

# CHANGES IN GULL NUMBERS OVER 25 YEARS AND NOTES ON OTHER BIRDS OF THE OTAKI-OHAU COAST

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## ABSTRACT

The number of Black-backed Gulls (*Larus dominicanus*) between the Otaki and Ohau Rivers, on the southwest coast of the North Island, has more than doubled in the last 25 years. There was a significantly larger proportion of subadults in 1961 than now, indicating that the population may have been in a growth phase in the early 1960s. The number of Red-billed Gulls (*L. novaehollandiae*) was about one-third of the 1961 level; this coincides with a sharp fall in the number of Red-billed Gulls nesting on nearby Kapiti Island. Numbers of other coastal birds were recorded and are discussed.

## INTRODUCTION

In March 1961, the late Dr. K. Wodzicki made 11 traverses along the coast between the Otaki and Ohau River estuaries to count Black-backed Gulls and Red-billed Gulls. In his paper, Wodzicki (1962) gave the mean number of each gull species per mile for sections of the coast. In addition, he noted the proportion of adult and subadult Black-backed Gulls.

This paper describes counts of birds (excluding passerines) along the same stretch of coastline as that traversed by Dr Wodzicki, in the same month 25 years later, to determine whether gull numbers and proportions of adult and subadult had changed since 1961.

## METHODS

We repeated the methods used by Dr Wodzicki as closely as possible by doing the counts throughout March, and by randomly including a variety of states of tide, weather conditions and times of day. The coastline between the Otaki and Ohau Rivers was divided into the same five beach sections and five estuaries that Wodzicki (1962) had used (Figure 1). Members of the Wellington Branch of the Ornithological Society of New Zealand, walking steadily along the beach alone or in pairs, recorded the numbers of birds seen between the foredune and the outermost breakers, or in the tidal part near the mouth of the estuaries. The observers were asked to record numbers of birds for a variable number of sections but were not required to walk the entire distance between the two main rivers as Dr Wodzicki had done. They recorded the numbers of adult and subadult Black-backed Gulls and numbers of other coastal birds, and were given an option of describing the activities of the gulls.

The ten coastal segments (five estuaries and five beach sections), their reference codes, the linear distance of the coast (in km), and the number of counts are given in Table 1.

