

Monitoring Antipodean wandering albatross, 1998/99

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Monitoring Antipodean wandering albatross, 1998/99

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ABSTRACT

This report describes the sixth consecutive year of study of the Antipodean wandering albatross (*Diomedea antipodensis*). Productivity for the 1998 breeding season was 74.9% and the average for the last five years was 76.7%. In 1998, 137 chicks were banded, making a total of 469 chicks banded since annual banding for assessment of recruitment began in 1995. Data on the return of banded adults to the study area enabled estimation of annual adult survival for 1994/95, 1995/96 and 1996/97 of 1.01, 0.97 and 0.98, respectively. A total of 479 albatross nests within a representative census block were counted for assessment of population trends. The average number of nests within the block for 1994-99 is 487. To investigate the overlap of foraging albatross and long-line fisheries, ten satellite transmitters, with a planned battery life of two years, were attached to breeding albatross in February 1999.

Keywords: Antipodean wandering albatross, *Diomedea antipodensis*, breeding success, recruitment, adult survival, nest census, satellite tracking, at-sea distribution.

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1. Introduction

Antipodean wandering albatrosses (*Diomedea antipodensis*) have been a regular bycatch on both foreign and New Zealand southern bluefin tuna fishing boats since long-lining began in the early 1960s (Murray et al. 1993). As wandering albatrosses are long-lived (> 40 years), breed late (> 10 years), and produce a chick only once every 2-3 years, the increased mortality caused by bycatch has the capacity to threaten the species.

A number of concurrent programmes are attempting to examine and resolve this issue: a variety of underwater bait-setting and other mitigation devices are being developed and tested; observers are placed on boats to accurately document the extent and patterns of bycatch; the zones of greatest potential conflict are being identified through satellite telemetry of foraging albatross, and the impact of the bycatch and any mitigation of it on albatross populations are being monitored.

This paper reports on progress made in studying the population dynamics and foraging distribution of Antipodean wandering albatross during the year 1 July 1998 to 30 June 1999. Albatross nesting takes a full year, and this paper describes the end of the breeding cycle for birds that started nesting in January 1998, and the beginning of the breeding cycle for birds that started nesting in January 1999.

It is one of a series of annual progress reports on this research (Amey et al. 1994; Walker & Elliott 2002a, 2002b, 2002c) and, like the earlier reports, it describes only the work carried out in the previous year. Comprehensive analysis is being carried out and will be published when sufficient data have been collected.

Although wandering albatrosses spend most of their lives at sea, the most practical way to assess the fisheries impact is during the short period they concentrate on small subantarctic islands to breed. Every summer just less than half of the Antipodean wandering albatrosses gather to breed, or for adolescents to establish mates, on Antipodes Island, about 730 km south-east of the New Zealand mainland (see map in Walker & Elliott 2002a, fig. 1). During this period, population parameters can be assessed, and satellite transmitters can be attached to follow the birds' life at sea.

During 1998/99 there were three visits to Antipodes Island. The first, in October 1998, was by penguin researchers Lloyd Davis, Martin Renner and David Houston. During this visit, on 24 and 25 October, the productivity of wandering albatross in 1998 was assessed and all the chicks produced in the study area that year were banded for later assessment of recruitment.

A second visit was made between 20 January and 26 February 1999 to assess wandering albatross adult survival, population changes and to deploy ten satellite transmitters. The team comprised Sheryl Hamilton and Alan Wiltshire and transport was provided by the *Marine Countess*.

The third visit was made between 4 and 23 June 1999 by Martin Renner and Anja Schulze. The aim of this visit was to remove satellite transmitters attached

to 10 birds in February, and to assess the condition of the birds which carried them. The yacht *Totorore* provided transport to the island, but was later wrecked and the two crew drowned on the south coast of Antipodes I. The vessel *Ranui* searched for the *Totorore* and returned Martin and Anja to Dunedin on 1 July 1999.

2. Population dynamics

A population study aimed at measuring productivity, survival and recruitment had been conducted in a study area at the northern end of Antipodes I. since 1994 (see Walker & Elliott 2002a).

