Monitoring Gibson's wandering albatross, 1998/99

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A B S T R A C T

This paper reports on progress made between 1 July 1998 and 30 June 1999 on measuring survival, productivity and recruitment of Gibson's wandering albatross (*Diomedea gibsoni*). Productivity for the 1998 breeding season was 64%. To assess recruitment, 557 chicks have now been banded including 144 in 1998/99. Annual adult survival of 96.7% for the six years between 1991 and 1997 was estimated from the return of banded birds to the study area. Parts of the island, which includes about 12% of all albatross nesting on the island, were re-surveyed to monitor population trends.

Keywords: Gibson's wandering albatross, *Diomedea gibsoni*, breeding success, recruitment, adult survival, nest census, 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). 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.

Several concurrent programmes are attempting to examine and resolve the fisheries bycatch issue: a variety of underwater bait-setting and other mitigation devices to reduce or prevent bycatch 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 report describes progress during the 1998/99 year on monitoring the main Gibson's wandering albatross population on Adams I. This work focuses on estimating survival, productivity and recruitment rates so that the population can be modelled and sustainable bycatch levels estimated. Trends in population size are also monitored.

It is one of a series of annual progress reports on this research (Walker & Elliott 2002; 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 is to be published when sufficient data have been collected (Walker & Elliott 1999; Walker et al. 1995b).

Although wandering 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 a small subantarctic island to breed. Every summer, nearly half of the Gibson's wandering albatross population gathers on Adams Island in the subantarctic Auckland Islands group to breed, and adolescents also gather there for pre-breeding displays. 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 trips to Adams I. Gus McAllister, Rob Mason and Wally Hockly made the first visit, between 1 and 19 December 1998 aboard the frigate HMNZS *Te Kaha* and returned on the tourist ship *Akademik Shokalskiy*. They assessed 1998 productivity in both the main study area and in the Fly Basin square study area, and all the chicks produced in 1998 in the main study area were banded to allow assessment of recruitment. During this visit a Portacom® hut was erected on Adams I. to improve the productivity, safety, and comfort of albatross monitoring teams, and to reduce the environmental impacts of camping on the island.

The second visit was made between 3 January and 6 February 1999 to assess adult survival, to monitor population trends, and to attach 10 satellite

transmitters to breeding birds. The team comprised Kath Walker and Graeme Elliott, and the tourist ship *Akademik Shokalskiy* provided transport.

The third visit was made between 28 April and 5 May 1999 by Alan Wiltshire aboard the *Breaksea Girl*. The aim of this visit was to assess the condition of satellite transmitters attached in February, and of the birds carrying them, and, if there were any obvious problems, to remove the transmitters.

2. Population dynamics

Since 1991 a population study aimed at measuring productivity, survival and recruitment has been conducted on Adams I., where about 95% of Gibson's wandering albatross breed. The main study area comprises 60 ha on the southern slopes of Adams I., just west of Amherst Stream (Fig.1). Much of the study area is bounded by obvious topographic features, but white plastic electric fence poles demarcate the less well-defined parts of the northern, western and southern boundaries.

The second study area is a 25 ha square in the middle of a dense colony of wandering albatrosses just west of Fly Harbour (here called 'Fly Basin Square')(Fig. 1); it is demarcated entirely by white electric fence poles as there are no obvious topographic boundaries.