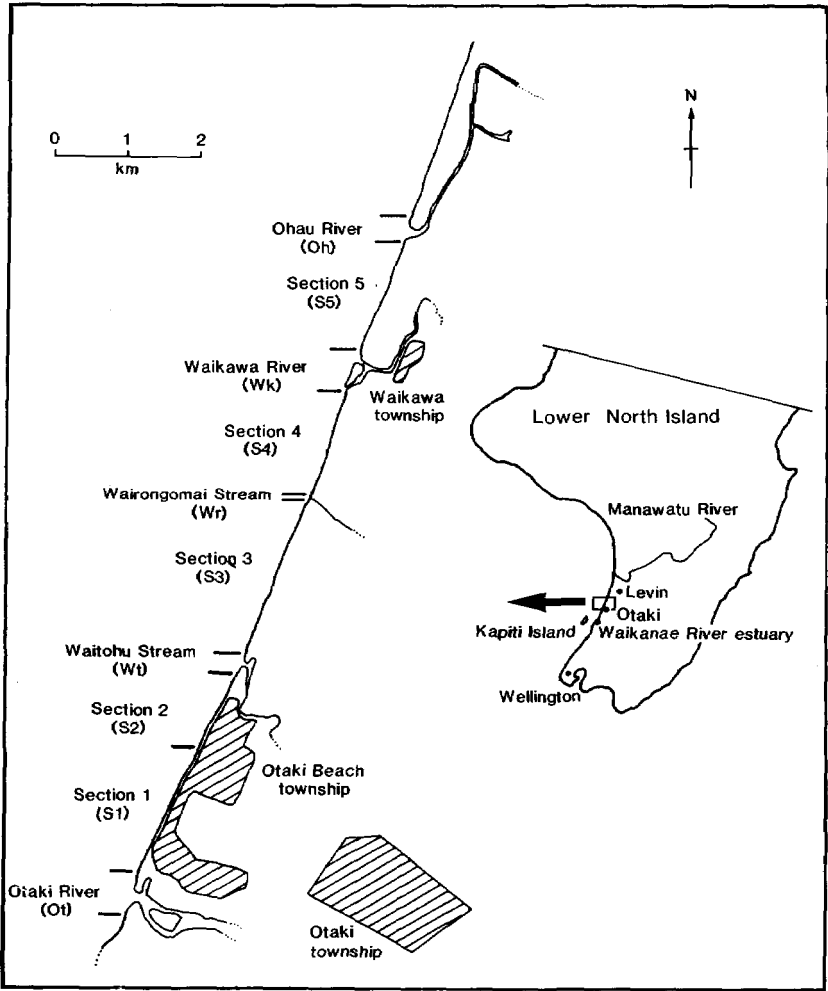


FIGURE 1 — The Otaki-Ohau coast, showing the positions of the five estuaries and five beach sections, and an inset of the lower North Island showing the positions of places mentioned in the text.

The point at which the Ohau River entered the sea in 1986 was apparently 0.9 km further south than in 1961 and so the total length of coastline between the two rivers was 10.2 km in 1986, compared with 11.1 km in 1961. This meant that total counts could not be compared, but counts per kilometre were still valid.

Full details of the counts have been deposited on file at both the Conservation Sciences Centre, Department of Conservation, and Ecology Division, DSIR. Despite careful searches, we could not locate Dr Wodzicki's

raw data which, in his paper, he said he had deposited at Ecology Division, DSIR. Without them we have been unable to perform statistical tests on many of the comparisons between 1961 and 1986. We were surprised that Black-billed Gulls (*L. bulleri*) were not mentioned by Wodzicki (1962), since they would almost certainly have been present.

### BLACK-BACKED GULL (*Larus dominicanus*)

#### Counts

In 1986, there were on average 44 Black-backed Gulls per kilometre for the entire study coastline (Table 1). This was 2.4 times the rate of 18 per kilometre (29 per mile) found in 1961. We found a significantly greater density of Black-backed Gulls at estuaries (92 per kilometre) than on beaches (27 per kilometre), but because Wodzicki combined some adjacent beach and estuary sections, we cannot make a complete historical comparison. He did, however, give mean counts for Otaki and Waitohu estuaries separately. At Otaki River estuary we found on average 162 birds per count compared with 69 in 1961, but at Waitohu Stream there were only 6 per count compared with 31 in 1961. On the beach between these two estuaries (i.e. S1 and S2) we found 121 Black-backed Gulls per count, where Wodzicki had found only 61. Wodzicki recorded few Black-backed Gulls north of Waitohu Stream (mean of 45 per count or 5 per kilometre), whereas in 1986 we found a mean of 145 per count or 23 per kilometre. The indication is that the number of Black-backed Gulls has increased and that the increase has been distributed fairly evenly between the estuaries and the beach. The increase has been greater in the northern part of the area near Waikawa and Ohau than in the Otaki area.

This widespread gull has an extremely varied diet. On land, it eats refuse from rubbish dumps, offal, carrion, worms, crustaceans, insects, frogs, small reptiles and mammals, young birds and eggs. At sea, or in shallow water, it takes echinoderms, krill, molluscs and fish (Fordham 1985). A few pairs nest just north of the Ohau River estuary, but the nearest large colony is on Kapiti Island (16 km from Otaki Beach), where several hundred pairs nest. Fordham (1968) showed that many of these Kapiti birds move to the Wellington West coast to forage. Wilkinson & Wilkinson (1952) noted that Black-backed Gull nests on Kapiti Island in 1924-1942 were well separated from one another around the coastline and made no mention of a colony on the island. Stidolph (1948) counted 129 nests at the north end of Kapiti Island in November 1941 and 120 nests in 1942. Fordham (1967) noted a marked increase to 589 occupied nests on 23 November 1963. On 23 November 1986, we counted 275 Black-backed Gull nests in about half of the colony that now extends continuously along about 1 km of the northern coast of Kapiti, near Lake Okupe, and we estimated that 500-600 nests were occupied in the whole colony. In addition, we recorded 31 nests at Rangatira Point, where none existed in 1963 (Fordham 1967) and only two were seen in 1941. This shows that the number of gulls on the island has increased greatly in the last 45 years, particularly between 1942 and 1963. Wodzicki *et al.* (1978), however, found no increase in the number of Black-backed Gulls at Waikanae estuary between 1941-1943 and 1971-1974.