The study area comprises about 29 ha at the northern end of Antipodes I. (Fig. 1), mostly bounded by obvious geographical features (see Walker & Elliott 2002c). It is bounded by Hut Stream and the base of the hills west of Crater Bay, and is marked elsewhere by white plastic poles. This year we placed more white poles along the less well defined boundaries to eliminate the possibility that different observers might have different ideas of where the boundaries really are (Appendix 1).

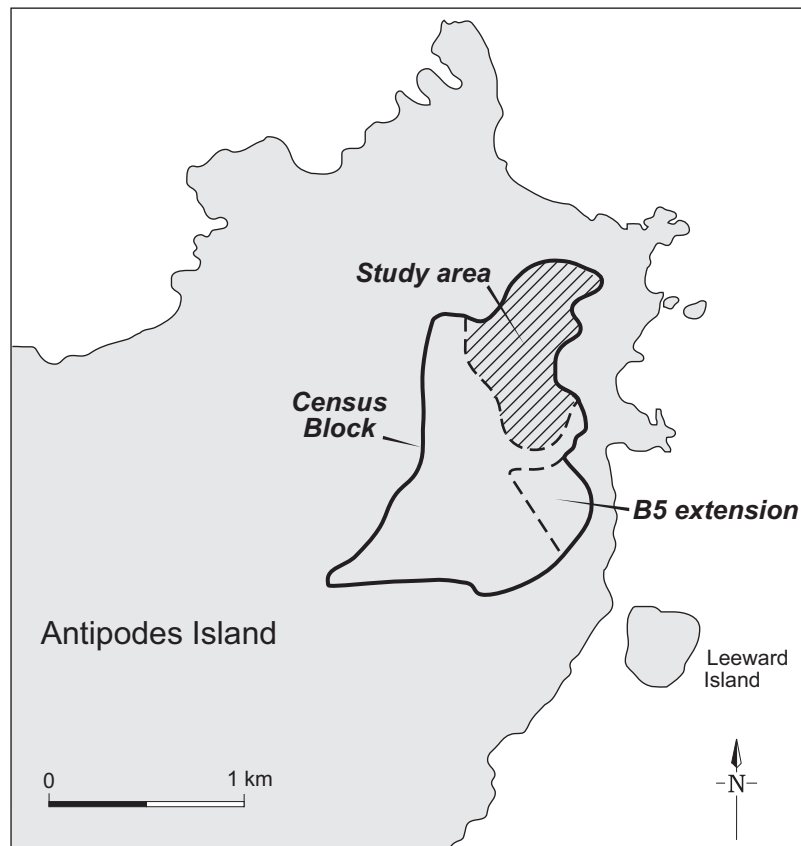


Figure 1. Study area on Antipodes Island. Marked Census Block A (MCBA) is the census block shown, roughly the old Block 5 minus an area adjacent to the eastern coastal cliffs ('B5 extension') where the tall fern and tussock obscured the birds, making it difficult to count them.

2.1 METHODS

On 24 and 25 October 1998, all the study area nests that had been recorded with eggs in February 1998 were visited and all chicks present were banded with both numbered metal and white darvic bands.

Between 27 and 30 January 1999 all of the previous season's nests were located, their identity confirmed from their metal tags, and their final outcome assessed using standard criteria (see Walker & Elliott 2002c).

Once all the previous season's nests had been found and assessed, the metal nest tags were removed, along with those from any earlier years' nests.

Between 21 January and 25 February 1999, daily trips were made to the study area to read the bands of all banded birds encountered in or within 50 m of the study area, to band any unbanded nesting birds with both metal and blue darvic bands, to put blue darvic bands on any already metal-banded study-area birds, to check every nest and potential nest for an egg to determine laying dates and incubation shift lengths, and to mark nests with numbered metal tags and map their positions using a compass and tape measure.

2.2 RESULTS

2.2.1 Breeding success

In October 1998, 137 chicks were banded from 173 study area nests. Nine of these were later found to have died before they fledged, and their metal and white darvic bands were removed (Table 1). Therefore, 128 chicks fledged from 173 study area nests in 1998. However, as in previous years, the ten nests where one of the pair had a transmitter attached in February 1998 (Walker & Elliott 2002c) were not included in the calculation for breeding success as it was thought that transmitter attachment might have caused some of these birds to desert their nests. Consequently, 74.9% (122 chicks) of the 163 nests in 1998 had chicks fledge, which is close to the average breeding success for 1994–98 of 76.7% (Table 2).

