C.A., and the general public.

At one stage on Friday (12 April, 1968) the Museum was caring for over 25 live birds of 6 species, ranging in size from large albatross to prions. Few of these birds had been picked up on or in the vicinity of beaches. The majority were collected in city streets and back gardens from Wellington, Petone, Lower Hutt and as far north as Wainuiomata and Upper Hutt (12½ miles inland). During Saturday (13 April, 1968) telephone reports were received from the Wairarapa, about "numerous" albatross cast ashore in the Palliser Bay area. The first three Black-winged Petrels were picked up on western beaches between Hokio and Waitarere Beach by P. Roberts. Beach patrols were organised, and during the following week the entire stretch of approximately 150 miles from Wanganui in the north to Cape Terawhiti (Figure 2, Beach Sectors 9 to 14), and from Cape Terawhiti to Cape Palliser (Beach Sectors 1 to 7) was investigated. The following members of the O.S.N.Z. and other parties contributed to the outstanding success of these beach patrols: D. E. Crockett with a Wanganui party supported by I. Andrew and a

Palmerston North party covered the beaches from Wanganui to Te Horo (Beach Sectors 11 to 13); Dr. P. C. Bull and P. Roberts each conducted lone beach patrols between Otaki and Waitarere (Beach Sector 11); G. Foreman covered the area between Titahi Bay, Cape Terawhiti and Ohiro Bay (Beach Sectors 9 and 1); Brian and Mrs. Enting and Ian and Mrs. Gillespie investigated the Wainuiomata and Orongorongo River mouth areas (Beach Sector 3 east part); B. D. Bell organised several very successful Wildlife Service teams which covered the entire Palliser Bay area (Beach Sectors 5 to 7); L. Moran (Wildlife) in addition to participating on Palliser Bay searches, made a successful lone beach patrol north of Wanganui (Beach Sector 14). The author joined some of the Wildlife teams in the Palliser Bay area and with J. A. Bartle covered beach areas not enumerated above.

A total of 578 birds of 30 species was found on southern and western beaches of the Wellington area, including some birds blown inland and reported to the Dominion Museum. However, it can be assumed that many birds blown inland during the storm were either not found, or not reported. All birds found and positively identified are tabulated in Table 1, which contains only birds killed or stranded by the storm of 10 April. Birds found, which had evidently been beach cast before the storm, or had been killed by other causes (fish hooks, etc.) or birds reported to the museum but of doubtful identification were not included in the count.

### PASSAGE OF STORM

The centre of the tropical storm, which approached New Zealand from the direction of New Caledonia, passed east of Auckland about midnight of 9 April, moved directly over Tauranga, continuing in a south-south-easterly direction over the North Island and crossed the east coast near Castlepoint about 9 a.m. on 10 April (See Figure 1). It continued in a general southerly direction. During the passage of the storm over the North Island, gale force east to north-east winds predominated in the Bay of Plenty and the Hawkes Bay areas. Storm-force south to south-west winds hit the Wellington area round about 6 a.m. on 10 April. The average wind speed being approximately 50 m.p.h. with gusts of at least 100 m.p.h. recorded frequently between 8 a.m. and midday, when the centre of the storm was about 100 miles distant. Shortly after midday, winds in the Wellington area diminished rapidly, and turned to light north-westerlies late in the afternoon, when the centre of the storm had shifted well to the south and east of the South Island.

### NOTES ON SELECTED SPECIES

#### *Spheniscidae* (Penguins)

The only species of penguin which suffered unusually high mortality was the Yellow-eyed Penguin (*Megadyptes antipodes*). Six specimens were found, i.e. five on Wellington south beaches, and one at Hokio. This comparatively high number of birds killed indicated that numbers of Yellow-eyed Penguins frequenting the eastern Cook Strait area must be even higher at this time of the year than was assumed from the rarity of beach cast specimens in the past

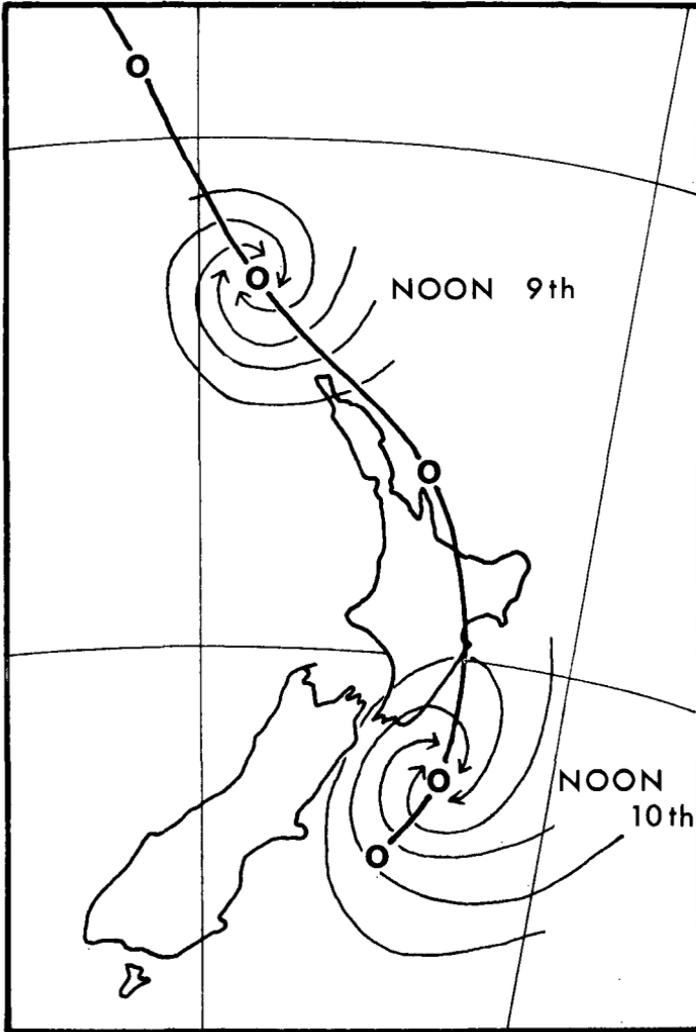


FIGURE 1 — PASSAGE OF STORM ACROSS THE NORTH ISLAND, SHOWING WIND DIRECTIONS (From details supplied by New Zealand Meteorological Service)

(Bull and Boeson 1961 et. seq.). All five birds found on the Wellington south coast were juveniles (birds of the year), whereas the one bird found at Hokio was allegedly in adult plumage.

Northern Blue Penguin (*Eudyptula minor novaehollandiae*) were not as heavily affected by the storm. The number of birds found (only four on the Wellington south shores, and 15 along the west coast) compares favourably with the normal mortality of the species during this time of year. The four birds found dead within the Wellington Harbour were not actually killed by the storm, but polluted from the oil slick following the 'Wahine' disaster, and died on eastern beaches of the Miramar Peninsula. One of these, P-526, was a female banded as an adult breeding bird on Somes Island on 10 November, 1956. This bird was at least 15 years old at the time of its death.

### *Diomedeidae* (Albatrosses)

A total of 187 albatrosses of 5 species was found, all of which, except for one White-capped Mollymawk (*Diomedea c. cauta*) were cast ashore on southern beaches, or blown inland from the south. All albatrosses on beaches were found on or beyond storm tide level, indicating that they were swept ashore at the height of the storm and either killed in the breakers, or cast ashore alive and died later. By contrast, many of the smaller petrels were probably killed by the storm further out to sea and cast ashore by later tides. The larger albatrosses were more affected by the storm than the smaller ones. 91 Northern Royal Albatross (*Diomedea epomophora sanfordi*), 19 Southern Royal Albatross (*Diomedea e. epomophora*) and 26 Wandering Albatross (*Diomedea e. exulans*) were found. Of the smaller albatrosses the White-capped Mollymawk was most affected, and a total of 45 specimens was collected, whereas only 5 Black-browed Mollymawk (*Diomedea melanophris*) and a single Buller's Mollymawk (*Diomedea bulleri*) were recovered.

The ratio of immature to adult Royal Albatross on the beach sectors visited by the author was approximately 1:5, whereas 50%, i.e. 13 out of the 26 Wandering Albatross, were birds in brown juvenile plumage. Only one of 45 White-capped Mollymawk showed some immature signs in the colouring of its bill, whereas four of the five Black-browed Mollymawk found, were birds of the year. One of these was banded as a chick on Campbell Island, 13 March 1968 (0-12120). Some birds were blown up the Wairarapa Valley for considerable distances, and two White-capped Mollymawk were found alive as far north as Mauriceville and Woodville, i.e. 53 and 85 miles inland respectively. Others were reported ('Wairarapa Times-Age', 17 April 1968) from Featherston, Mangamahoe, and Masterton. The only adult Black-browed Mollymawk found, was picked up 3 miles inland on the Orongorongo River bed.

All the above species of albatross occur in numbers in Cook Strait and outer Palliser Bay area, but comparative numbers killed by the storm are surprising. Bartle (in prep.) reports Wandering Albatross and both sub-species of Royal Albatross throughout the area. Wandering Albatross were never observed in large numbers, but Royal Albatross were more frequently seen. The ratio of Southern

to Northern Royal Albatross observed from a fishing vessel was estimated at 6:1. However the ratio of Southern to Northern Royal Albatross killed by the storm was 1:5.

The severe mortality of the two large albatross species during this storm is apparent when compared with published data on beach-cast specimens during recent years. In a 25-year period i.e. during 1939-1959 and 1960-1963 (Bull and Boeson, 1961a, 1961b, 1963, 1964, 1965) only 46 Wandering Albatross and 23 Royal Albatross were reported to the O.S.N.Z. Beach-patrol Scheme, or published in "Notornis" as individual findings of dead birds, as being found along all of the New Zealand coast. During the April 1968 storm, 26 Wandering Albatross and 110 Royal Albatross were found on Wellington south coast beaches alone.

In addition to the three species of mollymawk found during April, three others occur regularly in the affected area, i.e. Salvin's Mollymawk (*Diomedea cauta salvini*), Chatham Island Mollymawk (*Diomedea cauta eremita*) and the Grey-headed Mollymawk (*Diomedea chrysostoma*). The Grey-headed Mollymawk although normally the most common of the mollymawks reported beach-cast in the Wellington area (Bull and Boeson 1961 et seq.), was not found storm-wrecked during April. Chatham Island Mollymawk are extremely rare, but Salvin's Mollymawk are regularly present and scavenging offal from fishing vessels in only slightly lower numbers than White-capped Mollymawk (Bartle in prep.). Bartle estimates the ratio of these two closely related sub-species as being about 1:2 (Salvin's : White-capped). Bartle's estimate has been confirmed by J. Moreland (pers. comm.) and compared closely with observations made by the author in the area some years ago. It was surprising therefore, that although 45 White-capped Mollymawk either died or were blown inland, no specimens of Salvin's Mollymawk were found. Following a similar, but less severe storm in February 1947, close to 40 Salvin's Mollymawk were picked up on Wellington south beaches, but no White-capped Mollymawk were reported at the time (Cunningham, 1948). On first glance it seems difficult to explain why the position was reversed during the April storm of 1968. However, all White-capped Mollymawk found storm-killed during April were in heavy moult, with primary feathers missing, or not completely renewed, and body moult only half completed. Cunningham (1948) does not mention the plumage conditions of Salvin's Mollymawk found during February 1947 but three specimens picked up on Wellington beaches following that storm and held in the Dominion Museum collections (DM-1309, Petone 18/2/47; DM-1310, Petone, 17/2/47; DM-12301, Wanganui, 17/2/47) were in full moult. The same moult condition was found in two additional specimens both collected during February, but in different years and localities (DM-1212, Bounty Island, 27/2/26; DM-9893, Ohope, Bay of Plenty, February 1962). Therefore, the evident reason for the large mortality, is that the respective storms occurred during moult, when the birds were most vulnerable. Heavy losses of moulting White-capped Mollymawk were suffered during April 1968, whereas Salvin's Mollymawk, which had completed their annual moult at the time, seemed to have been unaffected. During the February storm in 1947 the situation was reversed.

The same applied to the two larger species of albatross (*D. exulans* and *D. epomophora*). In February 1947 only eight of these albatross were cast ashore, whereas in April 1968 136 were killed. All the April birds were in heavy moult, showing that Albatross are particularly vulnerable to storm mortality during moult.

#### *Procellariidae* and *Pelecanoididae*

Only four Giant Petrel (*Macronectes giganteus*) were found on Wellington's southern beaches. This is a surprisingly small number, as several hundred at a time congregated at the Tory Channel whaling station during its operations a few years ago, and dozens can sometimes be observed within Wellington Harbour. However, this species does not seem numerous in eastern Cook Strait (Bartle, in prep.) and the number killed by the storm confirms this observation. The same applies to Cape Pigeon (*Daption capensis*), which only occur in moderate numbers during the late summer, increasing during the winter months (Bartle, in prep.) when they are more frequent casualties on Wellington beaches. No Cape Pigeon were found.

Numerically, the two most unexpected petrels killed in the Wellington area, were Grey-faced Petrel *Pterodroma macroptera gouldi* and Black-winged Petrel (*Pterodroma hypoleuca nigripennis*), both of which are classified as sub-tropical, warm water sub-species. Grey-faced Petrels are seldom found on Wellington beaches, the only published record being 11 specimens killed on the Palliser Bay coastline by the February 1947 storm. (Cunningham, 1948). Following the April 1968 storm, 42 Grey-faced Petrel were recorded, concentrated mainly in the Wellington Harbour, Hutt Valley, and on eastern Palliser Bay beaches. Birds found were as far inland as Upper Hutt, and also Mount Bruce in the Wairarapa, 60 miles inland. The "Wairarapa Times-Age" of 17 April 1968 reported several "mutton-birds" found alive in the Wairarapa, which are assumed to have been Grey-faced Petrel. Cunningham (1948) explains the occurrence of this species storm-killed on the Wairarapa coast, by the birds having first being blown south from the Bay of Plenty - East Cape, and then north against the mainland. This explanation is quite plausible. However, Fleming (1950: 184) reports this species as abundant about 100 miles off the North Island coast and as far as 35°S, and J. Moreland (pers. comm.) has observed Grey-faced Petrel between Banks Peninsula and the Chatham Islands. It can be assumed that this species, although not previously observed in eastern Cook Strait, regularly feeds in the warm East Cape current, which extends south to the Chatham Islands. The birds killed in April 1968 could have been blown in from the east or south-east, and killed by the southerly wind as the storm passed south.

All birds of this species were far advanced in moult with fresh flight feathers. However, in the majority, the 10th (outermost) primary had not reached its full length and all birds dissected were adults coming into breeding condition.

Black-winged Petrels are known to breed on Norfolk, the Kermadec and Three Kings Islands within the New Zealand region. Observations of these birds at sea south of North Cape are rare, but were reported in the Bay of Plenty and East Cape vicinity by P. C. Harper in 1965 (pers. comm.). Up to April 1968, only four

storm-cast specimens were found on the New Zealand mainland and all were found in the Wellington area (Imber, 1966; P. C. Bull, unpublished, 1964). Following the April storm, 41 were found, nine in Hawkes Bay (one nearly five miles inland at Pakowhai), two on the Wellington south coast, and 30 on beaches between Otaki and Wanganui on the west coast. The weather preceding the beach-cast of one specimen found on Foxton beach in 1963 was similar to, but not as severe as that in April 1968. Imber (1966) speculates that this bird was probably blown south along the east coast of the North Island and later blown through Cook Strait by strong southerlies, finally perishing in the Tasman Sea. The large number of Black-winged Petrels found during the April cyclone, and the distribution of the storm-wrecked birds around the southern parts of the North Island, support Imber's theory. The birds may have been swept south from the North Cape and Bay of Plenty by gale force northerlies, some being killed on Hawkes Bay beaches by predominantly east to north-east winds there; others, blown further south and wrecked on the Wellington south coast, or blown back north through Cook Strait into the Tasman Sea by the storm force southerly winds.

Ten birds of this species were found in good condition, and prepared as study skins at the Dominion Museum. Eight were adults (3 males and 5 females) and 2 immature (both males). All adults had finished their moult of flight feathers and rectrices and only two had not completed body moult. Both immature birds showed slight body moult. All ten birds were thin, their average weight being 115.5 gms. with a maximum of 150 gms. and a minimum of 100 gms.

The total of 102 Fairy Prion (*Pachyptila turtur*) found may seem high. However, if the vast numbers normally occurring in the affected area are kept in mind, and the number killed during the storm compared with those beach-cast in the Wellington area annually (Bull and Boeson 1961 and seq.), it is evident that the mortality caused by this storm is not particularly high.

Westland Black Petrels (*Procellaria westlandica*), now known to occur regularly in eastern Cook Strait and along the South Island east coast, as far as Banks Peninsula (Bartle in prep.), were affected to some degree by the storm, six birds being found. Two were found at Petone Freezing Works, one near the Orongorongo River mouth and three on eastern Palliser Bay beaches. All had fresh plumage, and the four birds dissected were adults with enlarged gonads.

Flesh-footed Shearwaters (*Puffinus carneipes hullianus*) seem to have suffered little during the storm, as only eight were found (one in Wellington, five in eastern Palliser Bay, and two on the west coast). This species is very common in eastern Cook Strait and outer Palliser Bay, and Bartle (in prep.) considers them to be one of the most numerous species of pelagic birds during summer and up to the end of April, when they suddenly disappear on their northward migration. J. Moreland (pers. comm.) reported them as numerous in the area on 27 March 1968, two weeks before the storm.

TABLE 1 — LIST OF SPECIES RECOVERED FOLLOWING STORM OF 10 APRIL, 1968  
SHOWING NUMBERS AND PLACE OF RECOVERY

Species	Sectors								Total on South- ern Beaches	Sectors						Total on West Coast	Hawkes Bay	Species Totals
	1.	2.	3.	4.	5.	6.	7.	8		9.	10.	11.	12.	13.	14			
<i>Megadyptes antipodes</i>			1		1		3		5			1				1		6
<i>Eudyptula minor novaeholland- iae</i>	4				3		1		8	3		1	1	2		7		15
<i>Diomedea e. exulans</i>			1		2	6	17		26									26
<i>Diomedea e. epomophora</i>			1		3	11	4		19									19
<i>Diomedea epomophora sanfordi</i>	9	17			19	19	27		91									91
<i>Diomedea melanophris</i>			2			2	1		5									5
<i>Diomedea bulleri</i>						1			1									1
<i>Diomedea c. cauta</i>		8	11		3	7	13	2	44					1		1		45
<i>Macronectes giganteus</i>		1			1		2		4									4
<i>Pterodroma macroptera gouldi</i>	17	1			1	14	8	1	42									42

TABLE 1 — Continued

Species	Sectors														Total on West Coast	Hawkes Bay	Species Totals
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.			
<i>Pterodroma hypoleuca nigripennis</i>	1										16	12	1	1	30	9	41
<i>Pachyptila v. vittata</i>					1						1				1		2
<i>Pachyptila desolata</i>				2	1						2		1		3		6
<i>Pachyptila turtur</i>	10	2	20	21	13	1	67	3	12	8	1	11	35				102
<i>Procellaria westlandica</i>	2	1			1	2	6										6
<i>Puffinus carneipes hullianus</i>	1				3	2	6				2				2		8
<i>Puffinus bulleri</i>	2	4	3	26	34		69		1	3	2				6		75
<i>Puffinus griseus</i>					1		1		1	2	1				5		6
<i>Puffinus g. gavia</i>	2	3		5	8		18		8	3	7				18		36
<i>Puffinus huttoni</i>											1				1		1

TABLE 1 — Continued

Species	Sectors (see map)								Total on South- ern Reaches	Total on West- Coast	Hawkes Bay	Species Totals				
	1.	2.	3.	4.	5.	6.	7.	8.								
<i>Puffinus assimilis</i> ssp.									1	1		1				
<i>Pelecanoides urinatrix</i>					1				1	1		4				
<i>Sula bassana serrator</i>	8	9	3		20				1	4		25				
<i>Phalacrocorax carbo</i>					1							1				
<i>Strictocarbo punctatus</i>					1	1					1	2				
<i>Haematopus ostralegus finschi</i>									1			1				
<i>Larus dominicanus</i>			2		1	3	1				1	4				
<i>Larus novaehollandiae scopulinus</i>					1							1				
<i>Larus bulleri</i>											1	1				
<i>Sterna striata</i>			1	3		4		3	2	1		10				
<i>Carduelis carduelis</i>		1			4			3	2	1		10				
<b>TOTALS:</b>	64	47	67	126	142	4	450	9	3	47	38	19	12	128	10	588

Buller's Shearwaters (*Puffinus bulleri*), however, suffered heavy losses and a total of 75 was found. Buller's Shearwaters are found on Wellington beaches fairly regularly, but have been considered one of the rarer species of the area. Recently, however, Bartle (in prep.) has found them occurring in large numbers in eastern Cook Strait during autumn and considers them to be the most abundant species of petrel at that time. The large number storm-killed during April agrees with his findings. The birds found were both juvenile and adult, the latter being in full moult.

Two further species of petrel need special mention, mainly because of the small number killed. Sooty Shearwater (*Puffinus griseus*) occur in eastern Cook Strait throughout the summer, with a large increase during the spring and autumn migrations. Bartle's observations during the first half of 1966 (in prep.), indicate that numbers of Sooty Shearwater in the area are fairly constant up to late April when they suddenly increase because of migrating birds moving north from the Stewart Island breeding grounds. His estimated ratio of Sooty Shearwater to Buller's Shearwater during late summer is in the vicinity of 1:5. However, only one Sooty Shearwater was found on eastern beaches, as compared with 69 Buller's Shearwater. This indicates that Sooty Shearwater were not as heavily affected.

