SEABIRDS FOUND DEAD ON NEW ZEALAND BEACHES IN 1982 AND A REVIEW OF PENGUIN RECOVERIES SINCE 1960

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ABSTRACT

In 1982, 3705 kilometres of coast were patrolled and 6957 dead seabirds were found. Large numbers of Sooty Shearwaters *(Puffinus griseus)* were found on Stewart Island beaches (mainly in July) and Auckland West beaches (November-December). Large numbers of Blue Penguins *(Eudyptula minor)* were found on Auckland West and Auckland East beaches in January-February and August-September. Unusual finds were single specimens of Long-tailed Skua *(Stercorarius longicaudus)*, Black-fronted Tern *(Sterna albostriata)*, Arctic Tern *(S. paradisaea)* and Little Tern *(S. albifrons)*. A summary is given of the coastal and monthly distribution for each species of penguin found over the 1960-1982 period.

INTRODUCTION

This paper records the results of the Ornithological Society of New Zealand's Beach Patrol Scheme for 1982. Patrols were carried out on all sections of coast except Fiordland. Some beaches on the Chatham Islands were patrolled and the results are given under the heading Outlying Islands. In all, 577 Beach Patrol Cards and 34 Specimen Record Cards were submitted. Conventions used are the same as in previous reports (see Powlesland 1983).

RESULTS AND DISCUSSION

In 1982 the total distance of coast travelled was 3705 km and 6957 seabirds were found dead by 215 members of the Ornithological Society of New Zealand and their friends. The average number of birds found per kilometre of coast covered monthly was 2.11 (Table 1). The total distance travelled in 1982 was similar to the average of 3732 km for the previous ten years (1972-1981). However, the averages of 9948 birds per year and 3.15 birds per kilometre covered for the previous 10 years are much greater than the values for 1982. Table 1 also gives the kilometres covered and the number of seabirds found per month and in total for the various coasts, plus the number of birds picked up per kilometre covered for each coast. Table 2 gives the coastal and monthly distributions of the less commonly found seabirds (1-13 birds in 1982) and Tables 3 and 4 give these of the more commonly found seabirds.

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TABLE 1 — Numbers of dead seabirds recovered and kilometres covered on each coast in 1982.

COAST	CODE		MONTH JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL KM	TOTAL BIRDS	BIRDS/KM /COAST
AUCKLAND WEST	AW	KM	152	100	67	83	154	97	54	177	126	100	96	118	1324		
		BIRDS	473	209	63	95	149	67	38	889	219	100	435	755		3492	2.64
TARANAKI	TA	KM	14	5	4	9	17	2	18	17	12	13	-	8	119		
		BIRDS	36	7	12	20	28	5	22	33	34	16	-	71		284	2.39
WELLINGTON WEST	WW	KM	17	12	10	32	57	14	25	15	29	7	8	15	241		
		BIRDS	46	74	10	16	54	7	29	47	54	15	21	120		493	2.05
AUCKLAND EAST	AE	KM	88	58	57	61	69	66	65	75	52	51	42	36	720		
		BIRDS	362	37	40	72	257	74	49	217	73	53	12	14		1460	2.03
BAY OF PLENTY	BP	KM	14	11	-	-	34	29	7	34	102	39	16	16	302		
		BIRDS	27	20	-	-	40	18	5	23	107	14	19	5		278	0.92
EAST COAST NI	EC	KM	5	1	3	8	8	2	2	6	5	5	4	5	54		
		BIRDS	11	3	5	0	2	0	0	0	2	1	6	0		30	0.56
WAIRARAPA	WA	KM	4	-	-	12	-	-	-	-	-	-	-	-	16		
		BIRDS	1	-	-	6	-	-	-	-	-	-	-	-		7	0.44
WELLINGTON SOUTH	WS	KM	3	1	-	7	3	12	-	1	1	1	-	-	29		
		BIRDS	2	1	-	5	6	7	-	2	1	2	-	-		26	0.90
NORTH COAST SI	NC	KM	-	-	-	-	-	3	-	-	-	2	-	-	5		
		BIRDS	-	-	-	-	-	6	-	-	-	0	-	-		6	1.20
WESTLAND	WD	KM	8	4	-	-	5	5	3	2	-	-	4	2	33		
		BIRDS	6	3	-	-	3	5	4	0	-	-	2	0		23	0.70
CANTERBURY NORTH	CN	KM	11	5	11	30	29	14	8	4	-	5	-	-	117		
		BIRDS	31	7	9	41	18	4	10	1	-	3	-	-		124	1.06
CANTERBURY SOUTH	CS	KM	9	6	6	33	14	7	33	12	7	6	7	29	169		
		BIRDS	18	5	18	51	67	41	9	11	16	4	5	19		264	1.56
OTAGO	OT	KM	8	9	6	9	6	5	1	-	-	-	-	-	44		
		BIRDS	6	9	2	1	0	1	0	-	-	-	-	-		19	0.43
SOUTHLAND	SD	KM	12	25	8	-	10	-	22	-	8	-	-	-	85		
		BIRDS	23	106	5	-	16	-	262	-	1	-	-	-		413	4.86
OUTLYING ISLANDS	OI	KM	28	-	12	-	-	-	-	-	-	-	-	-	40		
		BIRDS	38	-	0	-	-	-	-	-	-	-	-	-		38	0.95
TOTAL KILOMETRES TRAVELLED			437	266	194	297	479	271	327	380	370	246	198	240	3705		
TOTAL KILOMETRES COVERED			373	237	184	284	406	256	238	343	342	229	177	229	3298		
TOTAL SEABIRDS RECOVERED			1080	581	264	307	640	235	428	1223	507	208	500	984		6957	
BIRDS/KM COVERED/MONTH			2.90	2.45	1.43	1.08	1.58	0.92	1.80	3.57	1.48	0.91	2.83	4.30			2.11

