SEABIRD RECORDS FROM THE TRANSGLOBE EXPEDITION, PART 1: AFRICAN AND NEW ZEALAND SECTORS OF THE SOUTHERN OCEAN

1979 - 1981

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INTRODUCTION

During a polar circumnavigation of the globe by the Transglobe Expedition, the expedition support ship, M.V. *Benjamin Bowring*, crossed several oceans from the Southern Ocean to the Arctic Ocean. We had the good fortune to be aboard as scientific officers for two years. This presented an opportunity for observations to be made by the same observers on seabirds in widely separated areas, using consistent techniques from the same ship. It is difficult to draw more than tentative conclusions from information for single cruises and we wish mainly to present our data with comments on only a few points. Although not ornithologists, we spent many hours in the field and hope that the data we have collected may contribute to a growing body of data on seabird distribution at sea. This paper represents the first part of our results and covers two voyages in the Southern Ocean.

METHODS

The observations are divided into two major sea passages undertaken between December 1979 and February 1981. Observations were made for three one-hour watches each day (morning, afternoon and evening) during these passages. Commitments to deck work and bridge watches occasionally interfered with the bird watches (e.g. only two watches per day were possible between Cape Town and Antarctica) and additional watches were undertaken when this seemed desirable.

All birds visible within 500 m of the ship were counted in consecutive 10-minute periods. Watches were kept from the bridge deck (3,5 m above sea level) over 360°. This method was used for several reasons: the *Benjamin Bowring* is a small ship (*c.* 61 m long, 1 200 tons) with a slow speed (average 9 - 10 knots but highly dependent on sea conditions). Consequently most seabirds had little difficulty keeping up with or overtaking the ship, so that it was not feasible to assume that once we had passed a bird it would not be recounted. However, it was possible to see the entire length of the vessel from the bridge deck and we could obtain an accurate count of the total number of birds around the ship. Also, because birds following

the ship were often very close, individuals could occasionally be recognized. It was thus sometimes possible to tell whether the same birds were being recounted in consecutive periods or not. Start and finish positions for each one-hour watch were taken from the ship's satellite navigator system. Visibility (in nautical miles), ship's speed and wind speed and direction (corrected for ship's speed and course) were also recorded at the start and end of each watch.

RESULTS AND DISCUSSION

Results obtained from the African and New Zealand Sectors of the Southern Ocean are first given and discussed separately, and are then compared.

African Sector of the Southern Ocean

Data on species' distribution along a return transect between Cape Town, South Africa and Fimbulisen, Antarctica during December 1979 - January 1980 are presented in Table 1. A clear separation between Subantarctic and Antarctic species assemblages was apparent around 60°S on both the north and south bound legs. These assemblages were albatross species in the north and Snow and Antarctic Petrels *Pagodroma nivea* and *Thalassioca antarctica* which formed the majority of observations in the south (Fig. 1). Of the 25 species recorded (excluding Prions *Pachyptila* spp.), only seven were recorded south of 60°S. These were Adélie, Chinstrap and Emperor Penguins *Pygoscelis adeliae*, *P. antarctica* and *Aptenodytes forsteri*, McCormick's Skua *Catharacta maccormicki*, Wilson's Stormpetrel *Oceanites oceanicus* and Snow and Antarctic Petrels. Only one Chinstrap Penguin was seen. It appeared on 10 January 1980 on the shelf ice near SANAE and after two days joined company with six Adélie Penguins.

It was noticeable that whereas Snow Petrels were common on the south bound leg none was recorded on the return route which avoided the pack ice by passing farther to the west. The overall density of all species combined was markedly higher on the return leg, presumably due to the proximity of Bouvet Island (Bouvetøya). Although van Zinderen Bakker (1971) observed no juvenile Wandering Albatrosses *Diomedea exulans* between Prince Edward Island and Cape Town, immature birds formed the majority of our records for this species. Although we have too few data on which to base any serious conclusions it was noticeable that the ratio of adult to juveniles observed was much lower for the Wandering Albatross (9:17) than for the Blackbrowed Albatross *Diomedea melanophris* (11:5). The total number of albatrosses seen was small (74 birds during 31 watches north of 60°S, i.e. an average of 2,38/watch north of the Antarctic Convergence) the commonest species being the Wandering Albatross. Only one Shy Albatross *D. cauta*, three Yellownosed Albatrosses *D. chlororhynchos* in a single watch and four Greyheaded Albatrosses *D. chrysostoma* in two watches were recorded. Except for one record of a Greyheaded Albatross, all these latter sightings were made near or north of 40°S. Sooty Albatrosses *Phoebetria fusca* were recorded only in the vicinity of Bouvet Island. The only albatross seen in groups of more than three or four was the Lightmantled Sooty Albatross *P. palpebrata*, a party of 11 birds

