SEABIRDS FOUND DEAD ON NEW ZEALAND BEACHES IN 1989, AND A REVIEW OF *Pelecanoides urinatrix, Phaethon rubricauda, P. lepturus* and *Fregata ariel* RECOVERIES, 1943 TO 1988

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ABSTRACT

In 1989, 4194 kilometres of coast of New Zealand were patrolled and 8221 dead seabirds were found as part of the Beach Patrol Scheme. Unusual finds were a Snares Crested Penguin (*Eudyptes robustus*), two White-capped Noddies (*Anous tenuirostris minutus*) and a Brown Booby (*Sula leucogaster*). A summary is given of the coastal and monthly distributions of *Pelecanoides*, *Phaethon* and *Fregata* species found during the 1943-1988 period. Overall, 11 472 *Pelecanoides urinatrix* were found, but 10 or fewer of the other three species were found.

INTRODUCTION

This paper records the results of the Ornithological Society of New Zealand's Beach Patrol Scheme for 1989, when all sections of coast, except Fiordland, were patrolled (see Powlesland & Imber 1988) and 921 Beach Patrol Cards and 17 Specimen Record Cards were submitted. *Pelecanoides urinatrix, Phaethon rubricauda, P. lepturus* and *Fregata ariel* recoveries from 1943, when the results of patrols were first recorded on Beach Patrol Cards, to 1988 are reviewed.

Kilometres "travelled" are the total distances travelled during patrols, whereas kilometres "covered" are the lengths of coast patrolled monthly. Hence, if the same 1 km stretch of beach is patrolled twice in one month, 2 km have been travelled but only 1 km covered per month. For a detailed description of methods for beach patrolling and of the Beach Patrol Scheme see Powlesland & Imber (1988). The taxonomic nomenclature and sequence used are as in Turbott (1990).

RECOVERIES IN 1989

In 1989, the total length of coast travelled was 4194 km, along which 8221 seabirds were found by 246 members of the Ornithological Society of New Zealand and their friends. The average number of birds recovered per kilometre of coast covered was 2.38 (Table 1). The total distance travelled was similar to the average of 4052 km per year recorded over the past 18 years (1971-1988). However, the number of seabirds found in 1989 was only 78% of the average of 10 519 birds for the same 18 year period. This period is used for the comparison because the distance travelled annually was fairly constant, whereas from 1943 to 1970 the distance travelled increased gradually (Powlesland 1990). Table 1 gives the kilometres covered and the number of seabirds found per month and in total for the various coasts, plus the number of birds picked up per kilometre covered for each coast. Coastal

TABLE 1 — Numbers of dead seabirds recovered and kilometres covered on each coast of New Zealand in 1989

COAST	CODE		MONTH JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL KM	TOTAL BIRDS	BIRDS/KM OF COAST
AUCKLAND EAST	AE	KM	75	45	49	51	35	38	36	40	47	68	36	18	538		
		BIRDS	1259	265	120	85	30	35	28	55	405	437	76	12		2807	5.22
AUCKLAND WEST	AW	KM	113	130	71	163	148	119	69	15	127	163	57	115	1292		
		BIRDS	176	101	78	94	115	64	146	33	80	216	97	249		1449	1.12
BAY OF PLENTY	BP	KM	74	23	12	13	5	14	10	18	33	52	29	18	301		
		BIRDS	794	65	10	31	4	11	15	52	110	175	80	52		1399	4.65
CANTERBURY NORTH	CN	KM	38	27	7	19	0	5	11	4	24	28	13	12	188		
		BIRDS	59	62	14	25	0	10	15	16	19	22	46	32		320	1.70
CANTERBURY SOUTH	CS	KM	2	1	4	3	3	0	0	7	0	0	8	0	28		
		BIRDS	1	15	8	5	8	0	0	24	0	0	26	0		87	3.11
EAST COAST NI	EC	KM	5	14	11	13	17	12	11	13	5	13	10	2	126		
		BIRDS	9	9	8	12	8	6	1	8	1	7	17	3		89	0.71
NORTH COAST SI	NC	KM	5	4	2	2	29	26	1	0	7	15	0	4	95		
		BIRDS	35	8	2	5	17	4	2	0	1	16	0	1		91	0.96
OTAGO	OT	KM	13	11	9	10	13	9	10	15	7	8	10	8	123		
		BIRDS	13	10	10	6	4	6	1	12	2	9	11	5		89	0.72
SOUTHLAND	SD	KM	8	0	0	34	11	3	0	0	0	8	6	6	76		
		BIRDS	15	0	0	41	620	1	0	0	0	6	12	16		711	9.36
TARANAKI	TA	KM	17	8	7	3	0	13	3	0	4	9	2	13	79		
		BIRDS	60	10	4	2	0	15	1	0	0	21	4	32		149	1.89
WAIRARAPA	WA	KM	0	8	7	13	4	0	0	0	1	3	0	5	41		
		BIRDS	0	10	7	5	1	0	0	0	2	5	0	11		41	1.00
WESTLAND	WD	KM	3	0	4	0	0	15	0	0	0	0	0	5	27		
		BIRDS	1	0	1	0	0	1	0	0	0	0	0	4		7	0.26
WELLINGTON SOUTH	WS	KM	10	6	8	12	2	5	6	10	2	12	18	6	97		
		BIRDS	6	20	6	11	4	8	30	13	9	6	11	3		127	1.31
WELLINGTON WEST	WW	KM	8	39	27	59	38	39	52	50	34	22	23	50	441		
		BIRDS	7	195	30	76	20	18	44	30	8	22	143	262		855	1.94
TOTAL KILOMETRES TRAVELLED			530	367	254	440	326	312	259	220	369	474	272	370	4194		
TOTAL KILOMETRES COVERED			371	317	218	396	305	298	209	172	291	401	212	262	3452		
TOTAL BIRDS RECOVERED			2435	770	298	398	831	179	283	243	637	942	523	682		8221	
BIRDS/KM COVERED			6.56	2.43	1.37	1.01	2.72	0.60	1.35	1.41	2.19	2.35	2.47	2.60			2.38

