

# SEABIRDS FOUND DEAD ON NEW ZEALAND BEACHES IN 1987, AND A REVIEW OF *PROCELLARIA* SPECIES RECOVERIES SINCE 1960

By R. G. POWLESLAND

## ABSTRACT

In 1987, 3776 kilometres of coast were patrolled and 4124 dead seabirds were found, well below the average for the previous 17 years (10 624). Unusual finds were a White-bellied Storm Petrel (*Fregetta grallaria*), a Kermadec Petrel (*Pterodroma neglecta*) and a Red-tailed Tropicbird (*Phaethon rubricauda*).

A summary is given of the coastal and monthly distributions for *Procellaria* species found during the 1960-1986 period. The most frequently recovered species was the Black Petrel (*P. parkinsoni*), the number found annually varying markedly.

## INTRODUCTION

This paper records the results of the Ornithological Society of New Zealand's Beach Patrol Scheme for 1987. All sections of coast were patrolled except Fiordland. Some beaches on the Chatham Islands were patrolled and the results for these are given under the heading "Outlying Islands". In total, 563 Beach Patrol Cards and 10 Specimen Record Cards were submitted.

Kilometres "travelled" are the total lengths of coast patrolled; kilometres "covered" are the lengths of coast patrolled monthly. Hence, if 1 km 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 see Powlesland & Imber (1988).

The nomenclature used is that of Kinsky (1970, 1980), except that I have followed Imber (1985a) for the Kerguelen Petrel (*Lugensa brevirostris*).

## RESULTS AND DISCUSSION

In 1987, the total length of coast travelled was 3776 km and 4124 seabirds were found by 238 members of the Ornithological Society of New Zealand and their friends. The average number of birds per kilometre of coast covered was 1.15 (Table 1). The total distance travelled was slightly less than the average (3954) for the past 17 years (1970-1986), but much fewer birds were found (average 10 624). Only in the period 1960-1969, when much less patrolling was done (average = 1569 km travelled per year), were fewer than 4000 birds found in a year (average = 2283 birds). The average number of birds found per kilometre covered in 1987 (1.15) was also much less than for the previous 17 years (3.1). In addition, 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. Table 2 gives the coastal and monthly distributions of the less commonly found species (1-20 birds in 1987), and Tables 3 and 4 give these for the more commonly found species.

TABLE 1 — Numbers of dead seabirds recovered and kilometres covered on each coast in 1987

COAST	CODE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL KM	BIRDS	BIRDS/KM /COAST
AUCKLAND WEST	KH BIRDS	213	153	197	162	158	170	130	183	172	120	143	112	1913	1497	0.78
	KM BIRDS	190	135	78	95	108	88	115	37	201	144	118	188			
TARANAKI	KH BIRDS	51	6	7	7	18	14	13	10	6	13	3	6	124	126	1.02
	KM BIRDS	51	8	2	14	13	7	12	6	6	23	-	4			
WELLINGTON WEST	KH BIRDS	14	31	6	36	45	40	23	38	61	22	4	60	380	938	2.47
	KM BIRDS	24	169	18	51	46	51	29	77	192	77	5	199			
AUCKLAND EAST	KH BIRDS	107	12	51	18	41	10	35	45	17	20	16	20	402	530	1.32
	KM BIRDS	122	17	35	21	37	8	32	38	18	27	53	122			
BAY OF PLENTY	KH BIRDS	35	10	3	11	8	7	3	15	8	14	10	26	150	206	1.37
	KM BIRDS	36	7	2	2	2	3	3	22	5	31	10	78			
EAST COAST NI	KH BIRDS	1	14	14	26	14	12	15	26	10	14	18	1	165	175	1.06
	KM BIRDS	3	11	15	20	6	10	17	52	2	8	27	4			
WAIKARAPAPA	KH BIRDS	6	-	-	-	-	-	-	6	6	-	-	-	18	6	0.33
	KM BIRDS	1	-	-	-	-	-	-	5	-	-	-	-			
WELLINGTON SOUTH	KH BIRDS	-	5	32	-	2	50	35	17	8	1	1	-	151	132	0.87
	KM BIRDS	-	10	58	-	1	16	19	10	15	2	1	-			
NORTH COAST ST	KH BIRDS	-	-	-	-	-	-	-	1	4	1	-	4	35	35	1.00
	KM BIRDS	-	-	-	-	-	-	-	7	1	-	8	18			
WESTLAND	KH BIRDS	-	4	-	1	-	6	-	-	4	-	-	4	19	6	0.32
	KM BIRDS	-	-	-	2	-	2	-	-	-	-	-	1			
CANTERBURY NORTH	KH BIRDS	4	-	2	-	-	-	30	6	1	-	18	11	72	310	4.31
	KM BIRDS	10	-	4	-	-	-	153	12	5	-	105	21			
CANTERBURY SOUTH	KH BIRDS	1	-	-	-	10	-	20	-	1	1	1	-	34	73	2.15
	KM BIRDS	9	-	-	-	28	-	31	-	1	2	2	-			
OTAGO	KH BIRDS	10	7	8	6	12	9	6	6	6	8	8	8	94	57	0.61
	KM BIRDS	10	12	5	-	4	4	-	-	-	4	7	11			
SOUTHLAND	KH BIRDS	5	-	1	-	-	-	-	-	-	-	-	-	7	23	3.29
	KM BIRDS	12	-	10	-	-	-	-	-	-	-	-	-			
OUTLYING ISLANDS	KH BIRDS	3	-	1	-	-	-	-	-	-	-	2	11	17	10	0.59
	KM BIRDS	2	-	1	-	-	-	-	-	-	-	6	1			
TOTAL KILOMETRES TRAVELLED		444	263	331	266	321	329	333	367	310	242	243	327	3776		
TOTAL KILOMETRES COVERED		420	242	322	267	308	318	317	356	295	215	237	284	3581		
TOTAL SEABIRDS RECOVERED		450	369	228	210	245	189	412	266	447	324	337	647		4124	
BIRDS/KM COVERED/MONTH		1.07	1.52	0.71	0.79	0.80	0.59	1.30	0.75	1.52	1.51	1.42	2.28		1.15	

