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Nearshore sightings of seabirds off the coast of Otago and Canterbury, New Zealand

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Abstract: Coastal and nearshore habitats are important to all seabird species. Understanding the distribution of seabirds in these environments can aid in their conservation. Despite the importance of coastal habitat, data collection for seabird species at sea is often difficult and resource intensive. Here, we take advantage of an established marine mammal surveying programme to collect distribution data for seabird species encountered in nearshore habitat. We surveyed seabird communities over 76 days in four locations along the southeast coast of New Zealand's South Island; Dunedin, Moeraki, Timaru, and Banks Peninsula. We present observations of seabird species presence in these locations, as well as, a brief assessment of the counting techniques used during the study. In addition, we summarise the seabird numbers in relation to the marine mammal surveys (i.e. the presence and absence of dolphins). We aim to show the value of opportunistic data collection, while contributing to baseline species distribution knowledge.

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INTRODUCTION

All seabird species use coastal and nearshore habitat, whether they are obligate to these areas year-round, or transient, returning to land to breed, socialise, or rear offspring. Understanding the distribution of seabird species within the nearshore environment can aid in their conservation, providing species managers with insight into habitat use (McLeay *et al.* 2010; Montevecchi *et al.* 2012), potential conflicts with anthropogenic interests (Anderson *et al.* 2011; Grémillet *et al.* 2018; Rodríguez *et al.* 2019), and areas of particular importance for each species (Forest & Bird 2014). Despite the importance of these ecosystems there are few data on seabird distribution in these habitats, particularly in Aotearoa New Zealand (but see O'Driscoll *et al.* 1998; Hawke 1998; Richard 1998). The collection of such data is often limited by access, expense, and weather.

Methods for collecting distribution data for seabirds in coastal habitat vary in scale and specificity. Global Position System (GPS) tracking studies are considered "gold standard" as they provide excellent fine scale distribution data. Such

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tracking does not rely on the researcher having access to the study area and allows for data to be collected regardless of sea condition (e.g. overnight or during storms). However, for small or difficult to access species, GPS studies are not always feasible, trackers can be lost, and the cost of such devices often results in low sample sizes (Casper 2009; Recio *et al.* 2011). Simple and inexpensive methods do exist, like shore based/vantage point observations, where researchers count species passing through an area (e.g. Waggitt *et al.* 2014). These surveys are useful in establishing the presence of a species and have been used to understand changes in habitat use prior to and post changes in the environment (e.g. the establishment of offshore wind farms; Rothery *et al.* 2009). Shore based observations, however, are limited to the immediate coastal area, and rely on birds being identifiable and coming within range of the vantage point (Waggitt *et al.* 2014). Surveying from boat-based platforms, provides the ability to move throughout the entire nearshore area, enabling researchers to collect data on all individuals that are encountered. Although boat-based surveys are still resource intensive, opportunities exist to take advantage of pre-established monitoring trips.

We aimed to record seabird species presence in coastal environments along the southeast coast of the South Island of New Zealand. We took advantage of a Hector's dolphin (*Cephalorhynchus hectori*) surveying programme to collect location data for all seabird species encountered. We use this opportunity to provide, 1) a brief assessment of the distribution of observed seabirds in coastal areas, 2) a comparison of seabird abundance in the presence and absence of dolphins, and 3) a comparison of two different bird counting methods feasible in this opportunistic situation; continuous and point counts.

METHODS

Seabird surveys were conducted on 76 days during November 2021 to July 2022, off the southeast coast of the South Island, New Zealand, in four locations: Dunedin, Moeraki, Timaru, and Banks Peninsula (BP; Fig. 1, Table 1). Surveys were conducted on one of three different planing research vessels (RV; 'Nemo','Grampus', and 'Cetos', Fig. 2). Vessels were 5.0–6.5 m in length and powered by single outboard engines (70–110 horsepower), and all observations took place on the decks which were essentially at sea level. Surveys were performed within 3 nm from shore and included both along shore routes (within 0.5 nm) and offshore 'zig-zags' (up to the 3 nm limit). Resampling of areas on the same day was avoided where possible, although in some areas (e.g. harbour entrances, small inlets/bay) repeated effort was inevitable. Surveys were restricted to weather conditions that favoured detection of marine mammals, principally Beaufort <4 and swell height no greater than 2 m. Surveys were not conducted at a regular time of day, instead they were timed to maximise effort when conditions were suitable. No burley or waste that might attract birds was discarded before or during surveys. Two methods were used to quantify birds during the surveys, continuous counts, and five-minute point counts.