and monthly totals for uncommon species (10 or fewer specimens) are given in Table 2, while for more common species (more than 10 specimens) coastal totals are presented in Table 3 and monthly totals in Table 4.

Unusual finds

A Snares Crested Penguin picked up from Chrystalls Beach (OT) in April is only the fourth record for the Scheme (Table 2). The results for these birds are: 1963, SD, January; 1976, SD, February; and 1983, OT, March. The 1983 bird, an adult-plumaged male from Long Beach, was initially misidentified and reported as an Erect-crested Penguin (*Eudyptes sclateri*) (Powlesland 1985, A.J.D. Tennyson pers. comm.).

TABLE 2 — Coastal and monthly distribution of seabird species for which 1 to 10 specimens only were found in 1989

SPECIES OR SUBSPECIES	NUMBER FOUND	COAST(S)	MONTH(S)
Diomedea exulans	5	AW,BP,NC,OT,WW	FEB,APR(2),JUN,OCT
Diomedea epomophora	3	NC(2),OT	JAN(2),FEB
Diomedea melanophrys	3	AW,BP,WA	JAN,FEB,DEC
Diomedea cauta subspp.**	5	AW,CN,NC,SD,WW	JAN,FEB,APR,JUL,NOV
Diomedea cauta salvini	5	CN(2),CS,OT,WS	JAN,MAR,APR,AUG(2)
Diomedea chrysostoma	4	AW(2),AE,TA	JAN,JUL,SEP,OCT
Diomedea chlororhynchos	1	BP	OCT
Diomedea bulleri	4	AW(2),SD,TA	JAN,MAR,APR,JUN
Phoebetria palpebrata	4	AW(2),BP(2)	JUL,OCT(3)
Puffinus gavia/huttoni	8	AW,CN(3),WW(4)	FEB(4),APR,JUN,NOV,DEC
Procellaria spp.**	3	AW,CN,WW	FEB,MAR,APR
Procellaria cinerea	1	BP	DEC
Procellaria westlandica	1	AW	OCT
Procellaria aequinoctialis	5	AW(4),WA	NOV(4),DEC
Lugensa brevirostris	1	AW	MAY
Fulmarus glacialoides	4	AW(2),WW(2)	JUN,JUL,AUG,DEC
Pachyptila desolata	6	AW(3),WD,WW(2)	JUL(4),AUG,DEC
Pachyptila salvini	4	AW(2),SD,WW	JAN,MAR,JUN,JUL
Halobaena caerulea	9	AW(7),AE,CN	JUL(2),AUG(2),SEP,OCT(3),DEC
Pterodroma longirostris	1	WW	DEC
Pterodroma pycrofti	1	AW	MAY
Pterodroma nigripennis	3	AW(2),WW	MAR,APR,NOV
Megadyptes antipodes	10	CN,OT(4),SD(3),WS(2)	JAN(3),MAR,APR(2),JUN,SEP,NOV(2)
Eudyptes spp.**	1	CN	SEP
Eudyptes pachyrhynchus	1	SD	JAN
Eudyptes robustus	1	OT	APR
Eudyptes sclateri	1	OT	AUG
Sula leucogaster	1	WW	MAR
Phalacrocorax spp.**	1	AE	MAR
Phalacrocorax sulcirostris	5	AW,EC(3),WW	MAY,JUN,JUL,AUG,SEP
Phalacrocorax melanoleucos	9	AW,AE(2),BP(3),CS,NC,TA	JAN(4),AUG,SEP(2),OCT(2)
Stercorarius parasiticus	2	AW,WW	JUL,DEC
Sterna fuscata	1	AE	OCT
Anous tenuirostris minutus	2	AW(2)	OCT,NOV
Procelsterna cerulea	1	AW	MAR
TOTALS	117		