### Unusual finds

A Kermadec Petrel picked up from Anawhata Beach (AW) in September is only the third record for the Scheme (Table 2). The previous specimens were found on Auckland West beaches too; Muriwai Beach in April 1981 and Maunganui Bluff Beach in March 1986. This species' nearest breeding locality is at the Kermadec Islands on Macauley and the Herald Islands (Kinsky 1970). Considering that Kermadec Petrels nest throughout the year on the Herald Islets (Falla et al. 1979), it is interesting that only three birds have been found on New Zealand beaches. They are not seen at sea off the New Zealand coast, and the Tasman Front (Heath 1985) seems to limit them in normal conditions to warm, unmixed waters of subtropical origin (J.A. Bartle, pers. comm.).

TABLE 2 — Seabirds of which 1 to 13 specimens were found in 1987

SPECIES OR SUBSPECIES	NUMBER FOUND	COAST(S)	MONTH(S)
<i>Megadyptes antipodes</i>	6	WS, OT(4), SD.	MAR(2), MAY, JUN(2), NOV.
<i>Eudyptula minor albosignata</i>	8	WS(2), CN(5), OT.	FEB, JUN, JUL(2), AUG, OCT, DEC(2).
<i>Eudyptes chrysocome</i>	1	OI.	MAR.
<i>pachyrhynchus</i>	3	WW(2), WD.	SEP, DEC(2).
<i>sclateri</i>	1	OT.	FEB.
<i>Diomedea exulans</i>	5	AW(2), TA, WS(2).	FEB, MAR(2), MAY, OCT.
<i>epomophora</i>	3	WW, WS, OI.	MAR, MAY, OCT.
<i>melanophrys</i>	4	AW(4).	MAY, SEP, NOV(2).
<i>bulleri</i>	7	AW(7).	MAR, APR, MAY, JUN, JUL(3).
<i>cauta</i> subsp.*	4	AW(2), WW(2).	OCT(2), DEC(2).
<i>salvini</i>	3	WW, BP, WS.	JUN, OCT, DEC.
<i>Phoebastria palpebrata</i>	5	AW(4), WW.	JUN(3), SEP(2).
<i>Thalassoica antarctica</i>	9	AW(4), TA(2), WW(3).	JUL, SEP(7), OCT.
<i>Pterodroma</i> spp.*	7	AW(3), TA(2), BP, WS.	MAR(2), APR, JUL, OCT(2), NOV.
<i>neglecta</i>	1	AW.	SEP.
<i>pycrofti</i>	1	AE.	DEC.
<i>nigripennis</i>	6	AW(6).	JAN, FEB(2), MAR, DEC(2).
<i>Pachyptila salvini</i>	13	AW(6), WW(3), AE, EC(3).	JAN, APR, MAY, JUN(2), JUL(2), AUG(4), SEP, DEC.
<i>crassirostris</i>	11	EC(3), CN(2), CS(6).	JUL(8), AUG(3).
<i>Procellaria</i> spp.*	1	WW.	APR.
<i>cinerea</i>	1	AW.	AUG.
<i>parkinsoni</i>	7	TA, AE(6).	APR(2), JUN, DEC(4).
<i>westlandica</i>	4	AW(4).	JAN(3), DEC.
<i>aequinoctialis</i>	5	AW(3), EC, CN.	FEB, MAR, NOV(2), DEC.
<i>Puffinus pacificus</i>	2	AW, AE.	MAR, NOV.
<i>gavia/huttoni</i>	13	WS, CN(9), CS(3).	JAN(3), JUN, JUL(4), NOV(5).
<i>Fregatta grallaria</i>	1	OT.	JUN.
<i>Phaethon rubricauda</i>	1	AW.	FEB.
<i>Phalacrocorax</i> spp.*	3	AW, AE, BP.	JAN, MAY, OCT.
<i>sulcirostris</i>	4	WW, AE(2), BP.	JAN, FEB, JUN, JUL.
<i>brevirostris</i>	9	AW(4), AE, EC(2), OT(2).	JAN, FEB, MAY(2), JUN, JUL, AUG, OCT, DEC.
<i>Leucocarbo carunculatus chalconotus</i>	7	OT(6), SD.	JAN, FEB, MAR(4), NOV.
<i>Stercorarius skua lonnbergi</i>	1	OI.	JAN.
<i>parastiticus</i>	2	AW, CS.	MAR, MAY.
<i>Hydroprogne caspia</i>	12	AW(4), AE(6), BP, NC.	JAN, MAY, JUN, AUG, SEP(2), OCT, NOV(3), DEC(2).
TOTAL	171		

