

# Monitoring Gibson's wandering albatross, 2001/02

DOC SCIENCE INTERNAL SERIES 73

Kath Walker and Graeme Elliott

Published by  
Department of Conservation  
P.O. Box 10-420  
Wellington, New Zealand

*DOC Science Internal Series* is a published record of scientific research carried out, or advice given, by Department of Conservation staff, or external contractors funded by DOC. It comprises progress reports and short communications that are generally peer-reviewed within DOC, but not always externally refereed. Fully refereed contract reports funded from the Conservation Services Levy are also included.

Individual contributions to the series are first released on the departmental intranet in pdf form. Hardcopy is printed, bound, and distributed at regular intervals. Titles are listed in the DOC Science Publishing catalogue on the departmental website <http://www.doc.govt.nz> and electronic copies of CSL papers can be downloaded from <http://csl.doc.govt.nz>

© September 2002, New Zealand Department of Conservation

ISSN 1175-6519

ISBN 0-478-22307-2

This is a client report funded from the Conservation Services Levy (investigation no. 3083). It was prepared for publication by DOC Science Publishing, Science & Research Unit; editing and layout by Geoff Gregory. Publication was approved by the Manager, Science & Research Unit, Science Technology and Information Services, Department of Conservation, Wellington.

## CONTENTS

Abstract	5
1. Introduction	6
2. Overview of the study	7
3. Population dynamics	7
3.1 Methods	7
3.1.1 Breeding success	7
3.1.2 Recruitment	8
3.1.3 Adult survival, productivity and incubation behaviour	8
3.2 Results	8
3.2.1 Breeding success in the 2001 season	8
3.2.2 Adult mortality	12
3.2.3 Recruitment	12
4. Population trends	13
4.1 Methods	14
4.2 Results	14
5. Monitoring at-sea distribution	16
5.1 Methods	16
5.2 Results	16
5.2.1 2001 season telemetry	16
5.2.2 Telemetry of adult non-breeding birds in 2002	17
6. Acknowledgements	18
7. References	18
Appendix 1. Birds at nests in or near the study area on Adams I., Jan 2002	20
Appendix 2. Adult Gibson's wandering albatross banded with new metal 'R' bands and/or new darvic bands on Adams I., Jan-Feb 2002	24
Appendix 3. Wandering albatross with lost or broken darvic bands on Adams I., Dec 2001-Jan 2002	26
Appendix 4. Non-study area banded Gibson's wandering albatross recovered on Adams I. in 2002	27

# Monitoring Gibson's wandering albatross, 2001/02

Kath Walker and Graeme Elliott

549 Rocks Road, Nelson, New Zealand

## ABSTRACT

Gibson's wandering albatross (*Diomedea gibsoni*) are endemic to the Auckland Islands in the New Zealand subantarctic, and are caught as a by-catch of long-line fishing. In 1991 a study began to collect data for a model examining the sustainability of bycatch. This paper reports on progress made on this study between 1 July 2001 and 30 June 2002. Productivity for the 2001 breeding season was 65%, and the average for the last 10 years was 63%. In 2001, 136 chicks were banded, making a total of 888 study area chicks banded since annual banding for assessment of recruitment began in 1994. Thirty-three of these chicks were seen on Adams Island in 2002 for the first time since they had fledged. Data on the return of banded adults to the study area enabled estimation of adult survival between 1991 and 2000 of 96%. A total of 714 nests with eggs were counted in January 2002 in three representative blocks on Adams I. The average number of nests in these blocks for 1998-2002 is 680 (range 488-781). Satellite tracking of five birds from June to December 2001 showed the foraging area most frequently used by breeding birds during chick rearing was the central Tasman Sea. However, individual albatross seem to have favoured foraging areas so this sample of birds was probably too small to reliably assess patterns of ocean use by breeding Gibson's wandering albatross during the winter months.

Keywords: Gibson's wandering albatross, *Diomedea gibsoni*, breeding success, recruitment, adult survival, nest census, satellite tracking, at-sea distribution, Auckland Islands.

© September 2002, New Zealand Department of Conservation. This paper may be cited as: Walker, K.; Elliott, G. 2002: Monitoring Gibson's wandering albatross, 2001/02. *DOC Science Internal Series* 73. Department of Conservation, Wellington. 29 p.

# 1. Introduction

The great albatrosses (*Diomedea* spp.) are among the most spectacular sights of the Southern Ocean, with their huge wingspans (> 3 m) and graceful, soaring flight. Half of all the world's wandering albatross species nest in the New Zealand subantarctic on windswept islands far from human influence. However, most of their lives are spent at sea, and significant numbers have been killed as a bycatch of fishing activity since long-line fishing started in the Southern Ocean in the 1960s.

The well-studied South Atlantic and South Indian Ocean species of wandering albatross declined by more than 50% between 1964 and 1994 as a result of increased adult and juvenile mortality caused by fisheries bycatch (Croxall et al. 1990; de la Mare & Kerry 1994; Weimerskirch & Jouventin 1987; Weimerskirch et al. 1997). In New Zealand the endemic species of wandering albatross, Antipodean and Gibson's wandering albatrosses (*Diomedea antipodensis* and *D. gibsoni*) have been regularly observed as bycatch on both foreign and New Zealand southern bluefin tuna fishing boats (Murray et al. 1993), but there has been no information on whether the level of bycatch was having a significant impact on their populations.

In 1995, the New Zealand Government commissioned research on both Gibson's and Antipodean wandering albatrosses and levied the New Zealand tuna fishers (the Conservation Services Levy) to help pay for it. The main aim of the research was to determine whether the levels of bycatch were sustainable, and this required the collection of data on productivity, survival and recruitment. Wandering albatross are long-lived (> 40 years), mature late (> 10 years), and produce a chick only once every 2-3 years. These features not only make their populations particularly susceptible to increased mortality caused by fishing activity, but makes study of their population dynamics difficult and slow.

The second aim of the research was to identify ocean areas where albatross activity was concentrated and overlapped with fisheries.

From work on wandering albatrosses elsewhere, it was known in advance that it would take at least a decade to obtain reliable estimates of survival and productivity, and 15 years for recruitment. Similarly, population trends would emerge only after many years of annual counts of nests, as the albatrosses' biennial breeding causes considerable inter-annual variation in the number of birds nesting.

This paper reports on progress made in studying the population dynamics and foraging distribution of Gibson's wandering albatrosses during the Department of Conservation's financial year 1 July 2001 to 30 June 2002. Albatross nesting takes a full year, and this paper describes the end of the breeding cycle for birds that started nesting in January 2001, and the beginning of the breeding cycle for birds that started nesting in January 2002.

It is one of a series of annual progress reports on this research (Hamilton et al. 2002; Walker & Elliott 2002a, 2002b; Walker et al. 1991, 1995a, 2000) and like

the earlier reports, it describes only the work carried out in the previous year. Comprehensive analysis is being carried out and published when sufficient data have been collected (Walker & Elliott 1999; Walker et al. 1995b).

## 2. Overview of the study

The Auckland Islands, in the south-west Pacific Ocean, comprise six islands and several islets. Most Gibson's wandering albatross nest on Adams I., the southernmost island in the group. A few nest on southern parts of the main Auckland Island and there is a small population on Disappointment Island.

Adams I. ( $50^{\circ}53' S$ ,  $166^{\circ}10' E$ ) is approximately 20 km long and 7 km wide, with a 600 m high range running east-west along its length. The island has a narrow band of forest and scrub near sea level, with tussock then bare fellfield above. There are no introduced predators and no human habitation. While albatrosses nest on most ridges off the main range of Adams I., there are two large concentrations of birds, both on the southern slopes of the island—the Astrolabe-Amherst colony and Fly Basin colony (see map in Walker & Elliott 1999).

The survivorship and breeding history of about 900 individually marked birds that regularly nest in a 60 ha study area within the Astrolabe-Amherst colony have been followed since 1991. Each year all birds visiting the study area are identified so that survivorship can be calculated. Each nest is mapped so that its success can be judged a year later, and any chicks produced are banded for later estimation of recruitment. The number of pairs nesting in three areas on the island are counted annually to assess population trends.