** Species or subspecies was not identified by the patroller

This species breeds only on The Snares, with the breeding population numbering about 23 000 pairs (Marchant & Higgins 1990). Little is known about the movements of Snares Crested Penguins at sea in the non-breeding season (mid-February to late August)(Warham 1974). However, stragglers have been recorded as far afield as South Australia, Tasmania, Macquarie Island, Chatham Island, Antipodes Island, Campbell Island and the Falkland Islands (Lamey 1990, Marchant & Higgins 1990). A number have been found on Stewart Island and the New Zealand mainland, particularly about Southland, Westland and Otago coasts. Many of the stragglers were late summer-autumn moulting immatures (Marchant & Higgins 1990).

TABLE 3 — Coastal distribution of the seabirds species more commonly found dead (>10 specimens) in 1989

SPECIES OR SUBSPECIES	COAST AW	AE	BP	TA	WW	EC	WA	WS	MC	WD	CN	CS	OT	SD	OI	TOTAL BIRDS
Diomedea spp.**	5	0	0	0	3	0	0	0	2	0	3	0	0	2	0	15
Diomedea cauta steadi	5	0	0	3	3	0	0	1	0	0	0	0	0	1	0	13
Puffinus spp.*	3	0	1	1	11	0	1	0	1	0	3	0	0	1	0	21
Puffinus carneipes	11	111	15	1	0	1	1	0	5	0	8	0	0	0	0	140
Puffinus bulleri	66	156	50	13	23	5	7	0	5	0	8	0	0	0	0	333
Puffinus griseus	208	31	25	16	72	7	3	2	4	0	26	8	6	632	0	1040
Puffinus tenuirostris	84	6	7	17	12	2	1	2	0	0	1	0	0	0	0	130
Puffinus gavia	202	324	91	17	33	1	3	2	4	0	3	0	0	0	0	680
Puffinus huttoni	14	6	3	0	7	3	1	0	0	0	1	0	1	0	0	40
Puffinus assimilis	4	17	31	0	1	0	1	0	6	0	1	1	2	3	0	56
Pelecanoides urinatrix	135	457	163	4	54	1	4	6	6	0	1	0	2	3	0	837
Procellaria parkinsoni	0	12	3	0	0	0	0	0	0	0	2	0	1	0	0	15
Daption capense	3	1	2	0	3	0	0	0	2	0	2	0	1	1	0	15
Macronectes spp.**	5	0	0	0	2	0	1	0	0	0	3	0	1	1	0	12
Pachyptila spp.**	23	4	14	7	183	0	0	1	7	0	3	0	0	1	0	254
Pachyptila turtur	83	57	123	10	199	0	0	11	11	1	6	1	5	3	0	510
Pachyptila belcheri	31	0	4	0	7	0	0	0	0	0	3	0	3	4	0	42
Pachyptila vittata	7	1	0	3	37	1	1	0	0	0	3	0	0	0	0	60
Pterodroma spp.**	1	0	9	0	2	0	0	0	0	0	0	0	0	0	0	12
Pterodroma cookii	12	32	2	0	2	0	0	0	0	0	0	0	0	0	0	48
Pterodroma inexpectata	21	0	0	0	0	0	0	0	0	0	0	0	0	2	0	23
Pterodroma macroptera	10	58	96	1	1	0	0	0	0	0	1	0	0	0	0	167
Pterodroma lessonii	26	0	5	2	4	0	0	0	0	0	0	0	0	0	0	37
Pelagodroma marina	10	7	18	0	0	0	0	0	0	0	0	0	0	0	0	35
Eudyptula minor	177	1359	640	9	53	7	9	6	20	2	11	10	8	8	0	2319
Morus serrator	117	86	18	12	15	12	0	1	4	0	2	1	0	1	0	269
Phalacrocorax carbo	1	2	1	0	3	7	1	0	2	0	1	0	0	0	0	17
Phalacrocorax varius	9	23	10	0	1	0	0	0	2	0	3	0	0	0	0	48
Leucocarbo chalconotus	0	0	0	0	0	0	0	0	0	0	0	2	14	10	0	26
Stictocarbo punctatus	2	4	1	0	0	1	0	0	5	0	73	41	22	7	0	156
Larus dominicanus	84	23	20	20	93	29	2	63	4	0	85	14	10	20	0	467
Larus novaehollandiae	20	18	20	3	7	0	0	20	6	0	55	4	6	7	0	166
Larus bulleri	0	1	0	0	1	8	1	0	0	0	1	1	0	1	0	14
Sterna caspia	3	2	8	0	0	1	0	0	1	0	0	0	0	0	0	15
Sterna striata	27	3	10	7	6	0	2	1	2	2	9	2	1	0	0	72
TOTALS	1409	2801	1390	146	838	86	39	124	86	6	310	85	80	704	0	8104