Least affected of all petrels was the Diving Petrel (*Pelecanoides urinatrix*), large numbers of which occur in Cook Strait throughout the year. This species is regularly beach-cast in the Wellington area. Only one specimen (freshly moulted) was found on the Wellington south coast, and three on Wellington west coast beaches.

### *Sulidae*

Gannets (*Sula bassana serratator*) suffered a fairly high mortality during the storm, and of the 25 individuals found, 20 were picked up on the Wellington south coast. Eight of these were blown ashore at Petone, giving a fair indication of numbers present in Wellington Harbour at the time. Three of the 25 birds were juveniles. One adult was banded as a chick on 31/1/60 at Cape Kidnappers Plateau (M-14290), and one juvenile banded as a chick on 26/1/68 at Cape Kidnappers Plateau (M-17361).

### *Laridae* and *Sternidae*

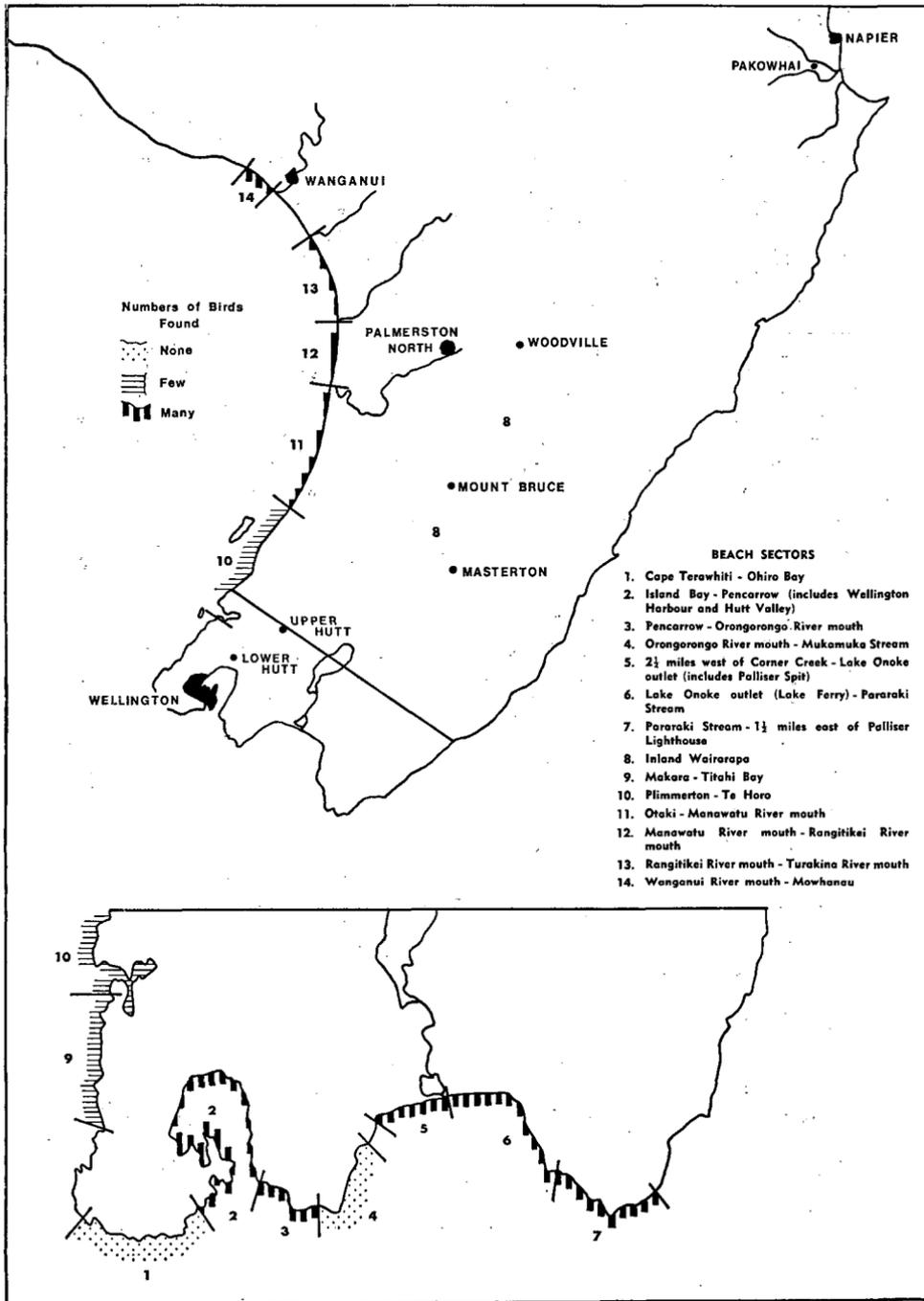
These two families hardly suffered any loss, except for White-fronted Tern (*Sterna striata*), 10 of which were found. All of these were juveniles, fledged during the previous breeding season (1967-68), and in very poor physical condition.

One Black-billed Gull (*Larus bulleri*), banded as a chick on 20/11/66 at Waipara River, North Canterbury (E-46468), was found storm-killed in Hawkes Bay.

## DISCUSSION

It is evident from Table 1 that the main mortality of pelagic birds occurred along the Wellington south coast. The largest numbers were found in the Wellington Harbour area, near the Wainuiomata and Orongorongo River mouths and in the central and eastern parts of Palliser Bay. No birds were found along two lengthy stretches of beach between Cape Terawhiti and Cape Palliser. The long stretches from Cape Terawhiti to Ohiro Bay and the beach between

FIGURE 2 — COASTLINE INVESTIGATED FOLLOWING STORM OF 10 APRIL, 1968, SHOWING AREAS SEARCHED AND DENSITY OF WRECKED BIRDS



the Orongorongo River mouth and Corner Creek were bare (see Figure 2 and Table 1). A possible explanation for this is the orientation of the beaches to wind direction. Petrels blown against the coast during a storm tend to fly along the coast in the line of least resistance, until exhausted. A coast aligned north-west, such as that between Sinclair Heads and Cape Terawhiti, will naturally tend to "funnel" birds north through the Cook Strait narrows, into the Tasman Sea. The western beaches of Palliser Bay, however, lay more or less parallel to the wind at the height of the storm. On the Wellington west coast, with winds during the storm blowing from the south to south-west, the beaches become more exposed in the north (Sectors 11-14), where the majority of beach-cast birds were found. The exceptionally high mortality in the Palliser Bay and Wellington Harbour areas can be accounted for by birds being swept south along the east coast of the North Island and west out of the Pacific Ocean, into the comparatively restricted area of eastern Cook Strait, where they were caught by the storm-force southerly winds and swept north against the North Island, with only a very narrow escape route through Cook Strait. Those birds which managed to escape were able to disperse in the Tasman Sea, if not overcome by exhaustion and washed ashore on western beaches.

#### ACKNOWLEDGEMENTS

The writer is indebted not only to those members of the Ornithological Society of New Zealand mentioned in the introduction, who participated in and helped organise beach patrols following the storm, but in addition would like to thank: Messrs. N. B. Mackenzie and J. Heighway, who reported storm-killed birds in Hawkes Bay; Mr. N. G. Robertson of the Meteorological Service, Wellington, who kindly supplied information on the weather conditions during the passage of the storm; Officers of the Wellington R.S.P.C.A. who, in spite of overwork for several days following the storm, repeatedly brought van loads of live birds to the Dominion Museum; and all members of the public who by either bringing live birds to the Museum, or reporting dead birds found, helped to accumulate important information. In addition special thanks are due to Mr. C. J. R. Robertson, who prepared the maps published with this paper; Mr. J. A. Bartle for his kind permission to peruse and quote from his manuscript "Seabirds of Eastern Cook Strait in Autumn"; and Messrs. B. D. Bell and C. J. R. Robertson for reading the manuscript and preparing it for publication, after the writer had left on an overseas study trip.

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## SOME NOTES ON THE BIRDS OF NORFOLK ISLAND

By HARRY WAKELIN

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Norfolk Island lies about 460 miles N.N.W. of North Cape, and is roughly 5 miles long by 3 miles wide. It has about 90 miles of roads, of which the greater proportion are earth. There are about 1,000 inhabitants who are largely descended from the Bounty mutineers, but nowadays intermingled with Australians, New Zealand and English settlers.

Access from the sea is by lighter to Kingston Pier to the South and Cascade Pier to the North and as these landings face the open sea, they are often unworkable, but most of the passenger trade and perishable foodstuffs come in by air.

The island is mostly of volcanic origin, but with dead coral out-cropping on the south-east corner and live coral reefs mostly to the south. These reefs enclose the only safe swimming beach, named Emily Bay.

Much of the island is upland plateau from which lead many steep and rugged valleys cutting seawards. On the plateau, towards the north-west, two volcanic peaks (Mt. Bates and Mt. Pitt) rise to a little over 1,000 feet.

Cliffs which average 200 to 300 feet in height surround most of the Island. There are not many places where one can reach the sea level easily. The only land near sea level is at Kingston where there are perhaps 200 acres of flat land and swamp known as Kingston Common. It is here that one finds the ruins of the gaol and the old administration buildings (some still in use, while others are in ruins) from the notorious penal days of the late 18th and early 19th centuries. There is also the cemetery where one may get an insight into those turbulent times by reading the tombstones.

During the penal days the Island supported approximately 1,800 people — mostly off the land. Nowadays it relies almost entirely on the sale of postage stamps, taxation on liquor, and tourism for its income.

Because of its small size it is not very difficult to study the bird life. Seabirds are here in great profusion during the breeding season.

There are two offshore islands namely, Nepean Island — approximately half a mile offshore to the south east and Philip Island — approximately two miles away in the same direction. In contrast to Nepean Island which is formed almost entirely of dead coral raised about 50 feet out of the sea and is approximately level, Philip Island is volcanic with steep hills, high cliffs and rugged valleys and is very eroded, standing as a monument to the folly of the men who released rabbits there in the early days. It rises gaunt above the sea, but beautiful on account of the rich and varied earth colours.

To the north of Norfolk Island and close inshore, a number of spectacular rock formations formed entirely of basalt, weathered black, rise high and sheer out of a deep blue sea.

The Kingston Common is where one sees the migrating waders. These commonly frequent a marshy area through which Watermill Stream flows into the sea at Emily Bay.

The Mt. Pitt - Mt. Bates area is still largely covered by indigenous bush, which in many ways resembles New Zealand bush. There are some very thick groves of palms very closely akin to New Zealand Nikau, two varieties of Tree Ferns and quite a variety of ferns, a number of which occur in New Zealand. Everywhere the stately Norfolk Pines (*Araucaria heterophylla*) raise their heads above the bush, and indeed, dominate the whole island even to the cliff faces. This is their timber tree and it supports three sawmills. The sawn timber is rather like Kauri. Unfortunately many of these trees are dying and have very little remaining foliage, but are festooned with long beards of blue-grey lichen. The seeds, which are carried in spherical cones about 6 inches across, fall and germinate in profusion, but where the area is not enclosed, are soon demolished by cattle. Some Norfolk Pines are very large, although well past useful maturity. There is one tree 33 feet in circumference and another 31 feet. Both are still alive but hollow, and it is possible to climb inside at the base and find ample room to move about. Indeed, one such tree (since destroyed) is said to have housed an escaped convict named Barney Duffey for seven years during the penal era. Another tree is 27 feet in circumference and lies at an angle of approximately 45 degrees from the perpendicular.

Another common tree which grows to considerable proportions is the native hibiscus (*Lagunaria patersoni*), known locally as White Oak. In the spring these trees are covered profusely with lovely pink blossoms. They also grow around the cliff faces where they form a low wind-swept scrub conforming to the shape of the cliffs. The cattle are very fond of these trees and consequently there seems to be little regeneration. Their numbers were greatly reduced in the early days as the wood was used for burning lime which was not discoloured by the white ash.

There are two varieties of a small tree similar to New Zealand Ake Ake, known locally as Tea Tree, one of which has a profusion of red flowers in the late spring, which make it very conspicuous in the bush.

When Captain Cook discovered Norfolk Island in 1774 he found it to be uninhabited and the earliest reports state that lush, dense bush everywhere reached the cliff tops. The cliffs were covered in flax and in the penal days Maoris were brought over from New Zealand to teach the convicts the art of dressing this for making canvas.

Beyond the bush, wherever the land has been cultivated, much of it has been colonised by Lantana and wild guavas. There are no native grasses, but now wherever there is grass, it is mostly Kikuyu, which, if left ungrazed, grows so tall that it is really hard work to scramble through it.

Following are the birds seen by the writer most of which have also been photographed during short visits to the Island in August 1963, November 1965, February 1967 and August 1967.

Also mentioned are visiting birds as noted over the years by

Mrs. Merval Hoare, a local naturalist, to whom I record my thanks for supplying these few notes to supplement my own.

"During 1951-52, a white crane (*Egretta* sp.) frequented the swampy areas.

In December 1960, c. 30 birds identified as Pied Oystercatchers were seen probing for food on the air-strip. [A lost flock of *H. o. finschi*? Ed.]

April 1961, a Red-billed Gull at Kingston.

Summer 1961, a Strawnecked Ibis with a damaged leg was often seen on Kingston Common (c.f. *Notornis* 10, 304).

29/8/65. Two Goldfinches at Duncombe Bay were the first I saw on the island.

12/4/64. Two gulls at Kingston.

21/3/65. A 'grey-backed' gull at Slaughter Bay.

17/3/65. Four gulls at Emily Bay. These were very like the Red-billed Gull of New Zealand, except that the bills were black. Legs and feet were red." [Evidently immature Red-billed or Silver Gulls. Ed.]

#### SPECIES LIST

##### GIANT PETREL (*Macronectes giganteus*)

On 5/8/67 I saw 2 Giant Petrels feeding on garbage in the sea at Headstone rubbish tip. Their dark heads and the colour of their bills suggest that they were young birds possibly of South Atlantic origin.

##### WEDGE-TAILED SHEARWATER (*Puffinus pacificus*) (Known locally as Ghost Birds)

The top of Nepean Island is composed of rotted coral which has disintegrated into sand. This is riddled with the nesting holes of Wedge-tailed Shearwaters and it is impossible to walk more than a few steps without putting one's foot through into their burrows.

They also nest along the cliff tops in many places on Norfolk Island and cause a great deal of erosion, which in turn makes them very unpopular with the islanders.

Because Norfolk Island is for the greater part volcanic, the top soil in many places is very fine and dusty and if it were not for the fact that Kikuyu grass grows there plentifully, the erosion would be much greater.

In November 1965, I found that the shearwaters were already coming ashore to claim their nesting burrows, and by going around at night with a torch we were able to find birds sitting around on the ground outside the burrows as well as inside. Under the ground they make a horrible wailing sound (hence the name Ghost Bird).

In February 1967 I expected to find young in the burrows, but was surprised to find still only eggs. They are white and about the size of hen eggs but very much more pointed and I understand they take seven weeks to hatch.

Many of these birds fall prey to cats or rats and many may be found with the breasts eaten out.

I believe that in the season they can be seen just on dusk on a clear evening approaching from the sea in a huge black cloud.

**BLACK-WINGED PETREL** (*Pterodroma nigripennis*)

In February 1967 I saw quite a number of these birds flying about the cliffs and doing all sorts of acrobatics. Their antics in the air are so carefree that they made me think of clowns in the air. In the Blackbank area I saw the remains of a number of them and presumed that they had been shot, but the next morning I found three which had obviously been dead for only a few hours on the ridge by Captain Cook's memorial. They showed no apparent sign of injury and I wondered whether they had hit the ridge while flying in the dark. I was unable to ascertain where they breed.



Plate XXI — Red-tailed Tropic Birds fighting over a nesting site, November 1965. [Harry Wakelin

**RED-TAILED TROPICBIRD** (*Phaethon rubricauda*)

These birds arrive every year to nest, mostly around the northern cliffs where the nesting sites are, for the most part, inaccessible.

I was fortunate to have found access to a few nesting sites about 100 feet down a cliff. I saw lots of birds flying round and from the top of the cliff they looked white and no larger than Red-billed Gulls, so, when I was able to see them closer I was surprised to find that they are about the size of a duck.

Having climbed down the cliff to where I had seen them coming in to land, the first close view I had was of two holding each other by the beaks, locked in combat, fighting over nesting sites. Both birds pulled and twisted until at last one gave in, and then, utterly exhausted, the other would settle on the nesting site only to be challenged later by another bird. This was in November, 1965.

On close inspection I found that they were not completely white, but were wearing nuptial plumage which shows a delicate pink blush through the feathers. The result is really quite subtle and beautiful. Some have a great deal of colour, often a salmon pink. The two red feathers in their tail are about the size of knitting needles and are very conspicuous, especially while they are in flight, because they change direction with each movement of the other tail feathers during manoeuvring. Their beaks are about 3 inches long, very strong, and a bright red.

The nesting sites I saw were on ledges in the cliffs that had been cut out by the weather, leaving partial cover arching above. The fighting which I had witnessed took place about mid-day. I went back at 6.30 a.m. one morning to find not a bird in sight so came to the conclusion this must be their fishing time. They feed on small squid about 4 inches long.

In February 1967 I returned to the same nesting area and found access to five nests. Fortunately, they were in different stages of breeding, from the egg (which is heavily speckled over a rusty coloured background), to fairly fully fledged young. They have only one young, and, like Gannets, sit very close.

They use no nesting material. By this time of the year most of them had lost their pink flush. Their feathers were beginning to look bedraggled and invariably they had only one red tail feather which gave me the impression that perhaps they moulted one and grew another before moulting the second one. The islanders used to pluck the red tail feathers out for hat decoration.

On one site were two parent birds with their young, while on another was one parent bird and another which was dead. On top of the dead one was a squid which gave me the impression that the live mate had brought it and offered it, thinking to revive its partner. It was fortunate for the rest of the family that I found it as it was already attracting blowflies, and I threw it over the cliff which must have been a relief to the rest of the family.

In contrast to the parents, the young have dark grey beaks which seem to merge with the eyes at the early stage. The little ones are covered in fluffy grey down. Later, as the wings develop, the down becomes whiter and the feathers on the wings have black edges, giving a rather pleasing mottled effect. The young, whose parents were away, tended to be dozing, while those whose parents were present, used them for sheltering and hiding behind.

#### BLUE-FACED BOOBY (*Sula dactylata*)

Nepean Island is also a favourite nesting ground for Blue-faced Boobies. Although about the same size as our Gannets, they are not nearly so handsome, as they lack the orange shade to the head. Their heads are white and the beak is an old ivory colour turning to blue at the base.

While our Gannets nest in tight colonies with about a square yard for each pair, the Boobies spread their nests well apart and have no close contact with each other.

In November 1965 they were at all stages of breeding from eggs to fully fledged young, so it would appear that perhaps they nest fairly continuously (they must at least be nesting in June).

In February 1967 I saw a pair with a fully fledged young which had been raised on the point at '100 acres' on Norfolk Island itself, where there had been several nesting pairs that season.

**WHITE-FACED HERON (*Ardea novaehollandiae*)**

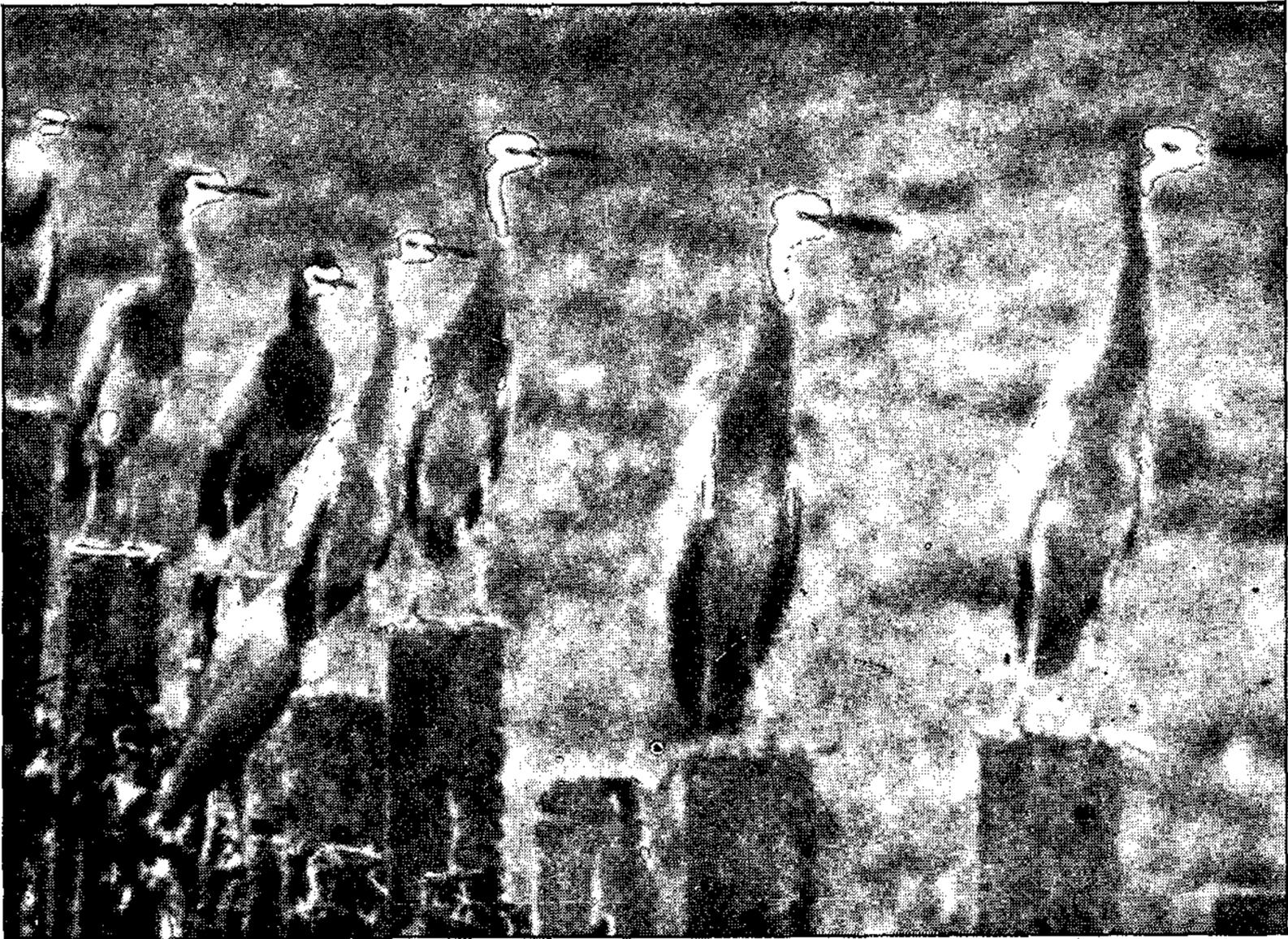
In August 1963, I noted one pair which spent their time in Watermill Creek when the tide was in and when out — on the coral reef at Cemetery Beach.