No patrols were reported from Fiordland

Unusual finds

A Long-tailed Skua, picked up on Muriwai Beach (AW) in January, is only the second record in the 44 year history of the Beach Patrol Scheme (Table 2). The first specimen was found on the Auckland East coast on 23 September 1981, not October as previously stated (Powlesland 1983).

The other unusual finds for the year were the fourth specimens for each of three species of terns: Black-fronted Tern, Arctic Tern and Little Tern (Table 2). The Black-fronted Tern was found on Makatere Beach (CS) in July. The previous records are 1976, WS, June; 1978, BP, July; and 1981, OT, April. All four specimens have been picked up by patrollers in autumn and winter. During spring and summer the birds breed along the braided rivers of the eastern South Island, migrating to coastal regions afterwards (Lalas 1979).

In November a recently dead Arctic Tern was recovered from Waikanae Beach on the Wellington West coast. The records for the three previous specimens are 1963, WW, November; 1969, SD, January; and 1975, Chatham Islands, January. This tern breeds in arctic and temperate regions of Asia, northern Europe and North America, migrating as far south as the Antarctic pack ice for the northern winter. It may regularly frequent the subantarctic islands of New Zealand, having been reported from the Auckland and Campbell Islands, and Macquarie Island. There are two major migration routes, one down the eastern side of the Atlantic, the other down the eastern side of the Pacific (Falla *et al.* 1979). Although mainland New Zealand is not on the migration route, at least eight reports of this tern (other than those of the Beach Patrol Scheme) having strayed or been blown on to the mainland of New Zealand have been documented (Kinsky 1970). The four specimens found by patrollers in November (2) and January (2) were probably birds on their southern migration.

A Little Tern was recovered from the Firth of Thames (AE) in April. The records for the other specimens are 1975, CS, October; 1978, AW, November; and 1980, AW, December. This tern is a regular summer migrant to New Zealand. Although single birds have been seen as far south as Stewart Island, most remain in the northern North Island, particularly about the Kaipara and Manukau Harbours and the Firth of Thames. The Little Tern's breeding distribution is from southern and eastern Asia to the Philippines, Moluccas, Papua New Guinea, eastern Australia and Tasmania (Falla *et al.* 1979). Each year the first individuals arrive during October-November and peak numbers occur from January to March. Most flocks consist of fewer than 20 birds, but a large flock of 88 was seen at Rangiputa Bank, Northland, in January 1976 (Edgar 1976). Some of these terns overwinter in New Zealand, but usually only occasional sightings are made from June to September. The condition of their plumage on arrival in spring, the times of moult and the seasonal behaviour of most of the Little Terns suggest that they are Eastern Little Terns

TABLE 2 — Seabirds of which 1 to 13 specimens were found in 1982.

SPECIES OR SUBSPECIES	NUMBER FOUND	COAST(S)	MONTH(S)
Megadytes antipodes	2	WS,CS	MAY,JUN
Eudyptes pachyhynchus	2	SD(2)	JAN(2)
Diomedea exulans	4	AW(2),EC,WS	MAR,MAY,JUN,DEC
epomophora	2	AW,WA	APR,NOV
melanophrys	6	AW(4),WW,AE	JAN,MAY,JUN,AUG(2),DEC
cauta subspp*	11	AW(6),AE,WD,CS,SD(2)	JAN(2),FEB,APR,JUL,AUG(3),NOV,DEC(2)
salvini	5	AW(2)WS,CN,SD	JAN,FEB,APR,AUG(2)
Fulmarus glacialoides	11	AW(8),TA(2),WS	JAN(2),MAY(3),JUN,JUL,AUG,OCT(2),NOV
Pterodroma spp*	6	AW(3),TA,WW,AE	APR,MAY,JUL,AUG,DEC(2)
pycrofti	2	AW(2)	APR,AUG
cookii	13	AW,TA,AE(10),SD	JAN(3),FEB(2),MAR(4),APR(2),MAY(2)
nigripennis	10	AW(10)	JAN(8),MAR(2)
Pachyptila salvini	8	AW(6),WW(2)	MAY,JUN,AUG(5),NOV
crassirostris	1	OI	JAN
Procellaria spp*	5	AW(3),WW,SD	FEB,APR,OCT,DEC(2)
cinerea	2	AW(2)	JAN,AUG
parkinsoni	9	AE(9)	FEB,MAY(7)JUN
westlandica	10	AW(10)	AUG,SEPT,OCT(2),NOV(2),DEC(4)
aequinoctialis	9	AW(6),WW(2),CN	JAN(5),FEB,OCT,DEC(2)
Puffinus spp*	10	AW(2),TA,WW(6),CS	JAN(2),MAY(3),JUN,JUL,OCT(2),DEC
Oceanites oceanicus	1	BP	JUN
Garrodia nereis	1	WW	DEC
Phalacrocorax spp*	1	WD	JUN
carbo	9	AW,AE(2), EN(4),CS,OT	JAN,FEB,MAR,MAY,JUL,SEP(2),NOV(2)
melanoleucos	7	AW(2),TA,AE,CN,OT(2)	JAN(3),JUL,AUG,SEP,NOV
Leucocarbo carunculatus chalconotus	4	OT,SD(3)	JAN,JUL(3)
Strictocarbo punctatus featherstoni	1	OI	JAN
Stercorarius skua lonnbergi	1	OI	JAN
parasiticus	1	AW	FEB
longicaudus	1	AW	JAN
Larus bulleri	10	WW,AE(3),EN(2),CN,CS(3)	JAN,FEB,MAR(3),MAY,AUG,DEC(3)
Hydroprogne caspia	4	AW,AE(2),BP	JAN,APR,SEP,NOV
Sterna albostriata	1	CS	JUL
paradisaea	1	WW	NOV
albifrons	1	AE	APR
fuscata	1	WW	DEC
TOTAL	173		