TABLE 1

DISTRIBUTION AND NUMBERS OF SEABIRDS SEEN BETWEEN CAPE TOWN, SOUTH AFRICA AND FIMBULISEN, ANTARCTICA, DECEMBER 1979 - JANUARY 1980

Date	Time	Lat.	Long.	Vis. (miles)	Speed (knots)	Species No. (see species list 1)																					
						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1979																													
23 Dec	1700	37 48S	18 30E	12	7						3													6						
24 Dec	0700	39 30	18 12	10	8			2																4			10			
	1705	41 00	18 36	10	8			3				2												12						2
25 Dec	1700	42 36	18 48	11	8			1																4	13					
	1700	44 12	18 24	12	8																									4
26 Dec	0710	45 30	18 12	8	7				3															5						1
	1705	46 48	18 24	9	7				2															1	12					
27 Dec	0700	48 06	18 54	10	8			2										1							9					
	1655	49 48	19 00	9	8			2																					2	2
28 Dec	0705	51 18	19 12	10	8			1						1										7	35			3		1
	1700	53 12	19 12	12	8			1						1											250					
29 Dec	0710	55 00	19 28	0,5	9									2							2									7
	1650	56 54	19 30	0,5	9																1		3							
30 Dec	0700	58 24	19 36	5	9									1											5					2
	1655	60 06	19 42	4	9												3		4											
31 Dec	0710	61 18	17 24	10	8												6		8											
	1700	62 36	14 48	8	8												12		21											
1980																														
1 Jan	0700	64 00	11 45	8	8														13											
	1655	65 30	08 40	8	8												7		9											

	1700	68 12	02 18	12	10										6		9											
3 Jan	0700	69 00	01 06	7	5		20																					
	1700	69 18	00 30	10	4										45		8											
4 Jan	0705	69 48	01 12W	8	4	3	16																				7	
									NORTHBOUND																			
18 Jan	0700	68 14	03 20W	12	9										7													
	1700	66 49	03 30	12	10										12													
19 Jan	0700	64 52	03 24	11	9										23													
	1705	62 35	04 18	11	9										6										4			
20 Jan	0705	60 38	02 25	12	9				3				2	13	14	8			13	2	21				6			
	1705	59 02	00 50	9	8,5			4	4		2	11	1	38		14			7	1	38				3			
21 Jan	0700	57 25	00 45E	0,25	9														12									
	1600	56 17	01 40	0,25	9						1		1	24						1								
	1700	56 15	01 50	0,25	9,5														9		2							
22 Jan	0700	54 02	03 30	5	5			1								8			12							4		
	1700	52 35	05 00	8	7			2			1	1	3													3		
23 Jan	0705	50 47	05 58	6	8						3					9				12		5				3		
	1700	50 05	06 30	5	7													3	3	17								6
24 Jan	0700	48 02	07 37	7	8													1		13				12				
	1700	46 54	08 13	10	9,5			1	1		2									52	7			5				
25 Jan	0700	44 40	09 50	12	9,5				2											2	2			18	4			
	1710	43 00	10 54	12	10			3	1															15				
26 Jan	0700	41 18	12 12	11	10			1																	3			
	1705	39 48	13 30	7	10			2																				6
27 Jan	0705	37 55	15 05	12	10													7										
	1700	36 50	15 56	8	10					1								4					18					

SPECIES LIST NO. 1

1. Emperor Penguin *Aptenodytes forsteri*, 2. Adélie Penguin *Pygoscelis adeliae*, 3. Wandering Albatross *Diomedea exulans*, 4. Blackbrowed Albatross *D. melanophris*, 5. Shy Albatross *D. cauta* 6. Yellownosed Albatross *D. chlororhynchos*, 7. Greyheaded Albatross *D. chrysostoma*, 8. Sooty Albatross *Phoebetria fusca*, 9. Lightmantled Sooty Albatross *P. palpebrata*, 10. Southern Giant Petrel *Macronectes giganteus*, 11. Antarctic Fulmar *Fulmarus glacialoides*, 12. Antarctic Petrel *Thalassoica antarctica*, 13. Pintado Petrel *Daption capense*, 14. Snow Petrel *Pagodroma nivea*, 15. Greatwinged Petrel *Pterodroma macroptera*, 16. Kerguelen Petrel *P. brevirostris*, 17. Softplumaged Petrel *P. mollis*, 18. Blue Petrel *Halobaena caerulea*, 19. Whitechinned Petrel *Procellaria aequinoctialis*, 20. Prion *Pachyptila* spp., 21. Cory's Shearwater *Calonectris diomedea*, 22. Great Shearwater *Puffinus gravis*, 23. Wilson's Stormpetrel *Oceanites oceanicus*, 24. Blackbellied Stormpetrel *Fregetta tropica*, 25. McCormick's Skua *Catharacta maccormicki*, 26. Unidentified