TABLE 1 — The number of adult and subadult gulls, and the density (number per kilometre), including those of unknown age, of three species of gulls between the Otaki and Ohau River estuaries in March 1986

Species	Estuaries and beach sections											Totals for	
	Ot*	S1	S2	S3	S4	S5	Wr	S4	Wk	S5	Oh	Total	Estuaries
Distance (km)	0.7	1.9	1.1	0.3	2.2	0.1	1.4	0.6	1.5	0.4	10.2	2.1	8.1
No. counts	3	3	7	9	10	10	12	8	12	6			
<b>Black-backed Gull</b>													
Adult	424	215	218	44	314	33	218	107	161	214	1948	822	1126
Subadult	63	41	33	9	62	9	121	56	40	65	499	202	297
Density	232	45	33	22	18	43	20	34	11	116	44	93	27
<b>Red-billed Gull</b>													
Adult	18	35	24	18	27	0	2	12	3	0	139	48	91
Subadult	1	13	9	0	6	0	0	4	14	0	47	5	42
Density	9	8	4	7	2	0	0	3	1	0	4	4	3
<b>Black-billed Gull</b>													
Adult	0	3	3	1	0	0	0	0	0	0	7	1	6
Subadult	0	0	0	59	10	2	5	132	7	49	264	242	22
Density	0	1	0	22	1	2	0	28	0	21	3	12	1

\* Ot = Otaki River, Wt = Waitohu Stream, Wr = Wairongomai Stream, Wk = Waikanae River, Oh = Ohau River,

S1 ... S5 = Sections 1 to 5

We suspect that the marked increase in the number of Black-backed Gulls between Otaki and Ohau in the last 25 years is a result of more food becoming available from refuse dumps and general rubbish, such as remains of fish gutted on the beach. This increase has been greatest in the northern part of the beach study area, around Waikawa Beach township, where the human population has grown most.

### Age ratio

In 1986, 2447 Black-backed Gulls were seen, of which 499 (20.4%) were in subadult plumage (Table 1). This is a significantly smaller proportion of subadults than the 262 (23.9%) of 1549 gulls counted by Wodzicki in 1961 ( $X^2 = 5.47$ ,  $p < 0.05$ ). The proportions of adults to subadults at both estuaries and beaches were almost identical for each set of counts. The subadult category includes all birds up to four years old (Kinsky 1963), and the difference in age ratio between the two counts may reflect one or two exceptionally good or poor breeding seasons before the surveys. Fordham (1968), working at Wellington Harbour (60 km south of our study area), found a higher proportion of yearlings in 1961 than in the two subsequent years, indicating that the 1960-61 breeding season may have been very successful. Moreover, a growing population would be expected to have a higher proportion of subadult birds. Fordham (1967) showed that the Black-backed Gull population in the Wellington area had grown very quickly in the years leading up to 1965. The population that Wodzicki recorded may have been in a growing phase in 1961, which has now levelled off. Preliminary results from monthly counts of Black-backed Gulls in Wellington Harbour in 1986-1987 show that there has been no marked increase since 1975-1977 (HAR, unpubl.). Further checks on the ratios of adult to subadult birds are needed.

TABLE 2 — Activity recorded for different age classes of Black-backed Gull: number of observations (percentage)

	Adult		Subadult	
Fly	183	(16%)	84	(28%)
Rest	676	(61%)	147	(49%)
Forage	195	(17%)	48	(16%)
Comfort	33	(3%)	12	(4%)
Swim	23	(2%)	7	(2%)
	<hr/>		<hr/>	
	1110		298	

$$X^2_4 = 23.54, p < 0.001$$

### Activity

The activity of Black-backed Gulls was recorded by description and then grouped into broad behavioural categories: fly, rest (including sitting, standing and roosting), forage (feeding, walking, dropping shells), comfort (preening, bathing and drinking), and swim. These are summarised in Table 2 for adults and subadults separately. There was a clear difference between the age classes, with adults spending more time resting and subadults spending more time flying. The age classes spent a similar proportion of time foraging. There was a significant difference between the age classes in the number of birds displaying different activities ( $X^2 = 23.54$ ,  $p < 0.001$ ). This may indicate that adults have a greater overall feeding success, and also perhaps a greater dominance, which would combine to give them more time to rest.