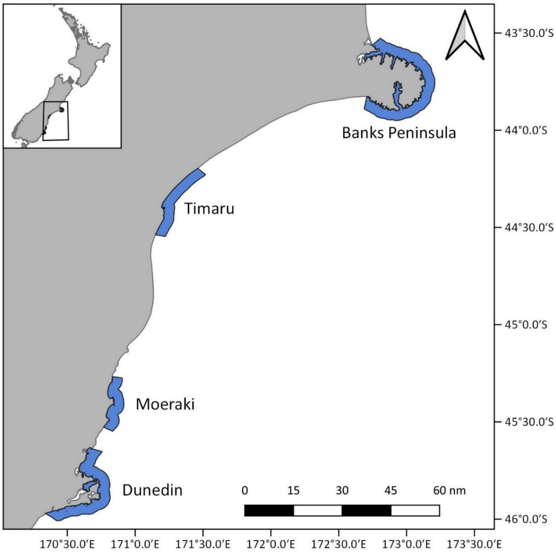

Figure 1. Map of the southeast coast of the South Island, New Zealand. Survey locations (north to south) Banks Peninsula, Timaru, Moeraki, and Dunedin.

For continuous counts, observers collected seabird sightings by facing the bow of the RV and continuously scanning the forward 180° aspect. All birds within an estimated 100 m radius were recorded, whether they were flying, diving, on, or under the water (e.g. diving penguins). The 100 m count radius was calibrated at the beginning of the survey, using static distance markers and GPS positions (e.g. distance to shore) to improve the accuracy of estimates. Count effort was given whilst travelling from 12 to 15 knots. Effort was stopped at low speeds due to the increased likelihood of resighting boat positive individuals. Once an individual was sighted, a GPS point was immediately generated. No attempt was made to assign a position to the bird, instead all individuals were given the location of the RV. Where multiple individuals were seen concurrently, they were recorded as a group and given the same GPS location. Birds flying with the RV were noted and not recounted. When tracking individuals became difficult, i.e. larger groups, a second observer was employed to assist. Continuous counts did not begin until one minute after departing a stop, to reduce any confounding impact of boat positive birds.

Five-minute point counts for seabirds were conducted as part of a distribution survey of Hector's dolphin. The RV stopped to collect environmental data at both dolphin presence and absence locations, it was at these times that five-minute point counts were performed. Presence locations were defined wherever a dolphin sighting was made, with a point count starting immediately upon sighting. While absence locations were taken every 30 minutes when dolphins were not sighted, beginning immediately once the vessel was stopped. At absence locations, counts were performed while the RV was stationary or drifting. Counts at presence locations were taken while stationary or taxiing with a dolphin group (<5 kn). For five-minute counts, one observer would scan a 360° view, and all birds that came within the 100 m perimeter were recorded.

Both continuous and point counts were carried out primarily by a single observer with optional assistance from other crew members. When the number of birds exceeded a reasonable amount to count, the best estimate was made and corroborated. Birds seen outside of the detection zone were not recorded even when identification was possible. Individuals that were within the detection zone but unable to be identified to species level were identified to the nearest taxonomic unit or recorded as unknown. In cases where the bird was totally obscured (usually by the sun), the sighting was given an unknown designation. In the case of fluttering shearwaters (*Puffinus gavia*) and Hutton's shearwaters (*Puffinus huttoni*), we did not attempt to differentiate between the two species given their high degree of similarity. Although we had very few sightings of prions (*Pachyptila* sp.), due to the high degree of similarity between species, we did not attempt to identify to species level. No voucher photographs were taken. The RV did not alter course for distant large aggregations of seabirds, therefore only groupings along the dolphin survey route were recorded. Sighting information and GPS locations were recorded using CyberTracker (CT; www.cybertracker.org) software on handheld mobile devices.