\* Species or subspecies was not identified by the patroller.

Presumably it takes exceptionally strong north-easterly winds to blow these birds as far south as New Zealand.

Eleven Fulmar Prions (*Pachyptila crassirostris*) were found in 1987. Only in 1985 (63) and 1986 (16) were more Fulmar Prions found in a year. The 1987 prions were found on East Coast North Island (3), Canterbury North (2) and Canterbury South (6) beaches in July (8) and August (3). From bill measurements, J.A. Bartle and M.J. Imber (pers. comm.) thought most of these prions immatures of the *pyramidalis* subspecies from the Chatham Islands. For a review of the Fulmar Prions found before 1987, see Powlesland (1989).

A White-bellied Storm Petrel found on Hampden Beach (OT) in June

TABLE 3 — Coastal distribution of the seabirds more commonly found dead in 1987

SPECIES OR SUBSPECIES	COASTS											TOTAL BIRDS				
	AW	TA	WV	AE	BP	EC	WA	MS	NC	WD	CN		CS	OT	SD	OI
<i>Eudyptula minor</i> subsp.*	113	11	58	100	37	4	1	9	10	-	2	1	10	4	3	363
<i>Dionedeia</i> spp.*	3	-	7	1	-	-	-	3	-	-	-	-	-	-	-	14
<i>Chrysoloma chrysoloma</i>	20	-	7	1	-	-	-	3	-	-	-	-	-	-	-	23
<i>Caula cauta</i>	20	-	7	1	-	-	-	3	-	-	-	-	-	-	-	31
Macronectes spp.*	21	1	3	-	2	-	-	1	-	1	-	-	-	-	-	29
<i>Fulmarus glacialisoides</i>	43	-	13	-	-	-	-	2	-	-	-	-	-	-	1	59
<i>Option capense</i>	18	1	7	2	1	5	-	3	-	-	5	-	1	-	-	43
<i>Lugenia brevirostris</i>	40	3	14	4	-	-	-	1	-	-	1	-	-	-	-	63
<i>Pterodroma macraptera</i>	18	3	2	3	7	-	-	-	-	-	-	-	-	-	-	33
<i>Lessoni's</i>	58	6	9	1	-	-	-	1	-	1	-	1	-	-	-	77
<i>Inespectata cookii</i>	16	6	2	-	-	1	-	-	-	-	-	-	-	-	-	19
Halobaena caerulea	5	-	2	20	-	-	-	-	-	-	-	-	-	-	-	27
<i>Pachyptila</i> spp.*	41	7	206	2	1	-	-	9	-	1	3	9	2	7	-	284
<i>Puffinus</i> spp.*	18	8	10	1	1	6	-	1	-	1	5	-	2	-	-	28
<i>Cornelias</i>	14	1	3	-	2	3	-	1	-	1	5	-	1	-	-	20
<i>bulleri</i>	108	11	204	36	18	37	3	7	5	-	83	14	-	2	1	529
<i>griseus</i>	5	1	2	-	1	-	-	-	-	-	3	8	-	-	-	19
<i>huttoni</i>	17	-	1	38	12	1	-	-	-	-	-	-	-	-	-	69
<i>astimilis</i>	59	5	22	27	6	6	-	13	-	-	-	-	-	-	-	138
<i>Puffinus</i> spp.*	158	9	44	58	19	18	-	5	2	-	38	12	2	4	2	371
<i>griseus</i>	152	12	46	41	12	1	-	2	-	-	2	1	1	-	-	358
<i>huttoni</i>	10	25	1	1	2	-	-	2	-	-	2	1	1	-	-	44
<i>astimilis</i>	6	1	4	2	4	-	-	-	-	-	1	-	-	-	-	18
<i>Pterodroma</i> spp.*	5	-	-	1	8	-	-	-	-	-	-	-	-	-	-	14
<i>Pelecanoides urinatrix</i>	38	4	46	36	28	2	-	5	-	2	-	-	-	-	-	161
<i>Sula bassana</i>	141	9	4	55	14	15	-	3	2	-	-	-	-	-	-	243
<i>Phalacrocorax carbo</i>	5	-	5	3	3	1	2	1	2	-	2	-	-	-	-	22
<i>varius</i>	11	-	-	26	5	-	-	2	-	1	-	-	-	-	-	45
<i>Stictocarbo punctatus punctatus</i>	1	1	-	-	-	-	-	-	3	-	20	6	3	-	-	34
<i>Larus</i> spp.*	120	21	103	26	6	47	1	35	6	1	14	2	15	1	-	432
<i>domesticus</i>	20	4	7	0	10	7	-	7	-	-	23	1	6	-	-	71
<i>delawarensis</i>	-	2	2	2	-	-	-	-	-	-	4	1	1	3	-	20
<i>bulleri</i>	-	3	3	4	2	3	-	3	1	-	7	2	-	-	-	48
<i>Sterna striata</i>	20	3	3	4	2	3	-	3	1	-	7	2	-	-	-	48
TOTALS	1437	120	924	512	201	166	6	123	34	4	293	63	42	21	7	3953