SPECIES LIST NO. 2

1. Emperor Penguin *Aptenodytes forsteri*, 2. Adélie Penguin *Pygoscelis adeliae*, 3. Wandering Albatross *Diomedea exulans*, 4. Royal Albatross *D. epomophora*, 5. Blackbrowed Albatross *D. melanophris*, 6. Greyheaded Albatross *D. chrysostoma*, 7. Lightmantled Sooty Albatross *Phoebetria palpebrata*, 8. Northern Giant Petrel *Macronectes halli*, 9. Southern Giant Petrel *M. giganteus*, 10. Antarctic Petrel *Thalassoica antarctica*, 11. Pintado Petrel *Daption capense*, 12. Snow Petrel *Pagodroma nivea*, 13. Whiteheaded Petrel *Pterodroma lessonii*, 14. Blue Petrel *Halobaena caerulea*, 15. Prion *Pachyptila* spp., 16. Whitechinned Petrel *Procellaria aequinoctialis*, 17. Parkinson's Petrel *P. parkinsoni*, 18. Sooty Shearwater *Puffinus griseus*, 19. Wilson's Stormpetrel *Oceanites oceanicus*, 20. Blackbellied Stormpetrel *Fregetta tropica*, 21. South Georgian Divingpetrel (?) *Pelecanoides georgicus*, 22. Campbell Island Cormorant *Phalacrocorax campbelli*, 23. Spotted Cormorant *P. punctatus*, 24. McCormick's Skua *Catharacta maccormicki*, 25. Antarctic Skua *C. antarctica*, 26. Kelp Gull *Larus dominicanus*, 27. Antarctic Tern *Sterna vittata*, 28. Whitefronted Tern *S. striata*, 29. Unidentified