The foraging areas used by Gibson's wandering albatross were monitored in 1995 and again in 1999, 2000 and 2001 by attaching satellite transmitters to a small sample of birds while they were nesting and tracking their subsequent movements at sea.

## 3. Population dynamics

### 3.1 METHODS

#### 3.1.1 Breeding success

To assess breeding success in 2001 we counted the chicks present at the end of the year in two areas in which the number of nests with eggs had been counted the previous February. The two areas were in different parts of the island to assess spatial and micro-climate variation in breeding success, and one was less visited than the other to assess the possible impact of disturbance.

The two areas were our study area (60 ha) in the Amherst-Astrolabe colony, and Fly Basin 'Square', a 25 ha square block within the dense colony of albatrosses just west of Fly Harbour. While much of the study area is bounded by obvious topographical features, white plastic fence poles mark the less well-defined northern, western and southern boundaries. Fly Basin Square is demarcated entirely by white fence poles as there are no obvious topographical boundaries.

The chicks in the study area were counted on 14 and 15 December 2001, and again on 24 January 2002 to determine fledging success. The number of successful nests in the Fly Basin Square were counted on 17 December 2001. Chicks (or nests which had recently fledged a chick) in the Fly Basin Square were counted using our normal census 'sweep' technique (see Walker & Elliott 1999), whereas nests in the study area had been mapped in the previous summer and were individually relocated.

To allow comparison of results between the 2 areas, the number of nests with eggs in the Fly Basin Square on 26 January 2001 was adjusted to include nests which had already failed that year, using extrapolations from the failure rate in January 2001 in the study area. Likewise, in measuring the success of the 2001 season nesting attempts, the 17 December 2001 Fly Basin Square count was compared with the 14 and 15 December 2001 study area count, rather than with the final fledging success in the study area.

To facilitate assessment of 2002 breeding success we counted the nests with eggs in the Fly Basin Square on 26 January 2002, and we mapped all the nests with eggs in our study area during repeated visits between 19 December 2001 and 2 February 2002.

### **3.1.2 Recruitment**

To enable future assessment of recruitment, we banded all the chicks present in the study area on 14 and 15 December 2001 with both numbered metal and darvic bands.

### **3.1.3 Adult survival, productivity and incubation behaviour**

Between 19 Dec 2001 and 1 Feb 2002 we made regular visits to the study area and:

- read the bands of all birds encountered in or near the study area;
- marked nests with eggs and mapped their positions using GPS;
- measured and banded with numbered metal and darvic bands any unbanded birds nesting in the study area;
- repeatedly checked every nest and potential nest to determine laying dates and incubation shift lengths.

## **3.2 RESULTS**

### **3.2.1 Breeding success in the 2001 season**

We monitored 219 nests in or near our study area in the 2001 season and found 143 (65%) were successful. However, 3 chicks (Table 1) still alive when we left

TABLE 1. GIBSON'S WANDERING ALBATROSS CHICKS, BANDED IN THE STUDY AREA IN DECEMBER 2001, WHICH WERE UNLIKELY TO FLEDGE.

NEST NO.	METAL BAND	DARVIC BAND	COMMENTS
735	R50094	Black-577	Dislocated leg—cannot walk or stand properly
510	R50056	Black-539	Downy neck and belly and weak on 1 Feb 02
519	R50089	Black-572	Downy neck and belly and weak on 30 Jan 02

the island in early February were small and undeveloped, or disabled, and were unlikely to fledge, so the final fledging success may be lower than this.

In December 2001 the remains of a chick (R56505 Black-469) banded in the study area in October 2000 was found near its old nest. The failure of this bird to fledge reduces our earlier estimate of breeding success in 2000 from 52% to 51.3%.

In most seasons since 1997, nest checks in the study area have been undertaken daily from before the peak period of laying in early January until early February. Between 1997 and 2002 the failure rate of nests during this period averaged 5% (Table 2). However, between 1991 and 1994 nest checks did not begin till late January or early February and in 1995 and 1996 were undertaken infrequently, but no allowance for early failures was made in the original calculations of breeding success for those years. In 2002, breeding success estimates for 1991–94 were retrospectively reduced by 5% (the average of later years) to compensate for this deficiency in the data. Revised breeding success since 1991 is presented in Table 3.

On 26 January 2001, 201 nests with eggs were counted in the Fly Basin Square. By this date in the study area, 14 (7%) of the then 200 nests had already failed, and a further 3 eggs were still to be laid. Therefore, we estimate that there were 218 nests with eggs laid in Fly Basin Square at the beginning of the breeding season.

TABLE 2. EGG LOSS RATE IN GIBSON'S WANDERING ALBATROSS NESTS IN THE STUDY AREA ON ADAMS ISLAND DURING JANUARY (1991–2002).

YEAR	DATE FIRST CHECKED	NO. OF NESTS LAID THAT SEASON	NO. OF NESTS FAILED, EARLY FEB
1991	11 Feb 91		Not known
1993	30 Jan 93		Not known
1994	24 Jan 94		Not known
1995	30 Dec 94		Not known
1996	6 Jan 96		Not known
1997	2 Jan 97	213	10 (5%)
1998	16 Jan 98	223	9 (4%)
1999	5 Jan 99	215	9 (4%)
2000	7 Jan 00	130	5 (4%)
2001	1 Jan 01	217	9 (9%)
2002	27 Dec 01	186	9 (5%)



TABLE 3. BREEDING SUCCESS OF GIBSON'S WANDERING ALBATROSS NESTING IN THE STUDY AREA ON ADAMS I. SINCE 1991.

YEAR	NO. OF NESTS MONITORED	BREEDING SUCCESS (%)
1991	88	60
1993	135	67
1994	120	64
1995	191	64
1996	206	65
1997	213	68
1998	223	64
1999	206	61
2000	119	51
2001	219	65
Average		63%

From these 218 nests in Fly Basin Square, 127 were judged (Table 4) to be successful on 17 December 2001, a breeding success of 58 %. Over the same period in the study area, from 219 nests with eggs, 144 nests were judged successful on 15 December 2001, a breeding success of 66% (Table 5). This differs markedly from results in the previous season, when breeding success in Fly Basin Square was much higher than that in the study area (75% and 54%, respectively) (Table 5).

Counts in Fly Basin Square on 17 December showing that 8.6% of chicks had already fledged, were compared with counts in the study area on 15 December 2001, when 2.7% of chicks had fledged. We are able to accurately judge the success of nests either when they still have chicks or just after fledging when there is still much sign of the chicks recent presence.

In January 2002, 186 new nests were tagged and mapped for assessment of their breeding success next summer (Fig. 1, Appendix 1). Of these, 179 were inside

TABLE 4. NEST COUNTS IN FLY BASIN SQUARE, 17 DEC 2001.

No. of sweeps (2 persons/sweep)	10
Counting time (people hours)	8 hours 20 min
No. of chicks	116
No. of nests where chick had fledged	11
Total no. of successful nests	127

TABLE 5. BREEDING SUCCESS OF GIBSON'S WANDERING ALBATROSS NESTING IN THE FLY BASIN SQUARE AND THE STUDY AREA BETWEEN 26 JAN AND 19 DEC 2001.