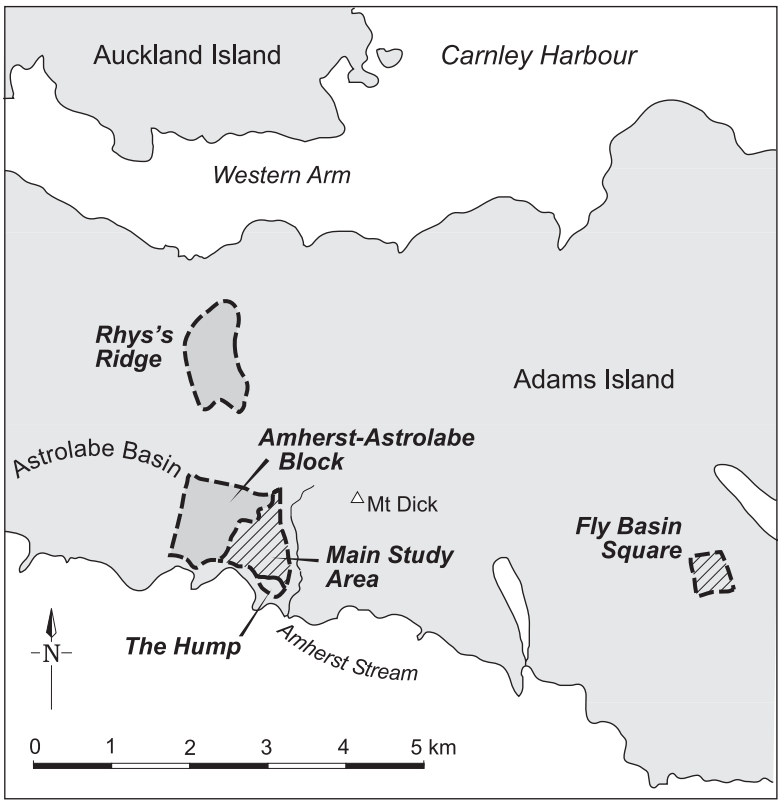

Figure 1. Census blocks and study area location on Adams Island

2.1 METHODS

On 11 and 12 December 1998, all the study area nests that had eggs in February 1998 were re-visited and chicks were banded with a numbered metal band on the right leg and a numbered black darvic band on the left leg.

On 16 December 1998 all the 1998 season's nests in the Fly Basin Square were checked for chicks so that the productivity of these nests could be assessed. The chicks at these nests were left unbanded.

On 21 and 22 January 1999 we searched for all of the previous season's nests in the main study area, confirmed their identity from their metal tags, and assessed their final outcome using the standard criteria (see Walker et al. 2002):

At the end of the summer field trip, once all the previous season's nests had been found and assessed, the metal nest tags were removed.

Between 5 January and 14 February 1999, 15 visits were made to the study area. 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, while any study area birds already metal-banded had red darvic bands put on them. Nests were marked with numbered metal tags and their positions were mapped using compass and tape measure.

On 24 January 1999 the number of nests with eggs in Fly Basin Square was counted by strip searching the area and painting the ground beside each nest after it had been counted. In November 1999 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 Breeding success, 1998 season

From 223 nests in the study area in 1998, 147 chicks were banded in December 1998, of which 143 (64%) fledged. Table 1 presents breeding success figures for this and the previous six years.

TABLE 1. BREEDING SUCCESS OF GIBSON'S WANDERING ALBATROSS NESTING IN THE STUDY AREA ON ADAMS ISLAND SINCE 1991.

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
Average		67%

From 248 nests counted in Fly Basin Square on 16 February 1998, 175 (70.6%) had just fledged or still had healthy chicks on 16 December 1998. By 14 February 1998 in the study area nine nests had already failed, and from the remaining 214 nests, 147 (68.7%) had just fledged or had a healthy chick on 12 December1998.

The small difference in breeding success between Fly Basin Square and the study area was not significant ($\chi^2 = 0.191$, df 1, $P_r = 0.662$). With the sample size used, the difference between the productivities of the two areas would have to be greater than 11% to be regarded as significant, while changes in productivity much less than this could have important impacts on populations. We propose to compare the productivities of the two areas for several more years so as to effectively increase the sample size.

2.2.2 Breeding success, 1999 season

By 26 January 1999, 215 new nests were tagged and mapped (Fig. 2) in the study area and their nesting success will be assessed in the 1999/2000 summer. While 206 of these nests were inside the study area boundary, nine were built just outside the study area by birds that had nested inside it in earlier seasons. Nine (4.2%) of these 215 nests had failed before the last visit to the study area on 4 February 1999 (Appendix 1).