In November 1965, I saw possibly two pairs. There was very little water showing as a result of the nine-month drought.

In February 1967, I saw mostly only four. I noticed two on the cliff top at '100 acres.'

In August 1967, Kingston Common was flooded and I saw ten together on several occasion. I was able to photograph eight in a row sitting on fence posts.

These observations seem to show a marked increase.



[Harry Wakelin

Plate XXII — White-faced Herons, lining a fence; Kingston Common, August 1967.

**ROYAL SPOONBILL (*Platalea regia*)**

During the whole of my stay in August 1963 a lone Royal Spoonbill was to be seen feeding in Watermill Creek on the Kingston Common. Mrs. Hoare also noted its presence, July 7th 1963, Watermill Creek, August 19th at the Swamp on Cascade Creek and again October 24th.

I understand it was later shot.



[Harry Wakelin

Plate XXIII — Royal Spoonbill on Kingston Common, August 1963.

#### GREY DUCK (*Anas superciliosa*)

In August 1963 on several occasions I saw three in the swamp between Watermill and Kingston.

In November 1965 I saw two in Cascade Stream near the foot of Red Road.

In August 1967 there was plenty of water about and I saw odd pairs in many places. They were very wary and unapproachable.

On August 9th when there were floods on Kingston Common there were a total of 52 on two ponds (one on the golf course and one behind the Administrator's House). As I was trying to stalk the ducks on the latter to photograph some of them, someone approached from the direction of the house and all the ducks flew and I did not see them in the area again.

#### CALIFORNIAN QUAIL (*Lophortyx californica*)

These are quite common. I have seen very young ones as early as the beginning of November and also in February.

#### HARRIER (*Circus approximans*)

These are sometimes seen in winter (c.f. Notornis 10, 304), apparently coming from New Zealand or Australia. They are not known to breed.

#### SWAMP HEN (*Porphyrio melanotus*)

(They are the same as our Pukeko and known locally as Tarler Birds).

These occur wherever there is water and some cover, but are most easily seen in the swamp below Mission Chapel. They are very wary.

I should imagine that a census would reveal 40-50 birds on the Island.

**SPOTLESS CRAKE** (*Porzana tabuensis*)

(Locally known as Little Tarler Bird.)

I have not seen any of these but I am given to understand that they still frequent the swamp below the Mission Chapel.

**PACIFIC GOLDEN PLOVER** (*Pluvialis dominica*)

In November 1965 these birds were common anywhere where there was open grassland; they were very busy and hard to approach and seemed to be working singly.

In February 1967 there were many Golden Plover about, but not so numerous as in November 1965.

**BANDED DOTTEREL** (*Charadrius bicinctus*)

In August 1963 I saw 4 Banded Dotterel in full breeding plumage feeding on the swamp in Kingston Common.

In August 1967 I saw up to 10 at one time associating with Turnstones and Stints at floodwaters on Kingston Common and on the rocks at Slaughter Bay.



[Harry Wakelin

Plate XXIV — Banded Dotterel in breeding plumage on spring passage and Red-necked Stint; Kingston Common, August 1967.

ASIATIC WHIMBREL (*Numenius variegatus*)

In November 1965 I saw one of these for a few moments feeding with Godwits. I got an unsatisfactory photograph because of poor light, but enough to recognise it.

BAR-TAILED GODWIT (*Limosa lapponica*)

November 1965 in drought conditions, I saw four Godwits feeding on Kingston Common, mostly by turning over dry cow manure. I was able to watch them closely at times in Watermill Creek as there was nowhere else for them to feed on account of the prolonged drought. One had a drooping wing. They were to be seen during the whole of my visit, i.e. 1-17 November.

TURNSTONE (*Arenaria interpres*)

In November 1965 there were two flocks totalling about 24 on Kingston Common very busy feeding on what they could uncover under dry cow manure. They were very hard to approach.

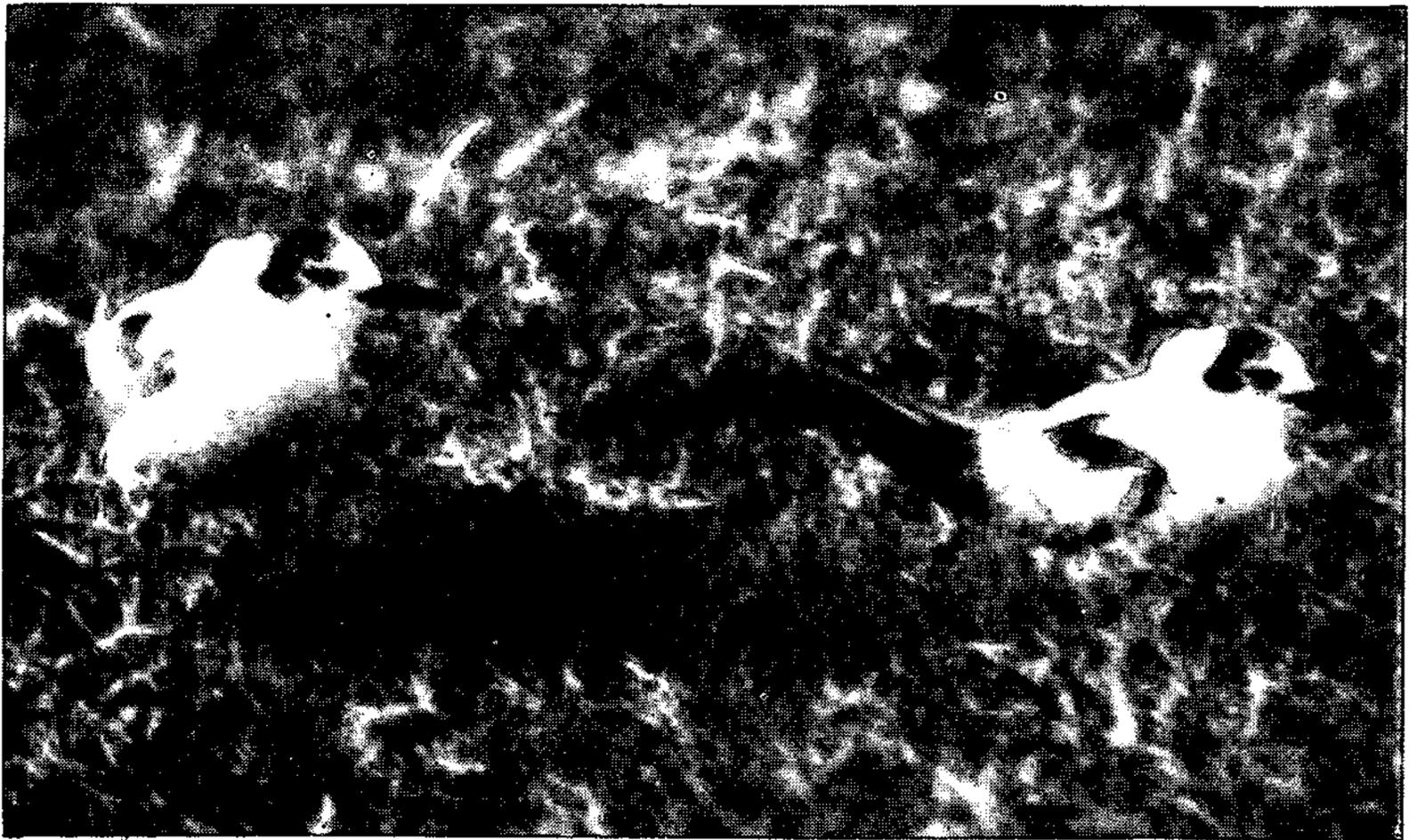
In August 1967 I saw four feeding alternatively between flood-water on Kingston Common and among rocks on Slaughter Bay at low tide. I found these much easier to approach than before.

RED-NECKED STINT (*Calidris ruficollis*)

In August 1967 I saw two stints in winter plumage associating with Turnstones and Banded Dotterel at Kingston Common and Slaughter Bay.

In February 1967 I saw four small waders flying momentarily which I did not have time to recognise; but having watched Stints in August 1967, I think that these are what I saw in February.

I was able to approach the Turnstones, Dotterels and Stints quite closely by following Mr. Ross McKenzie's method of concealing my legs as I scuffed across the sand on my seat.



[Harry Wakelin

Plate XXV — Two of four White-winged Black Terns on Kingston Common, February 1967.

### WHITE-WINGED BLACK TERN (*Chlidonias leucopterus*)

In February 1967 I watched four, none in breeding dress, mostly flying endlessly up and down Watermill Creek, turning their heads this way and that, and every now and then dropping to the ground to pick up food without alighting. Finally they settled down on the ground long enough to allow me to bring back the photographic evidence.

### SOOTY TERN (*Sterna fuscata*)

(Locally known as the Whale Bird)

These are very handsome birds with their black and white patches. To watch them in flight is something to behold. They have all sorts of ways of spreading their tails (so variable can its shape be, in fact, that you would almost think it wasn't the same bird).

They nest on the offshore islands in considerable numbers; but on Norfolk Island itself, only on the inaccessible cliffs and rocks of the north coast.

By law, the islanders are permitted to rob them of their eggs from October 1st until November 30th each year and they are considered a great delicacy. Great numbers of eggs are taken and on the days when the weather is suitable, I understand that it is a race to reach the best nesting grounds first. The yolks are said to be very red.

This notice taken from the Norfolk Island Government Gazette No. 98 is of some interest:

### BIRD PROTECTION LAW 1913

#### THE WHALE BIRD (STERNA FULGINOSA) — CLOSE SEASON

PURSUANT to the provisions of Section 3 of the *Bird Protection Law 1913*, I, REGINALD MARCH, Administrator of Norfolk Island, DO HEREBY DECLARE a close season for the Whale Bird (*Sterna fuliginosa*) for the period from the Thirtieth day of November, One thousand nine hundred and sixty-seven to the Thirtieth day of September, One thousand nine hundred and sixty-eight, both days inclusive.

Reg. Marsh,

Administrator

5/10/67

In November 1965 I was able to visit Nepean Island and the first thing I saw after I had landed was a bucket full of Sooty Tern eggs waiting to be picked up. Because it was robbing season the birds were very scared and impossible to approach, but I found a few eggs which had been overlooked. They were laid straight on the ground, which in this case was dead coral which had disintegrated into sand. Most of the growth on this island was Ice-plant (*Mesembryanthemum*).

In February 1967 I was able to see some young Sooty Terns at fairly close range on the cliffs. They have a speckled appearance and remind me of pine cones which have opened up to drop their seeds.

I understand the nesting grounds on Philip Island are extensive, but unfortunately so far I have not been able to go out there.

WHITE-CAPPED NODDY (*Anous minutus*)

Whenever I have been in Norfolk Island I have watched White-capped Noddies fishing at Cemetery Beach. In some lights they almost look as if they have no heads as the white of the heads blends with the white of the breaking waves, while this enhances the black of their bodies.

If you stand on the headland at the Emily Bay end of Cemetery Beach near dusk you will see them skim low around the cliff and over the headland. They are beautiful to watch.

I have been able to approach quite closely to them as they roost on the rocks; and when they are relaxed like this, they look rather top-heavy; but when they are nesting they look slimmer.

When I was there in November 1965 I was looking forward to seeing them nesting. I had some difficulty finding any information about the whereabouts of their nesting ground; but from what meagre information I could gather it seemed to be somewhere near Red Road. I set out confidently expecting them to be in full nesting as the Fairy Terns were. I set out from Red Road along the Bridle Track and turned right into the track leading to the late Mr. McLaughlin's place. Having reached the house I enquired from Mr. McLaughlin the whereabouts of the nesting grounds.

He, being a lonely old man, whose access to home was only by horse or by foot, said he would show me after a cup of morning tea. This was quite a process and involved long and varied conversation. (Mr. McLaughlin was a well educated man but had lived on the Island alone for about 40 years and consequently was pleased to have company.) The outcome was that we were still deeply engrossed in conversation when lunchtime came around. So to try and speed things up I gave him half my lunch, but still the conversation went on until, finally, I had to tell him that my wife expected me at Red Road at 2.30 p.m.

By the time we got moving it had begun to rain. We walked down the ridge behind his house towards the Blowhole. On the right was a valley full of Norfolk Island Pines. He called this Tetrach Valley (I understand Tetrach is the local name for White-capped Noddies) but that he had not seen any birds yet. And this was the case; there were no birds to be seen. He told me that sometimes, when the birds were nesting, the local boys used to stand on the ridge with sticks and beat the birds down to use as ground bait as they skimmed in low over the ridge on their way to the nesting grounds from the sea.

So I was still able to get back to where I had arranged to meet my wife by 2.30 accompanied by the old man.

When I returned in February 1967 I was taken by a friend into the area by another route. There were three valleys in which the trees held thousands of nesting Noddies. However, we had to make our way into the third valley before we could find a tree with a branch low enough to throw a rope over. Even so it was quite a climb up about 100 feet, to a convenient place for observation. The branches were just too far apart for comfortable climbing. However, it was well worth it as I got quite a range of photographs in the one tree. The nests which are very conspicuous because they

are covered with white droppings, look ridiculous as they are very scant and look as if they cannot possibly hold together; indeed, when I visited the same area the following August, I could not see the remains of any nests, the winter apparently having removed all traces.

The single egg is speckled on one end only.

In the breeding season the birds tend to have a purplish shade where one would expect them to be black. The little ones look rather quaint because right from the start they have a white cap like their parents. As the White Noddy (Fairy Tern) has tiny black feathers surrounding the eye, so, in reverse the White-capped Noddy has a band of tiny white feathers around the eye which stand out vividly against the black of the other feathers.

The noise in the nesting grounds is deafening and not very pleasant, in contrast to the noise of the Fairy Tern, which is quite soothing.

I had been told of a place on one of the cliffs where Noddies were nesting on the ground. After some difficulty I found only one nesting pair, in a place much exposed to the sun but sheltered from the wind (this was in contrast to the nests in trees which were for the most part in perpetual shade). These birds were really feeling the heat and spread their wings for coolness and were continually panting for air. Their feathers also were noticeably faded by the sun.

A pair of Sooty Terns had been nesting nearby and although I did not see the adults, I saw their young one with his head buried under the Noddy's nest.

### FAIRY TERN (*Gygis alba*)

(Known also as White Noddy, White Tern, Pacific Tern, Love Tern — this last, because they cuddle close and appear to whisper in each other's ears.)

I find Fairy Terns the most interesting birds on the island, perhaps because they are the most easily observed. In August both in 1963 and 1967 there were few about — either stragglers from last season or early arrivals. In November 1965 breeding was in full swing. There were thousands of birds breeding mostly on Norfolk Island Pines, but also on White Oaks.

Always there was one egg laid directly on the tree branch where there is some flaw so that the egg will not roll off. The eggs are very speckled and vary much the same as other tern eggs both in colour and density of spots. At this time of the year in some places there are many eggshells on the grounds.

The young have beautiful soft grey down when hatched and have such a firm grip on the branch that it is said they cannot be removed without injury. However, in high winds they do get blown down in great numbers and if they are too young they perish quickly.

These terns commonly fly around in threes, which at first sight would appear to indicate 'eternal triangles'; but as this goes on during the breeding season, it seems possible that the young tern from the previous season does not yet breed and still accompanies its parents.



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Plate XXVI — White Tern, still downy but nearly fledged.

White Terns feed their young on small fish about 2 inches long but sometimes bring in fish up to 4 inches long which are rejected by the young and discharged on the ground. Adults have been seen with as many as four fish in their beaks at the one time. They feed their young very gently and sometimes have some left over and will patiently brood their young while still retaining the surplus fish in their beaks. I disturbed one such adult and she swallowed the fish to the disgust of her young which sought a further feed a few minutes later.

The adults are very beautiful, pure white except for a ring of tiny black feathers around the eyes and black shafts on the primary wing feathers. Their beaks are a beautiful rifle barrel blue, very sharply pointed and slightly upturned, which leads one to think that they may skim the water for their food.

The young very soon develop a masklike appearance around the head which makes them look a bit stupid. At about one month, although still covered in down and nowhere near full size, their wings are well enough developed to enable them to flutter about for very limited distances, and they are sometimes to be found on the ground. This does not worry them as they are able to climb the trees again.

I watched as one climbed 10 feet up a tree. This feat took about half an hour and required gigantic effort and much resting. The action was to dig in the beak and by bending the neck and

using the feet to lever itself up the tree a little, at the same time spreading the wings and tail against the bark to stop it from slipping backwards.

This action was repeated again and again, in a spiral around the tree. The wing and tail feathers became very frayed with the rough bark. Altogether, it was a colossal effort.

A little older, when more fully fledged, but with a fair bit of down still showing through, I have seen them fly for several chains at a time. At this stage they attempt to obtain food from other parents, only to be rebuffed.

In February 1967, breeding was also in full swing. If these birds raise only one chick each season, the mortality rate must be very high indeed as there were very young birds everywhere. Of course I have no means of knowing whether the birds arrive together on their migration or arrive over a very long period. If the latter, this would account for the prolonged breeding period.

I was able to see the devastating effect of high winds on the young. Hurricane "Dinah" had just passed down the Australian coast and high winds were prevalent and consequently there were young to be seen on the ground everywhere.

These soon succumbed to black ants, which the islanders claim came from New Zealand during World War II with prefabricated army huts, and they claim they are the major cause of mortality among young birds of all varieties on the island.



[Harry Wakelin

Plate XXVII — Young White Tern scrambling back to nest.

In February the number of fully grown birds was very obviously much greater than in November, and in the mornings it was a great sight to see the morning exercise flights with hundreds of birds visible at once, flying in their threes above the trees and against the blue sky. When seen from close up, against the sky, the sun showing transparent through their wings, they are exquisite, truly earning themselves the name of Fairy Tern.

They are so adept on their wings that they are said to be able to recover fish which they have dropped, before it reaches the ground. They are curious birds and as one walks through the trees they often fly and hover close above one's head making a clicking sound, but never seem to be belligerent. Also, should one climb up a tree, they fly in and away, coming as close as within 18 inches.

#### GREY NODDY (*Procelsterna cerulea*)

It was while I was at Nepean Island I first saw Grey Noddies. They were flying about the cliffs taking every advantage of the air currents and were beautiful to watch. Somehow, to watch them, conjured up the thought of doves in my mind. I have not seen their nesting sites.

A few days later I was able to approach fairly closely to some resting on the rocks at Rock Point. Their colour is a similar grey to that of our Red-billed Gulls. They look to me like some museum specimens improperly finished around the eyes, because, like the other Noddies they have a narrow rim of contrasting coloured feathers around the eye.

In February 1967 I was able to watch them again playing in the air currents around the northern cliffs.

#### BLUE ROCK PIGEON (*Columba livia*)

There are quite a number of these. They are very unapproachable. They appear on an official list of protected birds.

#### GREEN AND BRONZE DOVE (*Chalcophaps chrysochlora*)

These stocky doves are seen mostly on the ground. They are akin to the Australian Greenwinged Pigeon. They feed restlessly like domestic fowls, moving about and pecking at the same time and are not easy to photograph. They are very handsome with their emerald green backs (with a conspicuous white bar on the shoulder) and their bronze head and breast. The orange beak almost looks transparent about the colour of ripe coprosma berries in the sun. In August they were seen to be feeding on olive berries. Their flight is swift.

#### CRIMSON ROSELLA (*Platycercus elegans*)

These birds are common, both in built-up areas and in the bush. They nest in chimneys and holes in trees. They are the most colourful birds on the island being bright crimson on the head, breast and underparts, and showing dark blue on the back, wings and tail. When in flight the spread wing and tail feathers show pale blue. Some birds appear to be dark green on the back [Immature — Ed.]

Apart from a typical parrot screech they also have rather a bell-like song. They fly very fast with a flash of crimson and



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Plate XXVIII — Pair of Crimson Rosellas on broken top of dead pine, Anson Bay, August 1967.

blues and are a sight long to be remembered. In August I saw them feeding on centres of Norfolk Pine needles, in November in a wheatfield, and in February on Lantana berries.

#### GREEN PARROT (*Cyanoramphus verticalis*)

These birds are very like the Red-fronted Parakeet of New Zealand, having a red frontal cap, green bodies and blue on the primaries. They live in the bush but make incursions into the orchards after fruit, peaches being their favourite right from the time the fruits first form. Because of this, their numbers have been reduced by shooting. They are elusive and are rarely seen, but when approached tend to be curious and will stand and stare when one makes unusual noises. This probably partly explains their rarity. Their chattering reminds me of subdued Kookaburra noises.

#### SHINING CUCKOO (*Chalcites lucidus*)

I heard one of these in February 1967. No doubt they use the local warblers for foster parents.

#### NORFOLK ISLAND OWL (*Ninox royana*)

I understand these are still occasionally heard in the Mt. Pitt area. They are closely related to the New Zealand Morepork and the Australian Boobook.