*Species or subspecies could not be identified by the patroller

(S. a. sinensis) from the Northern Hemisphere rather than from Australia (Falla *et al.* 1979).

Three species were found in greater numbers in 1982 than in previous years. Sixteen Buller's Mollymawks *(Diomedea bulleri)* were picked up in 1982, mainly from Auckland West (6) and Southland (7) beaches (Table 3). The previous highest annual total was 13 in 1975. Sixty-eight Mottled Petrels *(Pterodroma inexpectata)* were found in 1982, also mostly from Auckland West (27) and Southland (32) beaches (Table 3) in January and February (49) (Table 4). The previous highest total was 58 in 1978. The third species is the White-fronted Tern *(Sterna striata)*, of which 112 were found in 1982, compared with the previous highest annual total of 84 in 1975. Many (59%) were picked up on Auckland West beaches during autumn.

Wrecks

Although not the highest annual totals on record, enough of two other species were found for them to be considered wrecks. The 1839 Little Blue Penguins found in 1982 is exceeded only by the totals of 1973 (2115) and 1974 (4741). Most (88.5%) of the penguins in 1982 were found on Auckland West and Auckland East beaches. The two main periods of mortality were January-February (30.5%) and August-September (54.1%).

A large number of Sooty Shearwaters was also picked up in 1982, the total of 1557 having been exceeded only in 1971 (1627), 1975 (3668) and 1978 (6913). However, the totals are an insignificant proportion of the New Zealand population: Warham & Wilson (1982) estimated 5.5 million breeding birds on the two largest of the Snares Islands alone. This figure would probably be increased by several more millions if it included non-breeding birds and the birds nesting on other islands about New Zealand. Therefore, a wreck of 7000 birds represents less than 0.002% of the Snares Islands' breeding population.

In 1982 most of the shearwaters were found in July and November-December (Figure 1). The combined 1960-1981 data reveal two periods of high mortality, in October-January and in May, with greatest mortality in summer. The regular peak of Sooty Shearwater mortality during the October-January period (Veitch 1977, 1980) coincides with the period between the arrival of the birds at the breeding grounds and the end of incubation (Warham *et al.* 1982). Perhaps many of the shearwaters that die during this period are first- or second-year birds and hence are inexperienced at foraging in New Zealand waters. The May peak in mortality of the 1960-1981 data coincides with the departure of the chicks from burrows from mid-April to May (Warham *et al.* 1982) and the start of their migration north. Although the 1982 results show a July peak in mortality (Figure 1), 98% of these were picked up on Mason's Bay and Little Hellfire Beach, Stewart Island (SD), and were judged to have been dead for over a month. Therefore, they too were probably recently fledged chicks.

TABLE 3 — Coastal distribution of the seabirds more commonly found dead in 1982.