On 24 January 1999, 237 nests were counted in the Fly Basin square, and the outcome of these nests will be assessed in December 1999.

2.2.3 Adult mortality

In 1999, 215 pairs of birds nested within the study area. Of these, 38 were new birds that were banded for the first time, and ten were not checked for bands either because the nest failed before the bands of both partners had been read, or because the nest was found too late in the trip to read the bands of both partners. In addition the bands of 111 non-breeding birds that were present in the study area were read.

Adult survival was estimated using the methods of Cormack (1964, 1972). Due to the biennial breeding behaviour of wandering albatrosses, this method reliably estimates annual survival only for periods more than two years before the last visit to the island (Table 2).

TABLE 2. 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)	0.97 (0.02)
1996/97	0.95 (0.02)	0.96 (0.03)	0.96 (0.03)
Average	0.97 (0.02)	0.98 (0.01)	0.96 (0.02)

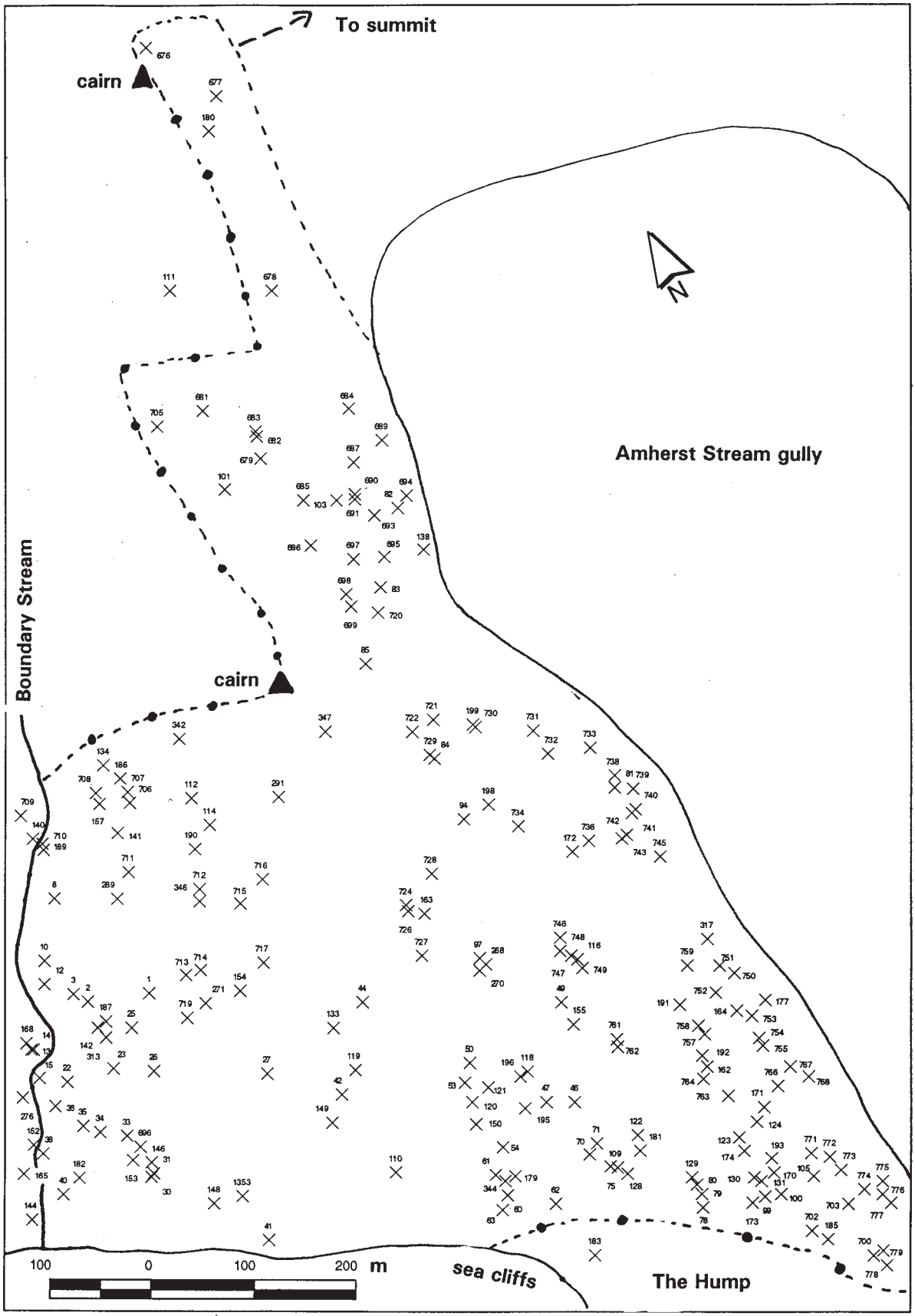

Figure 2. Gibson's wandering albatross nests in the main study area on Adams Island, 1999.

2.2.4 Recruitment

In December 1994, 26 of the chicks in the study area were banded, and since then all chicks produced in the study area have been banded before fledging (Table 3).

The average age of first return is likely to be about 6 years, and the average age of recruitment to the breeding population about 11 years. As a result reliable estimates of recruitment cannot be made until after 2007.

TABLE 3. 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	
Total	557	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 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 on Adams I. These show that each year an average of 5831 pairs bred on the island. Over the next few years counts will be of only representative portions of the island to monitor population change.

3.1 METHODS

Three representative areas were counted in 1999: Rhys's Ridge on the northern side of the island (Fig.1), which is 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-high density); and the Fly Basin Square (high density). There was insufficient time to census Magnetic Ridge, another low-density nesting area, which was counted in 1998.

Rhys's Ridge census block is well defined, comprising a sparse, discrete albatross colony. There are no albatross on the very steep north-eastern slopes