A summary of sightings for each species in each survey area is provided (Appendix 1), but for ease of interpretation we present heat maps and locations of the five primary groups sighted in Dunedin, Timaru, and Banks Peninsula. Moeraki was excluded due to the low number of surveys (n = 2) in this area. Species were grouped as follows: albatross (all family *Diomedeidae*), gulls (red-billed, *Chroicocephalus novaehollandiae scopulinus;* black-billed, *Chroicocephalus bulleri;* and black-backed gulls, *Larus dominicanus*), petrels (all family *Procellariidae*), terns (white-fronted, *Sterna striata;* black-fronted, *Chlidonias albostriatus;* and Caspian terns, *Hydroprogne caspia*) and shags (all family *Phalacrocoracidae*). Heat maps were produced in QGIS (version 3.8.3-Zanzibar, QGIS) using the "heatmap" symbology (radius 5,000 m) which renders all input locations as a raster. We weighted each location by both effort and group size so that sightings within an area of higher surveys, and smaller group size had a lower weight (as in Bennington *et al*. 2021). Effort areas were designated by creating a 3x3 nm grid, then counting the number of surveys (both point and continuous counts) that occurred within each section. The survey effort to each area was calculated as:

Locations were assigned the same survey effort as the area in which they occurred. The seabird count was included in the final weight by multiplying the effort by the proportion of individuals counted divided by the total count of that species:

For the point surveys, we provided a summary of seabird group counts in relation to the presence and absence of dolphins. We compared these counts using a two sample, two-sided t-test with seabird count as the response and presence/absence of dolphins as the grouping variable.

RESULTS

From November 2021 to July 2022, we sighted 10,840 groups of birds comprising 39,018 individuals over 611 five-minute point counts and 2,392.2 km of continuous counts. Most count effort was given at Banks Peninsula (BP) and Dunedin, with 37 and 24 survey days respectively (Table 1). This was reflected in the number of point counts (291 and 195) and the distance surveyed in continuous counts (1,495.6 km & 764.4 km) in both areas. Moeraki and Timaru were given the least effort with two and 13 survey days respectively, noting that no continuous counts were performed in Timaru (Table 1).

The most common species sighted were spotted shags (14,005; *Phalacrocorax punctatus*), black-backed gulls (6,284), red-billed gulls (6,165), sooty shearwaters (5,466; *Ardenna grisea*), and white-fronted terns (2,932). Another 30 species were sighted at least once during the counts. These included seven species of albatross, ten petrels, four shags, two terns, two penguins, arctic skua, black-billed gulls, and Australasian gannets (Table 2). The largest sighting event was a congregation of spotted shag 1.5 nm offshore of Te Kaio Bay (Banks Peninsula, 43º51.42'S 172º46.12'E), where approximately 2,300 individuals were estimated. The next three largest sightings were all

Table 1. Summary of the effort given recording seabird distribution along the southeast coast of the South Island, New Zealand. Displayed are the number of five-minute point counts, the total and average distance of continuous surveys, and the total time spent performing continuous surveys in either Dunedin, Moeraki, Timaru, or Banks Peninsula (BP). The total number of effort days and the summer (2021/22) and winter (2022) effort periods are also provided.

Location	Point counts	Distance surveyed (km)	Avg. survey length (km)	Total survey time (hours)	Survey days	Summer period	Winter period
Dunedin	195	764.4	7.1	31.6	24	Nov/Dec	June
Moeraki	16	132.2	7.8	6.2	2	Nov/Dec	NA
Timaru	109	0	–	0	13	March	June
BP	291	1,495.6	4.9	60.7	37	Jan/Feb	July
Total	611	2,392.2	5.5	98.5	76		

groups of sooty shearwaters directly off Aramoana Beach (Dunedin, 45º46.22′ S 170º42.79′ E) and were estimated at 400–500 individuals in number. Hutton's/fluttering shearwaters, red-billed gulls, black-backed gulls, and white-fronted terns all had single observations over 100 individuals.