** Species was not identified by the patroller

Two White-capped Noddies were found in 1989, both between Maunganui Bluff and Pouto, near Dargaville (AW), in October and November; the third and fourth for the Scheme. The first two were both found in January 1986, on Auckland West and Auckland East coasts. Details about the seasonal and geographical distribution of White-capped Noddies seen and found about the New Zealand mainland have been provided by Powlesland (1989).

A juvenile Brown Booby picked up from Waikanae Beach (WW) in March is the third record for the Scheme (Table 2). The previous specimens were found on Te Werahi Beach near Cape Reinga (AE) in January 1971 and on Muriwai Beach (AW) in April 1980. On a further 26 occasions Brown Boobies have been seen alive or found dead about New Zealand (Heather & Sheehan 1990, Marchant & Higgins 1990).

TABLE 4 — Monthly distribution of the seabird species more commonly found dead (>10 specimens) in 1989

SPECIES OR SUBSPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL BIRDS
Diomedea spp.**	4	1	0	3	1	1	0	0	1	0	1	3	15
Diomedea cauta steadi	1	1	1	2	0	1	0	0	0	2	1	3	13
Puffinus spp.**	1	3	0	6	1	0	0	0	2	3	1	4	21
Puffinus carneipes	14	37	18	29	6	5	0	0	0	4	22	5	140
Puffinus bulleri	140	21	17	19	5	8	1	1	11	55	36	19	333
Puffinus griseus	62	20	17	19	632	9	2	4	13	56	80	126	1040
Puffinus tenuirostris	66	8	13	1	7	8	1	3	0	1	5	17	130
Puffinus gavia	152	96	28	24	22	13	30	11	88	120	54	42	680
Puffinus huttoni	1	2	0	1	0	1	0	0	4	16	4	11	40
Puffinus assimilis	18	0	0	1	0	0	3	12	9	5	4	4	56
Pelecanoides urinatrix	86	12	3	15	6	25	73	40	252	247	17	61	837
Procellaria parkinsoni	1	2	0	2	0	1	0	0	0	2	7	0	15
Daption capense	3	1	0	0	0	1	2	1	1	4	1	1	15
Macronectes spp.**	0	0	0	1	0	2	1	0	0	3	2	3	12
Pachyptila spp.**	31	69	2	4	0	6	12	3	2	11	52	62	254
Pachyptila turtur	100	129	3	5	4	8	29	25	29	66	38	74	510
Pachyptila belcheri	0	2	1	1	0	2	24	9	2	1	0	0	42
Pachyptila vittata	4	1	1	0	1	0	1	0	0	1	3	47	60
Pterodroma spp.**	1	0	0	2	1	1	0	0	1	4	2	0	12
Pterodroma cookii	7	6	3	9	1	1	0	0	0	0	18	3	48
Pterodroma inexpectata	4	5	1	3	2	0	0	0	0	0	2	6	23
Pterodroma macroptera	118	14	9	1	1	1	0	5	4	3	3	8	167
Pterodroma lessonii	4	2	2	0	1	0	1	1	1	9	8	8	37
Pelagodroma marina	4	0	3	0	2	0	1	0	5	8	4	8	35
Eudyptula minor	1430	171	70	73	35	21	30	32	141	232	39	45	2319
Morus serrator	56	35	20	33	20	15	7	9	18	21	14	21	269
Phalacrocorax carbo	1	4	2	0	1	2	0	3	1	0	1	2	17
Phalacrocorax varius	4	5	7	6	5	1	0	3	7	4	3	3	48
Leucocarbo chalconotus	2	1	1	8	3	1	0	3	2	0	4	1	26
Stictocarbo punctatus	11	33	16	23	10	2	3	17	1	19	15	6	156
Larus dominicanus	53	38	28	74	43	26	28	35	18	20	59	45	467
Larus novaehollandiae	18	28	13	15	9	10	16	15	13	6	8	15	166
Larus bulleri	3	2	1	5	1	0	0	0	0	0	1	1	14
Sterna caspia	9	1	0	0	1	0	0	2	0	1	0	1	15
Sterna striata	10	11	9	2	7	0	4	0	3	4	4	18	72
TOTALS	2419	761	289	387	828	172	270	234	630	928	513	673	8104