\* Species or subspecies was not identified by the patronier.

(Table 2) is the second record for the Scheme. The first specimen was found on Piha Beach (AW) in May 1985. For a brief review of the biology of this storm petrel and of specimens found but not reported on beach patrol cards, see Powlesland (1987).

The other unusual find was a Red-tailed Tropicbird, which was found on Ninety Mile Beach (AW) in February. Only two specimens of this species have been found previously by patrolers; Toreparu Beach (AW) in October 1963

TABLE 4 — Monthly distribution of the seabirds more commonly found dead in 1987

SPECIES OR SUBSPECIES	MONTH												TOTAL BIRDS
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
<i>Eudiptula minor</i> subsp.*	72	34	25	7	16	10	7	22	21	22	18	109	363
<i>Diomedea</i> spp.*	-	-	2	1	3	2	1	2	1	-	-	2	14
<i>chrysostrona</i>	1	-	-	-	-	-	7	3	8	3	1	-	23
<i>cauta cauta</i>	2	1	1	2	5	8	4	-	1	3	1	3	31
<i>Macronectes</i> spp.*	1	1	-	1	1	4	8	3	7	2	-	-	29
<i>Fulmarus glacialisoides</i>	-	-	-	-	-	-	6	-	23	20	6	4	59
<i>Daption capense</i>	1	1	-	-	-	1	6	5	13	4	7	5	43
<i>Lugensa brevirostris</i>	3	-	-	-	-	-	20	6	20	12	-	2	63
<i>Pterodroma macroptera</i>	11	5	-	3	-	4	-	2	2	1	-	5	33
<i>lessonii</i>	2	3	1	2	1	5	4	2	26	25	1	5	77
<i>inexpectata</i>	3	5	2	-	1	-	-	-	-	-	-	8	19
<i>cookii</i>	5	1	1	1	1	-	-	-	-	2	7	9	27
<i>Halobaena caerulea</i>	-	-	-	-	-	1	7	2	31	9	5	1	56
<i>Pachyptila</i> spp.*	11	57	15	10	10	13	14	19	71	24	5	35	284
<i>vittata</i>	1	1	2	3	-	2	1	1	3	4	-	10	28
<i>desolata</i>	-	-	-	3	1	-	-	1	5	5	1	1	21
<i>halcheri</i>	1	-	-	-	-	1	8	7	2	1	-	-	20
<i>turtur</i>	33	82	11	4	9	8	121	84	81	36	19	41	529
<i>Puffinus</i> spp.*	3	-	1	2	6	-	2	2	-	-	1	2	19
<i>carneipes</i>	5	4	10	8	6	3	2	-	-	5	1	25	69
<i>bulleri</i>	15	18	15	13	13	9	-	1	1	22	15	16	138
<i>griseus</i>	43	17	16	17	43	11	4	1	6	24	92	97	371
<i>tenuirostris</i>	20	6	-	4	9	1	4	-	1	2	1	10	158
<i>gavia</i>	50	33	10	37	31	10	20	12	14	16	29	30	292
<i>huttoni</i>	2	1	2	-	1	1	-	-	12	16	6	3	44
<i>assimilis</i>	4	-	1	-	-	-	-	-	5	-	2	5	18
<i>Pelagodroma marina</i>	6	1	1	1	-	-	1	-	1	1	1	1	14
<i>Pelecanoides urinatrix</i>	42	8	2	2	8	10	16	12	12	8	12	29	161
<i>Sula bassana</i>	35	15	21	16	22	8	33	13	18	30	17	15	243
<i>Phalacrocorax carbo</i>	1	1	2	-	2	1	4	2	3	2	2	2	22
<i>varius</i>	6	-	-	3	2	3	4	4	3	4	10	6	45
<i>Stictocorbo punctatus punctatus</i>	3	-	-	-	2	1	6	5	1	1	14	1	34
<i>Larus</i> spp.*	-	-	-	-	-	-	14	1	-	-	-	-	15
<i>dominicanus</i>	33	46	46	53	32	44	41	31	33	7	30	36	432
<i>novaehollandiae</i>	11	17	14	4	4	3	13	6	6	2	8	3	91
<i>bulleri</i>	5	-	-	4	2	2	4	-	-	1	-	-	20
<i>Sterna striata</i>	5	1	10	3	3	4	4	2	1	2	9	4	48
TOTAL	436	359	211	204	234	174	388	255	432	312	321	627	3953