TABLE 1. ANTIPODEAN WANDERING ALBATROSS CHICKS Banded IN OCTOBER 1998 IN THE STUDY AREA ON ANTIPODES ISLAND BUT FOUND DEAD IN 1999.

1998 NEST NO.	METAL BAND	DARVIC BAND	COMMENTS
9	R53872	White-203	Carcass against nest - very little down left
74	R53843	White-162	Carcass 2m from nest - 70% of down left
504	R53863	White-187	Carcass found 1m from nest
534	not found	White-193	Only one leg bone and skull found
545	R539091	White-232	Partially decomposed carcass found June 1999
546	not found	White-279	Only one leg found in skua pickings
572	R53951	White-281	Died on 21 Jan 99
581	R53956	White-286	Skeleton remains only
623	R53834	White-151	Partially decomposed carcass found June 1999

TABLE 2. BREEDING SUCCESS OF ANTIPODEAN WANDERING ALBATROSS IN THE STUDY AREA ON ANTIPODES ISLAND SINCE 1994.

YEAR	NO. OF NESTS MONITORED	BREEDING SUCCESS (%)
1994	110	74.8
1995	156	74.4
1996	155	78.5
1997	146	80.8
1998	163	74.9
Average		76.7

In January/February 1999, 149 new nests were tagged and mapped (Fig. 2) and their breeding success will be assessed in January 2000. Ten of these nests had failed before we left the island at the end of February 1999 (Appendix 1).

2.2.2 Adult mortality

In 1999, 142 pairs of birds nested within the study area and seven pairs that had previously nested in the study area were found nesting within 150 m of the boundary. Of these, 34 were new birds banded for the first time and seven were unidentified, either because the nest failed before the bands of both partners had been read (five birds), or because the nest was found too late in the trip to read the bands of both partners. In addition, we read the bands of 83 non-breeding birds that visited the study area.

Adult survival was estimated using the methods of Cormack (1964, 1972) which reliably estimates annual survival only for periods more than two years before the last visit to the island (Table 3).

TABLE 3. ESTIMATED ANNUAL SURVIVAL OF ADULT ANTIPODEAN WANDERING ALBATROSSES RETURNING TO THE STUDY AREA ON ANTIPODES ISLAND. STANDARD ERRORS IN PARENTHESES.

YEAR	ALL BIRDS	KNOWN MALES	KNOWN FEMALES
1995	1.01 (0.02)	1.01 (0.01)	0.99 (0.01)
1996	0.97 (0.02)	1.01 (0.02)	1.04 (0.02)
1997	0.98 (0.03)	0.98 (0.03)	0.97 (0.04)
Average	0.99 (0.02)	1.00 (0.01)	1.00 (0.03)

2.2.3 Recruitment

In October 1998, 137 chicks were banded in the study area. Table 4 shows the number of chicks that have been banded on Antipodes I. for future assessment of recruitment.

