# Monitoring Gibson's wandering albatross, 1999/2000

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## ABSTRACT

This paper reports on progress made between 1 July 1999 and 30 June 2000 on measuring survival, productivity and recruitment of Gibson's wandering albatross (*Diomedea gibsoni*), and identification of their most important foraging areas. Productivity for the 1999 breeding season was 62% and the average for the last eight seasons was 66%. In 1999, 129 chicks were banded making a total of 686 chicks banded since annual banding for assessment of recruitment began in 1993. Data on the return of banded adults to the study area enabled estimation of annual adult survival of 97% for five cohorts studied between 1991 and 1997. A count of active nests in Astrolabe Basin was made which allowed five earlier years of counts to be compared with counts made in 1998, 1999, and 2000. A total of 488 nests were counted in three representative census areas subject to annual census for the past three seasons, and this is only 64% (range 62–75%) of the average for 1998 and 1999 census results. The reduction in nesting numbers in 2000 occurred across all count areas. Eight satellite transmitters, with a planned life of two years, were attached to breeding albatross in February 2000. By May 2000, seven of these birds had deserted their nests and three transmitters had stopped functioning. Foraging areas of the non-breeding birds (i.e. after nest failure) showed slight deviations from previous years' satellite tracking.

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

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# 1. Introduction

Gibson's wandering albatross *(Diomedea gibsoni)* 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). Wandering albatross species are long-lived (> 40 years), breed late (> 10 years), and produce a chick only once every 2–3 years. Therefore, the increased mortality caused by fisheries bycatch has the capacity to threaten the Gibson's wandering albatross population.

Several concurrent programmes are attempting to examine and resolve the fisheries bycatch 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 the albatross population are being monitored.

This report describes progress during the 1999/2000 year on two aspects: the at-sea distribution of Gibson's wandering albatrosses, and their population status. The population study focuses on estimating survival, productivity and recruitment rates so that the population can be modelled and sustainable bycatch levels estimated. Population trends are also monitored.

It is one of a series of annual progress reports on this research (Walker & Elliott 2002a, 2002b; Walker et al. 1991, 1995a, 2002) 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 (e.g. Walker & Elliott 1999; Walker et al. 1995b).

Although albatrosses spend most of their lives at sea, the most economical way to assess the fisheries impact is during the short period they concentrate on small subantarctic islands to breed. Every summer fewer than half of the Gibson's wandering albatrosses gather to breed, or for adolescents to establish mates, on Adams I. During this period, population parameters can be assessed, and satellite transmitters can be attached to follow the birds' life at sea.

During 1999/2000 there were three trips to Adams Island. Kath Walker and Graeme Elliott made the first visit, from 30 November to 9 December 1999 arriving on the *Marine Countess* and departing on the *Akademik Shokalskiy*. They assessed 1999 productivity in both the main study area and in the Fly Basin Square. They also banded all the chicks produced in the main study area in 1999 to allow assessment of recruitment. The second visit was made from 7 January to 17 February 2000 to assess adult survival and monitor population trends. The team comprised Josh Kemp, Rhys Buckingham, and Pip Aplin, and the *Marine Countess* provided transport. The third visit was made from 17 to 24 February 2000 by Sheryl Hamilton and Alan Wiltshire to attach satellite transmitters to eight breeding Gibson's wandering albatross. The *Marine Countess* provided transport.

# 2. Population dynamics

A population study aimed at measuring productivity, survival and recruitment has been conducted in a study area on Adams Island since 1991. The main study area comprises about 53 ha on the southern slopes of Adams Island, just west of Amherst Stream. 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 (Fig. 1). The second 25 ha study area is a square in the middle of a dense colony of albatrosses just west of Fly Harbour ('Fly Basin Square') and is demarcated entirely by white fence poles as there are no obvious topographical boundaries (see map in Walker & Elliott 2002b for location of both study areas).

## 2.1 METHODS

From 1 to 3 December 1999, all the study area nests that had eggs in February 1999 were visited and all chicks present were banded with both numbered metal and black darvic bands. The final outcome of nests was assessed using standard criteria (see Walker et al. 2002a).

On 18 January 2000, the 1999 nests were re-visited to confirm the survival of all banded chicks. The 1999 metal nest tags were removed along with those from any earlier years' nests.

Between 7 January and 23 February 2000 regular trips were made to the study area and

- the bands of all banded birds encountered in or near the study area were read,
- any unbanded nesting birds were banded with both metal and red darvic bands,
- any birds in the study area that were already metal-banded were banded with red darvic bands,
- every nest and potential nest was checked for an egg to determine laying dates and incubation shift lengths,
- nests were marked with numbered metal tags and their positions were mapped using a compass and tape measure.

On 31 January 2000, the number of nests with eggs in the Fly Basin Square was counted by sweep-searching the area and painting the ground beside each nest after it had been counted. In November/December 2000, nesting success in this low and sheltered area will be measured and compared with that in the higher, more exposed main study area.

## 2.2 RESULTS

### 2.2.1 1999 season breeding success in the main study area

There were 214 (215 minus one egg accidentally broken) study area nests in the 1999 season. In December 1999, 129 chicks were banded from study area nests and another seven nests produced fledging chicks but these chicks were not banded as they were outside the study area. Five of the banded chicks were found dead later in January and February 2000 (Table 1). Therefore, 131 chicks fledged from 214 study area nests in 1999.