\* Species or subspecies was not identified by the patroller.

and Maunganui Bluff Beach (AW) in April 1984. However, a few other Red-tailed Tropicbirds have been reported: Lake Taupo in February 1936, Muriwai Beach in May 1942 and off Taranaki in April 1961 (Kinsky 1970).

In the New Zealand region, the Red-tailed Tropicbird nests only on the Kermadec Islands. Although a few birds return to Raoul Island in winter, most remain at sea. They return to the island at the end of October and during November, and on Norfolk Island nest mainly on the ledges of cliffs near the

shore (Tarburton 1979). Between mid-December and mid-January a single egg is laid, which hatches about one month later. The chicks remain at the nest for three months, leaving in April and May. Although the birds disperse from their breeding sites in winter, they remain in tropical and subtropical waters, well north of New Zealand. Specimens on New Zealand beaches have been found mainly after northerly gales, which presumably forced the birds south from their usual foraging zone. That this occurs regularly, even if infrequently, was known by the North Cape Maori, who searched the nearby beaches for Amokura (tropicbirds) to obtain their prized tail streamers (Best 1942, Newman & Kinsky 1985).

A feature of the 1987 results was the very low rate at which dead seabirds were found in August (Table 1), when only 37 were recovered on Auckland West beaches from 183 km travelled. The monthly rate of recovery is often greatest in August (Powlesland 1986, 1989). Probably this result can be explained by the milder than usual weather in July and August 1987 (Hickman 1987). South-westerlies prevailed in July, particularly in the first 10 days over the South Island. In August a notable feature was the lack of strong, cold southerly winds. Although south-westerly winds prevailed on to North Island beaches, these winds were less frequent and weaker than usual.

### Miscellaneous birds

Birds other than seabirds recovered in 1987 totalled 222. There were 73 magpies, 19 Mallards, 13 Black Swans, 11 duck species, nine Pukekos, eight each of South Island Pied Oystercatchers, Rock Pigeons and Goldfinches, six each of Starlings and Indian Mynas, five each of Western Wekas and Knot, four each of domestic geese, Paradise Shelducks, Grey Ducks and Australasian Harriers, three each of Cattle Egrets, New Zealand Pigeons, passerine species and Tuis, two each of Royal Spoonbills, Canada Geese, Variable Oystercatchers, North Island Kakas, New Zealand Kingfishers and Blackbirds, and one each of Mute Swan, New Zealand Shoveler, California Quail, pheasant, Wrybill, Bar-tailed Godwit, Morepork, New Zealand Pipit, Grey Warbler, Greenfinch and House Sparrow.

### *Procellaria* RECOVERIES 1960-1986

The following is a summary of the coastal and monthly distributions of the *Procellaria* species found by patrollers in the past 28 years. To test whether the annual pattern of recovery for each species depicted in Figure 1 differed from the theoretical situation whereby an equal number of birds were found each month, I used the Kolmogorov-Smirnov one-sample test (Siegel 1956, p. 47).