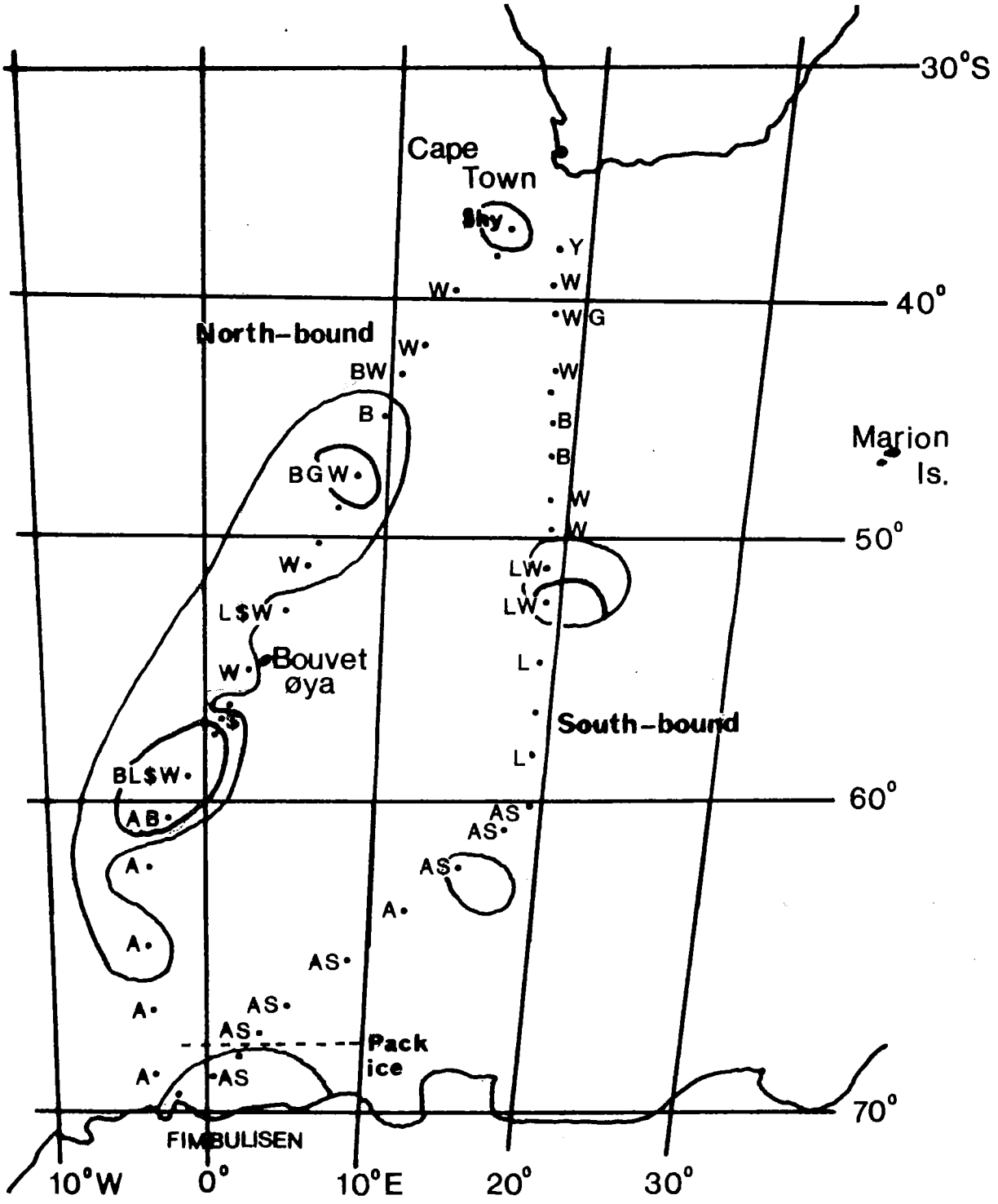

Figure 1

Course of M.V. *Benjamin Bowring* between Cape Town, South Africa and Fimbulisen, Antarctica, December 1979 - January 1980. Each point marks the start position of a one-hour watch. Watches during which albatrosses were recorded are keyed as: B - Blackbrowed; G - Greyheaded; L - Lightmantled Sooty; $ - Sooty; W - Wandering; Y - Yellownosed. Antarctic and Snow Petrel sightings are marked A and S respectively. Outer lines enclose stations where more than 20 birds were seen during the watch, inner lines more than 50 birds.

being recorded at 59 02S,00 50W. This species also formed the largest single aggregation of albatrosses seen between New Zealand and Antarctica (see below). Southern Giant Petrels *Macronectes giganteus*, which breed on Bouvet Island (Haftorn & Voisin 1982), were observed only on the north bound leg in the vicinity of the island between 60 38S and 52 35S. A total of seven individuals was recorded.

In addition to the observations recorded in Table 1 we also noted the following: on 28 December 1979 (53 40S, 19 12E) a very large flock of prions *Pachyptila* passed the ship. Light conditions were poor (it was 21h30) but they extended to the limits of visibility which was around eight nautical miles. Accurate counting was not possible but at least several thousand birds were present and probably considerably more. On two occasions we encountered birds resting on ice bergs: the ship circled an ice berg carrying eight Emperor Penguins, 176 Snow Petrels and 192 Antarctic Petrels on 31 December 1979 (61 45S, 17 00E); and we passed a berg carrying approximately 70 Antarctic Petrels on 18 January 1980 (68 24S, 02 41W).

New Zealand Sector of the Southern Ocean

Data collected during a voyage from Christchurch, New Zealand, McMurdo Sound, Antarctica; during a 15-day cruise in the Ross Sea and on the return voyage to New Zealand during January - February 1981 are presented in Table 2. A clear separation of Antarctic and Subantarctic species assemblages was again obvious. Snow and Antarctic Petrels first appeared somewhat farther south (*c.* 65°S) than between Cape Town and Fimbulisen (c 60°S). This could have been partly a seasonal effect since the McMurdo voyage was two weeks later in the season. In contrast with the Fimbulisen voyage, during which no albatrosses were seen south of about 60°S, Lightmantled Sooty Albatrosses were seen in small numbers as far south as the Ross Sea (*c.* 75°S). This species again formed the largest single aggregation of any albatross species when on the evening of 18 February 1981 at 69 33S, 171 35E, 35 individuals were counted in a dispersed flock around the ship. The distribution of observed albatrosses is given in Fig. 2 along with that of Snow and Antarctic Petrels. The most common abatross was the Blackbrowed Albatross (84 individuals recorded) followed by the Lightmantled Sooty Albatross (61 individuals but 35 of these recorded during a single watch). Only eight Greyheaded Albatrosses were seen, but some of these were much farther south than those seen on the Fimbulisen voyage. Our records for Wandering Albatrosses and Royal Albatrosses *Diomedea epomophora* are curious since 19 of the 20 Wandering Albatrosses seen were on the south bound leg while 11 of the 12 Royal Albatrosses were seen on the north bound leg, presumably because of the proximity of Campbell Island where Royal Albatrosses were observed breeding during a visit to the island on the return voyage. Campbell Island Cormorants *Phalacrocorax campbelli*, Subantarctic Skuas *Catharacta antarctica* and Antarctic Terns *Sterna vittata* were also observed at Campbell Island. The two single divingpetrels *Pelecanoides* sp. seen at 63°S and 59 27S on 20-21 February 1981 during the return leg were, from their location, presumably South Georgian Divingpetrels *P. georgicus* though positive field identification was impossible. It is interesting that the only divingpetrels seen were over the deep oceanic basin between the