However, the ten nests where one of the pair had a transmitter attached in February 1999 (Walker & Elliott 2002b) were not included in the calculations for the 1999 breeding success as it was thought that transmitter attachment might have disrupted the breeding cycle. Therefore, after removing the ten transmitter bird's nests, 62.3% (127 chicks) of 204 nests had chicks fledge which is slightly less than the average breeding success of 66% for 1991–99 (Table 2).

From 237 nests counted in the Fly Basin Square on 24 January 1999, 143 (60.3%) had healthy chicks on 5 December 1999. During the same period in the study area, 132 (64.7%) of 204 non-transmitter birds' nests were successful.

TABLE 1. GIBSON'S WANDERING ALBATROSS CHICKS BANDED IN THE STUDY AREA ON ADAMS ISLAND, DECEMBER 1999 BUT FOUND DEAD LATER.

| 1999 NEST NO. | METAL BAND | DARVIC BAND | BAND REMOVED? | DATE FOUND DEAD |
|---|---|---|---|---|
| 690 | R49869 | Black-341 | Yes | 18 Jan 2000 |
| 83 | R49890 | Black-347 | Yes | 18 Jan 2000 |
| 753 | R49921 | Black-378 | Yes | 21 Feb 2000 |
| 732 | R49904 | Black-361 | No | 9 Jan 2000 |
| 344 | R49966 | Black-423 | Yes | 14 Feb 2000 |

TABLE 2. BREEDING SUCCESS OF GIBSON'S WANDERING ALBATROSS NESTING IN THE STUDY AREA ON ADAMS ISLAND SINCE 1994.

| YEAR | NO. OF NESTS MONITORED | BREEDING SUCCESS (%) |
|---|---|---|
| 1991 | 88 | 67 |
| 1993 | 139 | 78 |
| 1994 | 122 | 68 |
| 1995 | 191 | 63 |
| 1996 | 221 | 61 |
| 1997 | 213 | 68 |
| 1998 | 223 | 64 |
| 1999 | 204 | 62 |
| Average | | 66% |

### 2.2.2 2000 breeding season nests

In January/February 2000, 130 new study area nests were tagged and mapped (Fig. 1) so that their breeding success could be assessed the following summer. Five of these nests had failed before the last nest check on 23 February 2000 (Appendix 1). Eight nests were outside the study area.

On 31 January 2000, 159 nests were counted in the Fly Basin Square; the outcome of these nests will be assessed next summer.

### 2.2.3 Adult mortality

In 2000, of the 130 study area nests, 122 were within the study area and eight pairs that had previously nested and been banded in the study area, nested outside of the boundary. Of the 260 breeding birds (2 × 130 pairs), 26 were unbanded adults that we banded (Appendix 2) and five were not checked for bands because the nest failed before both birds of the pair had been recorded. Another two study area breeding birds had new metal bands attached, one because its original band was in poor condition and one because it was only wearing a darvic band (Appendix 2).

Adult survival was estimated using the methods of Cormack (1964, 1972), which reliably estimate 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 GIBSON'S WANDERING ALBATROSSES RETURNING TO THE STUDY AREA ON ADAMS ISLAND. STANDARD ERRORS ARE IN BRACKETS.

| YEAR | ALL BIRDS | KNOWN MALES | KNOWN FEMALES |
|---|---|---|---|
| 1991/93 | 0.96 (0.02) | 0.98 (0.02) | 0.95 (0.03) |
| 1993/94 | 0.97 (0.02) | 0.98 (0.02) | 0.95 (0.03) |
| 1994/95 | 0.99 (0.01) | 1.00 (0.01) | 0.99 (0.02) |
| 1995/96 | 0.96 (0.02) | 0.98 (0.02) | 0.96 (0.02) |
| 1996/97 | 0.97 (0.02) | 0.97 (0.03) | 0.97 (0.03) |
| Average | 0.97 (0.02) | 0.98 (0.02) | 0.96 (0.03) |

### 2.2.4 Recruitment

In December 1999, 129 chicks were banded in the study area. Table 4 shows the number of chicks that have been banded on Adams I. for future assessment of recruitment.