PLACE	NESTS COUNTED IN JAN 2001	BREEDING SUCCESS 2001 (AND 2000)
Fly Basin Square	218	58% (75%)
Study area	219	66% (54%)

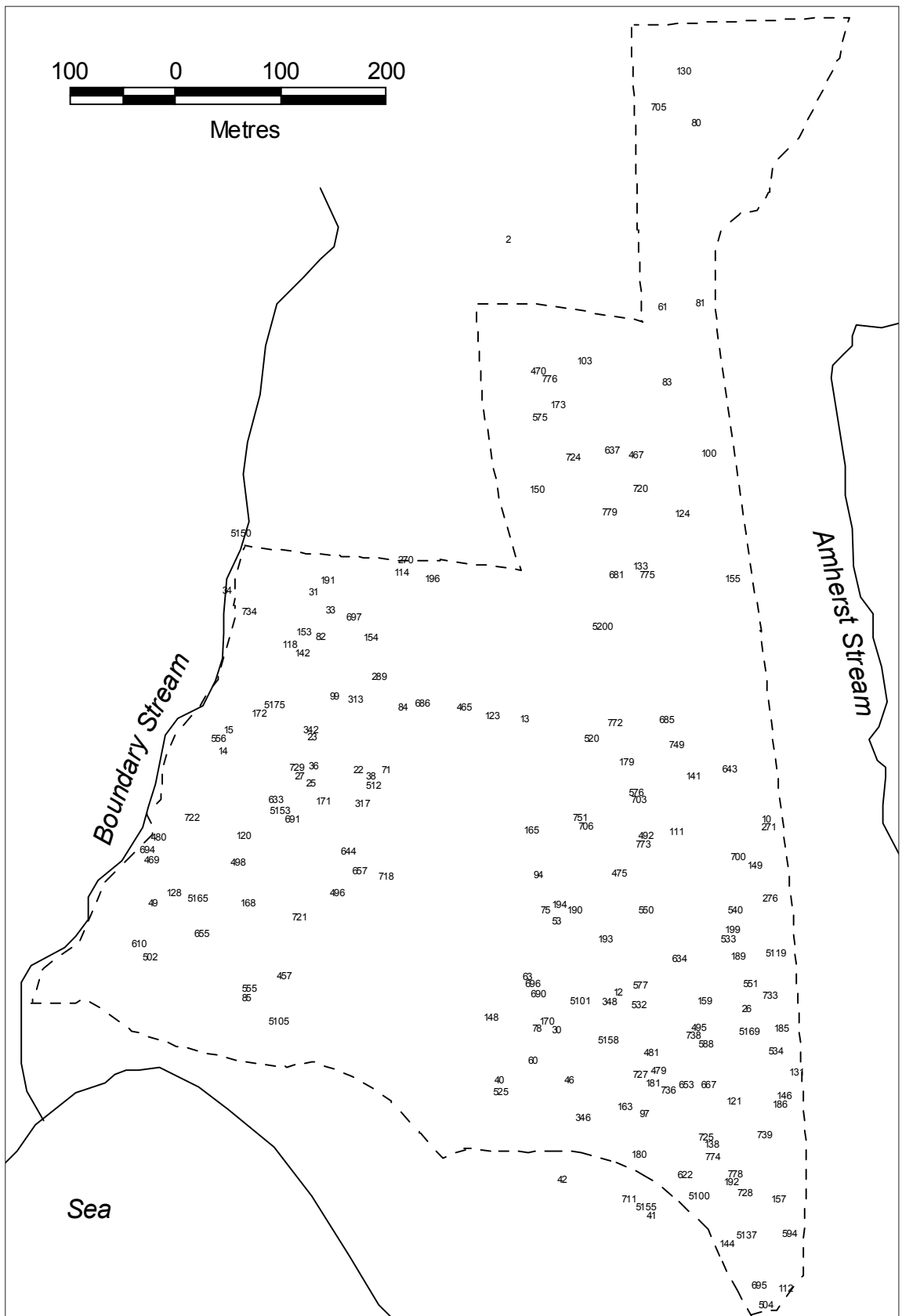


Figure 1. Gibson's wandering albatross nests in the study area on Adams Island, Jan-Feb 2002.

the study area and seven were just outside but were laid by pairs that had previously nested in the study area. Nine of the 217 nests had failed before our last check of the nests on 30 January 2002 (Appendix 1).

In the Fly Basin Square on 26 January 2002 we counted 246 nests with eggs, and at least 2 nests that had already failed. By this date in the study area there were 178 nests with eggs as 8 had already failed.

### 3.2.2 Adult mortality

Between 19 December 2001 and 30 January 2002 we banded 67 previously unbanded adults that were nesting in the study area for the first time (Appendix 2). There were 14 nests in the study area at which we read the bands of only one of the pair. Ten of these nests failed before we were able to read both partner's bands, and 4 were laid late in the season and only one bird had incubated before we left the island. Some of the 14 missing birds may have been recorded as non-breeders in the study area before eggs were laid.

Of 451 birds recorded between 19 December 2001 and 30 January 2002, which had previously been darvic-banded, 24 (5.3%) had lost their darvic bands (Appendix 3). This is not an annual loss rate since some birds have not been seen for several years. We have not been able to find the cause of the darvic band breakages, but because each darvic-banded bird also has a metal band, it is an inconvenience rather than a problem to the project.

Adult survival was estimated using the method of Cormack (1964, 1972) incorporating the modifications suggested by Croxall et al. (1990) for biennially breeding albatrosses (Table 6).

TABLE 6. SURVIVAL OF ADULT GIBSON'S WANDERING ALBATROSSES THAT HAVE NESTED IN THE STUDY AREA ON ADAMS I. SINCE 1991. STANDARD ERRORS ARE IN BRACKETS.

YEAR	BOTH SEXES	MALES*	FEMALES*
1993	0.983 (0.015)	0.999 (0.011)	0.969 (0.026)
1994	0.969 (0.012)	0.955 (0.018)	0.978 (0.015)
1995	0.960 (0.012)	0.987 (0.010)	0.955 (0.017)
1996	0.982 (0.008)	0.987 (0.010)	0.991 (0.008)
1997	0.962 (0.013)	0.979 (0.016)	0.959 (0.019)
1998	0.971 (0.014)	0.969 (0.020)	0.972 (0.019)
1999	0.953 (0.020)	0.956 (0.027)	0.953 (0.029)
2000	0.915 (0.031)	0.935 (0.040)	0.896 (0.047)
Average	0.962 (0.022)	0.971 (0.021)	0.959 (0.028)

\* Males and females were not reliably distinguished until 1997.

### 3.2.3 Recruitment

In December 2001, 136 fledglings were banded in the study area. Table 7 shows the number of chicks banded since 1993 for assessment of recruitment.

In January and February 2002 we found 60 non-breeding birds that had been banded as fledglings in previous years. The number of birds recovered from

TABLE 6. FLEDGLING GIBSON'S WANDERING ALBATROSSES Banded ON ADAMS I. SINCE 1993.

YEAR	STUDY AREA	OUTSIDE STUDY AREA
1993 <sup>a</sup>	2	
1994 <sup>a</sup>	26	
1995 <sup>a</sup>	119	319
1996 <sup>b</sup>	122	375
1997 <sup>c</sup>	144	
1998 <sup>c</sup>	144	
1999 <sup>c</sup>	129	
2000 <sup>c</sup>	66	
2001 <sup>c</sup>	136	
Total	888	694

<sup>a</sup> banded with metal bands only. <sup>b</sup> banded with metal and orange darvic bands. <sup>c</sup> banded with metal and white darvic bands.

each of the cohorts banded since 1993 clearly reflected the numbers banded each year, as well as increasing return rate with age. Three of the recoveries were 4 years old, four were 5 years old, 22 were 6 years old, 25 were 7 years old, and six were 8 years old (Appendix 4). Only four of the 60 birds had already been seen on the island, and all except one were seen only once during our 23 days spent in and around the study area. The great majority (82%) of the recoveries were made in the last two weeks of January, once egg-laying ceased and pre-breeding birds began to arrive to display and court.

While wandering albatross start returning to Adams I. from about 3 years old, with all those alive expected to return by age 7, they cannot be reliably detected until they breed at about 11 years old. This means we will not be able to make a first estimate of recruitment to the breeding population until about 2007. However, if the field expeditions can be extended into February, it may be possible in 2003 to make a coarse estimate of survival to age 5 for the first two large cohorts banded (1995 and 1996).

## 4. Population trends

Collecting information on population size in a deferred breeding species such as the wandering albatross is slow since birds return to breed only once every two or three years. Between 1991 and 1997 a series of annual whole island counts were carried out. Results from these show that in those years an average of 5831 pairs bred each year on Adams I. (Walker & Elliott 1999). Since 1998, counts of only a representative portion of the island have been undertaken to monitor population change.