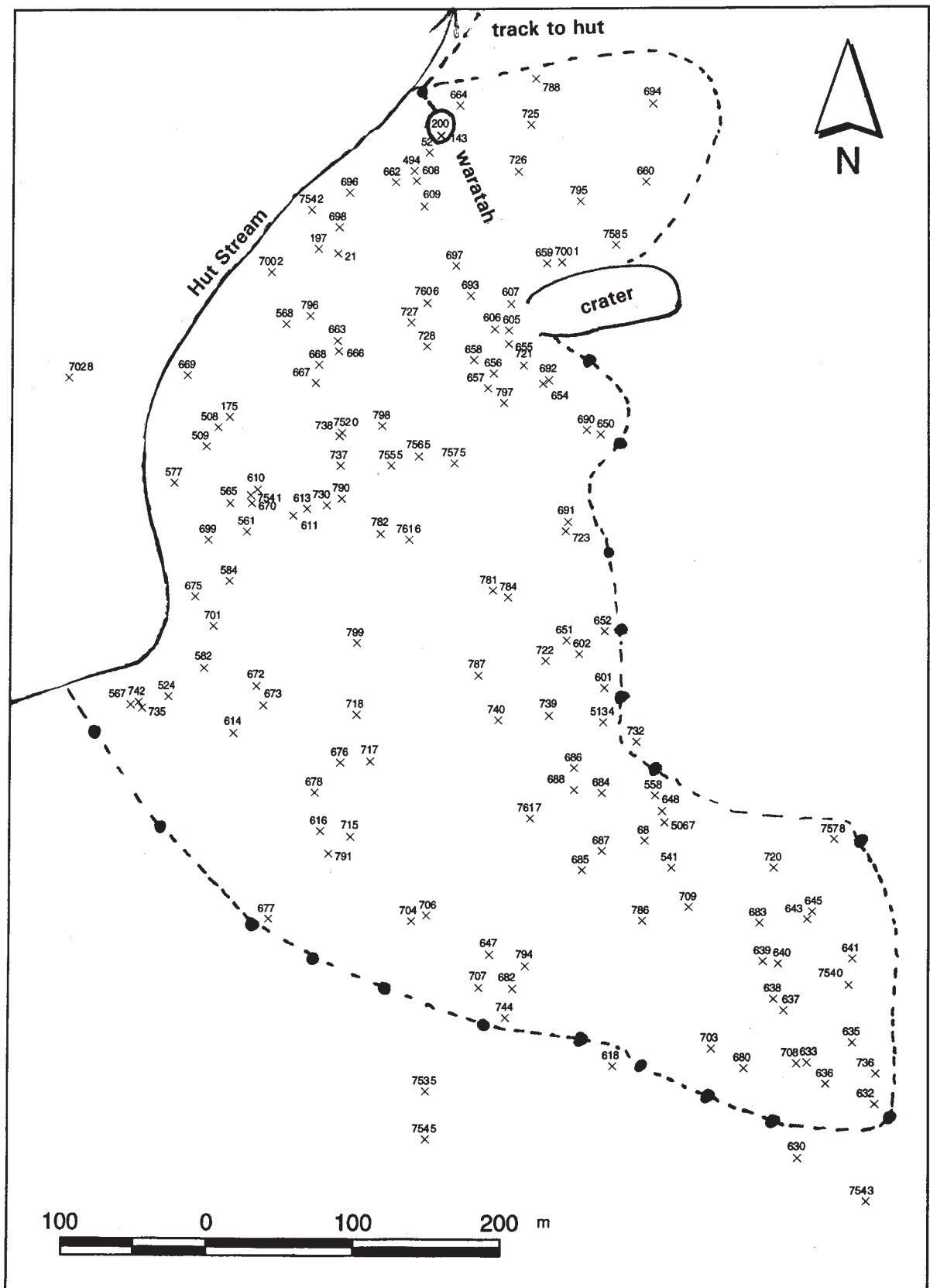


Figure 2. Antipodean wandering albatross nests in the study area on Antipodes Island, 1999.

TABLE 4. FLEDGLING ANTIPODEAN WANDERING ALBATROSSES BANDED ON ANTIPODES ISLAND, 1995-98.

YEAR	STUDY AREA	OUTSIDE STUDY AREA
1995 ^a	116	1865
1996 ^b	98	402
1997 ^c	118	
1998 ^c	137	
Total	469	2267

^a banded with metal bands only. ^b banded with metal and orange darvic bands. ^c banded with metal and white darvic bands.

3. Population trends

Collecting information on population size in a deferred-breeding species such as the Antipodean wandering albatross is slow, since birds return to breed only once every two or three years. Between 1994 and 1997, a series of annual counts of the whole of Antipodes I. were carried out. Results from these show that each year about 5100 pairs breed on the island (Walker & Elliott 2002c). Since 1998, annual counts of representative portions of the island have been made and are intended to monitor population change rather than assess population size.

3.1 METHODS

Between 9 and 16 February 1999, all active albatross nests within the Marked Census Block A (roughly Block 5 minus an area as described in Walker & Elliott 2002c, fig. 1) were counted. The area excluded comprised tall fern and tussock, and supported only a few albatrosses. Because of the difficulty in accurately counting birds in such country, it was excluded from the area marked out in 1998 for annual albatross nest counts.

This census block (MCBA) was counted using the standard 'sweep' technique (see Walker & Elliott 2002c).