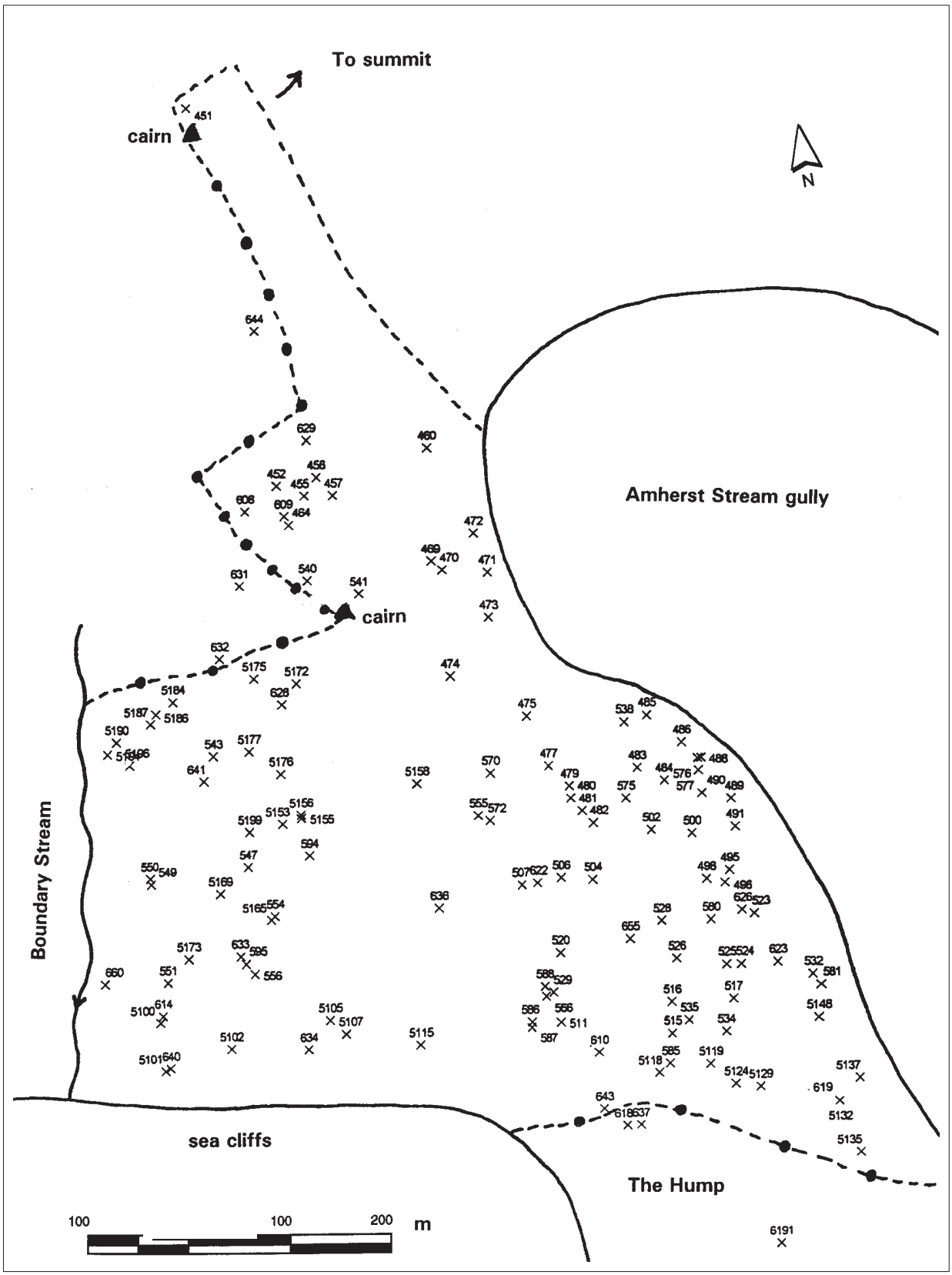


Figure 1. Nests in the study area on Adams Island for the 2000 breeding season. White boundary poles are shown by filled circles.

TABLE 4. FLEDGLING GIBSON'S WANDERING ALBATROSSES BANDED ON ADAMS ISLAND SINCE 1993.

| YEAR | STUDY AREA | OUTSIDE STUDY AREA |
|---|---|---|
| 1993[a] | 2 | |
| 1994[a] | 26 | |
| 1995[a] | 119 | 319 |
| 1996[b] | 122 | 375 |
| 1997[c] | 144 | |
| 1998[c] | 144 | |
| 1999[c] | 129 | |
| Total | 686 | 694 |

[a] banded with metal bands only. [b] banded with metal and orange darvic bands. [c] banded with metal and black darvic bands.

# 3. Population trends

Collecting information on population size in a deferred breeding species such as the Gibson's wandering albatross is slow since birds return to breed only once every 2–3 years. Between 1991 and 1997, a series of annual whole island counts were carried out. Results from these show that each year an average of 5831 pairs breed on the Auckland Islands (Walker & Elliott 1999). Now that htere is a reasonable estimate of the total population size, annual counts are currently made of representative portions of the island and are intended to monitor population change rather than assess total population size.

## 3.1 METHODS

Three representative census areas were counted in 2000 (see map in Walker & Elliott 2002b). These census areas were:

- Rhys's Ridge on the northern side of the island (typical of the low-density albatross nesting areas found on much of the island);
- the area between Amherst Stream and Astrolabe Basin, including the main study area and The Hump (medium to high density); and
- Fly Basin Square (high density).

In addition, the entire Astrolabe Basin was counted. This is a large area that has not been censused since the series of whole-island counts between 1991 and 1997. During these island-wide counts, what is now known as 'Representative Area B' (Amherst to Astrolabe) was counted with Astrolabe Basin as one large, undifferentiated unit. The census of Astrolabe Basin in 2000 was carried out to determine what proportion Representative Area B was of the original 'super-block'. This would allow the later subset counts to be compared with those made earlier.

Each block was counted by three observers walking 20 m apart up and down the block, parallel to the longest boundary. The person on the edge of the uncounted land marked the boundary with spray paint and the observers followed back along this line on the subsequent 'sweep'. Once a nest had been counted, a mark was made with spray paint on the ground nearby. All birds on nests were checked for bands and all nests were checked for eggs. Birds on the ground without nests were also checked for bands. The location of all banded birds was recorded along with breeding status and a Gibson Plumage Score (Gibson 1967).

Once each whole area had been counted, the reliability of the census was checked by walking straight transects along compass bearings at right angles to the census sweep lines until approximately 15% of the total nest count had been checked. All nests within 5 m of the transect were checked for paint marks which indicated that the nests had been counted.