### RED-BILLED GULL (*Larus novaehollandiae*)

#### Counts

In March 1986, 186 Red-billed Gulls were seen, giving a rate of 3.5 per kilometre compared with 10.6 per kilometre in 1961. This suggests a three-fold decrease in the last 25 years. By contrast, numbers did not change significantly between 1941-1943 and 1971-1974 at Waikanae estuary (Wodzicki *et al.* 1978) nor in the last 20 years in the large Kaikoura Peninsula colony that contributes substantially to the southern North Island population (J.A. Mills, pers. comm.). The nearest colony to this stretch of coast is on the northeastern corner of Kapiti Island. In 1942, Stidolph (1948) found 80 nests on a rock at Te Rere and six nests at the northern end of the island. There must have been a spectacular population increase because by 1960-61 there were 73 breeding pairs at the north of the island, below Tokohaki Trig, and another 400 breeding pairs at Rangitira Point, on the east coast. In 1961-62, 300 pairs nested below Tokohaki Trig, 500 pairs at Rangitira Point, and 8 pairs on a raised beach east of Tiwhapau Trig. This last site was the main colony (550 pairs) in 1963-64 (Gurr & Kinsky 1965). On 23 November 1986 we counted no nests at Rangitira Point and only 74 breeding pairs at the raised beach site east of Tiwhapau Trig in Waiorua Bay. The marked decline of this nearby breeding population on Kapiti Island probably explains the drop in the number of Red-billed Gulls on the Ohau-Otaki coast. Another contributing factor could be the timing of the northward movement of birds from the big breeding colonies at Kaikoura and Nelson Haven. This movement leads to a sudden increase in Red-billed Gulls in Wellington Harbour in March (HAR, unpubl.), and this influx may continue up these western beaches. This is supported by sightings of several colour-banded birds at Otaki that came from the Kaikoura Peninsula (pers. obs.).

The Red-billed Gull is common along the New Zealand coast and occasionally inland. It eats a wide variety of foods. During the breeding season, its main food is planktonic crustaceans found offshore. Outside the breeding season, some birds continue to feed at sea, some forage along the shore for marine invertebrates, and others eat refuse at sewage outfalls, rubbish dumps, parks and fishing ports (Mills 1985).

The density figures for Red-billed Gulls for each estuary and beach section (Table 1) show that most were found south of Waitohu Stream estuary. In contrast to Black-backed Gulls, the densities of Red-billed Gulls were similar for the estuaries (4.0 per kilometre) and the beaches (3.4 per kilometre). There were too few observations of activities to analyse, but all of the birds seen feeding (15/121) were on beaches, generally at the water's edge.

#### Age ratios

Overall, 25% of the Red-billed Gulls were in subadult plumage, but this proportion varied significantly ( $X^2 = 51.7$ ,  $p < 0.001$ ) between estuaries (9%) and beaches (32%). Unfortunately, Wodzicki (1962) gave no comparative figures for the 1961 counts.

### BLACK-BILLED GULL (*L. bulleri*)

#### Counts

In total, 271 Black-billed Gulls were recorded, at a density of 3.4 per kilometre. Although this density is very similar to that of Red-billed Gulls, the two used the area quite differently. For example, no Black-billed Gulls were seen at the Otaki estuary, where the Red-billed Gulls tended to congregate. However, the Black-billed Gulls were concentrated at the other small estuaries, with very few along the beaches. There were 12.2 Black-billed Gulls per kilometre at the estuaries compared with 0.4 per kilometre on the beaches.

#### Age ratios

Almost 97% of the Black-billed Gulls were subadults. This suggests that, like many migratory species, at least the one-year-old birds do not move from their wintering ground to the breeding colonies in spring. March is probably too early for many of the adults from South Island colonies to have reached the southwest of the North Island. A few Black-billed Gulls nest in the North Island, with the closest colonies being on the upper Manawatu River, in coastal Hawke's Bay and at Lake Rotorua. Preliminary results of colour-banding at the Lake Rotorua colony indicated that these birds stay near the breeding colony or move north or east to nearby coasts (J. Innes, pers. comm.).

All but one of the 243 Black-billed Gulls seen at estuaries were subadults, compared with 79% of the birds seen along the beach. These numbers are very significantly different ( $X^2 = 35.2$ ,  $p < 0.001$ ), but the reason is not clear.