of the adjacent ridge, on bare areas above 500 m a.s.l, nor in tall tussock and *Dracophyllum* and *Coprosma* scrub below 200 m.

The other two census blocks are part of much larger albatross colonies. The Fly Basin Square is demarcated with white poles within the dense albatross colony to the west of Fly Harbour. The Amherst–Astrolabe Block is defined on the east by Amherst Stream, on the south by the sea cliffs, on the north by fellfield unsuitable for nesting, and on the west by a line of white electric fence poles placed at c. 50 m intervals along the approximate boundary between the Astrolabe and Boundary Stream catchments.

Each block was counted by two 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. Most birds on nests were checked for bands, and all nests were checked for eggs. Most birds on the ground without nests were also checked for bands. The location of all banded birds was recorded, along with a Gibson Plumage Score (Gibson 1967).

In the study area–Astrolabe and Fly Basin census blocks, the reliability of the census was checked by walking straight transects along compass bearings at right angles to the census sweep lines, checking all nests within 5 m of the transect for paint marks which indicated that the nest had been counted during the census.

3.2 RESULTS

A total of 743 nests were counted in the three representative areas (Table 4). The total count was 5% lower than last year, with counts being lower in every block.

TABLE 4. GIBSON'S WANDERING ALBATROSS NEST CENSUS RESULTS, ADAMS ISLAND, 1999. (1998 TOTALS IN BRACKETS.)

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
Amherst–Astrolabe											
Study area (SA)		-	-	-	-	-	-	-	-	-	206
The Hump	31 Jan 99	1:36	3	26	4	1	0	31	1	4	27
SA–Astrolabe	28,29 Jan 99	14:08	17	200	51	13	4	268	17	55	213
Rhys's Ridge	2 Feb 99	11:16	1	60	17	0	1	78	1	18	60
Fly Basin Square	24 Jan 99	10:00	39	235	59	2	0	296	2	59	237
Totals		37:00 (45:14)	60 (19)	521 (562)	76 (241)	16 (4)	5 (4)	673 (811)	21 (8)	136 (245)	743 (781)

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

In the transect checks of the two main census blocks, 54 nests were counted again, and no unpainted nests were found, indicating that the original counts were very accurate and recorded all the nests that were present. The transect checks included 12% of the nests in both blocks.