#### KINGFISHER (*Halcyon sancta*) (Locally known as N'folker.)

I probably saw more in August 1967 as there was much more

water about than usual; although in February 1967 when they were mostly feeding away from water on insects in the grass, I found them fairly common.

**NORFOLK ISLAND SPARROW** (*Lalage leucopyga*)

This is a very rare bird bordering on extinction. It is said to be black and white. The last report was of a flock disturbed by forestry men deep in the bush. Apart from this they don't appear to have been sighted for years.

[According to Mayr (Birds of S.W.P. p. 88), the Norfolk Island Triller or Caterpillar-catcher is the southernmost of six subspecies of *leucopyga*, which are found from New Caledonia to the New Hebrides and Solomon Islands. Ed.]

**NORFOLK ISLAND THICKHEAD** (*Pachycephala xanthoprocta*)

(Locally known as Tamey.)

This is another bird of the bush. It is a little larger than a common sparrow. It absolutely ignores the presence of humans and busily goes about its business as if they don't exist. 'Tameys' forage in the bush canopy and on the ground as well, where they will come very close to one's feet. I have seen them eating both insects and berries.

In November they have quite a strong song, but in February seem to be silent except for a sharp whistle while feeding their young. They are easy to call up by imitating this whistle. The name "Tamey" is very apt.



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Plate XXIX — Norfolk Island Thickhead (Tamey) on Mt. Pitt, August 1967.

WARBLER (*Gerygone modesta*)

These look rather like a New Zealand Grey Warbler and appear to act in much the same way although I saw one which was more of a greyish mossy green than straight out grey. Their song seems immature and rather slurred at the end instead of being bold like its New Zealand counterpart. They are quite plentiful. I found a nest which had fallen from a tree — and it had the same pear shape as our own warbler's.



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Plate XXX — Norfolk Island Fantail, February 1967.

FANTAIL (*Rhipidura pelzelni*)

These are very much like our New Zealand Fantails and their actions and behaviour are similar. They are fairly numerous and especially noticeable around August before the breeding season when they disperse into the bush and become quite secretive.

SCARLET ROBIN (*Petroica multicolor*)

These beautiful birds are nowadays said to be rare, but once I found out their song I had no difficulty in finding them. The cock bird, with his jet black head, throat and back, relieved by a brilliant white patch on the forehead and patches of white on the secondary coverts, and his bright scarlet breast is a sight to be seen. He usually sings high up in the trees in the sun, which shows his colours superbly. His song is not unlike that of a Chaffinch. Near the ground and when feeding, he is silent.

His mate is also very beautiful. Her back is mostly brown and her breast is a beautiful sunset colour. I will never forget the first one I saw. It was in the deep bush and all of a sudden I noticed her just a few feet away, framed nicely in a bent twig, unafraid and silently watching me as if she wondered who the intruder was. The sunset flush on her breast was very conspicuous. In the bush these birds are usually seen in pairs and close to the ground.



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Plate XXXI — Pair of Scarlet Robins on Mt. Pitt, February 1967.

In February, 1967, I saw a cock bird singing in the sun on a dead, lichen covered branch. On the approach of a hen bird he stopped singing, left his perch and swooped in a tight circle around her a number of times at a very high speed.

In August 1967, I saw what looked like a hen robin singing the cock's song. I presumed it to be an immature male. This could possibly be a cock bird, capable of breeding, but still in immature plumage. In "Wild Life in Australia," March 1967, Roy P. Cooper mentions that he has records of cock Red-capped Robins and Flame Robins breeding in the brown phase. He has in his article a photograph of one such Red-capped young male at the nest. These birds are very closely related to the Scarlet Robin, so probably have similar breeding characteristics. [The same species — Ed.]

GREY-HEADED BLACKBIRD (*Turdus poliocephalus*)

(Locally known as Guava-bird.)

This bird is possibly extinct but was fairly common until recent years. It belongs to the thrush family, is about the size and colour of a hen European Blackbird with a grey shawl thrown over the head and neck.

BLACKBIRD (*Turdus merula*)

Plentiful.

SONG THRUSH (*Turdus philomelos*)

Fairly common, but not so numerous as the Blackbird.

GREY-BACKED WHITE-EYE (*Zosterops lateralis*)

These were very numerous in February feeding on Lantana berries; but not so noticeable at other times, possibly because they are very vulnerable to predation by cats. The most conspicuous group I saw were feeding on a Paw-Paw, the bright orange interior of which seemed to set them off to perfection.

SLENDER-BILLED WHITE-EYE (*Zosterops tenuirostris*)

These were described by Mathews after being collected at Kingston and the Cascades in 1913. Little now seems to be known about them; but I have a photograph in colour of what appears to be one.



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Plate XXXII — A White-eye that looks different, both in colouring and also in the shape and size of the bill; possibly *Z. tenuirostris*.

**GREENFINCH** (*Chloris chloris*)

I have seen a flock of about 12 at Ball Bay in November. There are usually a few feeding at the cemetery.

**GOLDFINCH** (*Carduelis carduelis*)

In August 1967 I saw two in New Cascade Road and also two towards Palm Glen. These sightings were about 1 mile apart.

**COMMON SPARROW** (*Passer domesticus*)

After the Starlings, Sparrows are the most numerous passerines.

**STARLING** (*Sturnus vulgaris*)

These are the most numerous introduced birds. They nest commonly in holes in the Norfolk Pines.

[It should be mentioned that the illustrations are all taken from the author's colour slides. Ed.]



## SHORT NOTE

### WELCOME SWALLOWS NESTING IN CHRISTCHURCH

On 1/2/67 Raymond Melhopt took me to see a Welcome Swallow (*H. neoxena*) nest containing three young, almost fledged. It was in a culvert under a roadway at Bromley. The adults were easily spotted as they continually flew in and out of the culvert. This, I believe, is the first report of Welcome Swallows nesting in the city area, although they were breeding at L. Ellesmere as long ago as 1961.

The nest was placed about fourteen feet from the entrance in the middle culvert of three which drain the Canal Reserve into the Heathcote-Avon estuary. The culvert, which is approximately in a N.W.-S.E. direction, is closed at the southern end by flood-gates. A depth of about nine inches of water is continually flowing through the culvert, while a heavy volume of traffic passes over it. The nest was five inches long, had a clearance of 1½ inches from the roof and was 39 inches above the surface of the water. It was made of mud and dried grass and was lined with poultry feathers. The chicks were viewed daily from Feb. 1st-7th, when they would take to flight very quickly. By March they were often seen over the long stretches of water in the district but the nest was deserted.

**RECORDS OF THE HUIA, NORTH ISLAND  
THRUSH AND NORTH ISLAND KOKAKO  
FROM THE DIARIES OF  
JOSEPH ROBERT ANNABELL (1857 - 1924)**

By *DAVID G. MEDWAY*

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Occasionally in the course of research one comes across diaries and journals which contain many interesting and valuable but to date unpublished records of various species of New Zealand birds, species which are now either extinct or greatly reduced in number and range. In this category are the existing diaries of Joseph Robert Annabell.

Born on 15 October 1857, Annabell was later to hold the position of surveyor on the temporary staff of the then Survey Department. He was issued with his first field book in 1879 but it is apparent that he was in the field before then for his diary for 1878 reveals that in that year he was engaged on survey work mainly in the Turakina River area. He resigned from the Survey Department in 1893. During his time with the Department he was engaged principally in the then little known and rugged back country between the headwaters of the Waitotara River and Rangitikei River, with periods spent also in parts of inland Taranaki and on the Volcanic Plateau to the east of Ruapehu. He died on 10 May 1924.

Fortunately, Annabell kept diaries for at least some of the time he was employed by the Survey Department. Some of those diaries are now in the Public Museum at Wanganui. They cover the years 1878-1885 and 1887. All are small field diaries the entries in which are sometimes in pencil and sometimes in ink and in many cases the writing is difficult to decipher. The Wellington District Office of the Lands and Survey Department holds several of Annabell's field books and some of his general correspondence is held by National Archives at Wellington, but this correspondence does not go to the extent of reporting on bird-life. Apart from brief references to his work which appear in the Annual Reports of the Survey Department no reports or personal papers other than the diaries mentioned seem to have survived.

The surviving diaries do reveal that Annabell was an ardent amateur naturalist and collector of bird-skins and that throughout the years he must have collected a considerable number of specimens and amassed an impressive private collection. From the diaries we learn that in June 1887 he displayed a number of his specimens at an exhibition held in Wanganui. It is, however, unfortunate that, with the exception of five specimens of the North Island Thrush (*Turnagra capensis tanagra*), all of his specimens seem to have disintegrated over the years for no others are known now to exist.

But while we do not have the majority of Annabell's specimens we do have his records of some of the birds met with by him during the years 1878-1885 and 1887 covered by his diaries. While he naturally did not record all of the birds encountered, it does appear that he was in the habit of noting those which were more uncommon



Plate XXXIII — Joseph Robert Annabell (1857-1924).

and those which were shot for food or as specimens. It must be remembered that Annabell was active at a time when little or nothing had been recorded of the birds present in many of the areas visited by him. Of particular importance are his records of the birds encountered by him in the country near the headwaters of the Waitotara River. So far as is known no records earlier than Annabell's exist



Plate XXXIV — Mt. Humphries (2238ft.), Matemateonga Range, inland Taranaki — bush cover and terrain typical of that in which Annabell recorded the North Island Thrush and Kokako at the headwaters of the Waitotara River.

for this area nor have there been many since. While it is not proposed here to deal in detail with his records from the Upper Waitotara it may be said that his diaries provide us with a tolerably complete picture of the species of birds present in that area in the mid-1880's. Among the species there noted by Annabell may be mentioned the North Island Kiwi (*Apteryx australis mantelli*), North Island Robin (*Petroica (Miro) australis longipes*), North Island Kokako (*Callaeas cinerea wilsoni*), North Island Thrush, North Island Kaka (*Nestor meridionalis septentrionalis*), Parakeet (*Cyanoramphus*), Whitehead (*Mohoua ochrocephala albicilla*), North Island Weka (*Gallirallus australis greyi*), Fernbird (*Bowdleria punctata vealeae*), Dabchick (*Podiceps rufopectus*), Brown Teal (*Anas castanea chlorotis*), New Zealand Scaup (*Aythya novaeseelandiae*), and Blue Duck (*Hymenolaimus malacorhynchos*).

Only three species encountered by Annabell and mentioned in his diaries have been selected for special treatment here. They are the Huia (*Heteralocha acutirostris*), North Island Thrush and North Island Kokako. The Huia has been selected because it is presumed to have been extinct for many years; the North Island Thrush because it is today undoubtedly in a most precarious position, existing only (if at all) in extremely small numbers in remote and favourable localities; and the North Island Kokako because, although it still survives in small and scattered populations, it has suffered quite drastic reduction in numbers since Annabell recorded it. It is felt important in order to make more complete our knowledge of the former distribution of these species, and for ease of future reference, to now publish and thus place on permanent record such details as are available regarding Annabell's references to these birds. There is a very real risk that important records such as those contained in Annabell's diaries, if not published, will in time be lost forever. For this reason it is to be hoped that further early records known to be contained in other diaries and journals will also in time be considered and published.

#### HUIA (*Heteralocha acutirostris*)

Annabell recorded the Huia on a number of occasions over a total period of approximately fourteen months spent between the end of November 1881 and August 1883 in the country between the Turakina and Rangitikei Rivers, in an area bounded generally speaking to the south by Hunterville and to the north by the township of Mataroa. It is perhaps significant here to note that this area between the Turakina and Rangitikei Rivers was the only one in which we know Annabell to have met with the Huia; and this despite the fact that over the years he spent many months in remote bush country in various localities to the west of the former river.

At the time of Annabell's visits, and for some years afterwards, practically the whole of the area with which we are concerned was still heavily forested and had suffered little, if at all, from the inroads of settlement. It was not until between 1890 and 1900 that the Main Trunk Line was continued from Palmerston North through Taihape and beyond. At about the same time began the extensive destruction of the bush cover by fire, with a consequent complete

elimination in most areas of indigenous forest habitat suitable to species like the Huia and North Island Thrush (Cumberland, 1947: 31-44).

But while in Annabell's time European man had not penetrated permanently into the area, other creatures had. From Annabell's diaries we learn that wild pigs were plentiful throughout the area and were frequently hunted. Wild cattle were recorded between the Turakina River and Mangapapa Stream and they too were hunted by Annabell and his companions for meat. Rats ruined two of Annabell's bird skins in a bush camp on 8/10/1882. "A great number of wild dog tracks" were seen in the valley of the Mangapapa Stream on 8/5/1882 and even a feral cat was killed by Annabell's dog in the Hautapu River valley on 22/12/1881. It is unlikely that mustelids found their way into the area until the late 1880's at least (Thomson, 1922: 71-72). However, there seems little doubt that the presence in the area of wild dogs and feral cats alone would have been most decidedly inimical to certain native species, particularly the North Island Thrush which evidence available elsewhere tends to show fell an easy victim to such animals by reason of its ground-feeding habits and its tame and confiding nature. In all probability wild dogs and feral cats were a major cause of the early and rapid diminution in the numbers of the North Island Thrush in areas wherein that species was apparently formerly quite common.

Phillips' records of the Huia in the Taihape-Moawhango area (Phillips, 1963: 101-108) are records principally from the 1890's and later, from localities mainly near to and to the east of the Rangitikei River. Records of the species from Annabell's diaries are valuable and fill a gap for they are records in the years 1882 and 1883 from localities to the west of the Rangitikei River. Phillips also noted (p. 115) that small field diaries kept by J. R. Annabell contained at least one reference to the Huia — "a rather vague mention of the Karioi-Taupo area." A careful perusal of the diaries has now disclosed the exact dates of Annabell's recorded sightings and it has also been possible, after much research, to pinpoint almost exactly the majority of the localities in which those sightings were made.

Although, as we have seen, Annabell first arrived in the area in question in November 1881 it was not until 23/1/1882 that he made the first reference to the Huia in his diaries. On that day Annabell noted that two Maoris accompanying his party shot a Huia while on their way through heavily timbered country to a camp which had been established near the Namunui Stream, a tributary of the Hautapu River, at a position close to the present township of Mataroa. Later, on 8/4/1882, we find Annabell camped at the Mangaone bridge on the Mangaone Stream, a westward flowing tributary of the Mangapapa Stream which is itself a tributary of the Turakina River. (The Mangaone bridge was about thirteen miles north of Hunterville where the track northwards, Murray's Track, crossed the Mangaone Stream, now the site of Tiriraukawa). We have already noted that at the time of Annabell's visits practically the whole of this area was heavily bushed and it is interesting here to record that in the 1880's the

country around the Mangaone Stream was most likely typical of the general nature of the country in which Annabell recorded the Huia. Survey plans Nos. 13539 and 13540 in the Wellington District Office of the Lands and Survey Department show the country around the Mangaone Stream in 1893 to have been predominantly hilly country at that time still covered in indigenous bush of matai, rimu, kahikatea, rata, maire, hinau, totara, rewarewa, konini, mahoe and tawa with supplejack undergrowth.

Annabell spent the 9/4/1882 in the Mangaone bridge camp and saw one Huia. He was to record the Huia and take a specimen at the same place over one year later. On 13/8/1883 he returned to camp at the Mangaone bridge and next day shot a "fine" Huia, commenting in his diary that he must preserve it very carefully. On 17/8/1883 he was camped on his own in bush a little to the north of the Mangaone bridge. In this camp he collected two more Huias and his diary entry relating to the event is worth quoting in full: "I got up early and had just begun my breakfast when two Huias came and I shot both, a fine old male bird and a female. The tails of both were very dirty, and ruffled but both of them had fine beaks and large orange lobes." All three Huias were set up by him on 25/8/1883 on his return to Wanganui.

Returning to 1882, we find Annabell on 15/4/1882 camped in the Mangapapa Stream about 27 chains below the junction of that stream and the Taumokomoko Stream about five miles west of Mataroa. Here before breakfast on that day he shot a Huia, remarking in his diary that he was going to try to preserve the skin and stuff it when he returned home.

Annabell was again in the country north of Hunterville from August to November of 1882. On the morning of 7/9/1882 he heard a Huia near the Mangapapa Stream about three miles west of the Mangaone bridge. Three weeks later on 28/9/1882, after having been engaged clearing Pukemapou trig (2066'), he left his companions to have a look at the site chosen for another trig to the east, seeing two Huias on the way and nearly succeeding in knocking one of them down with his billhook. Next day he remarked in his diary that he called the new trig 'Huia.' (Huia trig is about four miles due east of Tiriraukawa and Wellington Lands and Survey District Office plan No. 13903 shows it to lie on a ridge known as 'Huia Ridge,' perhaps also named by Annabell. (Another trig a few miles to the west of Mataroa is called 'Pukehuia' — 'Hill of the Huia' — and a road north of the Mangaone Stream is called 'Huia Road.')).

On 2/10/1882, having finished clearing Pukemapou trig, the whole party shifted over to Huia trig, Annabell shooting a female Huia on the way. This bird he skinned that evening and hung up among his other bird skins on the tent ridge-pole. The next few days were spent camped on Huia trig for the purpose of clearing it. While there on 5/10/1882 Annabell noted in his diary that "a Huia came near this morning at breakfast time and I whistled it and brought it near enough to shoot but it was not a very good specimen." Nevertheless he shot the bird and skinned it that same day at dinner time.

Later in October 1882 Annabell returned to continue work in the vicinity of Mataroa. On 20/10/1882 he went from their camp near the Namunui Stream to Kuratahi trig (2452') to the west and on the way back saw a Huia in the bush of the Mangarautawhiau creek, a tributary of the Ngaurukehu Stream. From that date until 6/11/1882 he and his companions were engaged in the vicinity of the Namunui Stream clearing stations from which to sight Rangiora (2265') and Motukawa (2238') trigs. On 24/10/1882 he heard a Huia calling on the hills near station XB and on 29/10/1882 while he was away pig-hunting one of his companions, Jack Heard, saw three Huia at their camp at station XA, which sighting prompted Annabell to remark in his diary that he wished he had stayed at home. On 1/11/1882, having finished clearing station XA, they shifted back to station XB and on the way saw two Huia but Annabell did not get a shot at them.

All in all, Annabell himself seems to have killed at least six Huia, some if not all of which he would have preserved for his private collection. Unfortunately none of them are known still to exist and it must be assumed that they disintegrated over the years along with the bulk of his collection.

It is also worth recording that on 13/1/1883 while at Wanganui Annabell "went to Putiki to see Tawhio the Maori King. We saw His Majesty and about 200 Auckland natives all with Huia feathers in their heads." King Tawhiao, or Matutaera (1825-94), was the second Maori King, having succeeded to the throne in 1860 on the death of his father, Te Wherowhero Potatau (Gorst, 1959). It was Tawhiao who in 1882 allowed Andreas Reischek, the Austrian naturalist-collector, to enter the King Country, the first white man to be given such permission after the Maori Wars (Reischek, 1930).

### THE HUIA PAINTING

It does seem appropriate to reproduce with this paper a fine but previously unpublished painting of a female Huia (see Plate XXXV). This painting is in the possession of Mr. A. J. F. Halcombe, of Urenui, a great-grandson of the noted naturalist, William Swainson (1789-1855). Swainson, with his second wife and four of his children, arrived at Port Nicholson on 24 May 1841. The family lived at Thorndon until June 1843 when they moved to their first homestead in the Hutt Valley. With the exception of three years spent in Australia on botanical surveys, Swainson lived in the Hutt Valley until his death there on 7 December, 1855.

We learn from Winchester (Winchester, 1967: 6-19) that during his lifetime Swainson must have made several thousand drawings and sketches and that a great many of these are still preserved in New Zealand, either in libraries and museums or in the possession of members of the family and collectors.

The original of the painting reproduced here is in colour and bears the initials "M.F.M." and the date "49." The initials are undoubtedly those of Swainson's eldest daughter, Mary Frederica (1826-54), who had arrived at Port Nicholson with her father in 1841. In 1849 she married J. W. Marshall of the 65th Regiment so that the painting must have been initialled by her in 1849 after



Plate XXXV — The Swainson painting of a female Huia.

her marriage to Marshall. It is the opinion of Mr. A. A. St. C. M. Murray-Oliver, of the Alexander Turnbull Library, that while Mary may have drawn the original outline of the bird, the finished work is definitely that of her father, William. Indeed the title on the painting "The Huia of N. Zealand" is in the handwriting of Swainson himself.

#### NORTH ISLAND THRUSH (*Turnagra capensis tanagra*)

In 1873 Buller wrote that the North Island Thrush was "comparatively common in all suitable localities throughout the southern portion of the North Island" and that it was "extremely rare in the country north of Waikato" (Buller, 1873: 136). He then ventured to express the belief that the species would in a few years be equally scarce elsewhere and so it proved for by 1888 the North Island Thrush had become, according to Buller, "one of our rarest species . . . certainly doomed to extinction within a very few years" (Buller, 1888, Vol. 1: 28).

Records of the North Island Thrush are very few and far between and it was pleasing to find references to the species in Annabell's diaries, particularly for the period between the years 1873 and 1888 when an apparently rapid decline in its numbers took place.

Although the diaries disclose that between 1879 and 1885 inclusive Annabell spent considerable periods of time working in the then largely bush-covered back country between the Wanganui and Rangitikei Rivers he mentions the North Island Thrush from that area on only two occasions. The first recorded was shot by him on 10/6/1879 at a time when he was engaged cutting lines in the bush of the Turakina River valley close to the present township of Pukeroa. The skin of this bird was apparently kept by Annabell for, as we shall see, we find him referring to it again in 1884. The second occasion was over three years later on 20/9/1882 in heavily bushed country to the east of the Turakina River about fourteen miles north of Hunterville. On that day before breakfast he shot a North Island Thrush between the junction of the Mangapapa and Mangaone streams and Pukemapou trig. He skinned it that same evening but was not to keep it for long for on 8/10/1882 the skin, together with that of a robin, was ruined by rats in a bush camp.