In total, 420 *Procellaria* petrels were found between 1960 and 1986, of which only 14 were not identified to species. The remaining 406 comprised all four *Procellaria* species (Table 5).

### GREY PETREL *P. cinerea*

In the New Zealand region, the Grey Petrel breeds on Antipodes Island,

TABLE 5 — Monthly rate of recovery (number found dead per 100 km of beach covered) of four *Procellaria* species during 1960-1986

SPECIES	AW	TA	WW	AE	BP	EC	WS	NC	WD	CN	CS	OT	SD
<i>P. cinerea</i>	0.17	0.06	0.05	0.03	0.54	0.11	0.09	-	-	0.05	0.06	-	-
<i>P. parkinsoni</i>	0.09	-	0.02	1.11	0.34	-	0.03	0.14	-	-	-	0.06	-
<i>P. westlandica</i>	0.17	0.03	0.06	-	-	-	0.61	0.28	0.17	0.10	0.13	-	0.08
<i>P. aequinoctialis</i>	0.23	-	0.04	0.02	0.07	0.22	0.21	-	-	0.10	0.06	-	0.17

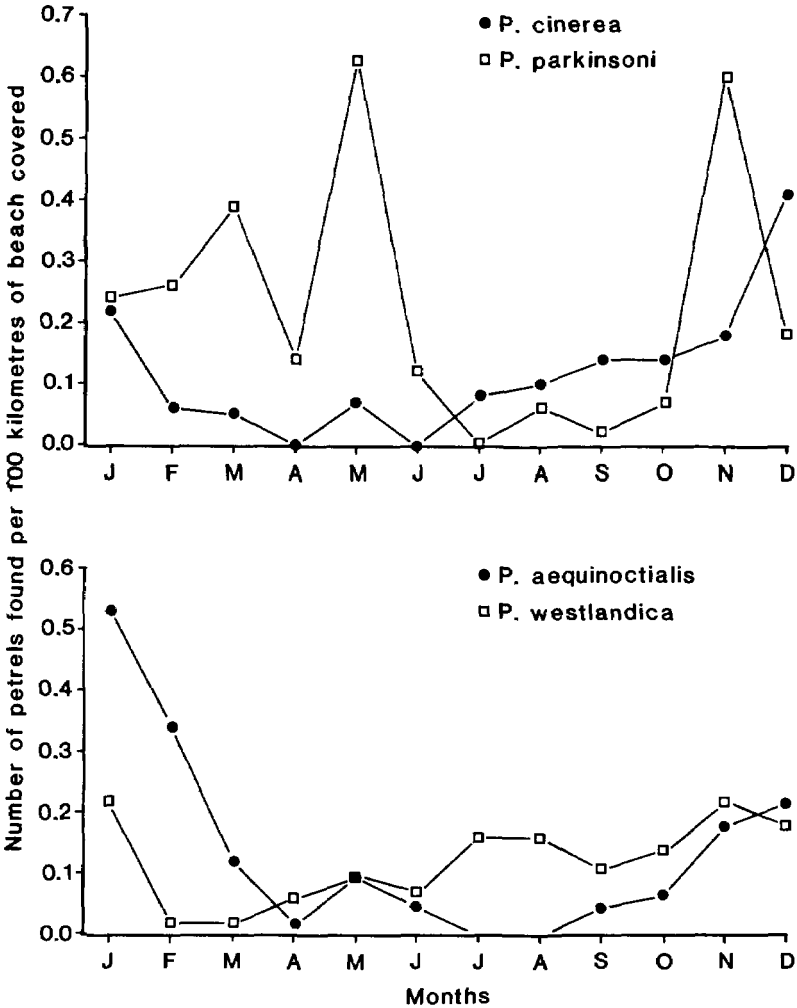


FIGURE 1 — Monthly rate of recovery (number found dead per 100 km of beach covered) of four *Procellaria* species during 1960-1986

Bollons Island, Campbell Island and Jacquemart Island (Warham & Imber 1985). In addition, there seems little doubt that the species formerly nested on Macquarie Island (Warham 1969, Brothers 1984). Beyond the New Zealand region, Grey Petrels nest on Gough Island and the Tristan da Cunha group in the South Atlantic Ocean, and on the Crozet, Prince Edward, Marion and Kerguelen Islands in the Southern Indian Ocean (Warham & Imber 1985).