Once the whole area had been counted, we tested the reliability of the census by walking straight transects along compass bearings at right angles to the census sweep lines. We checked all nests within 5 m of the transect for paint marks which indicated that the nests had been counted.

3.2 RESULTS

In the MCBA, 479 nests with eggs were counted (Table 5). Nests that had recently failed (freshly broken egg found in the nest bowl) were not included, as the proportion of failed nests missed during each census cannot be quantified. The block was counted in 17 sweeps, taking a total of 34.5 person hours. During this census we read the bands of 26 birds and saw another banded non-breeder that had been banded on Antipodes I. prior to this study and eight birds that had been banded in our study area (six of which were from this year's study nests) (Table 5).

In the transect checks, 68 nests were re-counted (14% of all the nests in the block), and one unpainted nest was found. This indicated that we underestimated the number of nests with eggs in our original count by 1.5%.

In the 1998 census, nine nests (1.66% of the 543 total) were counted in the small area of Block 5 that is not included in the Marked Census Block A (Walker & Elliott 2002c). Therefore, the Block 5 census data from 1994-97 were adjusted by subtracting 1.66% from each of the totals (Table 6). The average number of nests in the MCBA for 1994-99 is 487.

TABLE 5. CENSUS OF ANTIPODEAN WANDERING ALBATROSS IN THE MARKED CENSUS BLOCK A ON ANTIPODES ISLAND, 9-16 FEBRUARY 1999.

1998 chicks	26
Unbanded birds on eggs	449
Banded birds on eggs	30
Unbanded birds not nesting	215
Banded birds not nesting	5
Total number of banded birds	35
Total number of birds not nesting	220
Total number of nests	479

TABLE 6. NUMBER OF ANTIPODEAN WANDERING ALBATROSS NESTS WITH EGGS IN MARKED CENSUS BLOCK A (MCBA) BETWEEN 1994 AND 1999 .

YEAR	BLOCK 5	MCBA
1994	553	544*
1995	490	482*
1996	425	418*
1997	472	464*
1998	543	534
1999		479
Average		487

* Figure extrapolated by subtracting 1.66% from the Block 5 nest total.

4. Monitoring at-sea distribution

4.1 METHODS

In 1998, ten birds carried satellite transmitters for between 54 and 112 days before a manufacturing fault caused them to fall off (Walker & Elliott 2002c). In January 1999 we examined these birds and/or their nest sites or chicks to determine the effect that carrying a transmitter had had on their breeding success and survival.

Between 13 and 21 February 1999 we put Microwave Telemetry 'Pico' satellite transmitters on five male and five female wandering albatrosses incubating eggs in the study area. We deliberately selected birds that had successfully raised a chick at every breeding attempt they had made since 1994.

Transmitters were attached with a harness made of shock-cord, and all had a timed release mechanism. The battery life of all transmitters was approximately 27 months, but the release mechanisms were set to release after exactly 25 months. The transmitter, batteries, harness and release mechanism weighed 90 g (1.3–1.5% of body weight). Transmitters had a duty cycle of 6 hours on and 20.5 hours off. Table 7 shows the details of birds and their transmitters.

TABLE 7. DETAILS OF THE TEN ANTIPODEAN WANDERING ALBATROSS THAT HAD SATELLITE TRANSMITTERS ATTACHED IN FEBRUARY 1999.

BAND NO.	BIRD NAME	SEX	NEST NO.	PTT NO.
R48069	Totorore	Male	706	10007
R48003	Jesse	Male	677	10047
R47995	Angus	Male	175	10107
R47927	Aotea	Male	584	10119
R47941	Tainui	Male	656	10124
R48033	Countess	Female	638	10031
R47816	Poa-iti	Female	606	10035
R47855	Heather	Female	639	10037
R47990	Jacinda	Female	7542	10075
R47843	Tarremah	Female	683	10086

4.2 RESULTS

4.2.1 Birds carrying transmitters in 1998

Of the ten pairs of wandering albatross where one of the pair had a transmitter attached in February 1998, six successfully fledged a chick at the end of the season (Table 8). Of the four transmitter birds from the failed nests, three (Polar, Lichen, and Mariana) were back in the study area and incubating eggs in Jan/Feb 1999. The partner (R47794) of the fourth bird (Poly) was seen in the study area on 23 February 1999, but Poly was not seen during the Jan/Feb 1999

TABLE 8. BREEDING SUCCESS OF ANTIPODEAN WANDERING ALBATROSSES THAT HAD SATELLITE TRANSMITTERS ATTACHED IN FEB 1998.