## 3.2 RESULTS

A total of 488 nests were counted in the three representative areas that have been surveyed for each of the past three seasons (Tables 5, 6), and this is only 64% of the average for the 1998 and 1999 census results. The proportional drop in numbers nesting this year varied somewhat between the areas, with the greatest change in the medium- (62%) and high-density (66%) areas and the smallest (75%) in the low-density area.

For the 2000 season, there were only 122 nests within the study area (66% of the previous six seasons' average), the lowest number of nests there since this study began (Table 7). The breeding success in 1999 was only 62%, so breeding numbers could have been expected to be higher in 2000, not lower. The island-wide decrease in numbers attempting to breed in 2000 may have been a reflection of poor foraging conditions in 1999 for birds in their non-breeding year, and for failed 1999 breeders, so that many birds from both these groups did not attempt to breed this season. Seabird studies all across the Pacific report poor 1999 conditions.

A total of 794 nests were counted in Astrolabe Basin and 284 nests in the Amherst to Astrolabe area ('Representative Area B'), giving a total of 1078 for this 'superblock'. This means that Representative Area B is 26.3% of the original 'superblock' census area, and from this a comparison with earlier years is possible (Table 7). However, more time was taken for the Astrolabe Basin count in 2000 than in earlier years, with the bottom section walked rather being counted from a vantage-point with binoculars. Because of this, the 2000 count was probably more accurate and perhaps up to 5% higher than previous counts, and some caution should be exercised in interpreting the results.

Transect cross-checking to test the reliability of the census counts was completed for all areas. In these transect checks, no unpainted nests were found for the Amherst–Astrolabe section (17% of nests checked) or for Astrolabe Basin (19% of nests checked), which indicates that the census results were very accurate. For Fly Basin Square (30% of nests checked), one unpainted

TABLE 5. GIBSON'S WANDERING ALBATROSS NEST CENSUS RESULTS, ADAMS ISLAND, JAN–FEB 2000.

| Locality | Date | Count time[1] | No. of chicks | Un-banded on egg | Un-banded BOG[2] | Banded on egg | Banded BOG | Total checked for bands | No. of bands found | Total BOGs | Total no. of nests w. eggs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Rhys's Ridge | 2, 6 Feb 00 | 21 | 5 | 45 | 26 | 0 | 1 | 72 | 1 | 29 | 45 |
| Amherst–Astrolabe | | | | | | | | | | | |
| Study area (SA) | - | - | - | - | - | - | - | - | - | - | 122 |
| The Hump | 1 Feb 00 | 4 | 3 | 15 | 4 | 3 | 0 | 25 | 3 | 4 | 18 |
| SA–Astrolabe | 27 Jan 00 | 18 | 31 | 137 | 57 | 7 | 4 | 205 | 11 | 61 | 144 |
| Fly Basin Square | 31 Jan 00 | 13 | 22 | 158 | 135 | 1 | 1 | 295 | 2 | 136 | 159 |
| Sub-total, 3 blocks | | 56 | 61 | 355 | 222 | 11 | 6 | 597 | 17 | 230 | 488 |
| Astrolabe Basin | 28 Jan, 5,8, 9,10,12 Feb | 117 | 69 | 787 | 485 | 7 | 2 | 1281 | 9 | 498 | 794 |

[1] Person hours. [2] Birds on ground (without nests).

TABLE 6. GIBSON'S WANDERING ALBATROSS CENSUS RESULTS FROM REPRESENTATIVE BLOCKS ON ADAMS ISLAND, 1998–2000.

| Locality | Year | Count time[1] | No. of chicks | Total no. checked for bands | No. of bands found | Total no. of BOGs[2] | Total no. of nests |
|---|---|---|---|---|---|---|---|
| Rhys's Ridge | 1998 | 15 | 2 | 71 | 0 | 13 | 60 |
| (low density) | 1999 | 11.3 | 1 | 78 | 1 | 18 | 60 |
| | 2000 | 21 | 5 | 72 | 1 | 29 | 45 (75%) |
| Amherst–Astrolabe | 1998 | 20.6 | 9 | 343 | 8 | 83 | 473 |
| (medium density) | 1999 | 15.7 | 20 | 299 | 18 | 59 | 446 |
| | 2000 | 22 | 34 | 230 | 14 | 65 | 284 (62%) |
| Fly Basin Square | 1998 | 9.7 | 7 | 397 | 0 | 149 | 248 |
| (high density) | 1999 | 10 | 39 | 296 | 2 | 59 | 237 |
| | 2000 | 13 | 22 | 295 | 2 | 136 | 159 (66%) |
| Totals | 1998 | 45.2 | 18 | 811 | 8 | 245 | 781 |
| | 1999 | 37 | 60 | 673 | 21 | 136 | 743 |
| | 2000 | 56 | 61 | 597 | 17 | 230 | 488 (64%) |

[1] Person hours. [2] Birds on ground (without nests).

nest was found, which indicates that the number of nests in the census count there was underestimated by 2.1%. For all census areas, a total of 12 banded birds that were not from the study area were recorded (Appendix 3).