4. Monitoring at-sea distribution

Between 25 and 28 January 1999 we put Microwave Telemetry 'Pico' satellite transmitters on five male and five female wandering albatrosses incubating eggs in the study area. We selected birds that had successfully raised a chick at every breeding attempt they had made since 1991. We knew the laying date of the eggs of nine of the ten birds.

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 drop the transmitters after 750 days (25 months). The transmitter, batteries, harness and release mechanism weighed 90 g (1.3–1.5% of body weight). To extend battery life and thereby the tracking period, transmitters had a duty cycle of 6 hours on and 20.5 hours off. Table 5 shows the details of birds and their transmitters.

These birds were tracked until the end of the chick guard stage in early May, after which 6 of the transmitters prematurely fell off the birds and three of those that remained attached were recovered. An abrasion problem in the harness design was found to be responsible for the premature transmitter losses.

The nests of six of the radio-tagged birds failed before late April, and these birds subsequently foraged mostly in the north Tasman Sea. The duration, and to a lesser extent distance, of foraging trips of the four birds that continued to breed were reduced for the 3–4 weeks that the chicks were guarded after hatching. Once the chicks were able to be left unguarded, the adult flights lengthened and they returned only briefly to the island once every 4–14 days to feed the chicks.

TABLE 5. DETAILS OF THE 10 GIBSON'S WANDERING ALBATROSSES TO WHICH SATELLITE TRANSMITTERS WERE ATTACHED IN JANUARY 1999.

BAND NO.	BIRD NAME	SEX	NEST NO.	TRANSMITTER ID
R42656	Draco	Male	777	9892
R42657	Mrs Pete	Female	779	9900
R42642	Oreobolus	Female	759	9902
R42775	Manu	Male	142	9923
R42690	Sarah	Female	696	9954
R42668	Zeuss	Male	122	9958
R42711	Penny	Female	712	9974
R42618	Tussock	Male	85	9981
R42684	Jupiter	Male	53	9985
R42605	Fram	Female	685	9998

The foraging destinations of breeding birds were similar to those previously recorded, with males feeding off Tasmania, the east coast of New Zealand and off Pusyger Point, and females flying past Pusyger Point and foraging almost entirely in the mid and north Tasman Sea. For the first time, a female was recorded foraging up the east coast of New Zealand, but she eventually rounded North Cape and also ended up foraging in the north Tasman.

Foraging destinations varied between birds, but each bird appeared to have favoured foraging areas. Even when foraging trips were shortened during the guard stage, birds tended to fly to their usual locations.

The transmitter of one bird whose nesting attempt failed (Manu) stayed on till late June. He spent almost 5 months in a small area in the north-east Tasman Sea, close to the area where large aggregations of wandering albatrosses were seen around fishing boats in May and June in 1994 and 1995 (C. Petyt, pers. comm.). This is the first satellite tracking of a post-breeding Gibson's wandering albatross.