BAND NO.	BIRD NAME	SEX	NEST NO.	PTT NO.	TRANSM. SIGNALS (DAYS)	CHICK FLEDGED?
R47713	Polar	M	515	6113	54	No
R47707	Carex	M	102	6114	112	Yes
R52643	Bidibid	M	538	6117	54	Yes
R47689	Boris	M	499	6118	54	Yes
R47750	Louis	M	5041	6122	54	Yes
R47649	Lichen	F	507	6115	54	No
R47785	Mariana	F	549	6116	54	No
R47743	Nettie	F	624	6119	54	Yes
R47693	Poly	F	594	6120	85	No
R47788	Moana	F	576	6121	54	Yes

field trip. Polar, Lichen, and Mariana were all in good condition and were all nesting with the same partner they had in the previous season.

Of the satellite transmitters that had been attached in February 1998 but which had prematurely fallen off, one was found in February 1999. This was no. 6118 and had been attached to Boris from nest 499 (Table 8). It was found half-buried and built into nest 499 and was overgrown with bidibid. The 1998 chick fledged successfully from this nest. The body of the transmitter and the aerial were in good condition and the shock-cord harness showed no sign of perishing or wear.

4.2.2 1999 season telemetry

Most of the birds with transmitters attached to them in February 1999 were successfully tracked till early June, during which time only one nest (Jesse's) failed. However, abrasion of the harnesses against the transmitters caused the harness strings to break and five of the transmitters fell off prematurely, with the four remaining transmitters removed from the birds in early June.

The breeding birds made trips of between 8 and 20 days (mean 13.6, $n = 10$) until hatching, and then shorter trips of between 1.5 and 9.5 days (mean 3.5, $n = 34$) during the month-long guard stage. They then alternated short trips (mean 3.25 days, range 2.5-6.5, $n = 6$) and long trips (mean 10 days, range 6.5-16, $n = 10$) at the beginning of the chick-rearing stage.

The foraging destinations of breeding birds were similar to those previously recorded. Males predominantly foraged just south of the Chatham Is, although some birds made much longer flights far to the east and south of Antipodes I. Females mainly foraged north of the Chatham Is and off the east coast of New Zealand, but went no further than the Chatham Is during the guard stage.

Foraging destinations varied between birds, but each appeared to have favoured foraging areas.

5. Acknowledgements

Investigation of the impact of fisheries bycatch on Antipodean wandering albatrosses began in the 1993/94 season using private and DOC funds, and has been funded since the 1995/96 season from the Conservation Services Levy.

We would like to thank Pete Tyree for his help with trip preparation, and the staff of Stewart Island Field Centre for daily radio communications during January and February.

Special thanks to Martin Renner, Dave Houston and Lloyd Davis for banding the chicks, and to Martin Renner and Anja Schulze for retrieving the transmitters.

Gerry Clarke, who began this project in 1994, and Roger Sale, lost their lives in a boating accident on Antipodes I. while supporting the June 1999 expedition. We are greatly indebted to their foresight and commitment to the conservation of wandering albatross.