TABLE 7. NUMBERS OF GIBSON'S WANDERING ALBATROSS NESTING BETWEEN AMHERST STREAM AND ASTROLABE POINT, ADAMS ISLAND. STUDY AREA NESTS ARE ALSO INCLUDED IN REPRESENTATIVE AREA B.

| | 1991 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|---|---|---|---|---|---|---|---|---|---|
| Study area | | 146 | 134 | 182 | 208 | 213 | 223 | 206 | 122 |
| Amherst–Astrolabe (Repr. Area B) | 278* | 278* | 272* | 360* | | 375* | 483 | 446 | 284 |
| Astrolabe Basin | | | | | | | | | 794 |
| Total area | 1056 | 1054 | 1034 | 1368 | No census | 1422 | | | 1078 |

*Extrapolated from the ratio of Representative Area B to the Total area when both areas were counted separately in 2000.

# 4. Monitoring at-sea distribution

We put Microwave Telemetry 'Pico' satellite transmitters on four male and four female Gibson's wandering albatrosses between 18 and 21 February 2000 (Table 8). All birds were incubating at the time the transmitters were attached. We made sure that the eggs of transmitter birds did not have any defects, e.g. dents. Pairs were chosen if they had successfully bred two, but preferably three times, had never failed, and were considered to be 'calm'. The shock cord harness design with a release mechanism (Walker & Elliott 2002b) was used for all transmitter attachments.

The battery life for all transmitters is about 27 months, and the release mechanisms are set to release the transmitters after about 25 months. The total package, including transmitter, harness, batteries and release mechanism weighed 70 g, which is 0.7–1.5 % of the birds' body weight. The duty cycle for all eight transmitters is six hours on, 20.5 hours off.

Three of the transmitter birds abandoned their nests in March 2000, but the remainder stayed until the end of the chick guard stage in early May, when four more nests failed. In May, three transmitters stopped functioning, presumably because of water leakage into the batteries, or transmitter malfunction.

A high rate of desertion was also observed in Gibson's wandering albatross carrying transmitters in 1999. This contrasts with the very low desertion rates of Antipodean wandering albatross being tracked in both years over the same period and wearing the same design of transmitter and harness (Hamilton et al. 2002, Walker et al. 2002b). It seems that breeding season foraging is more energy-expensive for Gibson's wandering albatross than for Antipodean birds. Preliminary analysis of the foraging location data indicate that Gibson's wandering albatross must travel further on most flights to reach favoured foraging areas than do Antipodean wandering albatross. In all years, the breeding success of birds not carrying satellite transmitters is 10% lower on the Auckland Is than on Antipodes I., which tends to favour this theory.

Both male and female non-breeding Gibson's wandering albatross between March and June 2000 foraged in the Tasman Sea (about 60–70% of the time spent on flights) and also off the east coast of New Zealand, particularly around

TABLE 8. DETAILS OF THE EIGHT ADAMS ISLAND BIRDS THAT HAD SATELLITE TRANSMITTERS ATTACHED IN FEBRUARY 2000.

| METAL BAND | DARVIC BAND | BIRD NAME | SEX | NEST NO. | PTT ID |
|---|---|---|---|---|---|
| R42980 | Red-385 | Apollo | M | 484 | 9900 |
| R46408 | Red-170 | Blizzard | M | 515 | 9892 |
| R46470 | Red-045 | Maui | M | 474 | 6113 |
| R42796 | Red-233 | Anzac | M | 614 | 10086 |
| R47010 | Red-330 | Pimelia | F | 5118 | 9954 |
| R47054 | Red-215 | Dayna | F | 5115 | 9958 |
| R42917 | Red-274 | Tori | F | 543 | 6115 |
| R46499 | Red-354 | Flora | F | 5176 | 17393 |

the Chatham Rise. In contrast to earlier years, several females repeatedly flew between these two areas via North Cape, and spent some time foraging just north of North Cape, as did one male.

## 4.1 PRODUCTIVITY OF BIRDS WITH TRANSMITTERS ATTACHED IN 1999

Most of the ten birds with transmitters attached in the 1999 season (Walker & Elliott 2002b) were successfully tracked until the end of the chick guard stage in early May, after which six of the transmitters prematurely fell off. Three of those that remained attached were recovered in May 1999 (Table 9), and a design fault in the harnesses was found to be responsible for the premature failure of the harnesses (Walker & Elliott 2002b).

Of the ten pairs of Gibson's wandering albatross where one of the pair had a transmitter attached in February 1999, four successfully raised a chick, although one of these was small and weak at the end of the season (Table 9). Of the five transmitter birds that had an early nest failure, two (Manu and Penny) were

TABLE 9. DETAILS OF THE TEN ADAMS ISLAND BIRDS THAT HAD SATELLITE TRANSMITTERS ATTACHED IN FEBRUARY 1999.

| BIRD NAME | SEX | NEST NO. | PTT ID | BAND NO. | FATE OF PTT AND HARNESS | NESTING OUTCOME JAN–FEB 2000 | PAIR SEEN IN JAN–FEB 2000? |
|---|---|---|---|---|---|---|---|
| Draco | M | 777 | 9892 | R42656 | Fell off | Late fail | Neither |
| Manu | M | 142 | 9923 | R42775 | Unknown | Early fail | Manu and partner |
| Zeuss | M | 122 | 9958 | R42668 | Removed | Healthy fledgling | Neither |
| Tussock | M | 85 | 9981 | R42618 | Unknown | Early fail | Partner only |
| Jupiter | M | 53 | 9985 | R42684 | Unknown | Early fail | Neither |
| Mrs Pete | F | 779 | 9900 | R42657 | Removed | Healthy fledgling | Neither |
| Oreobolus | F | 759 | 9902 | R42642 | Unknown | Small fledgling | Neither |
| Sarah | F | 696 | 9954 | R42690 | Removed | Healthy fledgling | Partner only |
| Penny | F | 712 | 9974 | R42711 | Unknown | Early fail | Penny and partner |
| Fram | F | 685 | 9998 | R42605 | Unknown | Early fail | Partner only |

back in the study area with their partners in January 2000. However, neither of these birds nested and they were not caught to check whether they were still carrying their transmitters. Four more birds were not seen after the previous season and, therefore, it is not known whether or not they are still carrying their transmitter. There had been no signals from any of these transmitters since June 1999.