** Species was not identified by the patroller

The Brown Booby occurs through all tropical oceans, mostly between latitudes 30°N and 30°S (Marchant & Higgins 1990). Breeding of Brown Boobies has been recorded in all months. Adults leave the nesting islands after the breeding season, but the extent of their movements and those of juveniles is unknown. The subspecies *S. l. plotus*, of the western and central Pacific Ocean, is considered to reach New Zealand waters in most summers, where it often associates with Australasian Gannets (*Morus serrator*)(Turbott 1990).

Two species were found in greater numbers than usual in 1989. There were 2319 Blue Penguins (*Eudyptula minor*) picked up (Table 3), the third highest annual total. In 1985 and 1974, the annual totals for Blue Penguins were 5370 and 4741 respectively. Patrollers usually find 300-1000 such

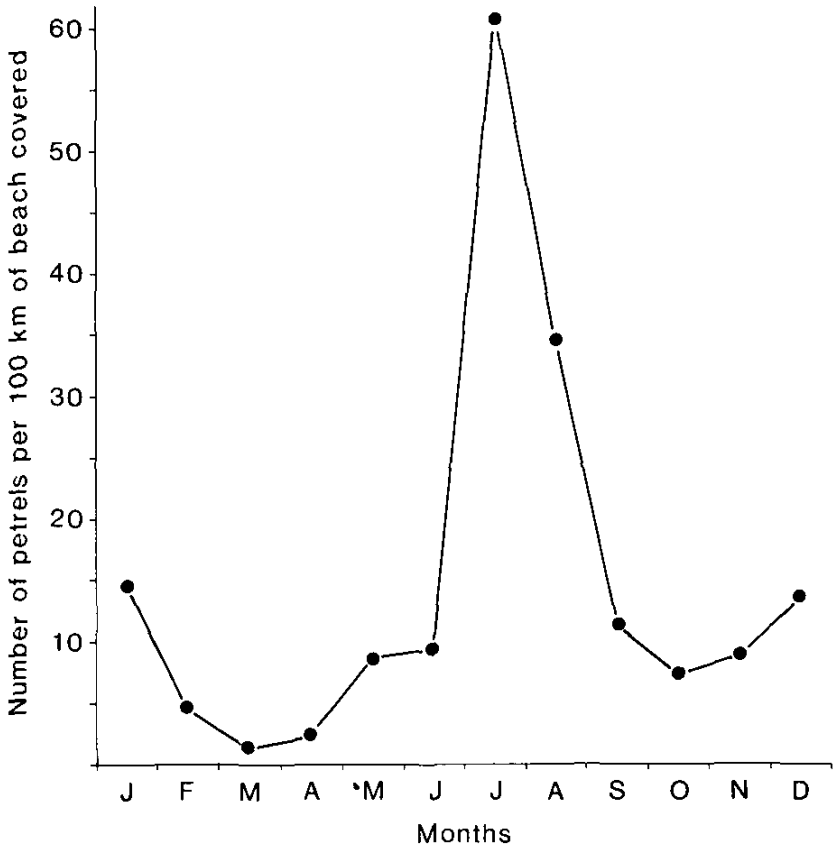

FIGURE — Monthly rate of recovery (number found dead per 100 km of beach covered) of *Pelecanoides urinatrix* during 1943-1988

penguins each year. Most of the 1989 penguins were found on Auckland East (1359) and Bay of Plenty (640) beaches, 1430 of them in January (Table 4). Increased mortality in summer is quite common for the Blue Penguin (Powlesland 1984). It coincides with fledglings first entering the sea. Possibly, poor food supplies and/or sustained rough seas resulted in poor foraging success for the fledglings and contributed to their high mortality.