In 1888 Buller recorded (Buller, 1888, Vol. 1: 29) that his last fresh specimens of this species (two males and a female preserved in spirit) were received by him in January 1884 from Mr. C. Field, a government surveyor, "who had obtained them far up the wooded valley of the Porewa on the west coast where he was conducting a trigonometrical survey." (The Porewa Stream is a southward flowing tributary of the Rangitikei River having its source above Hunterville.) It was Field again who in 1891 supplied Buller with further information on the occurrence of the species in the country between the Wanganui and Rangitikei Rivers *seven years before* (i.e. in 1884) and he specified localities in the valleys of the Turakina, Mangamahu, Mangawhero and Porewa as places where it was to be found at that time, adding that "they were formerly so plentiful in the Turakina and Mangamahu Valleys that I think it is likely a few might still be found there." (Buller, 1892: 75-76). In 1893 Buller further reported that he had heard from surveyors and others that the North Island Thrush was occasionally met with (always in pairs) along the Hunterville line of road (Buller, 1893: 68).

Although Annabell may have seen or heard the North Island Thrush in the Wanganui-Rangitikei area on more occasions than he noted in his diaries, the evidence afforded by those diaries does seem to suggest that had he met with the species more frequently he would most likely have recorded it at the time. In any event the fact that he only twice recorded it from the area would tend to indicate that the species was at that time far from common, at least in the localities visited by him. However, as against the paucity of records in Annabell's diaries we do have Field's and Buller's evidence (above quoted) to the effect that at a slightly later date the North Island Thrush was still to be met with in certain localities within the area, in some apparently quite commonly. But this apparent discrepancy can most likely be explained when one bears in mind that by the period in question (if not earlier) the

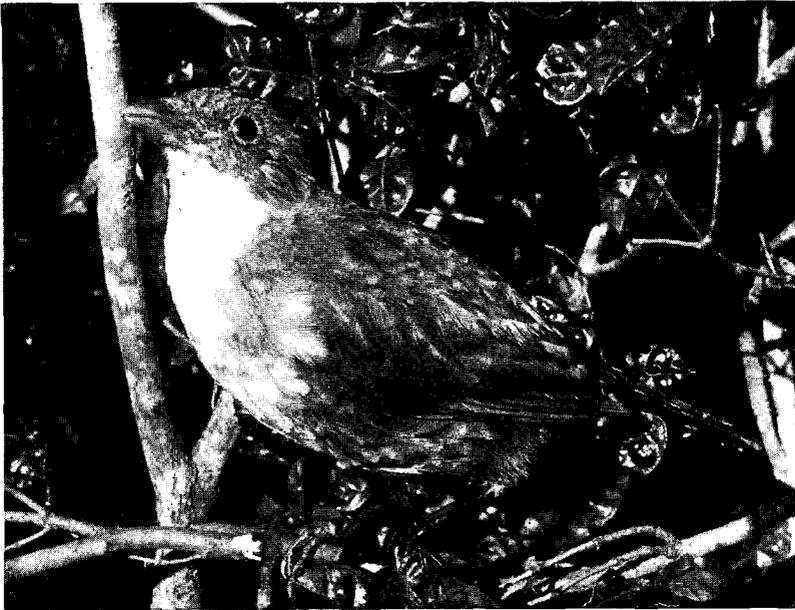
species had almost certainly been reduced to isolated pockets of population in suitable localities, which population pockets in this area were perhaps more frequently encountered by Field and others than by Annabell.

Between October 1880 and July 1881 Annabell was engaged in the then heavily bushed country near the Patea River inland from Eltham in central Taranaki. From that locality he recorded only one thrush which he saw on 28/4/1881 while cutting the confiscation line near Lake Rotokare about six miles to the east of Eltham. Once again it does seem likely had Annabell seen or heard other thrushes during the nine months he spent in the area that he would have recorded them in his diary. The fact that he recorded only one would seem again to indicate that the North Island Thrush was not often to be met with at that time in the area concerned. — an area which was then typical of, and appears to have been included in, the country which in 1884 was traversed by Morgan Carkeek who neither saw nor heard a thrush during a period of about two months spent in the rugged and bushed land of inland Taranaki. And this was an area in which, according to Buller, the North Island Thrush was in former years specially abundant (Buller, 1888, Vol. 1: 29).

Between October 1883 and October 1885 Annabell was engaged in the remote and heavily-bushed country near the headwaters of the Waitotara River, during which period he spent many months within what is now the Rawhitiroa State Forest (State Forest No. 3). This seldom-visited Forest lies in rugged country still covered in dense indigenous bush at the southern end of what is now one of the largest remnants of the original North Island forest cover.

From Annabell's diaries we learn that at the time of his visits wild pigs were plentiful throughout the area and wild cattle were present but apparently not very common. Rats, too, were present in the bush and on 25/1/1884, when camped near Rakaumahi trig (1998') at the headwaters of the Tunapoto Stream, he noted in his diary that there was a wild dog near their camp but that he and his companions had not yet seen it. Again it is very unlikely that mustelids found their way into this area until the late 1880's at least.

It was while within what is now the Rawhitiroa State Forest that Annabell recorded more thrushes than he recorded in any other area visited by him. It would appear that at that time certain localities within the Forest provided habitat favourable to the North Island Thrush. Of those localities visited by Annabell perhaps the most favourable was the valley of the Pokeka Stream which flows near the southern boundary of the Forest and is a tributary of the Waitotara River. In February 1884, on his first visit to the Pokeka, Annabell remarked that that valley provided "very bad travelling" and that the country therein was "very thick indeed." Similar conditions prevailed in the valley of a tributary, the Tunapoto Stream, wherein Annabell also recorded the thrush. To the north of the Pokeka the thrush was met with by him in heavily bushed country near the Omaru Stream but not as plentifully, perhaps only because Annabell did not spend as much time in that area as he did in the Pokeka.



[National Publicity Studios

Plate XXXVI — One of Annabell's N.I. Thrush specimens in the Dominion Museum.

But despite the fact that Annabell recorded more thrushes from these localities than from elsewhere it seems clear that even there the species was far from plentiful. During many months spent in the area Annabell recorded fewer than twenty thrushes and again he seems to have recorded all that were seen or heard by him.

Because Annabell's are the only known records of the species from the area in question it is impossible to say whether the North Island Thrush was in Annabell's time less plentiful there than formerly. But it is clear that the species had a better chance of continued survival there than in many places elsewhere, for this area was not to be subjected to the direct influence of man, by destruction of the bush or otherwise, as were many other localities wherein the thrush was formerly to be found. Indeed it was considered in 1949 that the valley of the Pokeka Stream had not been visited since Annabell was there in the 1880's (*The Press*, 25 January, 1949). Even if it had visitors were, and still are, few and far between and the country has in the main been left in its isolation.

It was on 17/5/1884 that Annabell recorded his first thrushes in the area. On that day he saw two while he was engaged cutting lines in the valley of the Tunapoto Stream which as have seen is a tributary of the Pokeka Stream on the southern boundary of the Rawhitiroa State Forest. Six days later, on 23/5/1884, he saw another thrush in the Tunapoto but was unable to get a shot at it.

However next day he shot one when on his way back to camp in the evening, noting in his diary that he was "very well pleased as I have only got a rather soiled skin at home, and have been wanting to get a good one for some time." This bird he stuffed the next day.

Presumably the soiled skin referred to was that of the thrush which we have seen was shot by him in the Turakina River valley on 10/6/1879. The fact that Annabell had only the one skin at home and was so pleased to have got another would seem to confirm the inference already drawn from his diaries that the North Island Thrush had been far from common in areas visited by him over the previous years.

Annabell was again in the Tunapoto at the end of October 1884 and on 29/10/1884 he heard a thrush in that valley. A month later, on 1/12/1884, while swagging up the valley of the Pokeka above the junction of the Whakauahi Stream, he fired at two thrushes and wounded both but failed to get either of them. However, early the next morning he heard a wounded thrush calling and managed to get it with the help of his dog and his gun. That same day he and his companions swagged out of the Pokeka valley to a camp behind Tawanui trig (1680') where he skinned the thrush and made a box in which to protect its skin. When returning down the Pokeka valley on 12/12/1884 he killed two thrushes in that valley above the Whakauahi Stream and next day he shot two more in the Pokeka above Lake Rotokohu but to these he "was too close and cut them up very much."

In the following months Annabell was again in the valley of the Pokeka Stream. There above Lake Rotokohu on 20/2/1885 he shot and skinned two thrushes and on 22/4/1885 he shot another which he skinned the next day while in camp at Lake Rotokohu.

In the meantime, for part of November 1884 Annabell had been engaged a little further to the north looking for a new trig point on a long heavily-timbered ridge running north-east from near the junction of the Waitotara River and the Omaru Stream to Puteore trig (1933'). On the morning of 15/11/1884 while clearing Tahupo trig (1677') he saw a thrush. He saw it again the next day and on 17/11/1884 heard it, remarking in his diary that he might get it when he came to observe at that station. It was not until May of 1885 that he returned to the area and on 12/5/1885, while on his way down from Puteore trig, he heard but could not get a shot at three thrushes between Tahupo trig and the junction of the Waitotara River and Omaru Stream. However on 11/6/1885 he was in country close to the Omaru Stream. He had left his gun at camp and was sorry when he heard a thrush but was able to knock it over with his billhook without damaging the skin. That the North Island Thrush was a bird of a tame and confiding nature is perhaps indicated by the fact that Annabell was able to approach this bird closely enough to knock it over with his billhook.

So far as is known Annabell's last visit to the headwaters of the Waitotara River was in October 1885. Sixty-four years later a son, A. R. Annabell, who was also keenly interested in the bird-life of New Zealand, led a party into the Rawhitiroa State Forest to

search for the North Island Thrush. This was in February-March 1949. Although the expedition was unsuccessful in its principal objective, A. R. Annabell did record that the side streams and valleys off the Pokeka Stream should be ideal country for the North Island Thrush (Annabell, 1949: 156; see also *Weekly News*, 27 April, 1949).

In the course of research on the New Zealand thrushes, extensive enquiries of museums around the world have revealed the existence of only twenty-seven specimens of the North Island Thrush. Of these, seventeen are in New Zealand, three in Holland, three in the United States of America, two in England, one in Austria and one in Australia. As mentioned earlier, at the present day the North Island Thrush is undoubtedly in a most precarious position, existing only (if at all) in extremely small numbers in remote and favourable localities. This unhappy fact renders it all the more important that we ascertain what details we can pertaining to the very few scattered specimens we know to have survived.

We know from the diaries that of the thrushes seen or heard by Annabell in the upper Waitotara ten were killed by him, six in 1884 and four in 1885. Of these the two he shot in the Pokeka Valley on 13/12/1884 were "cut up very much" and may not have been retained by him. Neither might he have retained the "rather soiled skin" of the bird he shot in the Turakina Valley on 10/6/1879. All in all Annabell probably retained eight specimens and it would appear safe to assume that all those retained had been collected within the confines of the Rawhitiroa State Forest at the headwaters of the Waitotara River.

Of these eight we know the destination of five. On 25/12/1884 Annabell went to see Mr. Drew's museum in Wanganui remarking that it was "a very good museum . . . for a private collection." He promised Drew a thrush skin which he took to him on 29/12/1884. (S. H. Drew began building up his private collection after his arrival at Wanganui in 1870. By 1885 the public were freely admitted to his museum which soon so grew in proportions that in 1892 he offered the whole collection at \$600 for a public museum at Wanganui. The Public Museum was formally opened in 1895, Drew's collection forming the nucleus thereof (Chappel and Veitch, 1939: 184-5)).

The Wanganui Public Museum now holds three mounted specimens of the North Island Thrush. Apart from the fact that all three were received by the Museum prior to 1920, none has any data concerning date of collection, locality or collector. However, in view of the foregoing it seems safe to assume that in all probability at least one of them was collected by Annabell in 1884 within the confines of the Rawhitiroa State Forest at the headwaters of the Waitotara River.

The other four Annabell thrush specimens of which we know the destination are held by the Dominion Museum at Wellington. All four are mounted specimens (Nos. 212-215) and bear the data "No sex, Waitotara District, 8/9/1900, J. R. Annabell." Of these specimens Oliver wrote (Oliver, 1930: 448) — "The last definite record of its (the North Island Thrush) occurrence pertains to four specimens in the Dominion Museum obtained at Waitotara in 1900." In 1949 A. R. Annabell wrote that they had been obtained in 1887

not 1900 (Annabell, 1949: 156), and in 1955 Oliver corrected his date to 1887 (Oliver, 1955: 524). But it would now appear from a close perusal of J. R. Annabell's diaries that the specimens were not obtained in 1887 either. His diary for that year shows that from the end of January until the beginning of June he was engaged in country well up the Wanganui River valley (principally between Pipiriki and the Ohura River) and for the rest of the year he was at home in Wanganui. All in all it seems quite certain that the four Annabell North Island Thrush specimens in the Dominion Museum were collected by him in 1884 and/or 1885 within the Rawhitiroa State Forest at the headwaters of the Waitotara River. In the circumstances the date "8/9/1900" on the labels is undoubtedly the date the specimens were received or registered by the Dominion Musum.

#### NORTH ISLAND KOKAKO (*Callaeas cinerea wilsoni*)

In 1873 and again in 1888 Buller recorded that the North Island Kokako was "sparingly dispersed over the North Island, being very local in its distribution" (Buller, 1873: 153; 1888, Vol. 1: 2). In 1905 he remarked that it was a matter of very keen regret to him that the North Island Kokako was "one of the endemic species destined ere long to vanish from the land" and that it was then becoming very rare in localities where formerly it abounded (Buller, 1905, Vol. 2: 166). Fortunately the species has not yet vanished from the land but it has, since Buller's day, suffered quite drastic reduction in numbers and now survives only in small populations mainly in certain more extensive forest remnants (Macdonald, 1966: 101).

As we have earlier seen, Annabell was engaged between October 1880 and July 1881 in the then heavily bushed country near the Patea River inland from Eltham in central Taranaki. It was in this country that he first recorded the kokako. On 10/12/1880 he saw "some kokako" in beech country near the Mangatoromiro Stream, a tributary of the Patea River about four miles east of Lake Rotokare. Later, on 4/4/1881, he saw a kokako while he was engaged cutting the confiscation line near Lake Rotokare.

An earlier unpublished record of the kokako from an area about twenty miles north-east of that of Annabell's above sightings could appropriately be included here. In December 1846 the Reverend Richard Taylor of the Church Missionary Society made a journey through unknown heavily forested country in central Taranaki to the Wanganui River near where it is joined by the Tangarakau and Whangamomona Rivers (Mead, 1966: 104-6). On 7/12/1846 he and his party left Mangaehu Pa on the Mangaehu Stream and proceeded on their journey through the forest towards the Whangamomona River, travelling by way of the Mangarewa Stream. In his diary of that date he noted: "We have also heard the kokako or New Zealand Crow, a beautiful glossy black bird, one of the mielophaga family much resembling the tui; its monosyllabic note is very loud shrill and sweet." (Taylor, 1846: 147).

As with the North Island Thrush, Annabell recorded most of his Kokako in bushed country near the headwaters of the Waitotara River while engaged there between October 1883 and October 1885.

The first occasion was on 22/11/1883 when he shot and preserved a Kokako in the valley of the Waitotara River close to the present township of Ngamatapouri. Further north on 19/12/1883 he heard but was not able to get a shot at "some Kokako" in heavy bush at Rakaumahi trig at the headwaters of the Tunapoto Stream.

Six months later, on 7/6/1884, he was clearing lines in heavily bushed country between Tahoronui trig (1819') and Rakautihitihi trig (1701') on the southern boundary of the Rawhitiroa State Forest to the east of the Tunapoto Stream. Here he shot a Kokako which he set up that evening. On 9/6/1884 Annabell and his companions started back from their camp at Rakautihitihi trig to the Waitotara River travelling via Rakaumahi trig. On the way he shot a Kokako which he set up next evening in camp at Pungarehu on the Waitotara River. On 12/6/1884 on his way down-river he shot another between the Waitotara River and Trig F (1440') which lies about four miles to the west of Ngamatapouri.

As we have seen, for part of November 1884 Annabell was engaged on a long heavily-timbered ridge running from near the junction of the Waitotara River and the Omaru Stream to Puteore trig. On 15/11/1884 he saw "Kokako" while clearing Tahupo trig. In May 1885 he was again in this area and on 11/5/1885 he shot one while on his way back from Puteore trig to Tahupo trig.

On 23/11/1884 Annabell shot and skinned a Kokako while camped at Whakauahi trig (1738') which lies in heavily bushed and broken country midway between the Pokeka and Omaru Streams. Three days later he saw two when travelling north-east along the ridge from Whakauahi trig to Maungarau trig (1876') on the eastern boundary of the Rawhitiroa State Forest. Several months later, on 6/6/1885, Annabell again travelled from Whakauahi trig to Maungarau trig. On the way he shot a Kokako which he skinned the next day when in camp at Maungarau trig.

On 5/3/1885 Annabell was again at Maungarau trig. From there he and his companions swagged south along the main ridge to Tuanuiotakou trig (2057') which lies at the head of the Tunapapa Stream about two miles to the east of the Rawhitiroa State Forest eastern boundary. From there they went to Mataimoana trig where a Kokako was shot by Annabell on 9/3/1885. Next day they swagged back from Mataimoana trig to Tuanuiotakou trig and on the way Annabell shot three Kokako which he skinned two days later. On 7/4/1885 he shot a Kokako on the ridge running north from Taurakawau trig (1350'), at a point near its junction with the main ridge running from Rakaumahi trig to Tuanuiotakou trig. This bird he skinned the next day.

Annabell's last record of the Kokako from this area was of a bird shot by him on 29/8/1885 in the vicinity of Lake Rotokohu. This bird he skinned also.

It is interesting to note that, with one possible exception, Annabell did not in his diaries record this species from areas visited by him to the east of the country near the headwaters of the Waitotara River. The one possible exception was on 10/7/1882 at a time when Annabell was engaged cutting lines in the vicinity of the

Waipahihi River a few miles east of Mount Ruapehu. He noted in his diary: "I saw a strange bird today. A bird as large as a pigeon nearly, dark slate colour or blue, with a slightly bent beak, large eyes with an eyebrow of bright blue. I should very much like to get him." From Annabell's description one would be tempted to say that this bird was definitely a Kokako were it not for the fact that Annabell obviously recognised a Kokako when he saw one for he had, as we have seen, previously recorded the species in inland Taranaki.

All in all Annabell recorded having shot twelve Kokako and although at least some of them would have been kept by him none are known to have survived to the present day.

### ACKNOWLEDGMENTS

I am most grateful to Mr. and Mrs. J. Chasemore James for their hospitality and co-operation during visits to Wanganui to peruse the diaries; to Mrs. A. Annabell of Ngamatapouri, daughter-in-law of J. R. Annabell and widow of A. R. Annabell; to Mr. A. J. F. Halcombe of Urenui for advising me of the Swainson Huia painting and allowing it to be reproduced; to Mr. A. A. St. C. M. Murray-Oliver of the Alexander Turnbull Library; to the Head Office of the Lands and Survey Department and National Archives; and to the National Publicity Studios for permission to use the photograph of the North Island Thrush. Last, but not least, I am most grateful to my wife for assistance in perusing the diaries.

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Most of the place names mentioned in the text can be found on maps published by the Lands and Survey Department as follows:

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A more general map covering all of the localities dealt with is N.Z.M.S. 10A Sheet 13 on which can be found a number of the place names mentioned.

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# AN INTERPRETATION OF THE AGE STRUCTURE AND BREEDING STATUS OF AN ADELIE PENGUIN POPULATION

By BRIAN REID

Wildlife Service, Department of Internal Affairs

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## INTRODUCTION

The size and complexity of Adelie Penguin rookeries along with the modified behaviour of individuals banded and studied in subsequent years has shown that long term study of a marked population may not provide reliable data on population dynamics.

Banding and close observation during seven summers caused the breeding population in six colonies at Cape Hallett to decrease by more than 90%. Several factors contributed:

- (a) higher pre fledgling mortality resulting from nest checking;
- (b) daily disturbance associated with study prevented young birds returning to their natal colonies to breed;
- (c) adults with previously good breeding records abandoned the study colonies for nesting sites free from interference and
- (d) proportionately fewer of those adults that did return to the study colonies bred. Standard and recognized treatment of recoveries from these colonies gave an adult mortality rate of 48% per annum which fallaciously implies that the Adelie is a rapidly declining species.

In such cases where *prima facie* interpretation of data give improbable values other studies, although primarily concerned with different topics, may provide more meaningful parameters on certain aspects of population. If the collation and fusion of data from diverse projects provides a basis to which acceptable concepts may be appended and if the resulting population structure shows all features essential for equilibrium; then a working model for conservationists exists until such time when many facets of the population may be determined more precisely.

In this discussion three concepts are accepted as fundamentally true:

- (a) Adelie populations are stable and evidence suggests, even slowly expanding. They may fluctuate but there is no measurable imbalance between recruitment and mortality (Reid 1962, Taylor 1962).
- (b) Chicks return to breed at their natal rookery (Sladen et al. 1966, Reid et al, 1967).
- (c) After the first year of life the mortality rate is more or less constant although it is probably slightly higher for birds in their second and third years than for older birds.

## ESTIMATES OF MORTALITY

Cape Hallett is the summer home for some 140,000-150,000 Adelie penguins. The breeding population varies between 56,000-62,000 pairs. These nest in several hundred colonies situated on shingle mounds and ridges scattered throughout the 100 acre spit.