SPECIES OR SUBSPECIES	MONTH												TOTAL
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	BIRDS
Eudyptula minor subspp.*	402	165	76	60	94	41	26	645	236	45	21	28	1839
albosignata	5	1	-	5	4	-	1	1	3	-	-	-	20
Diomedea spp.*	2	11	-	3	3	2	3	-	4	1	4	1	34
chrysostoma	-	3	-	2	1	2	1	6	8	1	1	4	29
bulleri	2	7	-	1	1	2	2	1	-	-	-	-	16
cauta cauta	-	2	2	1	3	4	-	4	3	1	2	8	30
Phoebetria palpebrata	3	-	-	-	-	-	1	2	4	-	2	2	14
Macronectes spp.*	4	-	2	6	5	1	4	4	6	2	2	-	36
Daption capense	1	1	1	1	-	1	1	12	9	9	6	6	48
Pterodroma macroptera	12	1	-	1	20	5	-	5	2	-	4	3	53
lessonii	6	7	4	2	5	6	7	6	6	9	9	20	87
inexpectata	14	35	2	3	2	1	-	-	-	1	1	9	68
brevirostris	3	1	-	-	-	-	2	8	3	1	-	-	18
Halobaena caerulea	7	1	-	1	-	-	4	12	12	6	5	1	49
Pachyptila spp.*	18	48	5	4	7	7	8	29	33	8	5	30	202
vittata	9	2	-	1	5	6	3	4	2	-	1	4	37
desolata	1	1	-	1	10	6	-	-	-	-	-	1	20
belcheri	1	1	-	-	1	-	3	7	4	5	1	6	29
turtur	30	32	3	6	21	13	26	52	27	23	14	45	292
Puffinus carneipes	31	8	17	7	47	-	-	-	-	1	1	8	120
bulleri	33	14	21	6	23	-	2	1	4	10	35	42	191
griseus	106	55	9	25	123	26	243	3	3	16	315	633	1557
tenuirostris	54	9	5	-	16	16	8	1	4	1	2	17	133
gavia	133	52	22	19	49	21	15	129	38	14	11	20	523
huttoni	5	-	1	4	1	-	-	5	2	1	-	6	25
assimilis	2	-	1	2	3	5	2	5	1	-	3	3	27
Pelagodroma marina	8	-	1	-	3	4	-	-	5	-	-	2	23
Pelecanoides urinatrix	55	15	2	1	25	10	10	197	38	7	1	10	371
Sula bassana	20	27	13	5	16	6	4	23	18	17	17	27	193
Phalacrocorax varius	3	1	1	1	4	3	1	2	1	-	4	2	23
Strictocarbo punctatus	7	9	14	25	39	11	5	6	6	4	3	5	134
Larus dominicanus	40	37	32	56	51	18	31	17	13	11	14	14	334
novaehollandiae	16	10	11	11	14	9	3	10	3	2	5	3	97
Sterna striata	9	15	8	37	22	-	2	7	4	4	1	4	112
TOTALS	1042	571	253	297	618	226	418	1204	502	200	489	964	6784

* Species or subspecies could not be identified.

The coasts having the highest rates of Sooty Shearwater mortality (birds per 100 km of coast covered) were Auckland West and Southland (Table 5). Presumably, most of the birds that were washed ashore on the Auckland West beaches were birds that died during the migration back to the nesting sites, whereas the Southland birds were recently fledged chicks that had left the nest in weak condition. Young birds that had recently left their nests are likely to be more vulnerable to storms than older birds returning to New Zealand and are therefore more likely to be wrecked. Of the ten wrecks of more than 400 birds in the past 23 years, eight occurred on Auckland West beaches and only one each on Wellington West and Southland beaches. Although not fully documented as part of the Beach Patrol Scheme, in May 1961 hundreds of juvenile Sooty Shearwaters were washed ashore on to South Canterbury beaches (Stonehouse 1964). Indications were that the birds had fledged in an undernourished state and became exhausted and drowned during persistent easterly and south-easterly winds.

The distribution of beach-wrecked seabirds may not fully reflect the distribution pattern of the live birds. Such factors as wind direction, coastal currents and whether a beach is patrolled regularly influence the distribution of dead seabirds (Veitch 1976). For example, although the distribution of dead Sooty Shearwaters suggests that most birds migrate to and from the nesting islands off the west coast of New Zealand, both M. J. Imber and J. Warham (pers. comm.) consider, from observations at sea, that the shearwaters' main route of migration is along the east coast.

Miscellaneous birds

Miscellaneous birds recovered in 1982 but not considered to be seabirds totalled 193. There were 31 magpies, 26 Mallards, 17 Black Swans, 15 Blackbirds, 11 Starlings, 10 Rock Pigeons, nine Grey Ducks, seven each of Canada Geese and unidentified ducks, six each of Australasian Harriers and Indian Mynas, five each of Paradise Shelducks, Pukekos and House Sparrows, four Variable Oystercatchers, two each of domestic geese, California Quail, South Island Pied Oystercatchers, Eastern Bar-tailed Godwits, New Zealand Pigeons and Song Thrushes, and one each of White-faced Heron, Reef Heron, Brown Teal, New Zealand Falcon, Pheasant, domestic turkey, Australian Coot, Spur-winged Plover, Knot, Pied Stilt, North Island Kaka, Rainbow Lorikeet, Long-tailed Cuckoo, New Zealand Kingfisher and Tui.

PENGUIN RECOVERIES 1960-1982

One of the objectives of the Beach Patrol Scheme is to provide information about the seabirds around New Zealand — their seasonal distribution, dispersal or migration routes, and variations in their annual mortality (Imber 1969). Now that we have annual records of beach-patrolling for more than 20 years it seems appropriate to begin summarising this information. The summaries will be given for

TABLE 4 — Monthly distribution of the seabirds more commonly found dead in 1982.