The 1989 tally of Grey-faced Petrels (Pterodroma macroptera gouldi) was 167, surpassing the previous highest annual total of 118 in 1981. Generally 30-70 Grey-faced Petrels are found each year. Of the 167 petrels picked up in 1989, all but 13 were found on Auckland East (58) and Bay of Plenty (96) beaches (Table 3). As for the Blue Penguin, a large proportion (71%) of the 1989 Grey-faced Petrels were found in January (Table 4). Fledglings go to sea from about 8 December to 20 January. Most adults (non-breeders, failed or early successful breeders) by then have gone far to the southeast or southwest (south Tasman Sea) to moult and so would probably not have been involved in the 1989 wreck (Imber 1985, pers. comm.). Even the few adults still feeding chicks in January go far to the southeast to forage (east of Wellington and south to Otago)(M.J. Imber, pers. comm.). However, the late fledglings, which tend to be weaker than early fledglings, would be particularly vulnerable to sustained rough weather.

Miscellaneous birds

Birds other than seabirds recovered in 1989 totalled 210. There were 57 Australian Magpies, 23 Mallards, 16 Black Swans, 13 Blackbirds, 12 South

Island Pied Oystercatchers, seven Rock Pigeons, six each of domestic geese and Australasian Harriers, five each of White-faced Herons, Canada Geese, Paradise Shelducks, Variable Oystercatchers and Eastern Bar-tailed Godwits, four each of Grey Ducks, duck species, Pukekos and Starlings, three each of Sacred Kingfishers, Tuis and Common Mynas, two each of Mute Swans, Wild Turkeys and domestic fowls, and one each of Reef Heron, Cattle Egret, California Quail, Western Weka, Pied Stilt, Spur-winged Plover, Shining Cuckoo, Spine-tailed Swift, Song Thrush, Satin Flycatcher, Yellowhammer, Goldfinch, House Sparrow and passerine species.

RECOVERIES 1943-1988 OF *Pelecanoides, Phaethon* and *Fregata*

The following is a summary of the coastal and monthly distributions of *Pelecanoides, Phaethon* and *Fregata* species found by patrollers during 1943-1988. To test whether the annual pattern of recovery for *Pelecanoides urinatrix* depicted in Figure 1 differed from the theoretical situation whereby an equal number of birds was found each month, we used the Kolmogorov-Smirnov one-sample test (Siegel 1956, p. 47).

COMMON DIVING PETREL (*Pelecanoides urinatrix*)

This distinctive species (small, stocky and short-necked) is circumpolar in distribution, the major breeding concentrations being from north of the Antarctic Convergence to north of the Subtropical Convergence. Two subspecies are in the New Zealand region (Turbott 1990), but they were not distinguished by patrollers. *P. u. urinatrix* breeds on many islands off New Zealand from the Three Kings Islands to the Bay of Plenty, off Taranaki, in Cook Strait and off the Marlborough Sounds, off the southern South Island, Stewart and Codfish Islands, and on Solander, Snares and Chatham Islands (Turbott 1990). By comparison, *P. u. exsul* is known to breed on Auckland, Campbell and Antipodes Islands in the New Zealand region (Marchant & Higgins 1990, A.J.D. Tennyson pers. comm.). Observations at sea suggest that the Common Diving Petrel is sedentary, remaining mainly in seas near the breeding islands. It has been recorded ashore on Chatham Island in every month (Marchant & Higgins 1990). Similarly, Thoresen (1969) and G.A. Taylor (pers. comm.) have recorded birds ashore on the islands of the Mercury Group, east of Coromandel Peninsula, for each month of the non-breeding season, except February, when they moult.

Common Diving Petrels about New Zealand start breeding in spring, but with some variation depending on latitude. For example, those on the Mercury Group laid eggs mainly in August and the nestlings fledged in late November-December (Thoresen 1969), whereas those at Whero Island, Foveaux Strait, laid eggs in late September-early October and the nestlings fledged in January-February (Richdale 1943).

Another species of diving petrel, the South Georgian Diving Petrel (*P. georgicus*), is also in the New Zealand region, breeding only on Codfish Island, Foveaux Strait. However, because only about 40 pairs breed there (Imber & Nilsson 1980, West & Imber 1989), it is not surprising that patrollers have found none. If they lay eggs in November (Dell 1950), the young can be expected to fledge in late February-March (Marchant & Higgins 1990).

Thus, patrollers of Southland beaches are most likely to find them in late summer.

From 1943 to 1988, 11 472 Common Diving Petrels were found at a rate of 16.1 birds per 100 km of beach covered. This species was the fifth most numerous found by patrollers during 1943-1987 (Powlesland 1990). The most found in a year was 3593 in 1975, followed by 1174 in 1986, but generally 100-400 were found per annum. Bay of Plenty had the highest rate of recovery at 32.4 diving petrels per 100 km of beach covered, followed by Taranaki (29.3), Wellington South (19.8), Auckland East (18.6), Wellington West (17.9), Auckland West (15.5) and Southland (14.2). The remaining coastal regions had recovery rates of 0.3 to 3.5 diving petrels per 100 km of beach covered.