5. Acknowledgements

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Appendix 1

BIRDS AT STUDY AREA NESTS, ADAMS I., FEB 1999

NEST	MALE		FEMALE		COMMENTS
	METAL	DARVIC	METAL	DARVIC	
1	R46660	Red-579	R46796	Red-546	
2	R42990	Red-748	R47541	Red-803	
3	R42920	Red-449	R47584	Red-241	
8	R47518	Red-547	R46742	Red-777	
10	R47535	Red-240	R47025	Red-451	
12	R43071	Red-738	R46798	Red-672	
13	R42703	Red-599	R42891	Red-580	
14	R47022	Red-805	R47059	Red-581	
15	R46655	Red-582	R46797	Red-788	
22	R42774	Red-238	R42706	Red-447	
23	R46654	Red-235	R49873	Red-713	
25	R42870	Red-471	R42988	Red-222	
26	R42700	Red-548	R42769	Red-549	
27	R46437	Red-630	R46495	Red-550	
30	R46513	Red-737	R46420	Red-583	
31	R42689	Red-584	R42794	Red-736	
33	R46776	Red-791	R46651	Red-715	
34	R42694	Red-786	R42765	Red-551	
35	R47057	Red-519	R47019	Red-504	
36	R47532	Red-442	R48097	Red-231	
38	R42696	Red-229	R42767	Red-345	
40	R46799	Red-439			
41	R47537	Red-552	R46609	Red-850	
42	R46412	Red-553	R43052	Red-510	
44	R42619	Red-647	R42903	Red-632	
46	R42904	Red-206	R46475	Red-337	
47	R47524	Red-648	R47525	Red-747	
49	R46524	Red-340	R47046	Red-208	
50	R46829	Red-214	R46810	Red-431	
53	R42684	Red-783	R42760	Red-704	
54	R46809	Red-194	R43000	Red-423	
60	R46808	Red-716	R46827	Red-749	
61	R42685	Red-185	R47015	Red-422	
62	R47011	Red-503	R49698	Red-733	
63	R49699	Red-734	R49853	Red-624	Probably abandoned
70	R42670	Red-556	R42788	Red-717	
71	R46476	Red-586	R46512	Red-571	
75	R42753	Red-768	R42669	Red-555	
78	R49871	Red-745	R49852	Red-575	
79	R42752	Red-329	R42667	Red-178	
80	R42859	Red-177	R47005	Red-328	
81	R46801	Red-813	R46789	Red-695	
82	R49874	Red-725	R49649	Red-562	
83	R42717	Red-480	R42616	Red-479	

NEST	MALE		FEMALE		COMMENTS
	METAL	DARVIC	METAL	DARVIC	
84	R49566	Red-501	R49884	Red-849	
85	R42618	Red-742	R42718	Red-639	
94	R42877	Red-638	R46449	Red-563	
97	R42763	Red-070			Failed when male deserted. Egg transferred to 740
99	R42962	Red-703	R42865	Red-644	
100	R42748	Red-702	R42662	Red-573	
101	R49560	Red-796	R47036	Red-779	
103	R43081	Red-726	R46502	Red-653	
105	R47002	Red-144	R46821	Red-619	
109	R47526	Red-665	R47512	Red-623	
110	R47538	Red-625	R42869	Red-785	
111	R42780	Red-710	R42602	Red-641	
112	R49855	Red-627	R49576	Red-774	
114	R47024	Red-463	R47061	Red-258	
116	R47565	Red-000	R49589	Red-794	
118	R42792	Red-211	R42683	Red-212	
119	R46762	Red-792	R46604	Red-646	
120	R42868	Red-197	R47513	Red-334	
121	R49876	Red-769	R49858	Red-596	
122	R42668	Red-782	R42996	Red-645	
123	R47511	Red-744	R47522	Red-643	
124	R42856	Red-642	R47598	Red-156	
128	R42900	Red-418	R47527	Red-179	
129	R46807	Red-838	R46759	Red-807	
130	R42749	Red-572	R42663	Red-808	
131	R49654	Red-322	R48092	Red-155	
133	R46761	Red-770	R46605	Red-631	
134	R49692	Red-683	R49854	Red-577	
138	R43044	Red-721	R46678	Red-685	
140	R47026	Red-453	R47524	Red-648	
141			R46519	Red-578	Egg broken beside abandoned nest
142	R42775	Red-804	R42707	Red-111	
144	R48096	Red-227	R49669	Red-440	
146	R47540	Red-670	R42692	Red-597	
148	R49700	Red-735	R49856	Red-585	
149	R42883	Red-216	R46800	Red-433	
150	R42676	Red-784	R42756	Red-705	
152	R42795	Red-628			
153	R47514	Red-223	R47539	Red-343	
154	R47058	Red-649	R47020	Red-333	
155	R47523	Red-324	R46826	Red-165	
157	R46576	Red-714	R46779	Red-842	
162	R42968	Red-754	R46822	Red-406	
163	R47579	Red-377	R48082	Red-057	
164	R49594	Red-836			
165	R47515	Red-787	R46690	Red-598	
168	R42886	Red-789	R47533	Red-711	
170			R49696	Red-730	Egg broken and abandoned in nest
171			R47507	Red-729	
172	R49885	Red-823	R49694	Red-697	