# 5. Acknowledgements

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# Appendix 1

## BIRDS AT STUDY AREA NESTS, ADAMS I., FEB 2000

| NEST | MALE | | FEMALE | | COMMENTS |
|---|---|---|---|---|---|
| | METAL 'R' BAND | DARVIC | METAL 'R' BAND | DARVIC | |
| 451 | 42601 | Red-004 | 42779 | Red-002 | |
| 452 | 43042 | Red-483 | 46459 | Red-022 | |
| 455 | 42608 | Red-025 | 42783 | Red-282 | Failed 7 Jan 00, egg accidentally broken |
| 456 | 42715 | Red-026 | 42873 | Red-283 | |
| 457 | 42894 | Red-602 | 42874 | Red-521 | |
| 460 | 46521 | Red-684 | 46458 | Red-557 | |
| 464 | 46468 | Red-029 | 42890 | Red-285 | |
| 469 | 46677 | Red-654 | 50007 | Red-591 | |
| 470 | 46679 | Red-874 | 46785 | Red-884 | |
| 471 | 49563 | Red-042 | 47553 | Red-291 | |
| 472 | 46517 | Red-043 | 46447 | Red-292 | |
| 473 | 43050 | Red-044 | 47037 | Red-486 | |
| 474 | 46470 | Red-045 | 42880 | Red-293 | Male transmitter bird 'Maui' |
| 475 | 49651 | Red-296 | 48090 | Red-049 | |
| 477 | 42622 | Red-076 | 42721 | Red-294 | |
| 479 | 42632 | Red-755 | 42727 | Red-564 | |
| 480 | 46467 | Red-077 | 43086 | Red-489 | |
| 481 | 46752 | Red-071 | 46672 | Red-299 | |
| 482 | 50008 | Red-074 | 42896 | Red-382 | |
| 483 | 42634 | Red-078 | 42728 | Red-384 | |
| 484 | 42980 | Red-385 | 49575 | Red-079 | Male transmitter bird 'Apollo' |
| 485 | 50023 | Red-871 | 50038 | Red-903 | Failed 9 Jan 00 when egg taken by skua |
| 486 | 42636 | Red-087 | 42637 | Red-388 | |
| 488 | 47306 | Red-084 | 49592 | Red-490 | |
| 489 | 50030 | Red-876 | 50009 | Red-852 | |
| 490 | 47568 | Red-763 | 47594 | Red-609 | |
| 491 | 42641 | Red-105 | 43060 | Red-493 | |
| 495 | 46504 | Red-393 | 43087 | Red-112 | |
| 496 | 49594 | Red-836 | 48078 | Red-892 | |
| 498 | 43089 | Red-399 | 46466 | Red-127 | |
| 500 | 46523 | Red-304 | 43059 | Red-102 | |
| 502 | 43014 | Red-492 | 43093 | Red-093 | |
| 504 | 46472 | Red-429 | 43055 | Red-210 | |
| 506 | 42725 | Red-065 | 49583 | Red-379 | |
| 507 | 42627 | Red-378 | 42628 | Red-064 | |
| 511 | 50024 | Red-872 | 50010 | Red-867 | |
| 515 | 46408 | Red-170 | 42908 | Red-325 | Male transmitter bird 'Blizzard' |
| 516 | 42960 | Red-162 | 46508 | Red-163 | |
| 517 | 42862 | Red-855 | 47593 | Red-920 | |
| 520 | 43053 | Red-425 | 43054 | Red-203 | |
| 523 | 42951 | Red-128 | 46456 | Red-496 | |