During the four summers 1958-59 to 1961-62 inclusive over 4,800 adults (mostly breeding pairs) were banded on 83 colonies. In addition, 510 chicks were banded on ten of these colonies.

Disturbance, and in some cases destruction, of banded colonies resulting from station activities (vehicle movements, maintenance and construction work, etc.) made follow-up studies at many of these meaningless.

By 1962-63 only nine of the 83 colonies were in areas of the rookery still unaltered or undisturbed by human interference. Recoveries that summer of adults banded on these colonies in 1961-62 showed that 86% returned to the rookery and of these 97% were on their traditional colony. As the bands used on these birds were more durable than those used on the six long term study colonies and there was no evidence of band loss (worn or abraded upper flipper feathers, or bands still intact but gaping) this recovery percentage is a direct measure of survival during the preceding twelve months. Furthermore, counts in these and other undisturbed colonies during six years gave a similar number of breeding birds each summer with 4,190 pairs in 1960 and 4,170 pairs in 1965. This suggests, and is accepted for this discussion, that the mean mortality rate during the six years was in the order of 14% per annum.

Recoveries of adults and chicks banded on ten colonies in 1959 and 1960 provides data on *relative* survival. Both age classes were subjected to the same interference on return to the rookery in subsequent years and both were banded with less durable bands than were birds on the nine undisturbed colonies. Therefore a true recovery rate is not possible. However, the difference in percentage of recoveries permits a calculation of juvenile mortality from the adult mortality rate. Recoveries show from equal numbers banded that for every ten adults recorded four to six years after banding only six bird banded as chicks are known to be alive after the same number of years. With adult mortality placed at 14% per annum some 67% of the chicks alive at four weeks must die before the age of four years. If for convenience (although perhaps not strictly true) the adult mortality rate is applied from the second year on, when birds are full grown although not sexually mature, then the difference in survival between those banded as adults and those banded as chicks is accounted for if 48% of chicks die during their first year.

With over 5,000 penguins banded and after seven years of study it is possible to say only that *about* 48% of chicks may die in their first year (between the ages of one and twelve months) and thereafter the adult mortality is *probably* 14% per annum. Although these mortality estimates agree closely with Richdale's (1957) figures for yellow-eyed penguins (i.e. 52% in the first year, thereafter 13%

p.a.) their validity depends on whether, when correlated with data on clutch size, hatching success, breeding age, proportion of non-breeders, etc., they show the population to be at least stable.

### POPULATION DATA

*Clutch size.* Of 213 breeding females of unknown age, 184 (86.4%) laid two eggs and 29 laid one egg giving a mean clutch of 1.86 eggs per breeding pair (Reid, 1965). Four-year-olds lay one egg, therefore the same is assumed for three-year-old females. Five-year-olds are equally likely to be incubating one or two eggs (Reid et al. 1967) and the mean clutch for 64 females known to be six or more years was 1.92 eggs.

*Chick survival, to the age of four weeks ("creche" stage, Sladen 1958).* ...Counts during three seasons showed a 38% combined loss of eggs and chicks before the latter reach the age of four weeks. In 1959 a sample of 236 breeding pairs had 281 chicks alive at four weeks (1.19 chicks/pair); the following year 1,070 breeding pairs had 1,466 chicks (1.37 chicks/pair); and in 1962 a sample of 949 breeding pairs had 845 (0.89 chicks/pair) survive their first month. These data suggest a mean annual productivity of 1.15 chicks per breeding pair (Reid 1964 and unpub) to the age of four weeks.

*Percentage of each Age Class at the Rookery.* If a constant mortality rate is assumed from the second year on then the number of birds recovered in younger age classes provides an estimate of the percentage of these age groups that return to the rookery. Limited data from Hallett (Reid et al. 1967) suggests approximately 5-10% of two-year-olds, 25-30% of three-year olds, 80-85% of four-year-olds and all birds five years or older tend to return to the breeding grounds.

*Percentage of each Age Class Breeding:* A preliminary statement on results from Cape Crozier (Sladen et al. 1966) mentions a small number of three-year-olds bred. As a working estimate this is taken at about 10% of those returning to the rookery. The youngest breeders recorded at Hallet were four years and 25% of those in this age class were incubating. Recoveries suggest that some 80-90% of five-year-olds, 85-95% of six-year-olds and 90-95% of older birds at the rookery breed (Reid, et al, 1967 and unpub.).

### POPULATION STRUCTURE AND EQUILIBRIUM

By incorporating all counts, calculations and estimates it can be shown (*Table 1*) that the age structure and breeding status derived for an Adelie penguin population in an "average" year will ensure stability. This table shows the population will be maintained if each breeding female produces about 1.83 eggs while actual counts give a mean clutch of 1.86 eggs. Furthermore, it indicates some 22% of the population at a rookery will not breed. This agrees closely with a 20% estimate based on field counts (Eklund 1961).

Furthermore, although the two species have quite different ecologies, the productivity and survival known or inferred for the

Table 1

## The Adelie Penguin

Table showing Age Composition and Breeding Status of a Population  
(Deduced from several studies carried out at Cape Hallett)

Age	Mortality Percent	Number Alive	Percent Ashore	Number Ashore	Percent Ashore Breeding	Number Breeding	Mean Clutch Size	Eggs Laid
Eggs	38	10,000						
Chicks	48	6,200						
	-c68							
1 yr.	14	3,224						
2 "	"	2,772	5-10	208	0			
3 "	"	2,384	25-30	655	10	65	1.0	65
4 "	"	2,050	80-85	1,691	25	422	1.0	422
5 "	"	1,763	100	1,763	80-90	1,498	1.5	2,247
6 "	"	1,516	"	1,516	85-95	1,364	1.92	2,619
7 "	"	1,303	"	1,303	90-95	1,205		2,314
8 "	"	1,120	"	1,120	"	1,036		1,989
9 "	"	963	"	963	"	890		1,709
10 "	"	828	"	828	"	766		1,471
11 "	"	712	"	712	"	658		1,263
12 "	"	612	"	612	"	566		1,087
13 "	"	526	"	526	"	486		933
14 "	"	452	"	452	"	418		803
15 "	"	388	"	388	"	359		689
16 "	"	333	"	333	"	308		591
17 "	"	286	"	286	"	264		507
18 "	"	245	"	245	"	226		434
19 "	"	210	"	210	"	194		372
20 "	"	180	"	180	"	166		319
				<u>13,991</u>		<u>10,891</u>		<u>19,834</u>

1. Average clutch size required to maintain population may be obtained by

$$(a) \frac{\text{Total Eggs Laid}}{\text{Total Number Breeding}} = \frac{19,834}{10,891} = 1.82 \text{ Eggs/Pair.}$$

$$(b) \frac{\text{Number Eggs at Start}}{\frac{1}{2} \text{ Total Number Breeding}} = \frac{10,000}{5,445} = 1.84 \text{ Eggs/Pair.}$$

2. An estimate of the breeders in the rookery population may be made, i.e.

$$\frac{\text{Total Number Breeding}}{\text{Total Number Ashore}} = \frac{10,891}{13,991} = \text{c78\% of population breed.}$$

Adelie penguin closely parallels those obtained from extensive studies by Richdale (1957) of the larger Yellow-eyed Penguin (*Megadyptes antipodes*).

- (a) The mean clutch for Yellow-eyed Penguins and also for Adelie Penguins aged six or more years contains 1.92 eggs.
- (b) 15.4% of eggs laid by Yellow-eyed Penguins survive to breed and calculations suggest approximately 15.7% of Adelie eggs survive to breed. (This percentage is derived by adding 14% of the breeding three- and four-year-olds to the number of breeding five-year-old birds).
- (c) 52% of Yellow-eyed Penguins die during their first year and thereafter the mortality rate is shown to be 13% per annum. Calculations place the Adelie mortality rate at 48% in the first year and then at about 14% per annum.
- (d) From Richdale's data it seems that about 93.5% of adult Yellow-eyed Penguins breed. Records from Hallett show 90-95% of "established" Adelies breed.
- (e) Calculations imply that about 5% of yearling Adelie Penguins will live another 19 years. Some Yellow-eyed Penguins are known to be at least 19 years old and Richdale's data show approximately 7% of yearlings should survive to their 20th year.

#### ACKNOWLEDGEMENTS

Dr. W. J. L. Sladen of the U.S. Antarctic Bird Banding Programme initiated penguin banding at Hallett, and supplied all the bands; Mr. R. C. Wood of that organisation banded over 3,500 birds. None of the studies on which this assessment of survival are based would have been possible without their help. I also thank my colleagues H. J. Cranfield and M. Woodgyer for help in the field; and G. R. Williams and C. J. Robertson for discussing the text.

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## THE BIRDS OF SWAIN'S ISLAND SOUTH-CENTRAL PACIFIC

By *ROGER B. CLAPP*

Paper Number 32, Pacific Ocean Biological Survey Program,  
U.S. National Museum, Washington, D.C.

In 1966 and 1967, during the course of field work in the south-central Pacific, field parties of the Smithsonian Institution's Pacific Ocean Biological Survey Program stopped seven times at Swain's Island to deliver supplies to the inhabitants. On six of these visits, five in 1966 (18 and 24 February, 3 August, 5 October and 30 November) and one in 1967 (13 April) field parties went ashore and made brief surveys of the island fauna.

Swain's Island lies at latitude  $11^{\circ}03' S.$  and longitude  $171^{\circ}05' W.$ , about 165 miles north-northeast of the Samoan Islands and about 100 miles south of the Tokelau Islands. It is about  $1\frac{1}{2}$  miles long in an east-west direction and about 1 mile wide. The island is a densely forested coral atoll. Most of the upper story of the forest is composed of coconut palms (*Cocos* sp.) but there are also

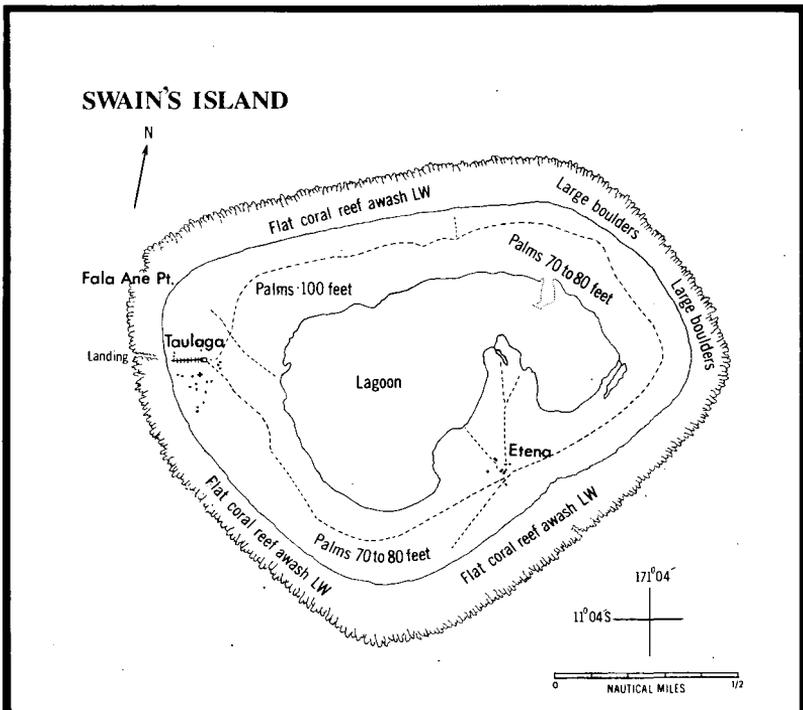


FIGURE 1 — MAP OF SWAIN'S ISLAND (Adapted from U.S. Coast and Geodetic Survey Map No. 4191).

many stands of *Pisonia grandis*. Occasional screw-pines (*Pandanus* sp.) grow in more open areas of the under-story and many ferns and epiphytes are present. In the drier coral rubble of the beach *Tournefortia argentea* and *Scaevola taccada* are the dominant plant species. Through this forest, a track with side trails to facilitate copra-harvesting, circles the island. (See Figure 1.)

The central lagoon is shallow and only a few areas are more than five feet deep. (See Figure 2). There are floating mats of vegetation along the west edge of the lagoon. About 200 yards from the west shore, behind the native village, is a small circular islet about 20 feet in diameter. On the northeast side of the lagoon a small grassy spit extends about 100 yards into the lagoon. Small areas of mud-flat bordering this spit are particularly favoured for foraging by transient shorebirds and Reef Herons (*Demigretta sacra*). At least four species of lizards are common to abundant: the Polynesian Gecko (*Gehyra oceanica*), the Mourning Gecko (*Lepidodactylus lugubris*), the Azure-tailed Skink (*Emoia cyanura*), and the Black Skink (*Emoia nigra*). Polynesian Rats (*Rattus exulans*) are plentiful and are particularly numerous in and on the piles of coconut husks left after copra-harvesting operations.

The island is currently owned by Wallace Hutchinson Jennings, a great-grandson of Eli Hutchinson Jennings who settled on the island in October 1856 (E. H. Bryan, Jr., *pers. comm.*). The native population, now composed of about 200 individuals from Samoa, Fiji, and the Gilbert Islands, varies in size and origin (since most are on the island to harvest copra for only short periods of time). They have introduced four species of domestic mammals (cats, dogs, pigs, and a single horse) and domestic fowl. Native informants state that cats and dogs are semi-feral and feed in part on rats and birds. POBSP collections and observations of the mammals of Swain's Island (made in February 1966), were summarised by Kirkpatrick (1966).

Previous knowledge of the avifauna of Swain's Island is scanty. The U.S. Exploring Expedition's ship *Peacock* surveyed the island from offshore from 1 through 4 February 1841. Titian Ramsay Peale, one of the naturalists on the expedition, merely noted that "scarcely any morning birds [terns?] were seen" and that "birds are fewer than they are even where inhabited by man" (Peale in Poesch, 1961). Charles Wilkes in his narrative of the expedition (1845) stated that "Pigeons, similar to those seen at the Samoan Group, were observed." It should be noted, however, that Wilkes, himself, did not see the island and obtained his bird information second hand. No pigeons have been seen by any of the POBSP survey parties.

Two young Hawaiian-Americans, Killarney Opiopio and Abraham Piianaia, kept long diaries of their experiences on the island 24 January through 28 February, 1963 (Opiopio, 1936; Piianaia, 1936). These diaries contained references to the birds of the island, but few of the descriptions are sufficiently detailed to allow accurate identification to species.

The frequency with which "gogo" (also referred to variously as "boobies" or "sootie terns") were mentioned indicates that these were the most abundant birds on the island. These "gogo" were apparently Brown Noddies (*Anous stolidus*) or Black Noddies (*Anous*

*tenuirostris*) judging from descriptions of the birds' habits and from Donaghho's remark that the natives of Swain's Island called noddies "logo" (Donaghho, 1952). This name "logo" or "gogo" is strikingly similar to "ngongo," the name that the Ellice Islanders use for the Brown Noddy (Child, 1960) and may well refer to the same bird.



IR. B. Clapp

FIGURE 2 — The Lagoon on Swain's Island, showing heavy peripheral vegetation — 3 August, 1966

The Hawaiian-Americans also make two references to white birds, one of which is further identified as a "love bird" or "akaiaki." These observations probably refer to the White Tern (*Gygis alba*) or possibly to the Black-naped Tern (*Sterna sumatrana*) which is called "akaiaki" by the Ellice Islanders and "kiakia" by the Gilbertese (Child, *op. cit.*).

I have been unable to identify a bird referred to as "vasavosa."

George C. Munro, one of the pioneers of Hawaiian ornithology, visited Swain's Island for a few hours 30 July 1938, but he apparently kept no notes of his bird observations (Bryan, *pers. comm.*). I found only one published comment on this visit — a remark that Brown Noddies "had well-grown young in the tops of high coconut trees . . ." (Munro, 1944). Walter Donaghho, one of Munro's assistants, later published his own journal, therein recording the occurrence of four species: Golden Plover (*Pluvialis dominica*), Noddy Terns (*Anous* sp.), Fairy Terns, and the New Zealand Cuckoo (*Eudynamis taitensis*). He noted, as had Peale before him, that birds were not very common and further observed that White Terns were more abundant than noddies.

#### ACKNOWLEDGMENTS

I am indebted to numerous field workers of the POBSP, in particular Walter Bulmer, Richard D. Chandler, Richard S. Crossin, and Lawrence N. Huber, for data incorporated in this paper. I thank Edwin H. Bryan, Jr., of the Bernice P. Bishop Museum, Honolulu for lending two manuscripts dealing with observations made in 1936, and also Dr. Charles A. Ely, Dr. Robert L. Pyle, Dr. Philip S. Humphrey, and Dr. Richard L. Zusi for their criticisms and comments on the manuscript.

#### SPECIES ACCOUNTS

##### WHITE-TAILED TROPICBIRD (*Phaethon lepturus*)

White-tailed Tropicbirds were seen on three of the six surveys of Swain's Island but were not common. A single tropicbird was seen flying over the island in October and four were seen overhead in November. Two of the four November birds flushed from a tall *Pisonia* tree but no nest was found. It seems likely that a few of these tropicbirds nest on Swain's Island since there is an abundance of nest sites present.

*Specimen:* 13 April 1967, f., USNM 497812, ovary 15 mm., wt. 263 grams.

##### RED-TAILED TROPICBIRD (*Phaethon rubricauda*)

A Red-tailed Tropicbird seen flying over the southeast beach on 30 November was collected. It was in adult plumage except for the lower back which retained a small amount of black speckling from the immature plumage. Natives stated that they occasionally saw this species flying over the island but that they had never seen them land.

*Specimen:* 30 November 1966, f., USNM 497208, ovary 10 x 17 mm., lg. ovum 3 mm., wt. 815 grams.

##### RED-FOOTED BOOBY (*Sula sula*)

Red-footed Boobies were seen on only one of the island surveys. On 5 October about 20 were seen feeding off the northwest corner of the island. One immature bird was collected as it flew over the forest near the Jennings' residence.

On 4 February 1936, Piianaia watched the natives capture a booby that was roosting in a coconut tree. Natives had told him that boobies were occasional visitors to the island but did not breed there.

*Specimen:* 5 October 1966, ?, USNM 496647, wt. 834 grams.

#### FRIGATEBIRD SP.? (*Fregata* sp.?)

On 3 August, two frigatebirds, one an immature, circled the south-east end of the island. Both birds were about one-half mile beyond the reef and specific identification could not be made.

#### REEF HERON (*Demigretta sacra*)

On 3 August POBSP personnel saw four dark-plumaged Reef Herons. Three foraged along the edge of a small grassy spit on the northeast side of the lagoon and the fourth flew from a perch in a coconut tree about 300 yards to the west of the spit. The herons exhibited a strong attachment to the spit area and returned to it repeatedly despite continued disturbance by the observers.

#### GOLDEN PLOVER (*Pluvialis dominica*)

Golden Plovers were seen on all visits and were present in July, 1938, as well (Donaghho, 1952). They seemed to exhibit little preference for any particular habitat on the island. Birds inhabited not only the outer beaches and the lagoon but also frequently foraged on paths through heavily forested areas.

Estimated numbers present varied from about 50 birds in February to about 100 in August. Estimates on the other three visits (October, November, and April) were respectively 90, 100, and 90 birds. The high August count included at least 45 birds seen in one flock near the edge of the lagoon while simultaneously perhaps 40 more were seen on the outer beaches and in the interior of the island. Some of these August plovers were in full breeding plumage and may have been early migrants from the breeding grounds. Certainly, the number seen is very large for a "summering-over" population [as compared with summer populations on islands of similar size in the nearby Phoenix group (unpub. POBSP data)].

*Specimens:* 18 February 1966, f., USNM 496683, ovary 10 x 5 mm., wt. 126 grams; 5 October 1966, m., USNM 496684, left testis 2 x 1.5 mm., wt. 121 grams.\*

#### RUDDY TURNSTONE (*Arenaria interpres*)

Ruddy Turnstones were present on all POBSP surveys except the one made in August 1966. An estimated 60 turnstones were present in February and 43 were counted in April. Nearly as many were present in November (about 30 birds). Only two turnstones were seen on the October visit but the beach was not surveyed during this visit and more could have been present.

Both feeding and loafing turnstones were found primarily on the beaches and only seldom foraging along the lagoon. None were reported from forested areas. The largest concentrations were seen on the east and southeast beaches where they readily associated with plovers. On 13 April a flock of 35 turnstones in nuptial plumage, the largest concentration seen, was found on the east beach.

\* A number of specimens collected were lost between collection and deposition in the USNM collections. These lost specimens were 5 Golden Plovers, 3 Wandering Tattlers, and a Sanderling.

*Specimens:* 30 November 1966 (m., f.) USNM 496924, m. left testis 4 x 1 mm., wt., 97 grams; USNM 496925, f., ovary 3 x 4 mm., wt. 100 grams; 13 April 1967, (m., f.) USNM 497544, m., left testis 4 x 2 mm., wt. 99.6 grams; USNM 497543, f., ovary 6 mm., wt. 96.9 grams.

#### BRISTLE-THIGHED CURLEW (*Numenius tahitiensis*)

A single individual was seen 5 October on the west shore of the lagoon directly behind the native village.

#### WANDERING TATTLER (*Tringa incana*)

The number present on Swain's Island varied little from survey to survey. On visits when more complete counts were made, numbers varied from a low of about 20 birds in August to a high of 34 birds in April. In both February and November an estimated 30 tattlers were present.

Most of the tattlers were observed along the outer beaches where they seemed to exhibit a preference for rocky outcroppings. Less than 10 of all tattlers seen on the six surveys were found foraging around the central lagoon. Most tattlers foraged in pairs or trios that did not associate with other species of shorebird present on the island. On 5 October, however, three tattlers were seen foraging with two turnstones and 20 plovers on the edge of the lagoon.