## 4.1 METHODS

Between 22 and 28 January 2002, all albatross nests with eggs were counted within the Amherst to Astrolabe Block, in Fly Basin Square and on Rhys's Ridge (see Walker and Elliott 1999 for a description of the blocks and the count method).

Once an area had been counted we tested the precision of the census by walking straight transects along compass bearings at right angles to the census sweep lines and checking all nests within 10 m of the transect for paint marks which indicated that the nests had been counted.

Nests in the study area were counted between 19 December 2001 and 30 January 2002 by marking and mapping every nest during repeated visits.

## 4.2 RESULTS

Details of the counts are presented in Table 8, and the number of nests with eggs counted in the three census blocks in 2002 are compared with those in earlier counts in Table 9 and Fig. 2. La Niña climate conditions in 1999 and 2000 probably reduced albatross food supply and led to the drop in numbers attempting to breed in 2000 (Fig. 2). Despite the poor years, there has been an overall increase in the number of birds counted in the Amherst to Astrolabe Block since 1991, but the increase is not quite significant (Regression  $F = 5.05$ , d.f. = 1, 8;  $P_r = 0.055$ ).

In the precision checks of the blocks, 22–24% of the total number of nests in the biggest two blocks were recounted, and no unpainted nests were found. This indicated we had very accurately counted the number of nests with eggs in our original counts.

TABLE 8. GIBSON'S WANDERING ALBATROSS NEST CENSUS RESULTS, ADAMS I., JAN 2002.

Locality	Dates	Count time <sup>1</sup>	No. of chicks	Un-banded on egg	Un-banded BOG <sup>2</sup>	Banded on egg	Banded BOG	Total checked for bands	No. of bands found	Total BOGs	Total no. of nests w. eggs
Rhys's Ridge	28 Jan 02	11.75	1	60	23	0	0	83	0	23	60
Amherst-Astrolabe											
Study area (SA) <sup>3</sup>	-	-	-	-	-	-	-	-	-	-	179
The Hump	24 Jan 02	2	3	18	9	4	6	37	10	15	22
SA-Astrolabe	22-24 Jan 02	15.25	12	200	132	7	28	367	35	160	207
Block total		17.25	15	218	141	11	34	404	45	175	408
Fly Basin Square		7	17	244	145	2	1	392	3	146	246
Total											714

<sup>1</sup> Person hours. <sup>2</sup> Birds on ground (without nests). <sup>3</sup> Not including study nests outside boundaries.

TABLE 9. GIBSON'S WANDERING ALBATROSS CENSUS RESULTS FROM REPRESENTATIVE BLOCKS ON ADAMS I., 1998-2002.

Locality	Year	Count time <sup>1</sup>	No. of chicks	Total no. checked for bands	No. of bands found	Total no. of BOGs <sup>2</sup>	Total no. of nests
Rhys's Ridge (low density)	1998	15	2	71	0	13	60
	1999	11.3	1	78	1	18	60
	2000	21	5	72	1	29	45
	2001	12.2	4	76	1	12	64
	2002	11.25	1	83	0	23	60
Amherst-Astrolabe (medium density)	1998	20.6	9	343	8	83	483
	1999	15.7	20	299	18	59	446
	2000	22	34	230	14	65	284
	2001	18.1	36	306	19	106	410
	2002	17.25	15	404	45	175	408
Fly Basin Square (high density)	1998	9.7	7	397	0	149	248
	1999	10	39	296	2	59	237
	2000	13	22	295	2	136	159
	2001	8.9	31	305	0	112	201
	2002	7	17	392	3	146	246
Totals	1998	45.2	18	811	8	245	781
	1999	37	60	673	21	136	743
	2000	56	61	597	17	230	488
	2001	39.2	71	687	20	230	675
	2002	35.5	33	879	48	344	714

<sup>1</sup> Person hours. <sup>2</sup> Birds on ground (without nests).

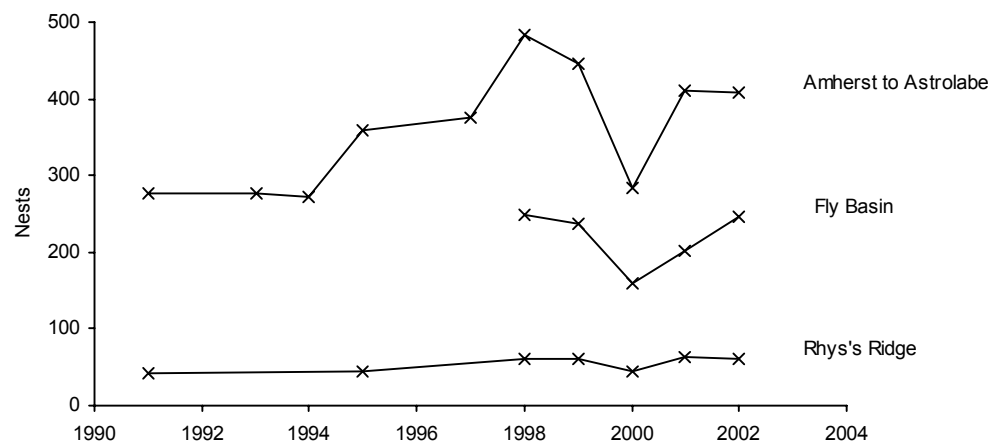


Figure 2. Number of Gibson's wandering albatross nests with eggs counted in January in three areas on Adams I. since 1991.

# 5. Monitoring at-sea distribution

## 5.1 METHODS

In January 1995 and again in January 1999 and 2000, the movements at sea of Gibson's wandering albatross were examined through the attachment of satellite transmitters to a sample of birds using glues and, later, harnesses. Information on the use of the oceans by incubating birds of both sexes was obtained, particularly in the January to March period, plus some limited information on the foraging of failed breeders.

However, the southern blue-fin tuna long-line fishery operates from about April to October in New Zealand waters, so to examine the overlap between albatross and fishers, information was also needed on albatross foraging over the winter months, and foraging by pre- and post-breeding albatross as well as breeding albatross.

To begin winter monitoring, satellite transmitters were taped to five birds feeding chicks on Adams I. in mid-June 2001. The movements of these five birds were tracked remotely until the transmitters' batteries failed. The birds were re-caught just before their chicks fledged and the transmitters were removed. The batteries in two of the transmitters were replaced and the transmitters were re-deployed on two adult birds without mates in January 2002 and will be tracked for up to 8 months.

## 5.2 RESULTS

### 5.2.1 2001 season telemetry

One transmitter fell off between 4.5 and 5.5 months after attachment, while the attachments on the other five transmitters lasted at least 6 months. The taping technique used to attach the transmitters caused no sign of damage to the skin or feathers of any of the five birds tracked. In addition, foraging trips of all five birds were of normal length, and their chicks were all strong and healthy and fledged at the same time as the majority of chicks whose parents were not carrying transmitters.

One transmitter had an unidentified fault and transmitted normally for only 35 days. All five transmitters were programmed to transmit for only a short period each day in order to extend battery life. However, the manufacturers mistakenly fitted the transmitters with batteries best suited to continuous transmission and these lowered the power output enough to significantly reduce the number of usable up-links given in the latter half of the tracking period (Table 10).

All five breeding birds tracked between June and November 2001 foraged exclusively in the Tasman Sea. Longer trips (5-10 days), usually to the mid Tasman Sea, were interspersed with shorter trips (1-4 days), usually just north-west or south-west of the Auckland Islands along the Macquarie Ridge. During

TABLE 10. HISTORIES AND DETAILS OF FIVE GIBSON'S WANDERING ALBATROSSES TO WHICH TRANSMITTERS WERE ATTACHED IN JUNE 2001

NAME	SEX	BAND NO.	PTT NO.	PERIOD TRACKED	BREEDING OUTCOME	COMMENTS
June	F	R46789 R-695	6115	16 Jun 01–22 Oct 01	Healthy chick fledged	Low battery voltage led to intermittent transmission after 15 August. PTT removed 26 Dec 01.
Sunshine	F	R42603 R-678	6116	15 Jun 01–29 Nov 01	Healthy chick fledged	Battery voltage too low for transmission after 29 Nov 01. Bird not recaptured so unknown when transmitter fell off.
Astelia	F	R42865 R-925	6118	19 Jun 01–17 Nov 01	Healthy chick fledged	Low battery voltage led to intermittent transmission after 6 Oct 01. PTT removed 27 Dec 01
Kehu	M	R42730 R-527	10075	15 Jun 01–23 Oct 01	Healthy chick fledged	Low battery voltage led to intermittent transmission after 8 Oct 01. PTT fell off before bird recaptured on 27 Dec 01
Pete	M	R42744 R-621	17394	24 Jun 01–29 Jul 01	Healthy chick fledged	PTT malfunctioned. PTT removed from bird on 21 Dec 01

July and August one male made several consecutive visits along the New South Wales coastline.