TABLE 2 DISTRIBUTION AND NUMBERS OF SEABIRDS SEEN BETWEEN CHRISTCHURCH, NEW ZEALAND AND THE ROSS SEA, ANTARCTICA

Date	Time	Lat.	Long.	Vis. (miles)	Speed (knots)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
						Species No. (see species list 2)																												
1981						SOUTHBOUND																												
7 Jan	1800	43 42S	173 14E	8	8					1				3		14						29				4				18		2		
8 Jan	0830	45 07	173 47	6	8			3		1				1		18																		4
	1800	46 12	174 19	5	7			3		1						6						9		4										3
9 Jan	0900	48 07	175 14	6	8											12						9												
	1110	48 13	175 11	4	7			2		2						15																		9
	1800	49 04	175 33	6	8			1	1							4																		18
10 Jan	0930	51 06	176 38	7	8			1				1				6																		8
	1415	51 46	176 55	6	8			1		1		1																						2
	1800	52 12	177 09	7	9			2																										
11 Jan	0915	54 29	178 10	6	9			2		1											2													
	1410	55 13	178 29	6	9					1		1									15													
	1800	55 47	178 45	0,25	9																													
12 Jan	0830	57 50	179 43	7	9			1													13													
	1400	58 30	179 54	6	9			1		1										1	5													
	1815	59 13	179 35W	7	9			1		4											15		3											
13 Jan	0840	61 23	178 27	7	9					3		2									7													
	1400	62 14	178 09	6	9			1		1													2											
	1750	62 56	177 54	6	10					1						1																		
14 Jan	0900	64 32	177 01	2	9															1														
	1400	65 33	177 04	0,25	8																													
	1800	65 48	177 04	0,25	8																													
15 Jan	0840	67 00	177 00	4	4										14																			
	1400	67 25	176 53	4	4									1	15																			
	1830	67 49	176 56	3	4										35																			
16 Jan	0800	69 04	177 05	5	8										16		3																	
	1400	69 36	177 07	5	8										3		2																	
	1800	69 51	177 07	2	7										16																			
17 Jan	0800	71 30	177 03	6	8		1								4																			

	1400	72 18	176 40	7	9			46	28				
	1800	72 51	177 02	8	9			3	2				
18 Jan	0800	74 17	177 41	8	5					1		1	
	1400	74 43	179 00	8	5	5		53					
	1800	74 53	179 54E	8	5	2		2	3				
19 Jan	0800	76 01	173 02	8	9								1
	1400	76 52	173 08	10	8								
	1800	77 34	169 24	8	9								
							ROSS SEA						
29 Jan	1800	77 36	165 57E	8	7	3						7	
30 Jan	0800	77 12	171 04	10	2								
	1400	77 17	174 10	10	7				9				
	1800	77 20	176 22	9	7				14				
31 Jan	0800	77 40	176 53W	8	4				15				
	1400	78 01	173 49	8	8					2			
	1800	78 15	171 42	8	7								
1 Feb	0800	76 58	169 60	7	6,5			6	3				
	1400	76 16	169 48	7	8			3	2				
	1800	75 45	169 52	4	5			7	6				
2 Feb	0800	76 22	165 03	4	7			7	4				
	1400	77 02	165 07	6	7				4				
	1800	77 32	165 11	8	7			22	5				
3 Feb	0800	77 44	162 08	8	7			18	3				
	1400	77 32	162 02	7	8				4				
	1800	77 23	162 48	5	7			13					
4 Feb	0800	76 35	171 01	5	10			4	7				