Species detection was broadly similar for both continuous and point counts across most species; however, there were a few notable exceptions. Fluttering/Hutton's shearwater, Australasian gannets (*Morrus serrator*), yellow-eyed penguins (*Megadyptes antipodes*), and little penguins (*Eudyptula minor*) all had notable higher detections during continuous counts, with the latter being the most extreme example.

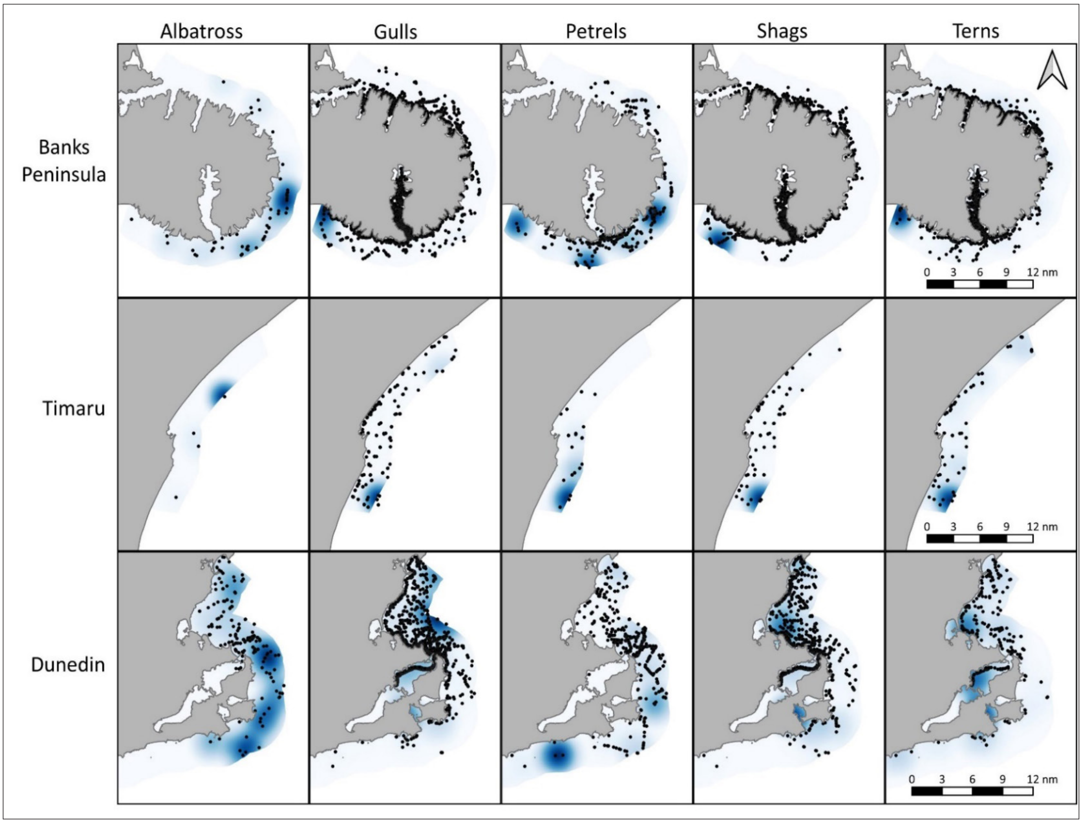

Figure 2. Sighting locations and associated heatmaps of seabird groups found in three sites (Banks Peninsula, Timaru, and Dunedin) along the southeast coast of the South Island, New Zealand. Heatmaps represent sightings weighted by survey effort and group size, with darker areas displaying higher densities. See Figure 1 for location context.