The monthly rate of recovery of Common Diving Petrels changed markedly during the year ($p \leq 0.01$). From a low of 1.2 birds per 100 km in March, the rate of recovery increased to a peak of 60.6 birds in July (Figure 1). Many of these July birds died in a wreck in 1975. Thus, this peak in mortality probably resulted from a combination of poor food supplies in winter and severe storms weakening the birds. The lesser peak of recoveries in December-January coincides with the departure of fledglings from their colonies.

RED-TAILED TROPICBIRD (*Phaethon rubricauda*)

In the New Zealand region, the Red-tailed Tropicbird nests only on the Kermadec Islands. Although a few birds are about Raoul and Macauley Islands in winter, most remain at sea. Courtship flights over the breeding islands start in September and reach a peak in November-December. On Norfolk and the Kermadec Islands they nest mainly on the ledges of cliffs near the shore (Tarburton 1979, Marchant & Higgins 1990). Most pairs lay their single-egg clutches between mid-December and mid-January, and the eggs hatch about 45 days later (Marchant & Higgins 1990). The chicks remain at the nest for three months, leaving in April and May. Although the birds disperse widely from their breeding sites in winter, they remain over tropical and subtropical waters, well north of New Zealand.

During 1943-1988, patrollers found five Red-tailed Tropicbirds. The results for these birds are: 1963, AW, October; 1984, AW, April; 1987, AW, February; 1988, AE, October; and 1988, Macauley Island of the Kermadec Group (OI), September. In addition, there are 18 other reports of Red-tailed Tropicbirds during the period 1877-1988 being found or seen about New Zealand (Marchant & Higgins 1990). All of these reports have been of birds near the Three Kings Islands or about the North Island. Most have been seen in summer, mainly after northerly gales. That tropicbirds forced south from their usual foraging zone are regular, even if infrequent, was known by North Cape Maori, who searched the nearby beaches for Amokura (tropicbirds) for their prized tail streamers (Best 1942).

WHITE-TAILED TROPICBIRD (*Phaethon lepturus*)

The White-tailed Tropicbird is a straggler to New Zealand. It inhabits tropical waters of the central and western Pacific Ocean, southern Indian

and Atlantic Oceans, and Caribbean Sea. White-tailed Tropicbirds breed on many south-western Pacific islands (Marchant & Higgins 1990). The nearest breeding site to New Zealand is Niue Island. The breeding season of the White-tailed Tropicbird there probably encompasses the entire year, with eggs from February to at least September and fully fledged chicks from May to at least November (Kinsky & Yaldwyn 1981). The species has been seen regularly in the Coral Sea (Marchant & Higgins 1990), about Fiji, and between Fiji and New Zealand to 21°S (Lovegrove 1978). However, few White-tailed Tropicbirds have reached New Zealand, the first being found in 1973.

During 1943-1988, patrollers found 10 White-tailed Tropicbirds. The results for these birds are: 1973, BP, January; 1979(3), AW(2) and TA(1), February(2) and June(1); 1983(3), AW, March, April and May; 1985, AE, December; and 1986(2), AE, January. Most of these birds were found after strong northerly winds in summer which, presumably, forced them south to our coasts. In contrast to the Red-tailed Tropicbirds, all the White-tailed found in New Zealand were dead. At least five were immature.

LESSER FRIGATEBIRD (*Fregata ariel*)

This species breeds on islands off Western Australia, Queensland, Fiji, New Caledonia and other locations in the Pacific Ocean (Newman & Kinsky 1985). It has a protracted breeding season, which varies between localities to the extent that nesting occurs year round. After breeding it disperses widely over tropical waters of the Indian and western and central Pacific Oceans. It is a vagrant to New Zealand, the first being found at Kaipara Harbour (AW) in 1907. Since then 17 more have been reported, mainly in January-March (Marchant & Higgins 1990). In this period tropical cyclones are most likely to reach New Zealand, perhaps forcing frigatebirds south to New Zealand. Both Lesser Frigatebirds found by beach patrollers were recovered from Ninety Mile Beach (AW) in January 1971 and November 1983.

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LITERATURE CITED

BEST, E. 1942. Forest Lore of the Maori. Dom. Mus. Bull. 14. Wellington: Govt Printer.

DELL, R.K. 1950. Birds of Codfish Island. NZ Bird Notes 3: 231-235.

HEATHER, B.D.; SHEEHAN, P.M. 1990. Fifty Years of Bird Study in New Zealand: an Index to Notornis 1939-1989. Lower Hutt: Ornithological Society of New Zealand Inc.