SPECIES OF SUBSPECIES	COASTS AW	TA	WW	AE	BP	EN	WA	WS	NC	WD	CN	CS	OT	SD	OI	TOTAL BIRDS
Eudyptula minor subspp*	904	27	25	724	123	-	-	2	1	-	1	9	2	15	6	1839
albosignata	-	-	-	-	-	-	-	-	-	-	11	9	-	-	-	20
Diomedea spp.*	10	4	2	-	-	-	-	-	1	-	3	-	-	14	-	34
chrysostoma	26	-	1	1	-	-	-	-	-	-	-	-	-	1	-	29
bulleri	6	-	1	-	-	-	-	-	-	1	1	-	-	7	-	16
cauta cauta	16	3	6	-	-	-	-	1	-	2	-	1	-	1	-	30
Phoebetria palpebrata	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14
Macronectes spp*	18	2	1	-	-	1	1	-	-	2	5	4	-	2	-	36
Daption capense	27	3	4	3	4	-	-	-	-	1	-	5	-	1	-	48
Pterodroma macroptera	21	4	-	24	4	-	-	-	-	-	-	-	-	-	-	53
lessonii	70	11	2	-	1	-	-	-	-	1	-	-	-	2	-	87
inexpectata	27	3	2	1	1	-	-	-	-	-	-	1	-	32	1	68
brevirostris	13	-	5	-	-	-	-	-	-	-	-	-	-	-	-	18
Halobaena caerulea	33	11	1	3	-	-	-	-	-	-	-	-	-	1	-	49
Pachyptila spp*	42	12	133	1	2	-	-	1	1	2	-	1	-	4	3	202
vittata	9	-	4	3	-	-	-	1	-	-	1	10	-	4	5	37
desolata	17	-	1	-	-	-	-	-	-	-	1	1	-	-	-	20
belcheri	22	4	1	-	-	-	-	-	-	1	-	-	-	1	-	29
turtur	127	16	100	33	2	1	-	2	-	3	2	2	-	1	3	292
Puffinus carneipes	15	1	-	104	-	-	-	-	-	-	-	-	-	-	-	120
bulleri	105	7	9	54	7	-	1	3	-	1	1	3	-	-	-	191
griseus	948	59	74	72	32	12	-	5	-	2	10	35	-	299	9	1557
tenuirostris	49	11	20	34	6	-	-	-	-	-	1	7	-	5	-	133
gavia	252	26	21	187	25	1	-	-	1	-	3	7	-	-	-	523
huttoni	17	-	3	-	-	-	-	-	-	-	3	2	-	-	-	25
assimilis	5	1	-	18	1	-	-	-	-	2	-	-	-	-	-	27
Pelagodroma marina	3	-	-	1	1	-	-	-	-	-	1	12	-	-	5	23
Pelecanoides urinatrix	258	21	12	63	11	1	1	-	1	-	-	-	-	3	-	371
Sula bassana	143	7	3	31	4	2	-	-	1	-	1	1	-	-	-	193
Phalacrocorax varius	9	-	-	5	8	-	-	-	-	-	1	-	-	-	-	23
Strictocarbo punctatus	1	-	2	2	-	-	-	-	-	-	32	88	9	-	-	134
Larus dominicanus	107	36	37	31	22	4	3	6	-	3	33	40	4	7	1	334
novaehollandiae	38	4	3	16	14	1	-	1	-	-	6	11	-	3	-	97
Sterna striata	66	5	3	18	8	-	-	-	-	-	3	7	-	-	2	112
TOTALS	3418	278	476	1429	276	23	6	22	6	21	120	256	15	403	35	6784

* Species or subspecies could not be identified by the patroller

species that have had wrecks during the year being reviewed; as was given, for example, for the 1981 wrecks of Kerguelen Petrels *(Pterodroma brevirostris)* and Blue Petrels *(Halobaena caerulea)* (Powlesland 1983). In addition, I intend to summarise the information for related species, as given below for penguins. Although a summary of the seabirds found during 1939-1959 has been published (Bull & Boeson 1961), the records for penguins were not detailed as to year, month or coastal region and so are not included in the results given below.

In total, 142 Yellow-eyed Penguins *(Megadyptes antipodes)* have been found during the past 23 years. The highest annual total was 50 in 1972, the second highest 14 in 1977. They have been found beach-wrecked predominantly on Wellington and eastern South Island beaches (Table 5). A specimen was found on Campbell Island (OI), where the species breeds. It also nests on Stewart Island and its outlying islands, Auckland Island and along the Canterbury South, Otago and Southland coasts. A banding study of Yellow-eyed Penguins on Otago Peninsula (Richdale 1949) showed that most fledglings moved north, dispersing much further than adults. By their third year of life these penguins are fairly sedentary, particularly those that have acquired a nest site. The adults are resident at the colony all year (Richdale 1941, 1949). The high rate of recovery on the Otago coast (Table 5) presumably results from deaths of adults as well as of independent young (fledglings).

In determining the monthly rate of recovery of the Yellow-eyed Penguin, I have analysed only data from the Wellington West and South, Canterbury North and South, Otago and Southland coasts. Most penguins (79%), in total and per 100 km covered (Figure 2), were found from March to July inclusive. Richdale (1949) found that the fledglings entered the sea between 29 January and 25 March, and that half died in their first 5 weeks at sea. Therefore, the annual peak in recoveries of this penguin was probably due to undernourished young that had recently gone to sea or to young that could not forage proficiently.

One Adelie Penguin *(Pygoscelis adeliae)* has been found during the 1960-1982 period. The dried corpse was found on the Canterbury North coast in December 1962 (Kennington 1963). This is a circumpolar species that breeds on the coasts and islands around the shores of the antarctic continent and rarely straggles north beyond 60°S (Kinsky 1970).

Five subspecies of Blue Penguin are recognised in the New Zealand checklist (Kinsky 1980), but because four of them could not be readily distinguished from one another by patrollers, the records for the Northern Blue Penguin *(Eudyptula minor iredalei)*, Cook Strait Blue Penguin *(E. m. variabilis)*, Southern Blue Penguin *(E. m. minor)* and Chatham Island Blue Penguin *(E. m. chathamensis)* have been combined.