#### SANDERLING (*Crocethia alba*)

Three Sanderlings were seen on Swain's Island by POBSP personnel. One was collected on the beach on 18 February and two others were collected along the southeast beach on 30 November. Only two of the three Sanderlings were subsequently preserved as specimens.

*Specimens:* 18 February 1966, m., USNM 496787, left testis 2 x 1 mm., wt. 49 grams; 30 November 1966, m., USNM 497229, left testis 3 x 1 mm., wt. 39 grams.

#### BLACK-NAPED TERN (*Sterna sumatrana*)

On 27 April a Black-naped Tern was seen in a flock of Brown Noddies roosting on the northeast beach. It was well observed, and all salient field characters were noted. An attempt was made to collect the bird but it flew out to sea at the shot and was not seen again.

#### SOOTY TERN (*Sterna fuscata*)

Three Sooty Terns flew near the POBSP support vessel just as it left Swain's Island on 24 February. We found no evidence that this species ever roosts or breeds on the island.

#### BROWN NODDY (*Anous stolidus*)

An estimated 1,500 to 3,000 birds were present on Swain's Island on five visits (February, October, November, and April) but only about 40 birds were seen in August, 25 of them in a feeding flock offshore. When these noddies were numerous they were usually evenly distributed throughout the forest with perhaps slightly greater densities being encountered on the north side of the island.

Three of the five February specimens (USNM 496391 - 496393) had bare brood patches and moderately enlarged gonads. Two birds with bare brood patches (USNM 496392 - 496393) had one or both of the 2nd primaries present as pinfeathers and the two

birds lacking brood patches were both a little more than half-way through the primary moult.

In April many young birds could be heard calling from nests in the coconut palms. Many noddies seen flying over the island were in moult as evidenced by missing remiges and rectrices.

The two October specimens and all five November specimens had moderately to much enlarged gonads and bare, or partially bare, brood patches. One female collected in November had an almost fully developed egg in the oviduct. Three of the fall specimens, two from October and one from November (USNM 497243), were in primary moult. The two October specimens were just completing moult of the outermost primary and the November specimen had begun to replace the innermost primary.

Gonadal and molt data from collected birds indicate that at least some were breeding from October through April. The low August numbers suggest that summer may be a non-breeding period or a period of much reduced breeding on this island. Munro (1944), however, found them breeding in July 1938.

*Specimens:* 18 February 1966 (3m., 2f.) USNM 496389, m., left testis 3 x 1 mm., wt. 190 grams; USNM 496390, m., left testis 3 x 1 mm., wt. 193 grams; USNM 496393, m., left testis 8 x 4 mm., wt. 193 grams; USNM 496391, f., ovary 8 x 3 mm., lg. ovum, 1 mm., wt. 157 grams; USNM 496392, f., ovary 10 x 7 mm., lg. ovum 2 mm., wt. 164 grams; 5 October 1966 (m., f.) USNM 497238, m., left testis 6 x 3 mm., wt. 195 grams; USNM 497237, f., ovary 13 x 7 mm., lg. ovum 2 mm., wt. 181 grams; 30 November 1966 (2 m., 3 f.) USNM 497242, m., left testis 6 x 3 mm., wt. 182 grams; USNM 497243, m., left testis 11 x 4 mm., wt. 180 grams; USNM 497239, f., ovary 20 x 10 mm., lg. ovum 8 mm., wt. 189 grams; USNM 497240, f., ovary 10 x 5 mm., lg. ovum 3 mm., wt. 189 grams; USNM 497241, f., egg in oviduct, wt. 209 grams; 13 April 1967, m., USNM 497627, left testis 6 mm., wt. 186 grams.

#### BLACK NODDY (*Anous tenuirostris*)

The number occurring on Swain's Island varied considerably from survey to survey. An estimated 200 birds were present in February; only about 25 birds were seen in August, and none were observed in October. At least 350 to 400 Black Noddies were observed in November and April and more may have been present at these times.

No nests were found in February but the single specimen taken had slightly enlarged gonads indicating that the bird may have been breeding. In August one was seen sitting on a nest in a coconut palm. An active colony was found in November on the east-northeast corner of the island. It contained about 125 nests about 75 feet up in two large *Pisonia* trees. Although the nests' contents could not be investigated, several birds were sitting on the nests. Three of the five specimens collected during the November survey had bare brood patches. This colony was still active in April. At this time one medium-sized nestling was collected and, from the ground, large chicks could be seen in the nests. A number of flying immatures also were seen in the colony.

Unlike the Brown Noddies which seemed to be evenly distributed over the entire island, the Black Noddies were primarily seen in the vicinity of their nests or roosts.

*Specimens:* 18 February 1966, m., USNM 496388, left testis 6.5 x 4 mm., wt. 110 grams; 30 November 1966 (3 m., 2 f.) USNM 497257, m., left testis 4 x 3 mm., wt. 98 grams; USNM 497258, m., left testis 5 x 3 mm., wt. 105 grams; USNM 497259, m., left testis 7 x 3 mm., wt. 116 grams; USNM 497256, f., ovary 10 x 4 mm., wt. 96 grams; USNM 497260, ovary 6 x 3 mm., wt. 102 grams; 13 April 1967 (4 m., f.?) USNM 497662, m., left testis 6 x 4 mm., wt. 102 grams; USNM 497663, m., testes "minute," wt. 111 grams; USNM 497664, m., left testis 6 mm., wt. 101 grams; USNM 497665, m., testes "minute." wt. 108 grams; USNM 497666, f., ovary 12 x 7 mm., lg. ovum 1 mm., wt. 103 grams; USNM 497667, ? (nestling), wt. 73 grams.

#### WHITE TERN (*Gygis alba*)

Numbers present on Swain's Island, like the numbers of noddies, varied considerably from survey to survey. An estimated 500 to 1,000 White Terns were present in October and November and an even larger number, perhaps as many as 3,000 terns, was present in February. In April an estimated 350 terns were present but in August not more than 40 individual terns were seen.

In November POBSP personnel found three White Tern nests containing eggs — one egg was 30 feet up on a dead palm stub; the other two eggs about 20 feet up on horizontal branches of *Pandanus* trees. All four specimens collected in November had bare brood patches.

In February, on the other hand, no nests were found and only 2 of 5 specimens taken had bare brood patches. POBSP personnel collected a recently fledged young in April. An adult collected then (but not kept as a specimen) had fresh plumage and a heavily vascularized brood patch. In August an intensive search for nests was fruitless. Only one White Tern seen during that survey behaved as if it were nesting.

The pattern of change in numerical abundance and observations of nest contents and of breeding indicators in specimens suggest that White Terns on Swain's Island breed primarily from September or October through February.

*Specimens:* 18 February 1966 (3 m., 2 f.) USNM 496396, left testis 6 x 4 mm., wt. 108 grams; USNM 496397, left testis 6 x 3 mm., wt. 106 grams; USNM 496398, left testis 6 x 4 mm., wt. 130 grams; USNM 496399, ovary 13 x 9 mm., lg. ovum 6 mm., wt. 109 grams; USNM 496400, ovary 9 x 7 mm., lg. ovum 2 mm., wt. 105 grams; 30 November 1966 (3 m., f.) USNM 497268, m., left testis 7 x 3 mm., wt. 113 grams; USNM 497269, m., left testis 6 x 3 mm., wt. 112 grams; USNM 497271, m., left testis 6 x 3 mm., wt. 106 grams; USNM 497270, ovary 17 x 8 mm., lg. ovum 5 mm., wt. 109 grams; 13 April 1967 (f. nestling) USNM 497610, ovary 2 mm., wt. 82 grams.

#### NEW ZEALAND CUCKOO (*Eudynamis taitensis*)

Cuckoos were present on each of the six surveys and Donaghoo (1952) saw a single cuckoo there on 30 July 1938. Differences in their abundance from visit to visit were difficult to assess since the cuckoos were extremely wary and difficult to observe. They

were seen throughout the heavily forested parts of the island but were seen somewhat more frequently in more open areas of lower growth. One cuckoo, observed at ground level, was feeding on young Azure-tailed Skinks. Estimates varied from about 10 in November to 30 in April and 50 in February, August, and October. Not less than 10 individuals were seen on the February surveys; 5 to 10 individuals in August; about 15 in October; one in November; and 8 to 10 in April. The only decided decrease in the population occurred in late November when most of the birds that wintered on the island presumably would have been arriving back at the breeding grounds in New Zealand (Bogert, 1937).

Five specimens were collected, four adult males and an immature male.

*Specimens:* 24 February 1966 (2 m) m., USNM 496725, testis 5 x 3 mm., wt. 161 grams; 13 April 1967, m., USNM 497789, testis 2 mm., wt. 123 grams; 3 August 1966 (3 m.) m., USNM 543144, testis 4 x 2 mm., wt. 119 grams; imm. m. USNM 543145, testis 1.5 x .5 mm., wt. 118 grams; m. USNM 543146, testis 3 x 2 mm., wt. 224 grams.

#### SUMMARY

On six surveys of Swain's Island in 1966 and 1967, field workers of the Smithsonian Institution's Pacific Ocean Biological Survey Program recorded 16 species of birds: 9 central Pacific seabirds, 5 Arctic shorebird migrants, and 2 migrants from the southwest Pacific. Three species of seabirds (Brown Noddy, Black Noddy, and White Tern) breed on the island and a fourth (White-tailed Tropicbird) probably does so. The other species of seabirds recorded from the island (Sooty Tern, Black-naped Tern, Frigatebird sp., Red-tailed Tropicbird, and Red-footed Booby) probably occur on the island only as visitants.

Three of the shorebirds (Golden Plover, Ruddy Turnstone, and Wandering Tattler) are common and regular migrants to the island; the other two species (Bristle-thighed Curlew, Sanderling) occur much less frequently and in much smaller numbers.

One of the two migrants from the southwest Pacific, the Reef Heron, is apparently of irregular or uncommon occurrence while the other, the New Zealand Cuckoo, is present in small to moderate numbers throughout much of the year.

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## OCCURRENCE OF GREAT KNOT IN NEW ZEALAND

By IAN G. ANDREW

*Massey University, Palmerston North*

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The Great Knot (*Calidris tenuirostris*) is listed in the Field Guide (Falla, Sibson and Turbott, 1966) as one of the species which is likely to occur, but has "not yet been satisfactorily identified in New Zealand." I can now record a sighting of three Great Knots at Manawatu Estuary (Wellington west coast) on 15th October, 1967. They were seen in the company of twelve Eastern Knots (*C. canutus*) (hereinafter referred to as Lesser Knot). Miss Sybil Quin, who was with me, was able to confirm the characters noted in the description below.

Sunday, 15th October, was selected by Wanganui and Manawatu OSNZ members as the date for a census of the Wellington west coast estuaries. At Manawatu Estuary, a party of eleven people arrived on the north side at 7 a.m., but a strong northwesterly, with overcast skies and scattered heavy showers, made conditions difficult for both birds and observers, and only four of us reached the south side to make the high-tide count, scheduled for 8 a.m. Those of us who reached the south side of the estuary saw all the waders that were seen, but, although we spent over an hour covering the area, the counts of Godwit, Golden Plover and Oystercatchers were all somewhat below the usual counts for the time of year, and no smaller waders could be found. So, while my companions returned to the boat to escape the increasingly cold wind, I waded out closer to the Godwit flock to make a more careful search for strangers.

With telescope rested on a log, I quickly spotted a squat, greyish bird, a little larger in body than a Golden Plover, which I tentatively identified as a Great Knot. I had watched this species in Australia ten months previously, and was fairly satisfied with the identification after a few minutes of observation, during which the bird ran about, fed, and twice flew a short distance. The third time it flew, I lost sight of it on the receding tide. The biting cold (and my stiff, shaking hands) precluded further observations, so I rejoined my companions for the return boat journey — a slow, wet trip, into a head wind, but assisted by a towline, so we reached the shore without mishap except for a fishhook in the hand of our oarsman.

At this stage, eight of the party had to return home. But three of us stayed at the estuary to have another look for the Great Knot, so, after a brief rest, we set off, prepared if necessary to make the long journey back to the south side by car. The tide was well on its way out, and birds were beginning to return to the north side of the estuary. Scanning with the telescope set at 20 x magnification, I picked out a group of smallish birds about 400 yards away, which we had missed at the high-tide roost. They were Knots, and the white rump seen on one of them as it flew told me that our search had ended. We drove to the nearest possible

point of approach, and, with the weather now much brighter, making viewing conditions most favourable, Sybil and I crawled up to a distance of 55 yards from the group, with the sun behind us. There were 12 Lesser Knots and 3 Great Knots in the group, and already at 80 yards we were able to confirm, with binoculars, many of the points of distinction listed below. All fifteen birds stayed in one group, somewhat separate from the Godwits that were also now feeding on the northern mudflat, but the Great Knots tended to stick together as a threesome within the group. We were able to observe the birds and make notes for 20 minutes before a Black-backed Gull, yelling his annoyance at us, caused them to take flight. Unfortunately, I did not secure a photograph, since I considered it more important to take an accurate field description with the birds still in view, than to test the somewhat limited capabilities of my equipment at a range of 55 yards.

Shortly afterwards, we again spotted the Knots (both species), across 200 yards of mudflat, as well as a group of six Wrybills which we had not seen before. The Knots being still less accessible to photography than they had been before, we decided to leave them for the day. Five days later, on the morning of 20th October, I returned to the estuary with Michael Bysouth, hoping to try out my long telephoto lens; but we were too late — the birds had flown, and only eleven Lesser Knots remained. The Great Knots were not seen again, and were evidently just passing through on the last leg of their southward migration.

Our records over the years suggest a considerable passage of Knots at Manawatu Estuary about October, and the same was evident this year, although more Knots stayed through the summer than has been usual in the past. Of the 11 Knots present on 20/10/67, one had a broken leg. This bird was not present on 15th (unless its leg had not yet been broken then), and it was not seen on 29th, when 10 Knots were present. It is possible that a different group of Knots was seen on each date. Knots passing through Manawatu Estuary are probably heading for some South Island summer quarters, possibly Farewell Spit, the area of greatest concentration of Knots in New Zealand, and the three Great Knots may well have spent the rest of the summer there.

#### FIELD DESCRIPTION

The following description of the Great Knots at Manawatu Estuary is based on field notes written while watching them. These notes have been submitted to the Rare Birds Committee. For most of the time, 8 x 30 binoculars and 15 x 60 telescope were used.

Resembles Lesser Knot more than any other wader in New Zealand — being of similar general proportions, habits and colouration — but distinguished at once by the distinctly larger size and relatively longer bill, the presence on the breast of large dark spots or blotches of variable intensity, the boldly streaked crown and upper back or mantle, the lack of a distinct pale superciliary stripe, and, in flight, the prominent white rump contrasting with the grey lower back and tail, as opposed to the uniformly barred pale rump and tail of the Lesser Knot. The white rump in flight is perhaps the best

distinguishing feature at a distance, and could be discerned at 400 yards with 20 x telescope; it was particularly outstanding on the three larger birds when the group was put to flight by the Black-backed Gull. All the other features described above were quite evident with 8 x 30 binoculars at 80 yards, the streaked crown and mantle contrasting particularly with the plain grey plumage of the Lesser Knot when the birds were all facing us with their heads down, feeding. In side view, the larger size, longer bill, heavily marked breast, and indistinct superciliary of the Great Knots were obvious points of difference from the Lesser Knot.

Further descriptive details, noted at close range, are as follows:

Bill black, about  $1\frac{1}{4}$  x length of head, and slightly decurved towards tip (in contrast to the virtually straight bill of the Lesser Knot). Legs dark. General tone of plumage close to that of Bar-tailed Godwit in winter plumage. Upperparts generally greyish, the bold streaking and mottling on the mantle continuous in front of the wing and on to the breast. The darkly spotted breast was demarcated from the white abdomen by a more or less distinct edge. In one individual, the breast markings were very dark, giving the breast an almost blackish appearance, whereas in the other two the breast was pale, with only small dark blotches (which distinguished it from the uniformly pale breast of the Lesser Knot). An indistinct pale superciliary was present, but contrasted markedly with the distinct whitish superciliary of all the Lesser Knots.

On the ground, the Great Knots fed with the Lesser Knots, bills probing into the mud, some yards from the water's edge. Sometimes, however, they formed a small group of three on their own. The first individual seen, with the Godwit flock on the south side, walked around feeding on snails (species uncertain) while the Godwits were still roosting. The slow passage of the snail up the bill, sometimes stopping halfway before being swallowed, somehow accentuated the length and slight decurvature of the latter. I had made this same observation on the Great Knots feeding at Pelican Point, Western Australia, ten months previously. In my experience, the Lesser Knot, with its much shorter bill, always gulps its food down too rapidly for identification. Only the first bird at Manawatu was seen eating snails — the food of the three on the north side could not be identified, nor could the manner of feeding be distinguished between the two species.

The slight decurvature of the bill of the Great Knot is a variable feature and has been overlooked in published descriptions. It is less marked than on the Curlew Sandpiper (*C. ferruginea*), but was quite pronounced on a dead specimen which I found at Pelican Point, and may be seen on some, but not all individuals in photographs taken there by me.

The darker-breasted bird at Manawatu evidently still retained some of its nuptial plumage. In full breeding plumage, the breast is quite black, the lines on crown and the markings on the mantle are black or chocolate black, and the scapulars are a dark chestnut. This plumage must be very distinctive, and is in marked contrast to the reddish colour of the Lesser Knot. Birds at Pelican Point even in December showed variable intensity in their breast markings.

Finally in this descriptive section are given some measurements of Great Knots quoted by Serventy (1944), with the corresponding figures for the Lesser Knot in brackets (quoted by Oliver, 1955): Bill 39.5-45.0 mm. (31-36.5), wing 175-187 (152-174), tarsus 33.5-37.3 (30-33), mid toe 30.0-31.7 (20-23). Measurements I made on a fresh specimen at Pelican Point were: Bill 47 mm., tarsus 36, mid toe 31.5.

The Great Knot is a more southerly breeder than the Lesser Knot, its home being the mountains of northeastern Siberia, whereas the eastern race of the Lesser Knot (*C. c. rogersi*) breeds on the New Siberian Is. (McGill, 1947; Hindwood & Hoskin, 1954). Their wintering ranges overlap in parts, however, and where this overlap occurs the two species frequently associate together. The wintering area of the Great Knot is given by Vaurie (1965) as Burma, Malaya, India, Sundas, north Australia, and recorded Persian Gulf. Masters (1876) recorded it as very common on all the islands of Torres Strait, and it is a more frequent visitor to southwest Australia than the Lesser Knot (Serventy, 1938). It is regular on the Queensland coast (Amiet, 1957), and straggles in very small numbers south to Sydney (Hindwood & Hoskin, 1954). There are isolated records from South Australia and Victoria (McPherson, 1957), but none to my knowledge from Tasmania.

The Lesser Knot (eastern race) has a generally more easterly and southerly wintering range. It is rare or unrecorded from Malaya, Indonesia, New Guinea (McGill, 1947), but regular on the Queensland and New South Wales coasts (Amiet, 1957; Hindwood & Hoskin, 1954). It has been recorded from Tasmania and Macquarie Island, but its main wintering quarters are in New Zealand. The route taken by the Lesser Knot on migration to and from New Zealand is not known, and records from Lord Howe Id., Norfolk Id., and New Caledonia are virtually non-existent (Hindwood & Hoskin, 1954). There is no direct evidence that birds move down the east coast of Australia before crossing the Tasman Sea. However, that at least some birds follow such a route is quite plausible, and since Lesser and Greater Knots associate in single flocks on the Queensland coast (Amiet, 1957), as well as in southwest Australia (personal observation), it is not surprising to find the two species together in New Zealand, and we look forward confidently to the next sighting of the Great Knot.

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## ORIENTAL DOTTEREL IN NORTHLAND

By A. T. EDGAR

An Oriental Dotterel was observed at Paua (Parengarenga Harbour) on 6/3/68 by A. T. Edgar, E. G. Turbott and G. R. Williams, and on 7/3/68 by the same observers plus A. H. Watt. On both days the bird was feeding on a flat paddock of short grass, heavily cropped by stock and dried up as the result of several weeks' drought, and occupied during the period of full tide by large numbers of feeding and resting waders of eleven species. Weather on 6/3/68 was fine with occasional showers and periods of bright sunshine, wind easterly; on 7/3/68 overcast with occasional heavy showers and fresh easterly wind. After a long dry period conditions underfoot were such that it was possible to observe the waders from a car, driven about the paddocks and stopped at intervals as convenient for counting and detailed observation.

When first spotted by E.G.T. the dotterel attracted immediate attention as it fed near scattered Turnstones, Golden Plover, Banded and New Zealand Dotterels, by reason of its erect carriage and most unusual colour pattern; at a range of about 100 yards the impression was that of a brown bird with buffy yellow head and neck, white belly and dark band on lower breast. By manoeuvring the car in a series of legs it was possible to shepherd the dotterel away from its companions and towards the fence line, and to obtain a number of good observations in bright sunlight, at ranges of from 50 to 15 yards, before it flew. On 7/3/68 the dotterel was even more accommodating; shortly after the car entered the paddock it was seen about 80 yards away, and of its own accord fed towards us until about 12 yards from the car; up to this point it showed no sign of alarm or even awareness of our presence. It then displayed some reaction, ran a few yards to one side, and continued to feed till we caused it to fly. This surprising absence of fear reaction gave opportunity for close observation, and our joint notes are summarised below.