Table 2. Summary of all bird species seen in both five-minute and continuous counts in four locations along the southeast coast of the South Island, New Zealand. Species are grouped by family and identified by both the common and scientific name (as per Checklist Committee (OSNZ) 2022). Displayed are the number of groups, number of birds, average group size, and percentage of surveys were that species was sighted. Proportion (%) of surveys sighted is conditionally formatted to highlight values 0–25% (lightest grey), 25–50% (light grey), 50–75% (medium grey) and 75–100% (dark grey). Sighting records are also categorised by location, either Dunedin, Moeraki, Timaru, or Banks Peninsula (BP).

					Proportion of surveys sighted (%)		Total sighted			
Family	**Species name (Scientific name)**	**No. of groups**	**No. of birds**	**Avg. size**	**Cont. surveys**	**Point counts**	**Dunedin**	**Moeraki**	**Timaru**	**BP**
Albatross	Black-browed albatross (*Thalassarche melanophris*)	1	1	1.0	2.3	0	0	0	0	1
	Buller's albatross (*Thalassarche bulleri*)	103	117	1.1	20.5	14.5	109	0	3	5
	Chatham Island albatross (*Thalassarche eremita*)	2	2	1.0	4.5	0	2	0	0	0
	Northern royal albatross (*Diomedea sanfordi*)	35	36	1.0	20.5	3.9	6	0	0	30
	Salvin's albatross (*Thalassarche salvini*)	44	53	1.2	20.5	17.1	30	12	0	11
	Southern royal albatross (*Diomedea epomophora*)	20	23	1.2	15.9	10.5	13	0	0	10
	White-capped albatross (*Thalassarche cauta*)	92	112	1.2	29.5	21.1	87	18	1	6
Gulls and terns	Black-billed gull (*Chroicocephalus bulleri*)	6	7	1.2	4.5	3.9	1	0	1	5
	Black-fronted tern (*Chlidonias albostriatus*)	3	4	1.3	4.5	0	2	0	0	2
	Caspian tern (*Hydroprogne caspia*)	2	3	1,5	2.3	1.3	0	0	0	3
	Red-billed gull (*Chroicocephalus novaehollandiae scopulinus*)	2,202	6,165	2.8	100	89.5	3,872	246	60	1,987
	Southern black-backed gull (*Larus dominicanus*)	2,612	6,284	2.4	100	98.7	2,532	378	520	2,854
	White-fronted tern (*Sterna striata*)	1,598	2,932	1.8	97.7	88.2	580	45	132	2,175
Shags	Little shag (*Microcarbo melanoleucos brevirostris*)	82	141	1.7	31.8	5.3	133	1	0	7
	Otago shag (*Leucocarbo chalconotus*)	587	986	1.7	36.4	31.6	867	117	0	2
	Pied shag (*Phalacrocorax varius varius*)	71	75	1.1	45.5	18.4	1	0	8	66
	Spotted shag (*Phalacrocorax punctatus*)	2,086	14,005	6.7	100	97.4	2,754	190	107	10,954

Table 2. *Continued*

Family	Species name (Scientific name)	No. of groups	No. of birds	Avg. size	Proportion of surveys sighted (%) Cont. surveys	Point counts	Total sighted Dunedin	Moeraki	Timaru	BP
Petrels	Buller's shearwater (*Ardenna bulleri*)	24	87	3.6	15.9	6.6	11	0	0	76
	Cape petrel (*Daption capense*)	109	204	1.9	18.2	34.2	104	0	79	21
	Fluttering/Hutton's shearwater (*Puffinus gavia/huttoni*)	479	1,858	3.9	70.5	39.5	395	32	244	1,187
	Northern giant petrel (*Macronectes halli*)	84	98	1.2	47.7	21.1	25	0	7	66
	Prion sp. (*Pachyptila* sp.)	7	13	1.9	2.3	1.3	13	0	0	0
	Sooty shearwater (*Ardenna grisea*)	370	5,466	14.8	47.7	27.6	5,376	30	0	60
	Southern giant petrel (*Macronectes giganteus*)	2	2	1.0	2.3	1.3	1	0	0	1
	Westland petrel (*Procellaria westlandica*)	2	2	1.0	2.3	1.3	0	0	0	2
	White-chinned petrel (*Procellaria aequinoctialis*)	29	32	1.1	25	7.9	16	1	0	15
	White-faced storm petrel (*Pelagodroma marina*)	1	1	1.0	2.3	0	0	0	0	1
Other	Little penguin (*Eudyptula minor*)	116	171	1.5	68.2	14.5	75	0	0	96
	Yellow-eyed penguin (*Megadyptes antipodes*)	4	4	1.0	6.8	0	3	1	0	0
	Arctic skua (*Stercorarius parasiticus*)	3	3	1.0	2.3	0	0	0	0	3
	Australasian gannet (*Morus serrator*)	67	131	2.0	40.9	14.5	34	0	0	97
	Unknown	86	177	2.1	56.8	9.2	74	2	6	96
Total		**10,929**	**39,195**	**3.6**	**-**	**-**	**17,116**	**1,073**	**1,168**	**19,839**