### 5.2.2 Telemetry of adult non-breeding birds in 2002

In mid-January 2002, satellite transmitters were taped to two adult Gibson's wandering albatross which had not bred in 2001. Both birds were in the albatross study area at the start of the 2002 breeding season, trying to gain a new mate when their old partners failed to appear (Table 11). Their feathers were in much better condition than those of birds who in January 2002 had just completed rearing a chick. To maximise the length of time the transmitters would stay attached, the well feathered non-breeders were chosen in preference to post-breeders, even though for the early part of the tracking period they will continue to visit Adams I.

Both birds foraged from late January to May in the Tasman Sea, in the same general areas as the breeders tracked during late 2001.

TABLE 11. HISTORIES AND DETAILS OF TWO GIBSON'S WANDERING ALBATROSSES TO WHICH SATELLITE TRANSMITTERS WERE ATTACHED IN JAN 2002.

NAME	SEX	BAND NO.	PTT NO.	PERIOD TRACKED	COMMENTS
Hinemoa	F	R42890 R-385	6115	19 Jan 02, ongoing	Successful breeder in 2000 but partner did not appear in 2002. Selecting new mate when PTT attached, but a non-breeder through the tracking period.
Mr Fram	M	R42782 R-603	6118	22 Jan 02, ongoing	Not yet remated after partner died in 1999. A non-breeder through the tracking period.



## 6. Acknowledgements

This project was 50% funded by the New Zealand Government and 50% funded by a conservation levy on the New Zealand Fishing Industry.

Thanks to Pete Tyree and Jeremy Carroll of the Department of Conservation, Invercargill for help with trip preparation, Heritage Expeditions and the New Zealand Navy for transportation to and from Adams Island, and to the staff of the Department of Conservation Stewart Island Field Centre for daily radio communications while we were on the island.

## 7. References

- Cormack, R.M. 1964: Estimates of survival from the sighting of marked animals. *Biometrika* 51: 429–438.
- Cormack, R.M. 1972: The logic of capture-recapture estimates. *Biometrics* 28: 337–343.
- Croxall, J.P.; Rothery, P.; Pickering, S.P.C.; Prince, P.A. 1990: Reproductive performance, recruitment and survival of wandering albatrosses *Diomedea exulans* at Bird Island, South Georgia. *Journal of Animal Ecology* 59: 775–796.
- de la Mare, W.K.; Kerry, K.R. 1994: Population dynamics of the wandering albatross (*Diomedea exulans*) on Macquarie Island and the effects of mortality from longline fishing. *Polar Biology* 14: 231–241.
- Hamilton, S.; Kemp, J.; Elliott, G.; Walker, K.; Wiltshire, A. 2002: Monitoring Gibson's wandering albatross, 1999/2000. *DOC Science Internal Series 71*. Department of Conservation, Wellington. 21 p.
- Murray, T.E.; Bartle, J.A.; Kalish, S.R.; Taylor, P.R. 1993: Incidental capture of seabirds by Japanese southern bluefin tuna longline vessels in New Zealand waters, 1988–1992. *Bird Conservation International* 3: 181–210.
- Walker, K.; Dilks, P.; Elliott, G.; Stahl, J-C. 1991: Wandering albatross on Adams Island, February 1991. *Science & Research Internal Report 109*. Department of Conservation, Wellington.
- Walker, K.; Elliott, G. 1999: Population changes and biology of the wandering albatross *Diomedea exulans gibsoni* at the Auckland Islands. *Emu* 99: 239–247. [Edited and republished as: Walker, K.; Elliott, G. 2002. Population changes and biology of the wandering albatross *Diomedea exulans gibsoni* at the Auckland Islands. *DOC Science Internal Series 68*. 19 p.]
- Walker, K.; Elliott, G. 2002a: Monitoring Antipodean and Gibson's wandering albatross, 1996/97. *DOC Science Internal Series 75*. Department of Conservation, Wellington. 14 p.
- Walker, K.; Elliott, G. 2002b: Monitoring Gibson's wandering albatross, 1998/99. *DOC Science Internal Series 70*. Department of Conservation, Wellington. 19 p.
- Walker, K.; Elliott, G.; Davis, A.; McClelland, P. 1995a: Wandering albatross on Adams Island: census, nesting data, and body measurements, February 1993. *Science & Research Series 78*. Department of Conservation, Wellington.
- Walker, K.J.; Elliott, G.P.; Nicholls, D.G.; Murray, M.D. 1995b: Satellite tracking of wandering albatross (*Diomedea exulans*) from the Auckland Islands: Preliminary results. *Notornis* 42: 127–137.

- Walker, K.; Elliott, G.; Amey, J.; McAllister, G. 2002a: Monitoring Gibson's wandering albatross, 1997/98. *DOC Science Internal Series 69*. Department of Conservation, Wellington. 19 p.
- Walker, K.; Hamilton, S.; Wiltshire, A.; Elliott, G. 2002: Monitoring Gibson's wandering albatross, 2000/01. *DOC Science Internal Series 72*. Department of Conservation, Wellington. 27 p.
- Weimerskirch, H.; Jouventin, P. 1987: Population dynamics of the wandering albatross, *Diomedea exulans* of the Crozet Islands: causes and consequences of the population decline. *Oikos 49*: 315-322.
- Weimerskirch, H.; Brothers, N.; Jouventin, P. 1997: Population dynamics of wandering albatross *Diomedea exulans* and Amsterdam albatross *D. amsterdamensis* in the Indian Ocean and their relationships with long-line fisheries: conservation implications. *Biological Conservation 79*: 257-270

# Appendix 1

## BIRDS AT NESTS IN OR NEAR THE STUDY AREA ON ADAMS I., JAN 2002

NEST	MALE		FEMALE		COMMENTS
	METAL 'R' BAND	DARVIC BAND	METAL 'R' BAND	DARVIC BAND	
2	42780	Red-710	42602	Red-27a	Outside study area
10	42636	Red-087	42637	Red-388	
12	47523	Red-324	46826	Red-165	
13	46786	Red-053	46662	Red-375	
14	48100	Red-263	49675	Red-468	
15	47535	Red-240	47025	Red-16a	
22	46429	Red-576	46498	Red-673	
23	46582	Red-262	46774	Red-467	
25	46581	Red-844	46773	Red-542	
26	49687	Red-505			
27	56704	Red-24a	56728	Red-59a	
30	56701	Red-21a			Failed 24 Jan 02
31	49692	Red-683	49854	Red-577	
33	46631	Red-473	47030	Red-270	
34	47520	Red-450	47544	Red-514	Outside study area
36	42710	Red-541	42777	Red-708	
38	56717	Red-42a	56703	Red-23a	
40	56740	Red-73a	56686	Red-997	
41			50039	Red-857	Outside study area (The Hump)
42	42673	Red-10a	42789	Red-182	Outside study area (The Hump)
46	47526	Red-665	47512	Red-623	
49	47536	Red-230	49670	Red-441	
53	42629	Red-743	48077	Red-693	
60	49881	Red-840	49691	Red-667	
61			43001	Red-362	Failed 16 Jan 02
63	46829	Red-214	46810	Red-431	
71	48099	Red-256	49673	Red-462	
75	56733	Red-65a	56700	Red-19a	
78	42680	Red-201	46828	Red-34a	
80	47035	Red-005	49554	Red-361	
81	46621	Red-502	56711	Red-32a	
82	56719	Red-44a	49562	Red-17a	
83	46521	Red-684	46458	Red-557	
84	47024	Red-463	47061	Red-258	
85	47537	Red-552	46609	Red-850	
94	42879	Red-633	42902	Red-525	
97	46805	Red-326	46760	Red-172	
99	46433	Red-257	56705	Red-25a	
100	47548	Red-034	49556	Red-287	
103	42888	Red-280	46436	Red-63a	
111	46467	Red-077	43086	Red-489	
112	42658	Red-405	42737	Red-316	