IMBER, M.J. 1985. Grey-faced Petrel. *In* Complete Book of New Zealand Birds. Sydney: Reader's Digest.

IMBER, M.J.; NILSSON, R.J. 1980. South Georgian Diving Petrels (*Pelecanoides georgicus*) breeding on Codfish Island. Notornis 27: 325-330.

KINSKY, F.C.; YALDWYN, J.C. 1981. The bird fauna of Niue Island, south-west Pacific, with special notes on the White-tailed Tropic Bird and Golden Plover. Nat. Mus. NZ Misc. Ser. 2.

LAMEY, T.C. 1990. Snares Crested Penguin in the Falkland Islands. Notornis 37: 78.

LOVEGROVE, T.G. 1978. Seabird observations between New Zealand and Fiji. Notornis 25: 291-298.

MARCHANT, S.; HIGGINS, P.J. (co-ordinators). 1990. Handbook of Australian, New Zealand & Antarctic Birds. Vol. 1, ratites to ducks. Melbourne: Oxford University Press.

NEWMAN, D.G.; KINSKY, F.C. 1985. Lesser Frigatebird. In Complete Book of New Zealand Birds. Sydney: Reader's Digest.

POWLESLAND, R.G. 1984. Seabirds found dead on New Zealand beaches in 1982 and a review of penguin recoveries since 1960. Notornis 31: 155-171.

POWLESLAND, R.G. 1985. Seabirds found dead on New Zealand beaches in 1983 and a review of albatross recoveries since 1960. Notornis 32: 23-41.

POWLESLAND, R.G. 1989. Seabirds found dead on New Zealand beaches in 1986, and a review of *Pachyptila* species recoveries since 1960. Notornis 36: 125-140.

POWLESLAND, R.G. 1990. Beach Patrol Scheme. Pages 20-23 *in* A Flying Start. B.J. Gill & B.D. Heather (eds). Auckland: Random Century.

POWLESLAND, R.G.; IMBER, M.J. 1988. OSNZ Beach Patrol Scheme: information and instructions. Notornis 35: 143-153.

RICHDALE, L.E. 1943. The Kuaka or Diving Petrel (*Pelecanoides urinatrix*)(Gmelin). Emu 43: 24-48, 97-107.

SIEGEL, S. 1956. Nonparametric Statistics for the Behavioural Sciences. International student edition. Tokyo: McGraw-Hill Kogakusha Ltd.

TARBURTON, M.K. 1979. Nesting habits and population status of the Red-tailed Tropicbird (*Phaethon rubricauda*) on Norfolk Island. Aust. Seabird Group Newsl. 12: 22-25.

THORESEN, A.C. 1969. Observations on the breeding behaviour of the Diving Petrel *Pelecanoides u. urinatrix* (Gmelin). Notornis 16: 241-260.

TURBOTT, E.G. (convener) 1990. Checklist of the Birds of New Zealand and the Ross Dependency, Antarctica. 3rd ed. Auckland: Random Century.

WARHAM, J. 1974. The breeding biology and behaviour of the Snares Crested Penguin. J. Roy. Soc. NZ 4: 63-108.

WEST, J.; IMBER, M.J. 1989. Surveys of South Georgian Diving Petrels (*Pelecanoides georgicus*) on Codfish Island. Notornis 36: 157-158.

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SHORT NOTE

Brown Booby on Farewell Spit gannet colony

On the evening of 6 January 1992, we walked from the lighthouse out to the Australasian Gannet (*Morus serrator*) colony on the Farewell Spit shellbanks. The weather was fine with a light westerly. While still about 1 km from the colony we noticed a large number of gannets in the air, which was extremely unusual. We were too far away to have been the cause. With binoculars HS saw a dark bird among the gannets, which we decided was unlikely to be a juvenile gannet as that would hardly cause such agitation. As we got closer HS identified the bird as a Brown Booby (*Sula leucogaster*), with which he was familiar in Australia.

Eventually we had very good views both on the ground and in the air from some 50 m. The booby was being harassed by the gannets and by the Caspian Terns (*Sterna caspia*) which have a colony alongside the gannets. A Caspian Tern was seen to grab the booby's wing with its bill, while both birds were in flight. While we were watching, the booby landed beside the gannets several times, when the gannets would calm down slightly, but whenever the booby was in the air it was swamped by a cloud of noisy, agitated gannets and Caspian Terns.

There was heavy rain the following morning and when we visited the colony in the early afternoon the booby was no longer there.

This is the first Brown Booby record for Farewell Spit.

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