One hundred and seventy-four little penguins were seen in total, sighted on 68.2% of continuous survey days and only 15.5% of point survey days (Table 2). Yellow-eyed penguins were not seen at all during point counts. The only species identified more from point counts were Cape petrels (*Daption capense*). Nine species were sighted only during continuous counts, while all species identified in point counts were also identified during continuous counts (Table 2).

Of the three areas with high survey effort (BP, Timaru, and Dunedin), hotspots in distribution of the five primary groups were observed (Fig. 2). At BP, Birdlings Flat (the southwest corner, 43º49.90'S, 172º42.54' E) was an area with high density sightings for all groups except albatross, which were mostly found off the east coast and further away from shore. Terns, shags, and gulls were found consistently along the coastal survey route while albatross and petrels were most often encountered during zig-zags. In Timaru no continuous surveys were completed and albatross and petrels were encountered less. Shags, terns, and gulls were encountered more evenly throughout both the coastal and zig-zag surveys and a hotspot of distribution was towards the southmost limit of the survey area. In Dunedin all groups were encountered regularly, with similar patterns to BP; shags, terns, and gulls were regularly encountered along the coastal surveys, though in comparison to BP, they were spread more evenly throughout the zig-zag surveys out to 3 nm. Hotspots for these groups occurred in Otago harbour and near Warrington beach (45º43.02'S, 170º36.19'E). Albatross and petrels were mostly encountered during zig-zag surveys with hotspots forming from Taiaroa Head (45º46.43'S, 170º44.45'E) and along the east coast of Otago Peninsula.

Some clear patterns in seabird distribution were noted along the latitudinal gradient of the surveyed sites. White-capped albatross (*Thalassarche cauta*), for example, were only sighted south of BP, with increasing frequency the further south the site (Table 2; Appendix SI. 2). Otago shag (*Leucocarbo chalconotus*) and yellow-eyed penguin follow the same pattern. No species displayed the inverse of this pattern, although many species were found only in BP, including black-fronted terns (*Chlidonias albostriatus*), black-browed albatross (*Thalassarche melanophris*), Arctic skua, and white-faced storm petrel (*Pelagodroma marina maoriana*). No species was only seen at either the Moeraki or Timaru sites. Instead, these sites showed intermediary seabird assemblages in comparison to both Dunedin and Banks Peninsula.

Changes in distributions over the study period were primarily noted for two species; sooty shearwaters and Buller's albatross (*Thalassarche bulleri*, Table 3). Sooty shearwaters were sighted almost exclusively in Dunedin during early summer (November/December), with large congregations present on the water (*c.* 500 individuals). Surveys conducted later in summer (and in different survey locations), sighted far fewer individuals, usually in groups less than 10 individuals. Buller's albatrosses were sighted infrequently during summer surveys, usually *c.* 1 nm from shore. During winter surveys, individuals were often sighted much closer to shore, with many sightings within Dunedin harbour and other sheltered waters (data not shown). Sightings of fluttering/Hutton's shearwater, red-billed gulls, southern black-backed gulls, white-fronted terns, and spotted shags were made in every season, but were much higher during early and mid-summer (Table 3).