NEST	MALE		FEMALE		COMMENTS
	METAL 'R' BAND	DARVIC BAND	METAL 'R' BAND	DARVIC BAND	
114	56585	Red-955	56570	Red-930	
118	49247	Red-265	49676	Red-469	
120	46516	Red-236	46426	Red-446	
121	47597	Red-854	47507	Red-729	
123	49567	Red-277	46661	Red-478	
124	49874	Red-725	49649	Red-562	
128	46776	Red-791	46651	Red-715	
130	43038	Red-360	42893	Red-724	
131	56722	Red-48a	56586	Red-958	
133	46679	Red-874	46785	Red-884	
138	47508	Red-700	48080	Red-820	
141	47577	Red-760	56734	Red-67a	
142	46442	Red-264	46520	Red-356	
144	56714	Red-38a	56747	Red-82a	
146	42648	Red-894	47505	Red-37a	
148	48094	Red-202	47013	Red-424	
149	50030	Red-876	50009	Red-852	
150	50027	Red-922	50021	Red-862	
153	46576	Red-714	56744	Red-79a	
154	42915	Red-259	46432	Red-464	
155	46517	Red-043			
157					Failed 11 Jan 02
159	49595	Red-126	56693	Red-07a	
163			42908	Red-325	Failed 19 Jan 02
165	42626	Red-054	42675	Red-853	
168	50036	Red-835	50035	Red-834	
170	42904	Red-206	46475	Red-337	
171	56595	Red-976	56697	Red-13a	
172	56709	Red-30a	56706	Red-26a	
173			56689	Red-02a	Failed 19 Jan 02
179	56723	Red-49a	56688	Red-01a	
180	42859	Red-177	47005	Red-328	
181	56738	Red-71a	56694	Red-08a	
185	56745	Red-80a	56736	Red-69a	
186	47596	Red-913	49599	Red-914	
189	47047	Red-117	49593	Red-394	
190	49582	Red-508	48083	Red-692	
191	56720	Red-45a	56699	Red-18a	
192	42651	Red-831	48086	Red-20a	
193	46472	Red-429	43055	Red-210	
194	42627	Red-378	42628	Red-064	
196	50031	Red-833	50011	Red-858	
199	42641	Red-105	43060	Red-493	
270	56730	Red-61a	56710	Red-31a	
271					Failed 16 Jan 02
276	47307	Red-095	49653	Red-302	
289	46478	Red-773	46449	Red-563	
313	42797	Red-841	56742	Red-75a	
317	42912	Red-459	46497	Red-253	
342	56750	Red-86a	56729	Red-60a	
346	56739	Red-72a	50025	Red-904	
348	56692	Red-06a	56589	Red-964	

NEST	MALE		FEMALE		COMMENTS
	METAL 'R' BAND	DARVIC BAND	METAL 'R' BAND	DARVIC BAND	
457	46763	Red-342	56687	Red-00A	
465	47547	Red-797	47586	Red-751	
467	46501	Red-027	43067	Red-368	
469	47532	Red-442	48097	Red-231	
470	42610	Red-013	46795	Red-55a	
475	46752	Red-071	46672	Red-299	
479	42960	Red-162	46508	Red-163	
480	42701	Red-706	42770	Red-675	
481	47008	Red-411	49852	Red-575	
492	56690	Red-03a	56749	Red-85a	
495	47504	Red-125	49597	Red-494	
496	56718	Red-43a	56695	Red-12a	
498	42700	Red-548	42769	Red-549	
502	46531	Red-224	56708	Red-29a	
504	42659	Red-828	42746	Red-150	
512	50026	Red-905	49647	Red-543	
520	42876	Red-052	46460	Red-374	
525			46827	Red-749	
532	56735	Red-68a	56725	Red-56a	
533	46453	Red-120	56712	Red-35a	
534	42955	Red-613	46465	Red-534	
540	46523	Red-304	43059	Red-102	
550	46451	Red-780	43056	Red-727	
551	43089	Red-399	42891	Red-580	
555	49700	Red-735	47056	Red-438	
556	42920	Red-449	47584	Red-241	
575	42972	Red-481	42895	Red-023	
576	42622	Red-076	42721	Red-294	
577	46524	Red-340	47046	Red-208	
588	42958	Red-51a	49600	Red-916	
594	47521	Red-455	42961	Red-148	
610	46799	Red-439	46653	Red-226	
622	29204	Red-175	47003	Red-416	
633	46660	Red-579	46796	Red-546	
634	42882	Red-121	46751	Red-33a	
637	56732	Red-64a	42771	Red-52a	
643	47560	Red-592	43006	Red-605	
644	47034	Red-353	47585	Red-252	
653	46568	Red-164	42970	Red-323	
655	46513	Red-737	56702	Red-22a	
657	56696	Red-247	42723	Red-524	
667	56737	Red-70a	56713	Red-36a	
681	49563	Red-042	47553	Red-77a	
685	49572	Red-080	47040	Red-50a	
686	56751	Red-87a	56743	Red-76a	
690	42681	Red-213	42790	Red-430	
691	46772	Red-906	46689	Red-545	
694	56597	Red-982	56727	Red-58a	
695	56715	Red-39a	56748	Red-83a	
696	42868	Red-197	47513	Red-334	
697			47587	Red-846	

NEST	MALE		FEMALE		COMMENTS
	METAL 'R' BAND	DARVIC BAND	METAL 'R' BAND	DARVIC BAND	
700	47568	Red-763	47594	Red-609	
703	49875	Red-761	49859	Red-657	
705	49551	Red-822	47550	Red-741	
706	42624	Red-967	56572	Red-935	
711	49654	Red-322	48092	Red-155	Outside study area (The Hump)
718	56716	Red-41a			
720			46502	Red-653	Failed 30 Jan 02
721	48098	Red-856	49656	Red-351	
722	42774	Red-238	42706	Red-447	
724	56724	Red-54a	56721	Red-47a	
725	42862	Red-855	47593	Red-920	
727	47588	Red-781	48087	Red-746	
728	42748	Red-702	42662	Red-573	
729	42989	Red-452	43064	Red-243	
733	49644	Red-529	49879	Red-799	
734	47027	Red-14a	47062	Red-883	
736	47051	Red-412	47007	Red-941	
738					Failed 5 Jan02
739	42954	Red-317	49645	Red-535	
749	47558	Red-798			
751	46491	Red-66a	49693	Red-694	
772	49651	Red-296	48090	Red-049	
773	56726	Red-57a	56691	Red-04a	
774	48093	Red-157	56746	Red-81a	
775	47573	Red-78a	56731	Red-62a	
776	42611	Red-021	42612	Red-366	
778	47002	Red-144	46821	Red-619	
779	46783	Red-041	46676	Red-290	
5100	46664	Red-864	42678	Red-829	
5101	42792	Red-05a	56685	Red-995	
5105	56583	Red-951	56579	Red-947	
5119	47306	Red-084	49592	Red-490	
5137	46406	Red-518	48079	Red-09a	
5150	50032	Red-825	50040	Red-859	Outside study area
5153	56741	Red-74a	56707	Red-28a	
5155	47050	Red-176			Outside study area (The Hump)
5158	47524	Red-648	42671	Red-11a	
5165	42987	Red-674	42690	Red-629	
5169	42951	Red-128	46456	Red-496	
5175	56698	Red-15a	56684	Red-994	
5200			47037	Red-486	Failed 14 Jan 02