| NEST | MALE | | FEMALE | | COMMENTS |
|---|---|---|---|---|---|
| | METAL 'R' BAND | DARVIC | METAL 'R' BAND | DARVIC | |
| 524 | 46526 | Red-133 | 42956 | Red-312 | Failed 11 Feb 00 |
| 525 | 47597 | Red-854 | 47507 | Red-729 | |
| 526 | 46568 | Red-164 | 42970 | Red-323 | |
| 528 | 46825 | Red-567 | 43095 | Red-709 | |
| 529 | 46414 | Red-427 | | | |
| 532 | 43018 | Red-138 | 46754 | Red-315 | Failed 6 Feb 00 |
| 534 | 42664 | Red-327 | 42750 | Red-174 | |
| 535 | 46805 | Red-326 | 46760 | Red-172 | |
| 538 | 50043 | Red-887 | 50029 | Red-882 | |
| 540 | 50027 | Red-922 | 50021 | Red-862 | |
| 541 | 43073 | Red-832 | 42613 | Red-875 | |
| 543 | 46479 | Red-359 | 42917 | Red-274 | Female transmitter bird 'Tori' |
| 547 | 42710 | Red-541 | 42777 | Red-708 | |
| 549 | 42920 | Red-449 | 47584 | Red-241 | |
| 550 | 47535 | Red-240 | 47025 | Red-451 | |
| 551 | 42774 | Red-238 | 42706 | Red-447 | |
| 554 | 46428 | Red-454 | 42919 | Red-245 | |
| 555 | 50028 | Red-907 | 50044 | Red-893 | |
| 556 | 50036 | Red-835 | 50035 | Red-834 | |
| 566 | 42680 | Red-201 | 46828 | Red-336 | |
| 570 | 42876 | Red-052 | 46460 | Red-374 | |
| 572 | 42626 | Red-054 | 42675 | Red-853 | |
| 575 | 47559 | Red-878 | 47580 | Red-870 | |
| 576 | 47041 | Red-491 | 49574 | Red-092 | |
| 577 | | | | | Failed before any bands read. |
| 580 | 47504 | Red-125 | 49597 | Red-494 | |
| 581 | 42650 | Red-139 | 42737 | Red-316 | |
| 585 | | | 50025 | Red-904 | Failed 14 Jan 00, egg accidentally cracked, unbanded male beside nest |
| 586 | 48094 | Red-202 | 47013 | Red-424 | |
| 587 | 46663 | Red-187 | 46830 | Red-193 | |
| 588 | 42868 | Red-197 | 47513 | Red-334 | |
| 594 | 42912 | Red-459 | 46497 | Red-253 | |
| 595 | 46516 | Red-236 | 46426 | Red-446 | |
| 608 | 47569 | Red-482 | 43041 | Red-020 | |
| 609 | 42972 | Red-481 | 42895 | Red-023 | |
| 610 | 42881 | Red-184 | 42999 | Red-421 | |
| 614 | 42796 | Red-233 | 42699 | Red-445 | Male transmitter bird 'Anzac' |
| 618 | 42673 | Red-419 | 42789 | Red-182 | Outside study area |
| 619 | 46406 | Red-518 | 46511 | Red-154 | Failed 16 Feb 00 |
| 622 | 42629 | Red-743 | 48077 | Red-693 | |
| 623 | 42958 | Red-129 | 49600 | Red-916 | |
| 626 | 49687 | Red-505 | 49659 | Red-395 | |
| 628 | 46765 | Red-276 | 46673 | Red-477 | |
| 629 | 42888 | Red-280 | 46436 | Red-017 | |
| 631 | 42871 | Red-499 | 49684 | Red-511 | Outside study area |
| 632 | 49682 | Red-498 | 49683 | Red-506 | Outside study area |
| 633 | 50042 | Red-885 | 50022 | Red-863 | |
| 634 | 46763 | Red-342 | 46608 | Red-219 | |
| 636 | 42619 | Red-647 | 42903 | Red-632 | |
| 637 | 42998 | Red-848 | 47528 | Red-731 | Outside study area |

| NEST | MALE | | FEMALE | | COMMENTS |
|---|---|---|---|---|---|
| | METAL 'R' BAND | DARVIC | METAL 'R' BAND | DARVIC | |
| 640 | | | 50041 | Red-879 | Failed 2 Feb 00, male not recorded on egg |
| 641 | 46443 | Red-865 | 46519 | Red-578 | |
| 643 | 49699 | Red-734 | 49853 | Red-624 | |
| 644 | 42780 | Red-710 | 42602 | Red-641 | Outside study area |
| 655 | 47523 | Red-324 | 46826 | Red-165 | |
| 660 | 42701 | Red-706 | 42770 | Red-675 | |
| 5100 | 47532 | Red-442 | 48097 | Red-231 | |
| 5101 | 47536 | Red-230 | 49670 | Red-441 | |
| 5102 | 47514 | Red-223 | 47539 | Red-343 | |
| 5105 | 50033 | Red-824 | 47055 | Red-912 | |
| 5107 | 48098 | Red-856 | 49656 | Red-351 | |
| 5115 | 47016 | Red-432 | 47054 | Red-215 | Female transmitter bird 'Dayna' |
| 5118 | 42666 | Red-181 | 47010 | Red-330 | Female transmitter bird 'Pimelia' |
| 5119 | 47050 | Red-176 | 47004 | Red-417 | |
| 5124 | 50034 | Red-827 | 50039 | Red-857 | |
| 5129 | 46664 | Red-864 | 42678 | Red-829 | |
| 5132 | 49654 | Red-322 | 48092 | Red-155 | |
| 5135 | 42659 | Red-828 | 42746 | Red-150 | |
| 5137 | 48070 | Red-873 | 48084 | Red-830 | |
| 5148 | 47001 | Red-141 | 46756 | Red-318 | |
| 5153 | 50026 | Red-905 | 49647 | Red-543 | |
| 5155 | 46429 | Red-576 | 46498 | Red-673 | |
| 5156 | 47064 | Red-255 | 42793 | Red-461 | |
| 5158 | 49567 | Red-277 | 46661 | Red-478 | |
| 5165 | 46772 | Red-906 | 46689 | Red-545 | |
| 5169 | 42989 | Red-452 | 43064 | Red-243 | |
| 5172 | 50031 | Red-833 | 50011 | Red-858 | |
| 5173 | 42773 | Red-237 | 42705 | Red-349 | |
| 5175 | 49679 | Red-476 | 47033 | Red-275 | |
| 5176 | 46433 | Red-257 | 46499 | Red-354 | Female transmitter bird 'Flora' |
| 5177 | 42915 | Red-259 | 46432 | Red-464 | |
| 5184 | 46631 | Red-473 | 47030 | Red-270 | |
| 5186 | 49247 | Red-265 | 49676 | Red-469 | |
| 5187 | 47581 | Red-472 | 47545 | Red-268 | Unsure of bird's sex |
| 5190 | 50032 | Red-825 | 50040 | Red-859 | |
| 5194 | 47520 | Red-450 | 47544 | Red-514 | Just outside study area |
| 5196 | 47027 | Red-267 | 47062 | Red-883 | |
| 5199 | 46582 | Red-262 | 46774 | Red-467 | |
| 6191 | | | 42965 | Red-888 | Unsure of sex, partner not recorded, possibly outside study area |