This petrel is a winter breeder but no major study of its breeding biology has been made. From the few sightings of adults and fledglings on Bollons and Antipodes Islands (Warham & Bell 1979, Imber 1983) it seems that the timing of the breeding cycle approximates that of the birds at Gough and Tristan da Cunha (Imber 1983). At Tristan da Cunha, the Grey Petrel has a long egg-laying period, extending from early April to June, and the chicks depart in October and November (Elliott 1957). The Grey Petrels on the more southerly Crozet Islands (Jouventin *et al.* 1985) nest about a month earlier than those on Tristan da Cunha.

During 1960-1987, patrollers found 83 Grey Petrels. About four petrels were found per year from 1970 to 1986, the lowest and highest annual totals being zero in 1979 and 10 in 1971. Overall, the average rate of recovery was 0.12 birds per 100 km of coast covered. Of the coastal regions, Bay of Plenty had the highest rate of recovery (0.54 birds / 100 km of coast covered), followed by Auckland West (0.17) and East Coast North Island (0.11) (Table 5). This result probably reflects the dispersal of Grey Petrels from the large colony on Antipodes Island to the northeast of New Zealand, rather than into the Tasman Sea.

Figure 1 shows that the monthly rate of recovery changed significantly during the year ( $p < 0.01$ ), being greatest in summer and least in autumn. As the chicks leave the colonies in October-November (Elliott 1957, Imber 1983), the summer peak in mortality is probably the result of recently fledged young dying. Mortality is least in autumn possibly because this is the laying period when most Grey Petrels would be at their breeding islands, well away from New Zealand's mainland coasts.

#### BLACK PETREL *P. parkinsoni*

Although this petrel bred on mountain ranges of the North Island and northern South Island in European times (Imber 1987, Olsen 1988), it now breeds only on Little Barrier and Great Barrier Islands in the Hauraki Gulf. The Black Petrel is uncommon, its total numbers being estimated at 3000-4000 birds (Imber 1987). In contrast to the Grey Petrel, the Black Petrel is a summer breeder, returning from winter quarters in the eastern tropical Pacific in October-November (Imber 1987). Eggs are laid in November-January and the young depart mainly in May-June (Imber 1987).

The number of Black Petrels found each year by patrollers has varied markedly. In only two years between 1960 and 1971 was the species found. However, since then Black Petrels have been found each year, except in 1976, the most being 39 in 1984. During 1960-1986, 146 of these petrels were found at an average rate of 0.21 birds per 100 km of beach covered. As expected from the distribution of its breeding colonies, most Black Petrels were found on Auckland East beaches (1.11 birds per 100 km of coast covered). The coast



with the next highest rate of recovery was Bay of Plenty (0.34) (Table 5).

The monthly rate of recovery, as shown in Figure 1, changes significantly through the year ( $p < 0.01$ ). The recoveries of Black Petrels from New Zealand beaches increase in October–November (Figure 1), when the birds first return to Little Barrier Island from their wintering quarters (Imber (1987). Just four birds were found in each of August and October, and only one in September. The August and September corpses were probably late fledglings because chicks have been seen on Little Barrier Island late in July (Imber 1987). The November peak in recoveries may reflect the return of large numbers by then to their breeding sites. Why there should be increased recoveries in March is unknown because mainly breeding adults would be about the breeding islands, the non-breeders having already departed. The high mortality in May coincides with the departure of many chicks to sea.

#### WESTLAND BLACK PETREL *P. westlandica*

The Westland Black Petrel has a very restricted breeding distribution, nesting in coastal forest between the Punakaiki River and Lawson's Creek, north Westland (Best & Owen 1976). In 1972, its total population was estimated at  $8000 \pm 2000$  birds (Bartle 1974), and by 1982 there were  $14,000 \pm 5000$  birds (J.A. Bartle, pers. comm.).

Although the first birds return to the colony in February, it is not until May that eggs are laid (Bartle 1985). The chicks hatch two months later and leave the burrows in November and December (Baker & Coleman 1977, Bartle 1985). During the breeding season Westland Black Petrels range over continental shelf waters between Cape Egmont and Foveaux Strait to the west of New Zealand, and between East Cape and Banks Peninsula to the east (Bartle 1974, 1985). After the breeding season the birds probably disperse eastward because in December 1987 good numbers of Westland Black Petrels, including juveniles, were seen around the Chatham Islands (M.J. Imber, pers. comm.).

Generally, 5–10 Westland Black Petrels have been found annually during the past 10 years, 11 in 1978 being the most. The species had a very poor breeding season in 1978 (J.A. Bartle, pers. comm.) and so more young than usual may have fledged in poor condition that year. From 1960 to 1986, 86 petrels were found at a rate of 0.13 birds per 100 km of coast covered. Of the coastal regions, Wellington South had the greatest rate of recovery (0.61 birds/100 km of coast covered), followed by North Coast South Island (0.28) (Table 5). These results were as expected from the petrel's distribution at sea during the breeding season (Bartle 1985).