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Appendix 1

STUDY AREA NESTS, ANTIPODES I., FEB 1999

NEST	FEMALE		MALE		COMMENTS
	METAL 'R' BAND	DARVIC	METAL 'R' BAND	DARVIC	
21	47898	Blue-459	28616	Blue-451	
52	52732	Blue-171	53631	Blue-002	
68	47669	Blue-135	53975	Blue-577	
143	28930	Blue-280	28607	Blue-000	
175	47902	Blue-464	47995	Blue-516	Male is transmitter bird Angus
197	47991	Blue-541	47897	Blue-346	
494	47894	Blue-293			Female deserted > 20 days after laying.
508	47649	Blue-040	47804	Blue-195	
509	47907	Blue-453	48049	Blue-466	
524	47922	Blue-065	48016	Blue-454	
541	47870	Blue-498	48036	Blue-612	
558	47836	Blue-277	47950	Blue-276	
561	53760	Blue-058	53768	Blue-262	
565	47908	Blue-524	47998	Blue-547	
567	53604	Blue-455	52745	Blue-462	
568	47905	Blue-549	48048	Blue-452	
577	47997	Blue-555	47906	Blue-595	
582	47653	Blue-548	47782	Blue-063	
584	48019	Blue-537	47927	Blue-631	Male is transmitter bird Aotea
601	53638	Blue-457	53643	Blue-279	
602	47945	Blue-309	47830	Blue-341	
605	47817	Blue-475	47601	Blue-505	
606	47816	Blue-465	47938	Blue-528	Female is transmitter bird Poa-iti
607	47939	Blue-556	47821	Blue-460	
608	52603	Blue-294	52663	Blue-170	
609	47893	Blue-360	28690	Blue-283	
610	53640	Blue-492	52743	Blue-560	
611	48007	Blue-458	47909	Blue-501	
613	53608	Blue-480	52744	Blue-050	
614	28736	Blue-469	47800	Blue-624	
616	48037	Blue-563	47660	Blue-652	
618	52676	Blue-449	28771	Blue-221	Outside study area
630	47968	Blue-485	47863	Blue-497	Outside study area
632	47964	Blue-564	47859	Blue-474	
633	47967	Blue-623	47862	Blue-494	
635	35651	Blue-508	48034	Blue-532	
636	47861	Blue-471	47966	Blue-470	
637	47867	Blue-504	47972	Blue-654	
638	48033	Blue-546	47856	Blue-579	Female is transmitter bird Countess
639	47855	Blue-488	28670	Blue-547	Female is transmitter bird Heather

NEST	FEMALE		MALE		COMMENTS
	METAL 'R' BAND	DARVIC	METAL 'R' BAND	DARVIC	
640	47854	Blue-301	47961	Blue-122	
641	53972	Blue-473	47806	Blue-113	
643	47956	Blue-126	53973	Blue-461	
645	47846	Blue-632	48030	Blue-580	
647	53605	Blue-499	52746	Blue-495	
648	47837	Blue-615	47951	Blue-634	
650	53610	Blue-281	53642	Blue-159	
651	28672	Blue-584	47829	Blue-650	
652	47946	Blue-550	47831	Blue-586	
654	53993	Blue-620	48024	Blue-254	
655	53994	Blue-622	53998	Blue-640	
656	47822	Blue-621	47941	Blue-513	Male is transmitter bird Tainui
657	47760	Blue-246	47614	Blue-245	Female deserted 6 days after laying
658	47615	Blue-519	47761	Blue-619	
659	47758	Blue-561	47609	Blue-483	
660	28612	Blue-478	53651	Blue-506	
662	53602	Blue-326	52736	Blue-022	
663	53986	Blue-596	54001	Blue-665	
664	47808	Blue-314	47930	Blue-520	
666	48045	Blue-539	47900	Blue-570	
667	47993	Blue-468	18989	Blue-463	
668	52679	Blue-036	52605	Blue-037	
669	52742	Blue-592	53634		Female deserted 16 days after laying. Pair at nest before egg laid
670	47677	Blue-227	47641	Blue-057	
672	47799	Blue-369	47652	Blue-351	
673	47916	Blue-626	48053	Blue-476	
675	53979	Blue-563	53981	Blue-533	
676	48014	Blue-540	47918	Blue-472	
677	48064	Blue-603	48003	Blue-656	Male is transmitter bird Jesse
678	53980	Blue-503	53988	Blue-598	
680	28687	Blue-676	47971	Blue-609	
682	52629	Blue-411	52668	Blue-082	
683	47843	Blue-500	47955	Blue-581	Female is transmitter bird Tarremah
684	53616	Blue-545	52750	Blue-613	
685	47974	Blue-582	47872	Blue-467	
686	53615	Blue-633	52749	Blue-481	
687	18773	Blue-484	47871	Blue-530	
688	47835	Blue-482	47949	Blue-542	
690	53609	Blue-552	52740	Blue-308	Female deserted 22 days after laying. Male at nest before egg laid
691	52607	Blue-152	52662	Blue-153	
692	47612	Blue-336	47759	Blue-156	
693	47815	Blue-617	47937	Blue-647	
694	47711	Blue-518	47602	Blue-544	
696	47717	Blue-557	52735	Blue-649	
697	53982	Blue-565	47943	Blue-021	
698	52737	Blue-629	53601	Blue-648	
699	47729	Blue-662	47650	Blue-569	