During the five-minute point counts, there was a statistically significant (T-Test, p-value < 0.05) difference in the number of seabirds that were counted when dolphins were present for two groups: albatross and terns. Albatross were sighted less often when dolphins were present, while terns were more likely to be seen (Table 4).

DISCUSSION

During this investigation we took advantage of established monitoring trips for marine mammals to survey the coastal bird diversity at four sites on the southeast coast of the South Island, New Zealand. We were able to tailor our data collection to be flexible with other research priorities whist still giving *c.* 150 hours of dedicated seabird survey effort. While the distribution data presented here were not collected to answer a particular research question; it contributes to baseline knowledge of seabird species in the nearshore environment.

The range and relative abundance of seabirds sighted across the survey locations fell within reasonable expectation for all species. Four of the five most sighted species (spotted shags, black-backed gulls, red-billed gulls, and white-fronted terns) are common in the coastal environment, while sooty shearwaters are typically a pelagic species. Most sooty shearwaters sightings were large aggregations during November, immediately off the Otago Peninsula. High densities of red-billed gulls, black-backed gulls, and white-fronted terns were noted at feeding aggregations, often associated with pelagic clusters of squat lobster larvae (*Munida gregaria*). Stationary aquacultural equipment (mussel buoys, salmon pens; Banks Peninsula) and commercial processing outfalls (Fish and meat works, Timaru) were also noted as aggregation sites for these species, as well as Cape petrels and northern giant petrels for the latter. Inshore trawlers and aquaculture vessels were also

Table 3. Seabird counts by period for all species sighted across the southeast coast of the South Island of New Zealand. Species are grouped by family and identified by common names. Counts are combined totals of continuous and point counts from November 2021 to July 2022. Early summer includes sightings in November 2021, mid-summer includes December 2021 and January 2022, late summer includes February and March 2022, and winter includes June and July 2022.

		Seabird counts by period			
Family	**Species name**	**Early Summer**	**Mid-Summer**	**Late Summer**	**Winter**
Albatross	Black-browed albatross	0	1	0	0
	Buller's albatross	5	5	0	107
	Chatham's albatross	0	0	0	2
	Northern royal albatross	4	31	0	1
	Salvin's albatross	31	22	0	0
	Southern royal albatross	6	13	0	4
	White-capped albatross	46	41	0	25
Gulls and terns	Southern black-backed gull	1,756	3,537	460	531
	Black-billed gull	1	1	1	4
	Black-fronted tern	2	2	0	0
	Caspian tern	0	3	0	0
	Red-billed gull	2,425	2,985	55	700
	White-fronted tern	462	2,277	97	96
Shags	Little shag	28	63	0	50
	Otago shag	591	249	0	146
	Pied shag	0	46	8	21
	Spotted shag	2,132	11,472	84	317
Petrels	Buller's shearwater	9	76	0	2
	Cape petrel	81	22	11	90
	Fairy prion	13	0	0	0
	Fluttering/Hutton's shearwater	234	1,356	244	24
	Northern giant petrel	20	67	6	5
	Sooty shearwater	5,361	105	0	0
	Southern giant petrel	1	0	0	1
	Westland petrel	0	2	0	0
	White-chinned petrel	12	19	0	1
	White-faced storm petrel	0	1	0	0
Other	Blue penguin	47	98	0	26
	Yellow-eyed penguin	3	1	0	0
	Arctic skua	0	3	0	0
	Australasian gannet	1	92	0	38
Total		13,271	22,590	966	2,191

observed to attract a high number of petrel species, in addition to common species (such as the gulls, terns, and albatross species groups). Species that were rarely sighted in this study, were likely so for several reasons, including actual rarity/conservation status (e.g. yellow-eyed penguin; Robertson 2021), sighting outside of normal range (e.g. southern giant petrel), or are migrant (e.g. Arctic skua, black-

Table 4. Seabird sightings recorded during five-minute point counts in relation to the presence or absence of Hector's dolphin (*Cephalorhynchus hectori*). Displayed are the number of birds sighted and the results of a two sample, two-sided T-test, comparing the means of seabird counts in either group.