5 Feb	0800	75 29	177 30	6	6														
	1400	75 27	175 00	5	7							2	4						
	1800	75 28	173 14	3	6								5						
6 Feb	0800	75 12	166 58	3	6														
	1400	74 49	167 33	5	7											1			
	1800	74 41	167 32	7	0								3						
7 Feb	0800	74 58	165 07	0,5	4								1						
	1400	74 46	166 19	0,5	8														
	1800	74 30	167 29	0,25	8								2						
8 Feb	0800	74 15	168 06	3	8								3						
	1400	74 00	170 31	0,25	7														
	1800	73 53	170 54	2	7								17						
9 Feb	0800	73 23	171 03	2	7			1											
	1400	72 46	171 24	5	8													1	
	1800	72 22	172 18	4	7,5			1											
10 Feb	0800	73 39	171 04	3	10			1											
	1400	74 43	170 11	4	10														
	1800	75 21	169 35	4	10														
11 Feb	0800	76 36	165 09	5	7,5														
	1400	76 35	163 43	5	6													3	
	1800	76 48	165 00	6	7														
12 Feb	0800	77 27	164 23	6	7,5								2						
	1400	77 40	166 30	6	7													2	
								NORTHBOUND											
16 Feb	0800	77 41	166 11	5	4	2												5	
	1800	77 11	166 03	3	9													1	
17 Feb	0800	74 57	168 59	6	10			1											

	1400	73 55	170 09	6	10																			
	1800	73 19	170 52	5	10					1								1						6
18 Feb	0800	71 10	171 45	7	9,5					1								2						
	1400	70 09	171 30	7	10					2		9						1						
	1800	69 33	171 16	8	9			6		35		3												
19 Feb	0800	67 35	171 19	7	8,5			6		1		30												1
	1400	66 40	171 10	8	8			4		2		1					14	2						
	1800	66 03	171 14	10	10			5						3	3		8	1						
20 Feb	0800	63 55	170 49	10	9			4						1	1									
	1400	63 00	170 37	9	9			3	1	1										1		1		
	1800	62 25	170 30	10	9			5	1		1		3		3		36							
21 Feb	0800	60 20	170 13	7	8,5			4						5			3							
	1400	59 27	170 06	8	10			3					4				8			1				
	1800	58 51	170 01	5	7,5			1	2					6				1						
22 Feb	0800	56 45	169 44	1	9			1																
	1400	55 20	169 45	2	8,5			3																
	1730	55 09	169 40	4	8,5		1	6		1							5		2					
23 Feb	0800	53 19	169 30	9	8		2	2		1							6	1						1
	1220	52 32	169 08	12	9		3	12	1		4					3	14		4		7		3	
24 Feb	0800	50 57	170 08	9	10		1	2		3						5	10		3					
	1400	50 00	170 19	7	10		2	1								8			2					
	1800	49 30	170 34	8	9		2										32		3					
25 Feb	0800	47 43	171 23	5	7,5	1											3							
	1400	47 06	171 39	4	7											7	2							
	1800	46 35	171 53	7	9												3							