Overall, 15 808 penguins of the four subspecies (henceforth called the Blue Penguin) have been found from 1960 to 1982. Most (85.6%) were beach-wrecked along the Auckland West and East coastlines (Table 5). The 67 penguins found on beaches of Outlying Islands were all on the Chatham Islands and so were presumably the local subspecies.

The North Island west coast regions (AW, TA, WW), North Coast South Island, Auckland East, Bay of Plenty and Southland are the coastlines from which more than 10 Blue Penguins have been found per 100 km of beach covered (Table 5). Even if the 1974 wreck of 3729 birds is deleted from the Auckland East total, the rate of 42.3 penguins per 100 km of coast covered remains the highest recovery rate for the various coasts. In addition, if the totals for Blue Penguins and White-flippered Penguins *(E. m. albosignata)* are

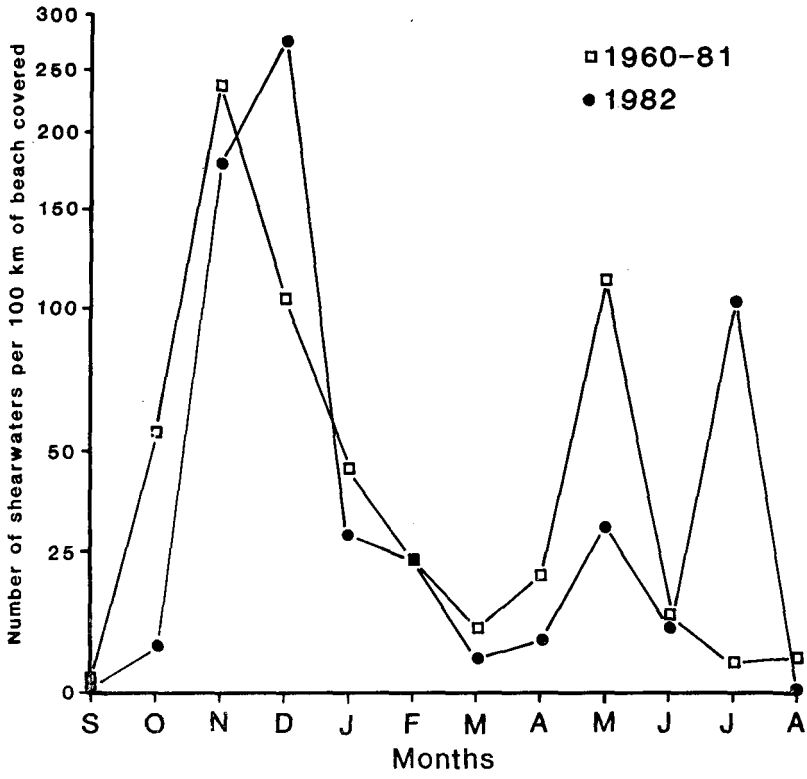

FIGURE 1 — Monthly rate of recovery (number of birds found dead per 100 km of beach covered) of the Sooty Shearwater during the period 1960-1981 and in 1982.

combined, the rates of recoverey for Canterbury North and Canterbury South are 12.8 and 14.6 penguins per 100 km of coast covered. Do these rates of recovery reflect differences in the density of Blue Penguins inhabiting the various coasts? Apparently so, because banding studies by Jones (1978) on Tiritiri Matangi Island (AE) and Kinsky (1960) on Somes Island (WS) have shown that most adult Blue Penguins are resident on a particular section of coastline throughout the year. The coasts with the higher penguin recoveries may have more penguins because they have islands and/or sections of coast that can not be reached by mammalian predators and are free of human disturbance. It would be interesting to compare the breeding success of a predator-free population with that of a nearby population to which predators have access.

The monthly recovery rate of Blue Penguins varies considerably because of the large influence that wrecks of penguins have on the results (Figure 2). For example, in April 1974, 2437 penguins were found compared with 100 or less for April in most other years. Therefore, to obtain a more realistic indication of monthly penguin mortality, I have replaced the figures for wrecks with the number usually found dead per month to give the " amended " line in Figure 2. The period of highest mortality is from January to March. During this time, both fledglings and adults could be struggling to feed themselves adequately; the fledglings when they first enter the sea, and the adults when they attempt to accumulate fat reserves to sustain them during their 2-3 week fast while moulting and again when they try to regain condition after the moult (Kinsky 1960, Jones 1978). Therefore, the increased mortality of Blue Penguins over summer occurs presumably because increased requirements for food coincide with poor foraging conditions. Crockett & Kearns (1975) concluded similarly that the high mortality of Northern Blue Penguins in 1973 and 1974 resulted from starvation, accentuated by heavy parasite loads and rough weather.