# Appendix 2

## ADULT GIBSON'S WANDERING ALBATROSS BANDED WITH NEW METAL 'R' BANDS AND/ OR NEW DARVIC BANDS ON ADAMS I., JAN-FEB 2002

DATE	NEW DARVIC	OLD DARVIC	NEW METAL 'R' BAND	OLD METAL 'R' BAND	SEX
6 Jan 02	Red-27a	Red-641		42602	F
5 Jan 02	Red-11a			42671	F
5 Jan 02	Red-10a	Red-419		42673	M
14 Jan 02	Red-52a			42771	F
5 Jan 02	Red-05a	Red-211		42792	M
14 Jan 02	Red-51a	Red-129		42958	M
14 Jan 02	Red-489			43086	F
17 Jan 02	Red-63a	Red-017		46436	F
19 Jan 02	Red-66a	Red-752		46491	M
11 Jan 02	Red-33a	Red-309		46751	F
14 Jan 02	Red-55a			46795	F
11 Jan 02	Red-34a	Red-336		46828	F
5 Jan 02	Red-16a	Red-451		47025	F
5 Jan 02	Red-14a	Red-267		47027	M
11 Jan 02	Red-50a	Red-937		47040	F
11 Jan 02	Red-37a			47505	F
19 Jan 02	Red-77a	Red-291		47553	F
19 Jan 02	Red-78a	Red-756		47573	M
2/02/02	Red-90a			47589	M
5 Jan 02	Red-09a	Red-307		48079	F
6 Jan 02	Red-20a			48086	F
5 Jan 02	Red-17a			49562	F
24 Jan 02	Red-505			49687	M
31 Dec 01	Red-994		56684		F
1 Jan 02	Red-995		56685		F
1 Jan 02	Red-997		56686		F
1 Jan 02	Red-00A		56687		F
5 Jan 02	Red-01a		56688		F
5 Jan 02	Red-02a		56689		F
5 Jan 02	Red-03a		56690		M
5 Jan 02	Red-04a		56691		F
5 Jan 02	Red-06a		56692		M
5 Jan 02	Red-07a		56693		F
5 Jan 02	Red-08a		56694		F
5 Jan 02	Red-12a		56695		F
5 Jan 02		Red-247	56696	42910	M
5 Jan 02	Red-13a		56697		F
5 Jan 02	Red-15a		56698		M
5 Jan 02	Red-18a		56699		F
6 Jan 02	Red-19a		56700		F
6 Jan 02	Red-21a		56701		M

DATE	NEW DARVIC	OLD DARVIC	NEW METAL 'R' BAND	OLD METAL 'R' BAND	SEX
6 Jan 02	Red-22a		56702		F
6 Jan 02	Red-23a		56703		F
6 Jan 02	Red-24a		56704		M
6 Jan 02	Red-25a		56705		F
6 Jan 02	Red-26a		56706		F
8 Jan 02	Red-28a		56707		F
8 Jan 02	Red-29a		56708		F
8 Jan 02	Red-30a		56709		M
8 Jan 02	Red-31a		56710		F
8 Jan 02	Red-32a		56711		F
11 Jan 02	Red-35a		56712		F
11 Jan 02	Red-36a		56713		F
11 Jan 02	Red-38a		56714		M
11 Jan 02	Red-39a		56715		M
11 Jan 02	Red-41a		56716		M
11 Jan 02	Red-42a		56717		M
11 Jan 02	Red-43a		56718		M
11 Jan 02	Red-44a		56719		M
11 Jan 02	Red-45a		56720		M
11 Jan 02	Red-47a		56721		F
14 Jan 02	Red-48a		56722		M
14 Jan 02	Red-49a		56723		M
14 Jan 02	Red-54a		56724		M
17 Jan 02	Red-56a		56725		F
17 Jan 02	Red-57a		56726		M
17 Jan 02	Red-58a		56727		F
17 Jan 02	Red-59a		56728		F
17 Jan 02	Red-60a		56729		F
17 Jan 02	Red-61a		56730		M
17 Jan 02	Red-62a		56731		F
19 Jan 02	Red-64a		56732		M
19 Jan 02	Red-65a		56733		M
19 Jan 02	Red-67a		56734		F
19 Jan 02	Red-68a		56735		M
19 Jan 02	Red-69a		56736		F
19 Jan 02	Red-70a		56737		M
19 Jan 02	Red-71a		56738		M
19 Jan 02	Red-72a		56739		M
19 Jan 02	Red-73a		56740		M
19 Jan 02	Red-74a		56741		M
19 Jan 02	Red-75a		56742		F
21 Jan 02	Red-76a		56743		F
21 Jan 02	Red-79a		56744		F
24 Jan 02	Red-80a		56745		M
24 Jan 02	Red-81a		56746		F
24 Jan 02	Red-82a		56747		F
24 Jan 02	Red-83a		56748		F
24 Jan 02	Red-85a		56749		F
30 Jan 02	Red-86a		56750		M
30 Jan 02	Red-87a		56751		M



# Appendix 3

## WANDERING ALBATROSS WITH LOST OR BROKEN DARVIC BANDS ON ADAMS I., DEC 2001-JAN 2002

DATE	LOST DARVIC	NEW DARVIC	METAL BAND	SEX	STATUS	COMMENTS
24 Jan 02	R-322					Found broken darvic on empty nest on The Hump
27 Dec 01	R-641	R-27a	R42602	F	Nesting	Outside study area
30 Dec 01	R-419	R-10a	R42673	M	Nesting	On The Hump
30 Dec 01	R-211	R-05a	R42792	M	Nesting	
30 Dec 01	R-281		R42889	F	BOG <sup>1</sup>	
21 Dec 01	R-129	R-51a	R42958	M	Nesting	
22 Dec 01	R-331		R42964	F	BOG	
18 Dec 01	R-158		R46401	F	BOG	
22 Dec 01	R-153		R46407	F	BOG	
21 Dec 01	R-017	R-63a	R46436	F	Nesting	
21 Dec 01	R-752	R-66a	R46491	M	Nesting	
8 Jan 02	R-309	R-33a	R46751	M	Nesting	
8 Jan 02	R-336	R-34a	R46828	F	Nesting	
22 Dec 01	O-074		R46852	F	BOG	
5 Jan 02	R-451	R-16a	R47025		Nesting	
19 Dec 01	R-267	R-14a	R47027	M	Nesting	
26 Dec 01	R-937	R-50a	R47040	F	Nesting	Second darvic she has lost since 1999
18 Dec 01	R-176		R47050	M	BOG	
30 Jan 02	R-912		R47055	F	BOG	
11 Jan 02	R-291	R-77a	R47553		Nesting	
18 Dec 01	R-756	R-78a	R47573	M	Nesting	
5 Jan 02	R-307	R-09a	R48079	F	Nesting	
22 Dec 01	R-720		R49570	M	BOG	
30 Dec 01	R-183		R49585	M	BOG	

<sup>1</sup> BOG Bird on ground

# Appendix 4

## NON-STUDY AREA BANDED GIBSON'S WANDERING ALBATROSS RECOVERED ON ADAMS I. IN 2002

SA = study area; BOG = birds on ground; Or = Or; Bl = Black.