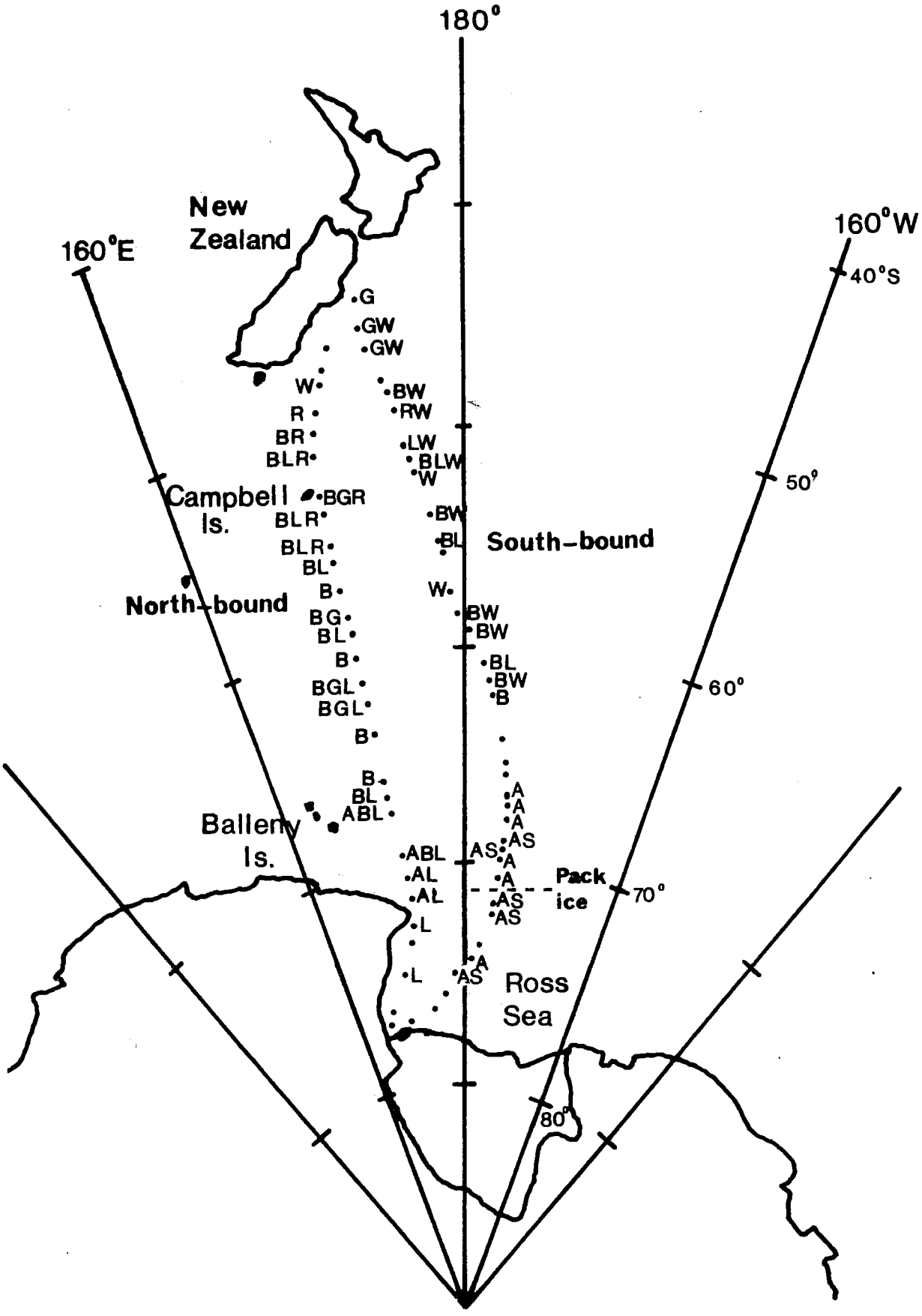

Figure 2

Course of M.V. *Benjamin Bowring* between Christchurch, New Zealand and McMurdo Sound, Antarctica. Each point marks the start position of a one-hour watch. Watches during which albatrosses, Snow and Antarctic Petrels were recorded are keyed as in Fig. 1 with the addition of R - Royal Albatross. Data for a 15-day cruise in the Ross Sea are not plotted but the cruise track is given in the inset to Fig. 3.

New Zealand and Antarctic shelves since they are normally encountered in offshore waters close to their breeding grounds (Harrison 1983).

Fig. 3 shows the density of seabirds seen, expressed as the total number of birds counted in each one-hour watch. A latitudinal effect on total bird numbers was much more apparent in this region than on the Fimbulisen voyage. Total numbers were highest over the New Zealand and Antarctic continental shelves with two large areas of very low densities, the Ross Sea and the deep oceanic basin. There was an increase in numbers of birds in the middle of the basin but in general very few birds were present. We have omitted data for the Ross Sea cruise from this figure for simplicity but the cruise track is indicated. Examination of Table 2 reveals that the Ross Sea supported very few birds. Whereas a total of 27 species was identified during the voyage only six species were observed in the Ross Sea. Numbers were also very low. We counted an average of 16,6 and 15,6 birds per watch on the south and north bound legs respectively and only 5,7 birds per watch in the Ross Sea. By far the most abundant species in the Ross Sea were Snow and Antarctic Petrels which were most abundant close to the coast or shelf ice. Lighmantled Sooty Albatrosses were seen on three occasions over two days (probably the same individual), and a total of only 11 Adélie Penguins was recorded though we were close to a breeding colony on Coulman Island off the Victorian Land coast (Wilson 1983). Three Wilson's Stormpetrels and 12 McCormick's Skuas were also recorded in the Ross Sea.

More comprehensive data on seabird distribution between New Zealand and McMurdo Sound are presented by Basset & Wilson (1983), who were also aboard the *Benjamin Bowring* and maintained almost continuous seabird watches, independant of ours, throughout the voyage with essentially similar results.

Comparison of the African and New Zealand Sectors

Overall we identified 25 species between Cape Town and Antarctica and 27 between Christchurch and Antarctica (excluding prions). Of these there were 15 species in common and 10 species exclusive to each voyage. The species in common were:

(a) Species seen only in Antarctic waters: Emperor and Adélie Penguins, Antarctic and Snow Petrels and McCormick's Skua.

(b) Species seen only in Subantarctic waters: Blackbrowed, Wandering and Greyheaded Albatrosses, Blue, Pintado and Whitechinned Petrels *Halobaena caerulea*, *Daption capense* and *Procellaria aequinoctalias* and Blackbellied Stormpetrels *Fregetta tropica*.

(c) Species seen in both waters: Lighmantled Sooty Albatross, Southern Giant Petrel and Wilson's Stormpetrel.