Size, somewhere between a Turnstone and a New Zealand Dotterel, but a slimmer, neater bird than either. Large dark eye; bill fairly slender, not noticeably thickened, blackish. Legs long (longer in proportion than those of New Zealand Dotterel), yellow, with a suggestion of darker colour at the joints. Forehead eyebrow and lores white in strong sunlight but tinged buffy when seen at close range. A roughly circular brown patch on the crown; hind neck, sides of face and foreneck buffy, with a brownish patch behind the eye; throat white. Upper breast mingled buff and pinkish rufous, the rufous deepening until replaced on the lower breast by chestnut; below the chestnut a black band, which falls in line with the dark flight feathers of the wing when the bird is at rest. Abdomen and under tail coverts white. Upper surface a smooth brown with narrow paler edges to the feathers. Wings long, wing tips projecting just beyond the tail when at rest; quills blackish, showing as a dark line when the wing is folded; no wing bar was visible in flight. Under surface of the wing not closely observed but in flight appeared to be off-white or slightly greyish. When the bird flew away from us the centre line of the rump was seen to be brown, edges white;

tail brown, with narrow white tips and white outer webs on the outer tail feathers, seen when the bird momentarily fanned its tail when settling after a short flight.

From our notes we concluded that the bird must be an Oriental Dotterel (*C. veredus*) or a Caspian Dotterel (*C. asiaticus*). The possibility of Caspian Dotterel was eliminated because of size; that species is stated to be only about an inch longer than a Banded Dotterel, and our bird was much larger than the Banded Dotterels which ran alongside it. The Large Sand Plover (*C. leschenaulti*) in breeding plumage has no black band on the chest and has black lores. Our conclusion is that the bird we saw was an Oriental Dotterel coming into full breeding dress. The description we were able to assemble from our joint observations tallies closely with that given by Oliver (1955) for the summer dress of this species, except "foreneck and chest chestnut, extending down the sides of the upper breast" and "feet flesh colour." We consider that the buff and pinkish rufous of the upper breast, deepening to chestnut near the black band, indicates that the bird was changing from winter dress to something approaching full summer plumage. Falla, Sibson and Turbott (Field Guide to New Zealand Birds, 1967) describe the legs as dull yellow; Serventy and Whittell (*Birds of Western Australia*, 1962), brown or dull yellow; Condon and McGill (Field Guide to the Waders, 1965), dull yellow, "flesh," olive, pale brown or light greyish green (variable). The legs of our bird were a clear distinct yellow.

Various accounts describe the Oriental Dotterel as shy and wary, but fortunately our bird displayed no such characteristic. The erect carriage, head held high when not feeding, is a noticeable field character. When feeding, the bird appears to advance one foot, and tilt its body forward so that tail to bill makes a straight line. Our bird fed actively, with short quick runs, apparently on some form of animal food on the grass or on the ground; it was seen to toss aside pieces of dry cowdung, as did other dotterels. Perhaps because the bird was not unduly alarmed we saw only a limited amount of "bobbing," but noted that it bobbed more frequently when close to the car. Full flight was not observed; the bird made only short flights during the period of observation, and then only when we made it fly. The only note heard was a soft single "tsip," twice uttered, as the bird flew from the vicinity of the vehicle. The only aggressive behaviour noted was when the bird made a short run at a Banded Dotterel which approached too close; it took no notice of two New Zealand Dotterels feeding nearby.

Previous records of this species in the New Zealand region have been from Raoul Island, Kermadecs (Oliver, 1955); Ruakaka (possibly) (McKenzie, 1947; 1956); Firth of Thames (McKenzie, 1956), and Pawa, Parengarenga Harbour (Sibson and Rutherford, 1956). It is not known whether the bird recorded by Oliver was in breeding or eclipse plumage. The others were birds in non-breeding dress.

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## MARSH SANDPIPER AT ORAWAITI LAGOON WESTPORT

By G. HARROW

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On the afternoon of 5/5/68, I was observing an Avocet (*Recurvirostra novaehollandiae*) feeding in a brackish pool by the rubbish dump in the Orawaiti Lagoon near Westport. A strange, very much smaller wader, came into my viewing field. While the Avocet's body was fully clear of the shallow water, this new bird was often wading with its belly immersed in water, even though the two species were within a foot of each other. The notes I made at the time described the new bird as having dark brownish grey upper parts, with a quite definite speckling around the nape and edge of the breast. The underparts were a clear white. The thin long needle-like bill was very striking and quit unlike anything I had seen among waders of my previous acquaintance. It was a very active feeder, often running quickly several steps to capture some apparently mobile crustacean. I watched the bird feeding for about half an hour from my car, from a distance often less than twenty yards through a 22 x 57 mounted telescope under very good light conditions. I suspected that the bird might be a Greenshank (*Tringa nebularia*) and therefore left my car and flushed the bird to obtain a flight silhouette. I quickly noted the white tail and inverted white V up the back, and now saw that the legs were very long indeed, trailing behind in stilt-like fashion. No call was heard. At this stage I was prepared to name the bird as a Green-shank, having noted the inverted white V in flight. I then checked my notes with the description of the Greenshank, given in the "Field Guide to the Birds of New Zealand" Falla et. al. and also Condon & McGill "Field Guide to the Waders." It was obvious to me that I had been observing a tringa, but the long trailing legs in flight, and the straight thin needle-like bill did not fit the description of a Greenshank. I noted that the bird had not flown very far, and was now feeding in company with some Pied Stilts (*Himantopus leucocephalus*). I backed the car along the edge of the lagoon and was able to be within twenty yards of this wader once again. I could now see that the bird in question was only two thirds the size of the stilts it was feeding with, and that it was much too small for a Greenshank. There was no suggestion of any upcurve in the slender bill. The bird was now feeding in very shallow water and I could now see the long stilt-like legs which were greyish-black. In this shallow water, the feeding attitude was most stilt-like, as the bird tilted its tail with the head down picking up food. I had no doubt that the bird I was looking at was a Marsh Sandpiper (*Tringa stagnatilis*) and I am informed that this is the first South Island record for this species.

## DOES THE GREATER SHEARWATER REACH THE SOUTHWEST PACIFIC?

By JOHN JENKINS

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Several times towards the end of last year a very large shearwater, dark above and white below and with a black cap, was seen to the north of this country. These birds were not interested in the ship and therefore a good view was not obtained until 31/12/67, when a single bird was seen at about 50 feet.

From subsequently comparing various references against field notes, this bird and others seen in the same region, and one on 24/7/68 in the Cook Strait area, appear to be the Greater Shearwater (*Puffinus gravis*). Careful notes were taken.

One bird was seen in company with six Wedge-tailed Shearwaters (*P. pacificus*). It was noticeably larger in both body size and wing span. Alexander (1) gives wing-span of *pacificus* as 11.5 inches and length 15.5 inches and of *gravis* wing 12 to 13 inches and length 18 to 21 inches. Rowan (3) gives the wing of a juvenile bird at the breeding grounds as 13.82 inches (350 mm.).

The dark cap was outstanding, there being a whitish band completely around the back of the neck. The black came down below the eye in a line with the gape.

Roux and Jouanin (2) when speaking of *gravis* state — "In that species a deep brown crown contrasts sharply with a pale nape and pure white throat."

The tail was long and dark above and whitish below. The rump seemed dark and there was no apparent sign of the white at the base of the upper tail, which is said to be a field character of *gravis*. It seems that this white area can be variable in width and could be so small in some birds as to be invisible in the field. Hagen (4) states the band can be broad up to 22 mm., or narrow and barred with grey and in one specimen mostly through wear, only two lateral spots showing.

The large black eye standing out against the darkness of the cap was noted, and is apparent in all the photographs of *gravis*.

The bill was recorded as long and all dark with no apparent variations in colour. There was a dark area before the wing reaching down onto the upper belly but not forming a complete band.

The brown patch on the lower belly was not seen. However as most sightings were made looking down on the birds, this could have been missed. Hagen (4) says this again is a variable character and in one specimen was represented by only a brown tinge in the middle of the lower breast and an up-and-down placed V on the abdomen.

The underwing was seen well and appeared wholly white with a narrow black edge, both fore and aft.

In their manner of flight these birds resembled *bulleri* or *pacificus*. They flew low over the sea with very little banking or turning and mostly on an even keel, the wing flapping being a slow and definite movement.

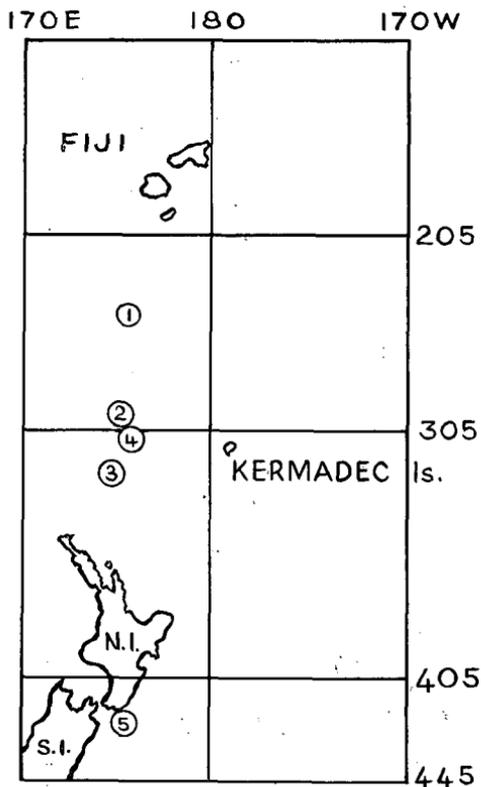
The sighting of these shearwaters in December and January at the height of the breeding season would seem to indicate that they were wandering juveniles whom the breeding urge was not strong enough to drive back to the Tristan Group. The sighting off the Cook Strait in July could well indicate that odd birds do regularly visit this region throughout the year.

It is to be hoped that a beach specimen will be collected in New Zealand to confirm the presence of this shearwater in our off-shore waters.

It is of interest to note that both these areas of sightings have been in known whaling grounds. Murphy (5) states "Whales or porpoises, according to Wynne Edwards, invariably have an attendant flock. The birds seem to feed to some extent upon cetacean feces, which may account in part for the large numbers of cephalopod beaks found in their stomachs."

RECORDED SIGHTINGS (See Map)

- (1) 31/12/67: 25°45'S. 176°45' E.  
Sea temp. 80°F.
- (2) 31/12/67: 28°42'S. 176°12'E.  
Sea temp. 78°F.
- (3) 3/1/68: 32°23'S. 175°25'E.  
Sea temp. 75°F.
- (4) 24/1/68: 32°00'S. 175°18'E.  
Sea temp. 75°F.
- (5) 24/7/68: 42°20'S. 174°39'E.  
Sea temp. 51°F.



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## SUSPECTED UPLAND PLOVER (*BARTRAMIA LONGICAUDA*) IN MANUKAU HARBOUR

By H. R. McKENZIE

On a routine visit to the Karaka Shellbank on 28/2/67 a strange wader was found by a party of watchers, Miss M. C. R. McIntyre, Dr. Asa C. Thoresen, First Officer John A. F. Jenkins and H. R. McKenzie. As the cars pulled up on the slightly higher ground overlooking the semi-marine flat a large mixed flock of Knot, Turnstone, Pied Stilt, Red-breasted Dotterel, stirred uneasily then rested again. Banded Dotterels bobbed about over a large area. As soon as the cars stopped Miss McIntyre called, "What is that bird with a long neck running along at the back of the others?" The bird alternatively ran and paused, then stood, keeping clear of the attenuated patchy flock, giving ample time, an hour or more, for observing all the features visible. Notes were immediately taken, binoculars and 30 x telescope being used at 125 yards.

The bird kept moving to the right until it was hidden by a ditch bank with only its head showing so nothing more could be done for the time being. It was thought not to be a Grey Plover because of the general colour, size, shape and the very large eye, etc., but, there being no further detail to be obtained of it on the ground, to make absolutely sure it was decided to put it up and look for the axillaries. The party approached in an arc, pinning it against a ditch and fence. It rose sharply at about 125 yards, circled back overhead and went right away. There was no sign of the axillaries being different from the rest of the underwing so Grey Plover was ruled out. So intent was everyone on looking for the axillaries that the tail was not noticed to be long or short. However it was obvious that the underwing markings were of such diagnostic value that this was more important than the length of the tail. There was no opportunity of seeing the upper tail fully but it was seen to be generally dark, certainly with no white rump. Golden Plover appeared later but the bird was not with them. H.R.McK. returned the next day when Golden Plover were again present but it was not seen again. Miss McIntyre noted two other birds on the far side of the field which she was sure were of the same species. These she later saw fly when the first bird was put up.

### OBSERVATIONS TAKEN IN THE FIELD

The following points were noted by all members of the party, except where otherwise stated:

*Size:* A slim bird, similar to large Golden Plover but with longer neck.

*Bill:* Colour practically the same as Golden Plover. Heavy like Golden Plover but a little longer. J.A.F.J. noted a shallow depression on the upper bill, less pronounced than in Golden Plover. The others noted a slight downward curve of the fore part. In regard to shape, not size, this made the bill appear to be a mixture of that of a dotterel and a sandpiper.

*Head:* It had a small rounded head, much as Golden Plover. Crown brown. Side of face and a little about the bill and chin patterned whitish-yellowish with some fine dark marking on side of head, similar to but not the same as Stone Curlew, the light area round the eye being wider. The pattern was large for the size of the head.

*Eye:* The eye was so large in proportion to the head that this could well be accounted the most prominent feature for identification. The Grey Plover has a large eye but not nearly so large in proportion as in this bird.

*Neck:* The neck was longer and thinner than in Golden Plover and was held erect.

*Body Colour:* The neck all round, back and upper sides were a firm brown with no definite patterning noted. Miss McIntyre noted that the upper wing was dark, the primaries particularly so.

*Lower Breast and Belly:* The belly was all white, the white extending to the lower breast or fore-belly.

*Tail:* The unusually long tail of the bird was not noted because it kept its head high and tail down, the three inches or so of ground cover being too high to allow it to be seen.

*Legs:* The legs could not be accurately described because of the ground cover and were thought to resemble Golden Plover but (A.C.T.) more brown than grey.

*Underwing:* It was clearly seen, when the bird was flushed and overhead, that the underwing was wholly dusky with distinct and profuse darker barring. This was indeed striking. The axillaries did not show a contrast.

*Tail:* Missed, as already explained.

*Voice:* No call made.

H.R.McK. the same night studied several books and suspected that the bird might be an Upland Plover. There the matter rested until a U.S. visitor, returning home, sent back a new book, "Birds of North America, A Guide to Field Identification" (Robbins, Bruun, Zim and Singer). The three illustrations of this bird, p. 117, particularly the showing of the large eye and the barred underwing, satisfied him that the bird was indeed an Upland Plover so the matter was reopened with the other members of the party and their notes re-checked.

The following chart is made up from measurements of males as per Witherby. Averages are shown in brackets.

	Upland Plover	Ruff	Asiatic Golden Plover
Wing	155 - 176.5 (165)	186 - 198 (192)	165 - 174 (170)
Tail	72 - 84 (78)	61 - 68 (64)	59 - 64 (61)
Tarsus	44 - 52 (48)	45.5 - 52 (48)	39 - 46 (42)
Bill, from feathers	28 - 32.5 (31)	34 - 38 (36)	21 - 27 (24)

## DISCUSSION OF THE CHART

The Ruff and Golden Plover are chosen for comparison being near in size and shape, also because no other bird comes to mind as being similar to Upland Plover.

The Ruff is shown to have longer wings. It is of course a larger bird.

The 17 mm. difference in tail from the Golden Plover is about  $\frac{3}{4}$  inch. The length of tail was not observed.

The tarsus was not closely observed.

Bill, from feathers: The comparison is important. The Ruff has a bill shaped like that of a Pectoral Sandpiper, the Golden Plover a dotterel-like bill, while that of the Upland Plover has less emphasised outlines so as to appear to be a mixture of the two.

## SOME REFERENCES TO LITERATURE

Dr. Asa C. Thoresen, Chairman Biology Department, Andrews University, Michigan, U.S.A., writes, "I have been through all of the good reference books and have compared yours and my notes with the information and pictures. I am convinced that we actually observed an Upland Plover (*Bartramia longicauda*)."

Witherby et. al. "The Handbook of British Birds," Vol. 4, pp. 181-184, give a fully detailed description. The bird was too far away for the patterning on the feathers to be noted and the underwing, seen only in shadow, was thought to be a little darker than the description. The drawing of the bill on p. 184, showing the shape, bears out exactly the field observations of the party.

Robbins, et. al. "Birds of North America, A Guide to Field Identification." The notes taken are in line with the showing of the patterning of the head, the proportion of the very large eye to the small head, the underwing barring and the general body colour, p. 117.

Peterson, "A Field Guide to the Birds, Eastern Land and Water Birds," p. 103, shows more contrast between the upper and lower surfaces and agrees with Witherby in the yellow of the legs. It could be that the Karaka bird was not fully mature, being generally a little darker and with less leg colour. The eye is not shown to be abnormally large.

Stout, Matthiessen, Clem and Palmer, "The Shorebirds of North America," p. 111, emphasises the white more forward onto the breast as the Karaka bird and describes the legs as yellowish.

## DISCUSSION

There are rather wide differences in the literature referred to but none of the descriptions vitiates the notes taken in the field. The illustrations in Robbins, et. al. were shown to Miss McIntyre and J. A. F. Jenkins and they were both quite sure of the identification. J.A.F.J. put his finger across the neck and stated that the head and neck left to view provided sufficient evidence of the bird having been an Upland Plover or Bartram's Sandpiper.

This North American breeder migrates to Argentine and Chile. It has occurred widely as a straggler to Europe, more often to Britain. To the south Witherby has one record for Falkland Islands and there are two records for Australia, so it can well be expected to appear as a straggler in New Zealand.

**SHORT NOTE****RECORD STINT COUNT, AND AMERICAN PECTORAL SANDPIPERS IN SOUTHLAND**

The estuaries and lagoons along Foveaux Strait continue to attract a variety of migrants, including a fine representation of Sandpipers and related species.

Lake Waituna is particularly attractive to the smaller shorebirds, and almost any summer visit will disclose an impressive line-up of Red-necked Stints (*Calidris ruficollis*), Sharp-tailed Sandpipers (*C. acuminata*) and Curlew Sandpipers (*C. ferruginea*). To the dedicated naturalist, the possibility of Pectoral Sandpipers (*C. melanotos*), Sanderlings (*C. alba*) and other rarities adds piquancy to this already rich fare.

Stints are found in consistently large numbers for New Zealand, the Waituna summer counts for the past four seasons being 23+ (1964/65); 29 (1965/66); 39 (1966/67); and 57 (1967/68). To the last figure, recorded on 2/12/67, can probably be added a further 23, found at Woodend in the Invercargill Estuary on the following day. Maximum counts at Woodend in other years are 22 (1962/63); and 26 on 31/3/64 and again on 7/4/64, but only 6 were found on 11/4/64, indicating a probable early-April departure date. Of the 26 birds seen on 31/3/64 and 7/4/64 only one was showing red neck colour. At Waituna on 4/4/68 of 51+ stints seen, at least 7 were showing breeding plumage changes.

On 21/3/68 at Waituna, the writer with Roger Sutton and Lionel Lobb had a leisurely and very satisfactory encounter, in a good light and at close quarters, with three Pectoral Sandpipers. One was generally darker than the other two, especially at the leading edge of the wing, the back and the crown. All three demonstrated very clearly the dark gorget with the sharp line of demarcation at the breast, and pale unmarked underparts and flanks. Three Sharp-tailed Sandpipers nearby provided a good exercise in differential diagnosis, with their faint breast-wash, spotted flanks, generally tawny back and wing with dark longitudinal streaks. S.L.L.'s comment in the field note-book is "Have streaked appearance compared with Pectoral." Differences in leg-colour were looked for but not seen, nor were any distinctive calls heard.

Pectoral Sandpipers (*C. melanotos*) have been seen before at Waituna — 1 on 2/1/66, 2 on 18/12/66, and 1 on 6/1/68 and 11/2/68.

— MAIDA BARLOW

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**NOTICE****Beach Patrol Scheme**

The last report to appear in *Notornis* was that for 1963 but the 1964 report has been completed and will appear soon. The cards for 1965 are now being analysed and, in the near future, those for 1966 and 1967 will be processed. The organiser already has received a considerable number of cards for patrols in these years

but some members may have information that has not been reported. In particular, there is a scarcity of data from South Island coasts and from eastern coasts of the North Island from Bay of Plenty southwards. Would members please send information and cards to the organiser: M. J. Imber, Wildlife Branch, Department of Internal Affairs, Wellington. He can supply new cards and information about the scheme to those interested.



### LITERATURE AVAILABLE

The following are available on order from Mrs. H. R. McKenzie, Box 45, Clevedon:

**Back Numbers of Notornis** at 50c each. Large orders for full or part sets at special prices.

**O.S.N.Z. Library Catalogue**, 70 pp., 50c.

**Banding Reports**, Nos. 8 to 14, 50c each. Nos. 1 to 7 are incorporated in early issues of 'Notornis.'

**Kermadecs Expedition, 1964**, by A. T. Edgar. Reprints at 45c.

From all bookshops:

**A Field Guide to the Birds of New Zealand**, by R. A. Falla, R. B. Sibson and E. G. Turbott. \$4.50.

From O.S.N.Z., Box 40-272, Upper Hutt:

**A Biology of Birds**, by B. D. Heather. \$1.33 post free.

From B. A. Ellis, 36 Hartley Avenue, Christchurch 5:

**Field Guide to the Waders**, by Condon and McGill. Price 60c.



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**References:** If listed, these should be in the form of the following examples:

1. Atkinson, I. A. E., 1964: Feeding stations and food of the North Island Saddleback in August. *Notornis* 11, 2, 93-97.
2. Buller, W. L., 1888: A History of the Birds of New Zealand (2nd ed.) 2 vols., the author, London.

The references should be serially numbered, and in the text, should be shown thus: Atkinson 1964 (1), and Buller 1888 (2). If references are cited in the text, the following shortened form may be used: Atkinson 1964, *Notornis* 11, 2: 93-97.

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