NEST	FEMALE		MALE		COMMENTS
	METAL 'R' BAND	DARVIC	METAL 'R' BAND	DARVIC	
701	47924	Blue-602	48065	Blue-657	
703	54002	Blue-663			
704	28683	Blue-538	47698	Blue-290	Egg dented but birds still incubating when we left island
706	48066	Blue-514	48069	Blue-551	Male is transmitter bird Totorore
707	53606	Blue-675	53636	Blue-597	
708	47970	Blue-486	47865	Blue-523	
709	47692	Blue-218	47745	Blue-384	
715	53976	Blue-511	53983	Blue-566	
717	53618	Blue-491	53612	Blue-496	
718	48013	Blue-535	47917	Blue-479	
720	53617	Blue-672			
721	52733	Blue-521	53641	Blue-529	
722	47947	Blue-587	47832	Blue-493	
723	47828	Blue-477	47944	Blue-330	
725	47934	Blue-572	47812	Blue-489	
726	47810	Blue-509	47933	Blue-574	
727	47820	Blue-559	28952	Blue-490	
728	47819	Blue-558	48023	Blue-487	
730	53996	Blue-638	53974	Blue-510	
732	52748	Blue-659	53637	Blue-670	Outside study area
735	47709	Blue-636	28948	Blue-553	
736	47742	Blue-526			Female deserted within a day of laying
737	52734	Blue-028	53978	Blue-502	
738			53977	Blue-525	Male deserted on second day of nest check. Did not get lay date
739	53984	Blue-562			Female deserted 7 days after laying
740	47785	Blue-321	47661	Blue-238	
742	53786	Blue-374	54000	Blue-658	
744	53622	Blue-644	54005	Blue-678	
781	47877	Blue-577	47980	Blue-507	
782	47912	Blue-534	48009	Blue-628	
784	48038	Blue-512	47879	Blue-591	
786	52723	Blue-531	53635	Blue-522	
787	48001	Blue-239	53792	Blue-395	
788	53797	Blue-406	53781	Blue-361	
790	47884	Blue-637	48040	Blue-573	
791	48058	Blue-567	48000	Blue-593	
794	53623	Blue-585	53621	Blue-627	
795	47757	Blue-304	47608	Blue-005	
796	53803	Blue-347	53815	Blue-435	Female deserted 12 days after laying. Male on nest following day
797	47942	Blue-674	47823	Blue-248	
798	47886	Blue-655	48041	Blue-554	
799	48051	Blue-651	47913	Blue-625	
5067	47954	Blue-583	47842	Blue-614	
5134	47841	Blue-456	47953	Blue-543	
7001	52628	Blue-015	52673	Blue-017	
7002	47992		47899		Already failed when found
7028	48056	Blue-376	53995	Blue-630	Outside study area

NEST	FEMALE		MALE		COMMENTS
	METAL 'R' BAND	DARVIC	METAL 'R' BAND	DARVIC	
7520	47720	Blue-568	47628	Blue-589	
7535	28879	Blue-643	28747	Blue-576	Outside study area
7540	53990	Blue-607	53999	Blue-642	
7541	53987	Blue-599			Female deserted 9 days after laying
7542	47990	Blue-653	47896	Blue-571	Female is transmitter bird Jacinda
7543	47852	Blue-103	53989	Blue-604	Outside study area
7545	53607	Blue-578	54003	Blue-667	Outside study area
7555	47883	Blue-388	47984	Blue-155	
7565	47881	Blue-664	47982	Blue-241	
7575	54006	Blue-677	53997	Blue-639	
7578	53991	Blue-605	53992	Blue-590	
7585	47607	Blue-340	47713	Blue-007	
7606	28723	Blue-641	28608	Blue-306	
7607	47965	Blue-646	54004	Blue-673	More than 350 m outside study area; nest tag removed
7616	47880	Blue-645	48039	Blue-671	
7617	47873	Blue-588	47976	Blue-441	