Of the five subspecies of Blue Penguin in the New Zealand region, only the White-flippered Penguin, with its fairly distinctive flipper markings, was readily distinguished by patrollers. In total, 320 White-flippered Penguins were picked up. Of these, 91% were found on the Canterbury North and Canterbury South coasts (Table 5), as is to be expected because they breed on Motunau Island (CN) and Banks Peninsula (CN & CS) (Falla *et al.* 1979). The few birds found on other coastlines were probably juveniles, which go through a dispersive phase before returning to the vicinity of their natal colony to breed. The numbers found along the North Coast South Island and Otago coastlines (Table 5) indicate that the young disperse to the north and south of the nest sites. This pattern could, however, be caused by the mortality of penguins of the Cook Strait and Southern Blue Penguin subspecies, some of which have markings like those of the White-flippered subspecies (Kinsky & Falla 1976). To calculate

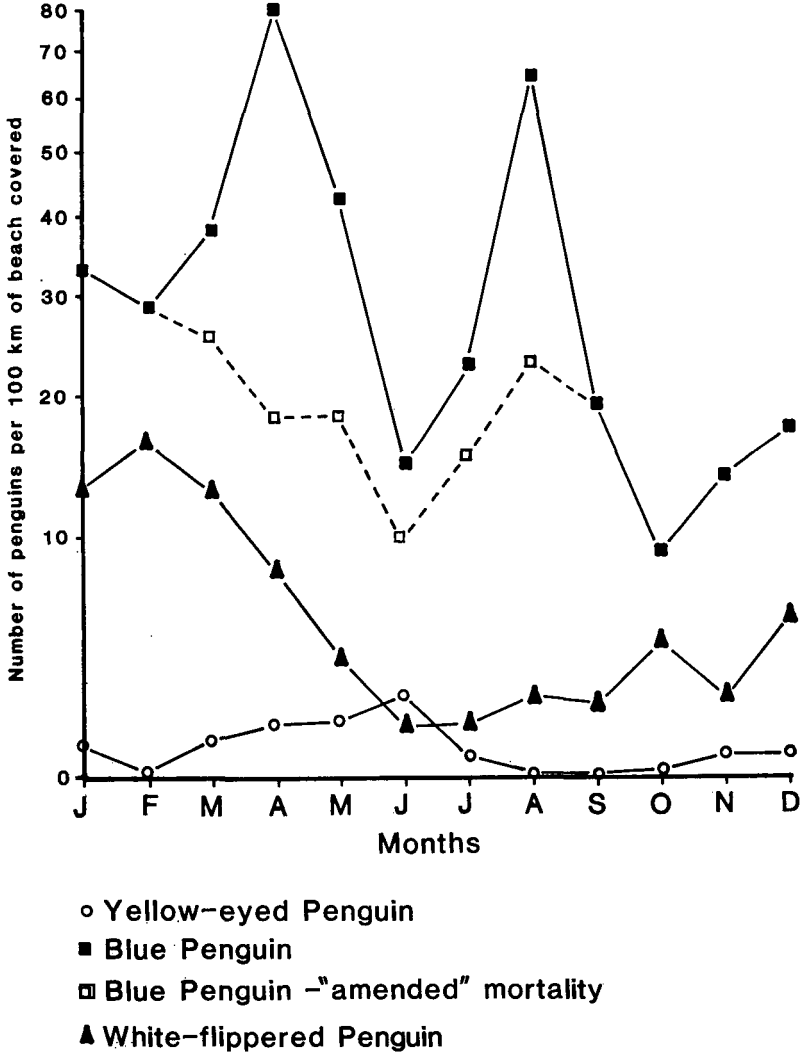

FIGURE 2 — Monthly rate of recovery (number of birds found dead per 100 km of beach covered) of the Yellow-eyed, Blue and White-flippered Penguins during 1960-1982.

TABLE 5 — Number and rate of recovery (number of specimens found per 100 km of coast covered) of the Sooty Shearwater and Yellow-eyed, Blue and White-flippered Penguin found along each coast.

	AW	TA	WW	AE	BP	EN	WA	WS	NC	WD	CN	CS	OT	SD	OI	TOTAL
Sooty Shearwater																
1960-81 Number	15,762	387	1753	1078	349	116	17	901	83	21	432	343	349	2266	69	23,926
Rate of recovery	85.0	15.4	21.5	16.8	22.1	31.4	7.0	32.7	15.3	4.9	29.6	31.6	27.4	213.4	20.0	51.1
1982 Number	948	59	74	72	32	12	-	5	-	2	10	35	-	299	9	1,557
Rate of recovery	71.6	49.6	30.7	10.0	10.6	22.2		17.2		6.1	8.5	20.7		351.8	22.5	47.2
Yellow-eyed Penguin																
1960-82 Number	-	-	24	-	1	-	-	37	-	-	5	14	51	9	1	142
Rate of recovery			0.3		0.1			1.3			0.3	1.1	3.9	0.8	0.3	0.3
Blue Penguin																
1960-82 Number	6,778	345	872	6755	428	20	3	146	87	4	55	39	71	138	67	15,808
Rate of recovery	34.1	13.1	10.4	94.5	22.8	4.7	1.2	5.3	15.9	0.9	3.5	3.1	5.4	12.0	17.4	31.6
White-flippered Penguin																
1960-82 Number	-	-	2	1	-	-	-	6	6	-	147	144	13	-	-	320
Rate of recovery			0.0	0.0				0.2	1.1		9.3	11.5	1.0			0.6

the seasonal variation in the mortality of White-flippered Penguins, I have used only data for the North Coast South Island, Canterbury North, Canterbury South and Otago coasts. Figure 2 shows that, as for the Blue Penguin, the White-flippered Penguin has a peak of mortality from January to March.