### COUNTS OF OTHER COASTAL BIRDS

We kept records of other coastal birds during our survey in the various segments (Table 3).

#### AUSTRALASIAN GANNET (*Sula bassana*)

Three gannets were seen during the survey, all in flight. At other times of the year, gannets are occasionally seen along the Wellington West coast and in Wellington Harbour. The nearest colonies are at Waimaru Bay in Pelorus Sound and at Farewell Spit (Wodzicki *et al.* 1984).

TABLE 3 — The density (number per kilometre) of coastal birds other than gulls between the Otaki and Ohau River estuaries in March 1986

Species	Estuaries and beach sections										Totals for		
	Ot*	S1	S2	Wt	S3	Wr	S4	Wk	S5	Oh	Total	Estuaries	Beaches
Distance (km)	0.7	1.9	1.1	0.3	2.2	0.1	1.4	0.6	1.5	0.4	10.2	2.1	8.1
No. counts	3	3	7	9	16	10	12	8	12	6			
Gannet	-	0.4	-	-	<0.1	-	-	-	-	-	0.1	-	0.1
Black Shag	3.9	-	0.1	-	0.4	-	0.2	0.4	2.0	48.3	2.5	8.6	0.4
Little Shag	10.4	0.7	0.3	-	-	-	-	-	-	-	0.7	2.8	<0.1
Spotted Shag	-	0.2	-	-	-	-	-	-	-	-	<0.1	-	<0.1
White-faced Heron	1.9	-	-	-	-	-	-	-	0.1	-	0.1	0.5	<0.1
Black Swan	-	0.4	-	-	-	-	-	-	-	-	<0.1	-	<0.1
Paradise Sheilduck	1.4	-	-	0.7	-	-	-	-	-	-	0.1	0.5	-
Variable Oystercatcher	-	-	-	-	0.5	8.0	0.2	1.0	0.6	5.0	0.6	1.5	0.3
Spur-winged Plover	12.4	-	-	-	-	8.0	-	1.0	1.2	4.5	1.3	4.8	0.2
Banded Dotterel	1.4	-	-	-	-	-	-	0.1	-	-	0.1	0.4	-
Black-fronted Dotterel	1.9	-	-	-	-	-	-	-	-	-	0.1	0.5	-
Godwit	-	-	-	-	-	-	-	-	0.1	-	<0.1	-	<0.1
Pied Stilt	34.3	0.5	-	1.0	-	-	0.2	6.2	1.6	9.3	3.7	13.4	0.4
Pomarine Skua	-	0.4	-	-	<0.1	-	0.4	-	-	-	0.1	-	0.2
Arctic Skua	-	-	-	-	-	-	0.2	0.1	-	-	<0.1	<0.1	<0.1
Skua spp.	-	-	-	-	<0.1	-	-	0.1	-	-	<0.1	<0.1	<0.1
Black-fronted Tern	-	-	-	-	-	-	-	-	0.1	-	<0.1	-	<0.1
Caspian Tern	16.1	0.2	0.1	0.3	<0.1	-	0.2	2.6	0.5	21.5	2.4	8.8	0.2
White-fronted Tern	292.0	45.3	1.5	57.7	7.2	-	25.9	94.8	-	165.5	54.6	151.1	21.6

\* Abbreviations as in Table 1 and Figure 1.



**BLACK SHAG** (*Phalacrocorax carbo*)

This shag is regularly seen along the coastline. As well as feeding just offshore, particularly at rivermouths, it forages up the major rivers in the region (Wodzicki *et al.* 1978). A small colony is in karaka trees near the Te Mimi Stream on the eastern coast of Kapiti Island (P. Daniel, pers. comm.) and at coastal lakes near Waitarere (17 km north of Waikawa). Three other breeding colonies known in the Wellington region are at Lake Kohangatera, at Wainuiomata Dam and in the Hutt River gorge downstream from the Pakuratahi Forks (Parrish 1984).

During the counts, Black Shags were seen mainly at estuaries, particularly at the Ohau River estuary (Table 3). The few shags between the river estuaries were either flying or feeding just offshore. Those at the Otaki and Ohau River estuaries were all roosting. The roosting Black Shags concentrate on the northern side of the Ohau estuary, probably because the spit is relatively inaccessible to people and dogs. The Black Shag takes much more effort and space to get airborne than other birds on this coast and so it seems to need roost sites free of frequent disturbance.