The monthly rate of recovery of Westland Black Petrels increased gradually, from a low in February–March to a peak in November–January (Figure 1,  $p < 0.05$ ). During February–March (low rate of recovery) few birds were seen at the colony (Bartle 1985) or about Cook Strait (Bartle 1974). The peak period of mortality in summer coincides with the departure of the nestlings (Bartle 1985). Most beached birds found in December–January on the North Coast South Island are newly fledged birds (J.A. Bartle, pers. comm.).

#### WHITE-CHINNED PETREL *P. aequinoctialis*

The White-chinned Petrel is widespread and abundant throughout the

Southern Ocean, in both the breeding and non-breeding seasons. In the New Zealand region it breeds on Auckland, Adams, Disappointment, Campbell, Dent, Antipodes and possibly Jacquemart Islands. In addition, it breeds at South Georgia, the Falkland Islands, Marion and Prince Edward Islands, Iles Crozet and Kerguelen, and Inaccessible Island (Imber 1985b). At sea the species ranges from Antarctic waters to about 30° S. About New Zealand it is more abundant to the south and east than in the Tasman Sea, reaching the latitude of Cook Strait in summer and the Auckland coasts in winter (Imber 1985b).

No detailed study of the breeding biology of White-chinned Petrels has been made in the New Zealand region. However, the little information about the population on Antipodes Island (Imber 1983) suggests it breeds at the same time as the South Georgian population (Imber 1985b). At Bird Island, South Georgia, White-chinned Petrels return to the island in September and lay eggs about two months later, from mid-November to mid-December (Hall 1987). Eggs hatch in January-February, and the nestlings leave the colonies three months later in April and early May (Hall 1987).

During 1960-1987, patrollers found 91 White-chinned Petrels. About five petrels were found in most years from 1970 to 1986, the highest annual total being 14 in 1983. Overall, the average rate of recovery was 0.13 birds per 100 km of coast covered. Of the coastal regions, Auckland West (0.23 birds/100 km of coast covered), East Coast North Island (0.22) and Wellington South (0.21) had the greatest rates of recovery (Table 5).

Figure 1 shows that the monthly rate of recovery changed significantly during the year ( $p < 0.01$ ), being greatest in summer and least in winter. Given the petrel's annual cycle, the monthly pattern of recovery on New Zealand beaches is unexpected. Instead of a peak in mortality after nestling departure in April-May, the peak apparently coincides with the dispersal of non-breeders into northern waters after hatching in January-February (J.A. Bartle, pers. comm.). Presumably, few birds are found on our beaches in autumn and winter because they disperse mainly to the east (Imber 1985b), where tides and prevailing winds seem less suitable for washing seabirds ashore than on the west coast.

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RALPH G. POWLESLAND, *Science Directorate, Department of Conservation, P. O. Box 10420, Wellington*

## SHORT NOTE

### California Quail distracts a stoat

For 23 years (1926-1951), I was on a farm in the Norsewood district of southern Hawke's Bay. During a farm muster, while waiting for part of the muster to catch up, I was on an elevation overlooking a clearing about 40 metres wide in the scrub. A file of 10-12 California Quail (*Lophortyx californica*) chicks emerged from the scrub and set a swift course for the opposite side of the clearing. About 12-15 paces behind the chicks an adult bird emerged from the scrub and moved hesitantly after the chicks. A third of the way across the clearing it stopped and looked back. A stoat came out of the scrub, following the birds, its nose to the ground.

As soon as the stoat appeared, the adult quail moved off almost at right angles to the direction taken by the chicks. When the stoat reached the point of divergence, it stopped, looked about the clearing, and then continued as before. The adult quail had also stopped. As soon as the stoat moved after the chicks, which had just reached cover across the clearing, the adult ran towards the stoat until 2-3 paces from it.

The stoat hesitated and then made for the adult, which fled but did not fly. Seeing the adult's speed, the stoat returned to the trail of the chicks, but the quail countered by moving back towards the stoat. The stoat seemed confused but, after some hesitation, chased the quail again, which again retreated. This sequence happened three more times before the quail reached the scrub with the stoat in pursuit. Each time the stoat had hesitated and looked back towards the chicks, the adult quail had also stopped and cautiously approached the stoat, and each time the stoat resumed the chase the quail retreated, but without flying.

I did not see the quail or its chicks again; and a second adult quail did not appear. The bird gave no call of warning or alarm; the whole incident was silent.

MALCOLM OLSEN, *11 Kennedy Drive, Levin*