The coastal and monthly distributions of *Eudyptes* penguins beach-wrecked from 1960 to 1982 are given in Table 6. The identity of 13 specimens could not be determined by patrollers and so have been grouped under the heading *Eudyptes* spp. Two Rockhopper Penguins *(E. chrysocome)* have been found: one on Campbell Island, where the species breeds (February), and the other on the Canterbury North coast (March). Stragglers have very infrequently been seen on the Canterbury and Otago coasts (Oliver 1955). However, Warham (1967) reported that a few reach the Snares Islands each summer, and often moult there. The Rockhopper Penguin is very abundant and breeds on many islands in the subantarctic and antarctic zones, Macquarie, Campbell, Antipodes and Auckland Islands being the closest breeding sites to New Zealand. Although the species is highly pelagic, spending the winter at sea, the scarcity of dead birds on our mainland beaches suggests that most remain in the subantarctic zones (Warham 1963).

In total, 19 Fiordland Crested Penguins *(E. pachyrhynchus)* have been found. Breeding colonies of this species are south of Bruce

TABLE 6 — Coastal and monthly distribution of Eudyptes penguins found dead on beaches from 1960 to 1982.

Species	Number found	
Eudyptes spp.*	13	Coasts: AW,WW(2),NC,WD(4),CS(2),OT.
(= pachyrhynchus spp.)		Months: Jan,Feb,Mar(3),Apr(2),Sep,Oct.
Eudyptes chrysocome	2	Coasts: CN,Campbell Is.
(= crestatus)		Months: Feb,Mar.
Eudyptes pachyrhynchus	19	Coasts: AW,WW(2),WD(7),CS,OT(2),SD(6).
		Months: Jan(2),Feb(2),Apr,May,Jul,Aug, Sep,Oct(2),Nov(5),Dec(3).
Eudyptes robustus	2	Coast : SD(2)
(= pachyrhynchus atratus)		Months: Jan,Feb.
Eudyptes sclateri	13	Coasts: WW,WS,SC(4),OT(3),SD(2), OI(2; Campbell Is.,Chatham Is.)
		Months: Jan,Feb,Mar(4),Apr(3),May, Jun,Aug,Sep.

* Species could not be identified by the patroller.

Bay in Westland, along the Fiordland coast and on the Southland coast as far east as the Green Islets (J. Warham, pers. comm.). In addition, some birds nest on and around Stewart Island, with a major colony on Codfish Island. Although many breed along the Fiordland coast none has been found on its beaches, almost certainly because the beaches have been rarely patrolled. Most specimens were found on Westland (7) and Southland (6) beaches, but one was found as far north as the Auckland West coast. Fiordland Crested Penguins straggle to the Campbell, Macquarie and Auckland Islands, and yearlings are commonly found on the Snares Islands in summer (Warham 1967). Single birds have been picked up on the coasts of southern Australia and Tasmania (Serventy *et al.* 1971). Many of the beach-wrecked birds were found during the period October to February (Table 6). This period coincides with when fledglings first enter the sea and when many breeding adults begin accumulating fat reserves in preparation for the moult, and following their moult (Warham 1974a).

Two Snares Crested Penguins *(E. robustus)* have been picked up by patrollers, both from Southland beaches in summer (Table 6). Sightings of live birds have been reported from Stewart Island, Akaroa and Hokitika (J. Warham, pers. comm.). This species breeds only on the Snares Islands, about 300 km south of Bluff. The colonies are deserted from mid-February until late March, after which the breeders, followed later by yearlings and prebreeders, return to moult (Warham 1974b). The two beach-wrecked birds on Southland beaches in January and February may therefore have been fledglings.

Thirteen Erect-crested Penguins *(E. sclateri)* have been recovered. This species breeds on the Bounty, Antipodes, Campbell and Auckland Islands (Falla *et al.* 1979). Stragglers have occurred as far south as Macquarie Island, and immatures and moulting birds as far north as North Cape (Falla *et al.* 1979). Most beach-wrecked specimens have been found along the south-eastern coast of the South Island (Table 6) during March and April. As breeders moult in March at their nest sites (Warham 1972), presumably many of the birds we find are young. However, Falla (1935) noted that the Otago, Canterbury and National Museums all had specimens from beaches nearby that were obtained in May, June and July. The regular finding of specimens along the Wellington and South Island east coasts in winter, together with the fact that this species has attempted to breed on the Otago Peninsula (Falla *et al.* 1979), suggests that at least some adults spend winter in the coastal waters of New Zealand, well to the north of their breeding grounds.

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SHORT NOTES

KINGFISHER TAKING A SILVEREYE

Andrew Grant's note about predation of a Goldfinch by a Kingfisher (*Notornis* 30: 318) reminded me of a similar experience we had on 8 June 1982 near the Matukituki River mouth, West Wanaka. A richly coloured New Zealand Kingfisher *(Halcyon sancta)*, after resting in a kowhai tree, flew to the top of a dead manuka, from whence it darted into a live manuka and emerged with a small bird; later in good sunlight we identified this prey as a Silvereye *(Zosterops lateralis)*. It then moved in a series of flights of 20-30 metres towards a swampy pond, at each stop bashing its prey against its perch and gradually swallowing it, feathers and all. Progress was easy to follow because at each stop it was mobbed by two or three Fantails *(Rhipidura fuliginosa)*. A few minutes later, with a very distended stomach, it stayed about the pond — where we recorded one a few years ago. (The Kingfisher is a rare bird in Central Otago.) Other potential prey species in this vicinity probably include insects, tadpoles and frogs of *Litoria aurea*, skinks, and trout fry.

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