**LITTLE SHAG** (*Phalacrocorax melanoleucos brevirostris*)

The 28 Little Shags seen during the counts were mostly at the Otaki River estuary (Table 3), usually roosting. They feed along rocky coastlines, in bays, estuaries, ponds, rivers and streams, and largely avoid coastal waters over sandy substrates. This is presumably why they were not seen foraging or flying just offshore from the beaches.

**SPOTTED SHAG** (*Stictocarbo punctatus*)

Just one Spotted Shag was seen, on the beach of Section 1. The species is a frequent visitor to the Waikanae River estuary from April to September (Wodzicki *et al.* 1978) and an occasional visitor to Kapiti Island (Wilkinson & Wilkinson 1952). The nearest breeding colony is on Somes Island, in Wellington Harbour, where a few pairs have nested since 1973 (Stephenson 1977).

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

White-faced Herons were seen mainly at the Otaki River estuary (Table 3). They feed in a variety of habitats, particularly along the edges of rivers and estuaries, but sometimes forage along the high-tide line of the beaches in the study area. They probably nest in trees on farmland adjacent to the beaches and estuaries between Otaki and Ohau.

**BLACK SWAN** (*Cygnus atratus*)

Two Black Swans were seen in flight over Section 1 during the counts. Black Swans are occasionally recorded on the upper reaches of the Ohau River estuary and on the Otaki River estuary (pers. obs.). Black Swans nest at Okupe Lagoon on Kapiti Island (P. Daniel, pers. comm.) and at lakes in coastal Horowhenua.

**PARADISE SHELDUCK** (*Tadorna variegata*)

All of the Paradise Shelducks were seen at estuaries (Table 3). From our observations during regular visits to this coastline, and those of Wodzicki *et al.* (1978), the Paradise Shelduck seems to be an uncommon but regular

visitor to the estuaries between Waikanae and Ohau. Several shelducks inhabit nearby Kapiti Island, each year raising broods on Okupe Lagoon, and they probably breed at the coastal lakes in Horowhenua.

#### VARIABLE OYSTERCATCHER (*Haematopus unicolor*)

Variable Oystercatchers are common residents of the coastline. During the counts they were present at the three northern estuaries and the adjacent sections of beach (Table 3). Perhaps they were absent from the Otaki River estuary and Section 1 because of the stony substrate; the other estuaries and sections have sandy substrates. Wairongomai Stream estuary had an unusually high density because two observers saw a family group there, consisting of two adults and two juveniles. We have found nests at the Waikawa River estuary, and up to eight pairs regularly nest on the spit between the Ohau River and the coast, where the river flows parallel to the sea (Figure 1).

Variable Oystercatchers are often seen probing in the sand for prey on the out-going tide along the beaches and about the estuaries. They are also sometimes seen foraging among the wrack at the high-tide line. Feeding birds often leave numerous probe-holes about decaying seaweed where they have searched for sandhoppers (*Talorchestia* spp.).

#### SPUR-WINGED PLOVER (*Vanellus miles*)

Although Spur-winged Plovers first bred in the North Island as recently as 1973 (Barlow 1985), this species is now rapidly colonising suitable habitat in the region. Though few birds were counted, they were often seen as a flock. The largest flock consisted of 22 birds at the Otaki River estuary, and others contained 13, 11, 8 and 7 birds. Nearly all Spur-winged Plovers were seen at estuaries (Table 3). We suspect that this species occasionally visits the coastline for some social display purpose, because we did not see them feeding at all. They did not allow close approach, flying inland as a group when disturbed.

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

Three Banded Dotterels were seen at the Otaki River estuary and one at the Waikawa Stream estuary (Table 3). Although numbers are always low, the species is seen frequently at estuaries of the region in the non-breeding season, particularly from February to June (Wodzicki *et al.* 1978). On 31 March, 41 were seen higher up the tidal part of the Ohau estuary than our counting area at the river mouth.

#### BLACK-FRONTED DOTTEREL (*Charadrius melanops*)

Four Black-fronted Dotterels were seen once at the Otaki River estuary. This recent immigrant to New Zealand was not seen at the Waikanae River estuary before 1975 (Wodzicki *et al.* 1978). Since 1980, single birds or small flocks have been seen at several estuaries along the Wellington and Horowhenua coasts, particularly in the non-breeding season. The Black-fronted Dotterel forages along the water's edge of backwaters and at river margins over muddy substrates at the estuaries.