Date	RECOVERED						BANDED			
	Metal band	Darvic band	Activity	In SA	Grid ref.	Location	Date	Activity	In SA	Location
26 Jan 02	140-51041		Nesting	No	293709, 673896	Fly Basin Square				
22 Jan 02	140-38993		Nesting	No	287775, 673968	Study area to Astrolabe				
26 Jan 02	140-33276		Nesting	No	293585, 673659	Fly Basin Square				
22 Jan 02	30514		Nesting	No	287478, 674393	Study area to Astrolabe				
22 Jan 02	30540		BOG	No	287694, 674120	Study area to Astrolabe	4 Feb 98			
22 Jan 02	30555		BOG	No	287350, 674289	Study area to Astrolabe			No	
14 Jan 02	46351		BOG	Yes			8 Dec 95	Chick	Yes	
22 Jan 02	46369		BOG	No	287084, 673847	Study area to Astrolabe	8 Dec 95	Chick	Yes	
19 Jan 02	46400		BOG	Yes	288571, 673547		7 Dec 95	Chick	Yes	
8 Jan 02	46561		BOG	Yes			31 Dec 94	Chick	Yes	
1 Jan 02	46563		BOG	Yes	288558, 673782		31 Dec 94	Chick	Yes	
30 Jan 02	46566		BOG	Yes	287865, 673840		31 Dec 94	Chick	Yes	
30 Jan 02	46585		BOG	Yes	287998, 673926		31 Dec 94	Chick	Yes	
8 Jan 02	46588	Red-509	BOG	Yes			31 Dec 94	Chick	Yes	
30 Jan 02	46616	Or-014	BOG	Yes	288221, 673842		18 Dec 96	Chick	Yes	
22 Jan 02	46640	Or-029	BOG	Yes	288424, 674106		18 Dec 96	Chick	Yes	
21 Jan 02	46643		BOG	Yes	288560, 673622		31 Dec 94	Chick	Yes	
19 Jan 02	46683	Or-079	BOG	Yes	288555, 673831		19 Dec 96	Chick	Yes	
1 Jan 02	46690	Red-598	BOG	Yes			28 Jan 95	Nesting	No	
30 Jan 02	46694		BOG	No	287545, 674498	Study area to Astrolabe. Female?	7 Dec 95	Chick	Yes	
1 Jan 02	46700		BOG	Yes			7 Dec 95	Chick	Yes	
24 Jan 02	46737	Or-064	BOG	Yes	288329, 674404		18 Dec 96	Chick	Yes	
24 Jan 02	46738	Or-065	BOG	Yes	288546, 673833		18 Dec 96	Chick	Yes	
30 Jan 02	46739	Or-067	BOG	Yes	288221, 673842		18 Dec 96	Chick	Yes	
24 Jan 02	46743	Or-071	BOG	Yes	288299, 674394		18 Dec 96	Chick	Yes	
30 Jan 02	46816		BOG	Yes	288514, 673599		7 Dec 95	Chick	Yes	
19 Jan 02	46831		BOG	No	288341, 673567	The Hump	7 Dec 95	Chick	Yes	
24 Jan 02	46846		BOG	Yes	288094, 673893		7 Dec 95	Chick	Yes	
22 Dec 01	46852	Or-074	BOG	Yes			19 Dec 96	Chick	Yes	
11 Jan 02	46863	Or-105	BOG	Yes	288378, 673757		19 Dec 96	Chick	Yes	
24 Jan 02	46864	Or-103	BOG	No	288350, 673523	The Hump	19 Dec 96	Chick	Yes	
22 Jan 02	46959	Or-306	BOG	No	287329, 674157	Study area to Astrolabe	20 Dec 96	Chick	No	Lower Study extension
22 Jan 02	46960	Or-294	BOG	No	287776, 674446	Study area to Astrolabe	20 Dec 96	Chick	No	Lower Study extension

Date	Metal band	RECOVERED				Grid ref.	Location	Date	BANDED		
		Darvic band	Activity	In SA	Activity				In SA	Location	
30 Jan 02	46979	Or-340	BOG	Yes	288221, 673842		20 Dec 96	Chick	No	Lower Study extension	
22 Jan 02	46985	Or-348	BOG	No	287318, 673980	Study area to Astrolabe	20 Dec 96	Chick	No	Lower Study extension	
19 Jan 02	47116	Or-195	BOG	Yes	288428, 674229		20 Dec 96	Chick	No	Lower west Study extension	
30 Jan 02	47125	Or-266	BOG	Yes	288156, 674099		20 Dec 96	Chick	No	Lower west Study extension	
22 Jan 02	47135	Or-279	BOG	No	287485, 673958	Study area to Astrolabe	20 Dec 96	Chick	No	Lower west Study extension	
26 Jan 02	47162	Or-291	BOG	No	293547, 674091	Fly Basin Square	21 Dec 96	Chick	No	Mt Dick	
24 Jan 02	47190	Or-357	BOG	No	287669, 674690	Study area to Astrolabe	21 Dec 96	Chick	No	Mt Dick	
24 Jan 02	47215	Or-370	BOG	Yes	288538, 673829		23 Dec 96	Chick	No	Mt Dick	
30 Jan 02	47215	Or-370	BOG	Yes	288514, 673599		23 Dec 96	Chick	No	Mt Dick	
30 Jan 02	47222	Or-450	BOG	Yes	288527, 673921		24 Dec 96	Chick	No	Upper Study area extension	
22 Jan 02	47531		Nesting	No	287763, 674043		14 Jan 97	Nesting	No		
19 Jan 02	49105	Bl-005	BOG	Yes	287995, 674117		7 Nov 97	Chick	Yes		
14 Jan 02	49163	Bl-075	BOG	Yes	288413, 673847		7 Nov 97	Chick	Yes		
24 Jan 02	49204	Bl-132	BOG	Yes	288094, 673893		7 Nov 97	Chick	Yes		
22 Jan 02	49237	Bl-170	BOG	No	287334, 674169	Study area to Astrolabe	7 Nov 97	Chick	Yes		
22 Jan 02	49335	Bl-279	BOG	No	287924, 674353	Study area to Astrolabe	12 Dec 98	Chick	Yes		
30 Jan 02	49355		BOG	Yes	288209, 674011		12 Dec 95	Chick	No	West of Boundary Stream	
22 Jan 02	49359		BOG	No	287707, 674321	Study area to Astrolabe	12 Dec 95	Chick	No	West of Boundary Stream	
22 Jan 02	49402		BOG	No	287392, 674182	Study area to Astrolabe	12 Dec 95	Chick	No	West of Boundary Stream	
24 Jan 02	49435		BOG	No	288350, 673523	The Hump	14 Dec 95	Chick	No	Mt Dick	
22 Jan 02	49477		BOG	No	287388, 674407	Study area to Astrolabe	17 Dec 95	Chick	No	High swathe below fell field, W of Boundary Strm	
22 Jan 02	49507		BOG	No	288071, 674282	Study area to Astrolabe	17 Dec 95	Chick	No	Hight swathe below fell field, W of Boundary Strm	
24 Jan 02	49602	Bl-296	BOG	No	288054, 674280		12 Dec 98	Chick	Yes		
22 Jan 02	49615	Bl-308	BOG	No	287279, 674035	Study area to Astrolabe	12 Dec 98	Chick	Yes		
30 Jan 02	49704		BOG	Yes	288608, 673504		7 Dec 95	Chick	Yes		
19 Jan 02	49712		BOG	Yes	288438, 673999		6 Dec 95	Chick	Yes		
22 Jan 02	49732		BOG	No	287820, 673943	Study area to Astrolabe	7 Dec 95	Chick	Yes		
22 Jan 02	49762		BOG	No	287447, 674001	Study area to Astrolabe	10 Dec 95	Chick	No	West of Boundary Stream	
22 Jan 02	49767		BOG	No	287429, 674167	Study area to Astrolabe	10 Dec 95	Chick	No	West of Boundary Stream	
22 Jan 02	49787		BOG	No	287868, 674587	Study area to Astrolabe	12 Dec 95	Chick	No	West of Boundary Stream	
30 Jan 02	49805		BOG	Yes	288222, 674078		10 Dec 95	Chick	No	West of Boundary Stream	
17 Jan 02	49812		BOG	No		Across Boundary Stream	10 Dec 95	Chick	No	West of Boundary Stream	

Date	Metal band	RECOVERED			Grid ref.	Location	Date	BANDED		
		Darvic band	Activity	In SA				Activity	In SA	Location
30 Jan 02	49831		BOG	Yes	288017, 673841		10 Dec 95	Chick	No	West of Boundary Stream
24 Jan 02	49844		BOG	No	287315, 673915	Study area to Astrolabe	10 Dec 95	Chick	No	West of Boundary Stream
22 Jan 02	49849		BOG	No	287502, 674041	Study area to Astrolabe	10 Dec 95	Chick	No	West of Boundary Stream