Group	Dolphin Absence	Dolphin Presence	p-value
Albatross	120	40	**<0.001**
Gulls	2,319	1,840	0.174
Terns	678	1,055	**<0.001**
Shags	1,051	4,160	0.178
Petrels	1,176	1,021	0.723

fronted terns).

Gulls, terns, and shags were commonly encountered close to shore at BP, and although this was true for both Otago and Timaru, there was a more even distribution of sightings throughout the survey area to 3 nm. This trend could be due to differences in the environment between study areas and could be worth exploring in future studies, though is beyond the scope of our analysis. Seasonal patterns in distribution were strongest for sooty shearwater and Buller's albatross. The higher presence of sooty shearwater in the nearshore environment around Dunedin could be the result of the use of this area (or nearby offshore islands, such as Rakiura) as a breeding ground, or as a productive area for foraging trips during this time of year, resulting in higher encounter rates (Jones 2000). Buller's albatross are endemic to New Zealand but breed on offshore islands (e.g. the Snare's, Solander, Chatham, and Three Kings Island groups; Turbott 1990). Although some individuals make foraging trips passing through our study sites during the breeding season (e.g. Sagar & Weimerskirch 1996), Buller's albatross have been observed in larger, more concentrated aggregations from April to July (Stahl *et al.* 1998), a pattern that agrees with our observations.

The point counts used in this study were performed to compare bird presence in areas with and without Hector's dolphin. Although most groups were not affected by the presence or absence of dolphins, both terns and albatross had strong, and opposing, relationships with dolphin presence. Seabirds and marine mammals are both indicator species, and it is likely that, for terns, they are congregating in areas where there is an abundance of a shared food source. This is not the first study to show a link between dolphins and terns, Bräger (1998) reported a link between white-fronted terns and Hector's dolphins at Banks Peninsula during feeding aggregations. In this study, 15.7% of dolphin groups were accompanied by terns. In contrast, albatross were rarely seen with dolphin groups. In summer, Hector's dolphins congregate in the nearshore environment (Rayment 2010), whereas albatross were much more commonly sighted further offshore. These contrasting ecologies may result in little overlap between these groups and hence, the trends presented here. In contradiction, however, is the hotspot around Taiaroa Head, a location that Hector's dolphins frequent (Williams et al. 2024), and is where the majority of albatross were sighted in the presence of dolphins.

When considering species detection alone, continuous counts performed better than point counts. Continuous counts were able to detect more species, over fewer survey days. This is unsurprising, given continuous counts had nearly double the time of active survey. Despite better species detection, continuous counts can be more difficult to perform during opportunistic surveys. They require personnel skilled enough to sight, identify, and record bird species while travelling *c.* 15 kn. Sea state and wind chill while underway can make it difficult to record data, even in conditions well within survey limits. These factors did not hinder point counts to the same degree and this survey type was easier to perform with sub-optimal identification skills (larger sighting window, opportunity to take photographs if required).

Seabird surveys are used to quantify the density and abundance of seabirds at sea. Although relative density measurements could be extrapolated from our data, variability in the length and direction of transects mean our surveys do not follow traditional methods (e.g. Tasker *et al.* 1984; Spear *et al.* 2004). We believe that strong biases would exist and quantifying data further holds little value. Instead, we provide an observational assessment of the seabird species along the southeast coast of New Zealand South Island and provide an example of the quantity and quality of data that can be collected opportunistically. We believe the description of seabird distribution and the quantity of seabird data collected, is of value as seabird distribution data around Aotearoa New Zealand remain scarce. We highlight the use of existing monitoring trips as opportunities to further gather seabird observations and recommend that future marine mammal surveys consider including seabird observers where possible.

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Appendix 1. Sightings of all seabird species across the southeast coast of the South Island, New Zealand. Locations surveyed include Dunedin, Moeraki, Timaru, and Banks Peninsula. Each map represents a single species, except in the case of fluttering/Hutton's shearwater (F/H) and prion spp. Blue dots represent the location of an individual or group sighting.