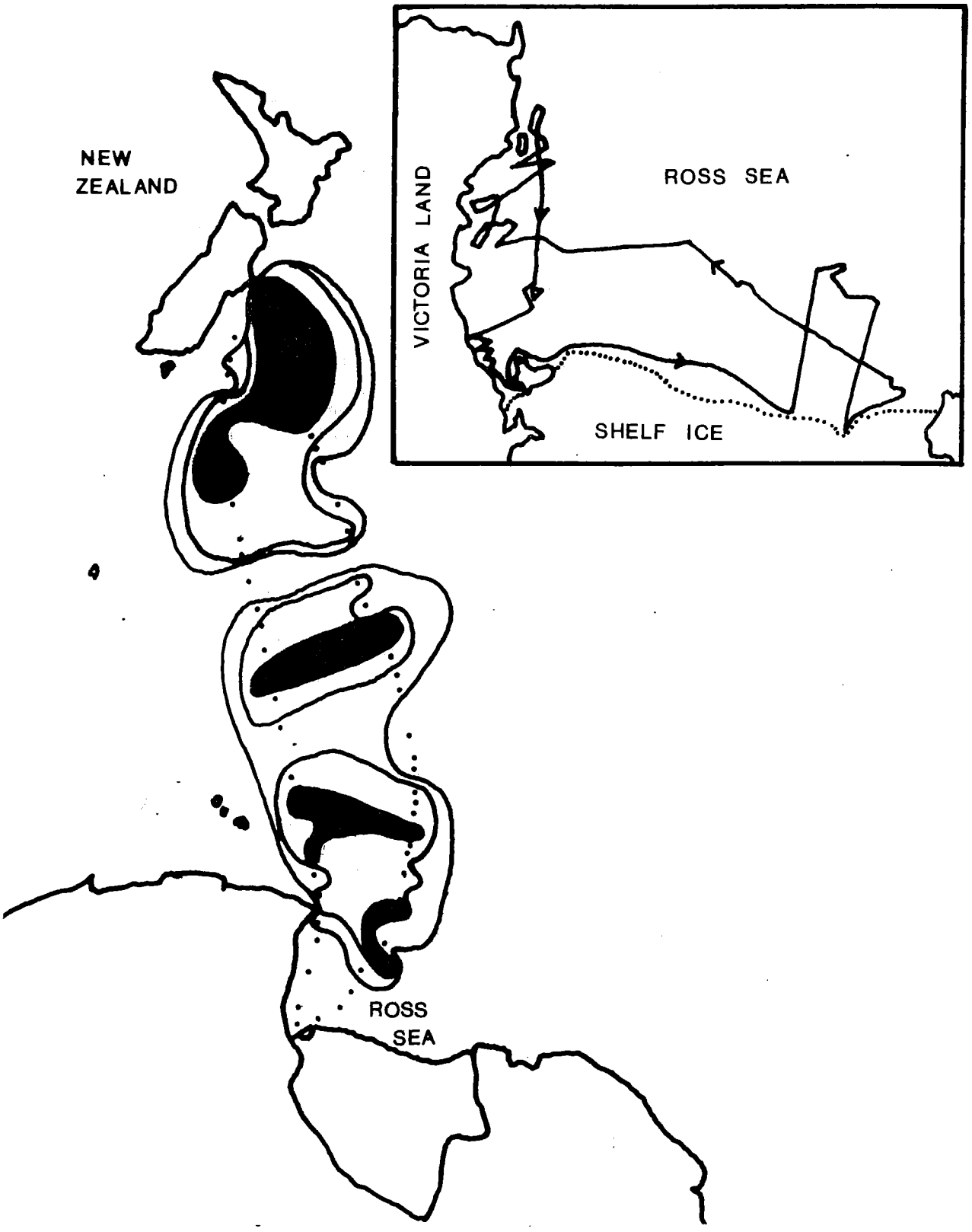

Figure 3

Density of seabirds observed between Christchurch, New Zealand and McMurdo Sound, Antarctica, based on total numbers seen during one-hour watches. The outer contour includes stations where 5-10 birds were seen, the second contour 10-20. Pale shading 20-40 birds and dark shading more than 40 birds. The inset indicates the ship's track during a hydrographic cruise in the Ross Sea. Data on bird observations during this cruise are given in Table 2.

Apart from differences in species composition, one interesting contrast between the two voyages was that albatrosses were much more abundant in the New Zealand Sector of the Southern Ocean. Albatrosses were recorded much farther south in this sector and during 47 watches north of 70°S 184 individuals were recorded, an average of 3,92/watch. During 29 watches north of 60°S 92 individuals were recorded, an average of 3,21/watch, compared to 2,38/watch north of the Antarctic Convergence in the African Sector.

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