**GODWIT** (*Limosa* sp.)

A godwit was seen on Section 5. Bar-tailed Godwits occur regularly at the Ohau River estuary but higher up the estuary than we went during the counts (pers. obs.) and at the Waikanae River estuary (Wodzicki *et al.* 1978). The main site for the species in the vicinity is the Manawatu River estuary, 20 km to the north, where about 350 spend the summer and 30 overwinter (pers. obs.).

**PIED STILT** (*Himantopus himantopus*)

Pied Stilts were recorded at most estuaries and beaches during the counts, but the density of stilts was much greater at estuaries (13.4 birds per kilometre) than on beaches (0.4). The birds at estuaries were foraging on wet sandflats and along the margins of deep channels or were roosting. Those along the beaches foraged in the shallow waves or among the wrack at the high-tide line.

**POMARINE SKUA** (*Stercorarius pomarinus*)

In total, 10 Pomarine Skuas were seen. All were in flight along beaches, and seven were counted on 2 March 1986 along Section 4 (Table 3). Although Falla *et al.* (1979) stated that the Arctic Skua is the most numerous of the *Stercorarius* species off New Zealand coasts each summer, these seven were seen, together with an Arctic Skua, harassing a large flock of White-fronted Terns. The following morning HAR saw a group of five Pomarine Skuas and two Arctic Skuas working a flock of White-fronted Terns.

**ARCTIC SKUA** (*Stercorarius parasiticus*)

Two Arctic Skuas were identified and two skuas (*Stercorarius* spp.) were seen but not identified as to species.

**BLACK-FRONTED TERN** (*Sterna albostrata*)

One Black-fronted Tern was seen during the counts, flying along Section 5. A few birds are frequently seen along the south-western Wellington coastline in the non-breeding season, but occasionally large flocks visit Waikanae estuary, e.g. 110 on 22 May 1985 (Tennyson 1986). Black-fronted Terns first appear in February (Wodzicki *et al.* 1978).

**CASPIAN TERN** (*Hydroprogne caspia*)

The Caspian Tern was seen at most estuaries and along all beaches, but mostly at estuaries (Table 3). All terns along beaches were flying, while most at estuaries were roosting. We watched birds diving for prey in the sea and in the estuaries.

**WHITE-FRONTED TERN** (*Sterna striata*)

This was the most common species seen during the counts, with a mean of 55 per kilometre compared with 44 Black-backed Gulls per kilometre. They were recorded at most estuaries and beaches, but over seven times more densely at estuaries (Table 3). The terns at estuaries were mainly roosting, whereas those along beaches were flying, either foraging along the outer breakers or moving between their offshore feeding grounds and the roosting sites.

The presence of large flocks of White-fronted Terns along the coastline was probably the main reason for the frequent sightings of skuas. The White-fronted Tern does not breed within the survey area, but a small colony is at Pipinui Point (Stephenson 1977) and small colonies are on rock stacks about Mana Island (R.O. Cossee, pers. comm.) and Kapiti Island (P. Daniel, pers. comm.).

### CONCLUSION

We found significant changes in the number and age structure of gulls on this coast since Dr Wodzicki did his counts 25 years ago. As human activity continues to increase here, further changes are inevitable. We hope that the gull counts will be repeated in the future and that counts of other coastal species will also be made to allow further comparisons.

### ACKNOWLEDGEMENTS

Dr Kazimierz Wodzicki, former Director of Ecology Division, DSIR, and more recently Honorary Lecturer of Zoology, Victoria University of Wellington, who died on 15 June 1987, aged 87, did considerable work on the birds of the south-west coast of the North Island, notably at Waikanae estuary. His counts were the basis of this historical comparison.

We thank the following Wellington members of OSNZ for helping us to record birds: P.C. Bull, R.H. & D.M. House, A. Munro, M.H. Powlesland, C. Reed, D.M. Stracy, B. & D. Tennyson, G. Woodward and J. Woon. P.C. Bull, M.C. Crawley, B.D. Heather, C.C. Ogle and M.R. Rudge made comments on the manuscript.

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