# Appendix 2

## ADULT GIBSON'S WANDERING ALBATROSS BANDED ON ADAMS I., JAN–FEB 2000

| DATE | DARVIC BAND | METAL BAND | STATUS | COMMENTS | BILL DEPTH |
|---|---|---|---|---|---|
| 7 Jan 00 | Red-591 | R50007 | Nesting | Had darvic but no metal band. Was R46784. | |
| 12 Jan 00 | Red-074 | R50008 | Nesting | Was R43005 - bad band removed | |
| 7 Jan 00 | Red-852 | R50009 | Nesting | | |
| 8 Jan 00 | Red-867 | R50010 | Nesting | | |
| 10 Jan 00 | Red-858 | R50011 | Nesting | | 38.94 |
| 13 Jan 00 | Red-862 | R50021 | Nesting | | 38.72 |
| 13 Jan 00 | Red-863 | R50022 | Nesting | | 39.4 |
| 14 Jan 00 | Red-871 | R50023 | Nesting | | 40.8 |
| 14 Jan 00 | Red-872 | R50024 | Nesting | | 40.56 |
| 14 Jan 00 | Red-904 | R50025 | Nesting | | 37.03 |
| 15 Jan 00 | Red-905 | R50026 | Nesting | | 41.44 |
| 18 Jan 00 | Red-922 | R50027 | Nesting | | 42.46 |
| 21 Jan 00 | Red-907 | R50028 | Nesting | | 40.52 |
| 23 Jan 00 | Red-882 | R50029 | Nesting | | 37.1 |
| 13 Jan 00 | Red-876 | R50030 | Nesting | | 43.42 |
| 17 Jan 00 | Red-833 | R50031 | Nesting | | 42 |
| 7 Jan 00 | Red-825 | R50032 | Nesting | | 44.2 |
| 7 Jan 00 | Red-824 | R50033 | Nesting | | 40.7 |
| 7 Jan 00 | Red-827 | R50034 | Nesting | | 39.5 |
| 8 Jan 00 | Red-834 | R50035 | Nesting | | |
| 8 Jan 00 | Red-835 | R50036 | Nesting | | 40.8 |
| 9 Jan 00 | Red-902 | R50037 | On ground | Should not be banded; field error | 39.2 |
| 9 Jan 00 | Red-903 | R50038 | Nesting | | |
| 12 Jan 00 | Red-857 | R50039 | Nesting | | 38.12 |
| 12 Jan 00 | Red-859 | R50040 | Nesting | | 37.96 |
| 24 Jan 00 | Red-879 | R50041 | Nesting | | 38.08 |
| 31 Jan 00 | Red-885 | R50042 | Nesting | | 42.42 |
| 4 Feb 00 | Red-887 | R50043 | Nesting | | 42 |
| 8 Feb 00 | Red-893 | R50044 | Nesting | | 38.72 |

# Appendix 3

## BIRD BAND RECOVERIES FROM NON-STUDY AREA, AND GIBSON CODES, ADAMS I., JAN–FEB 2000

| METAL BAND | DATE | GRID REF. | STATUS | HEAD | BACK | WING | TAIL | COMMENTS |
|---|---|---|---|---|---|---|---|---|
| 140-37448 | 8 Feb 00 | 864 746 | Nesting | 3 | 4 | 2 | 2 | |
| 140-39812 | 31 Jan 00 | 936 737 | Nesting | 4 | 4 | 4 | 3 | |
| 140-39886 | 10 Feb 00 | 869 738 | Nesting | 4 | 3 | 2 | 2 | |
| 140-41378 | 8 Feb 00 | 865 746 | Nesting | 2 | 2 | 2 | 2 | |
| 140-50141 | 31 Jan 00 | 937 736 | BOG | 4 | 4 | 4 | 3 | |
| R29140 | 2 Feb 00 | 878 768 | BOG | 6 | 5 | 4 | 3 | |
| R29149 | 8 Feb 00 | 864 747 | Nesting | 5 | 4 | 4 | 3 | |
| R29186 | 8 Feb 00 | 862 747 | Nesting | 2 | 4 | 2 | 2 | |
| R43358 | 12 Feb 00 | 857 743 | Nesting | 3 | 4 | 3 | 2 | |
| R43361 | 10 Feb 00 | 861 752 | Nesting | 4 | 4 | 3 | 2 | |
| R46967 | 8 Feb 00 | 869 748 | BOG | 2 | 2 | 1 | 1 | Darvic Orange-311 Banded as chick on 20 Dec 96 |
| R49596 | 5 Feb 00 | 871 743 | BOG | 2 | 3 | 2 | 2 | Darvic Red-764 |