NEST	MALE		FEMALE		COMMENTS
	METAL	DARVIC	METAL	DARVIC	
173	R29204	Red-175			
174	R47508	Red-700	R48080	Red-820	
177	R49695	Red-728	R49857	Red-595	
179	R49881	Red-840	R49691	Red-667	
180	R49551	Red-822	R47550	Red-741	
181	R47588	Red-781	R48087	Red-746	
182	R49655	Red-347			
183	R42998	Red-848	R47528	Red-731	
185	R46464	Red-321	R46407	Red-153	
186			R47587	Red-846	
187			R47021	Red-707	
189	R49882	Red-845	R49878	Red-778	
190	R46478	Red-773	R46434	Red-379	
191	R42734	Red-682	R42722	Red-513	
192	R46824	Red-753	R42969	Red-444	
193	R46594	Red-821	R46593	Red-701	
195	R47053	Red-426			Abandoned
196	R42681	Red-213	R42790	Red-430	
198	R49875	Red-761	R49859	Red-657	
199	R49570	Red-720	R47557	Red-679	
268	R49582	Red-508	R48083	Red-292	
270	R42629	Red-743	R48077	Red-693	
271	R46428	Red-454	R42919	Red-245	Egg broken, failed between 16 and 18 Jan 1999
276	R42701	Red-706	R42770	Red-675	
289	R46659	Red-776	R46767	Red-843	
291	R47547	Red-797	R47586	Red-751	
313	R49877	Red-775	R49872	Red-712	
317	R47309	Red-107			
342	R47063	Red-517	R42872	Red-740	
344	R49697	Red-732	R49880	Red-839	
346	R47023	Red-790	R47060	Red-772	
347	R48074	Red-817	R47555	Red-750	
676	R42601	Red-004	R42779	Red-002	
677	R42893	Red-724	R43038	Red-360	
678	R42979	Red-007	R43001	Red-362	
679	R42894	Red-602	R42874	Red-521	
681	R43066	Red-759	R46534	Red-014	
682	R49883	Red-847	R42852	Red-397	
683	R42606	Red-652	R42714	Red-590	
684	R46521	Red-684	R46458	Red-557	
685	R42605	Red-758	R42782	Red-603	
686	R46480	Red-522	R46409	Red-818	
687	R42781	Red-723	R42603	Red-678	
689	R47548	Red-034	R49556	Red-287	
690	R47575	Red-722	R48081	Red-687	
691	R42615	Red-757	R42716	Red-689	
693	R47573	Red-756	R47551	Red-559	
694	R47574	Red-558	R43046	Red-523	
695	R46677	Red-654	R46784	Red-591	
696	R42987	Red-674	R42690	Red-629	
697	R48089	Red-040	R49680	Red-485	
698	R49569	Red-051	R46676	Red-290	

NEST	MALE		FEMALE		COMMENTS
	METAL	DARVIC	METAL	DARVIC	
699	R46669	Red-656	R46626	Red-561	
700	R48085	Red-587	R48091	Red-622	
702	R42747	Red-574	R42661	Red-767	
703	R47521	Red-455	R42961	Red-148	
705	R49559	Red-015	R48072	Red-538	
706	R46500	Red-273	R46435	Red-475	
707	R47582	Red-626	R46575	Red-677	
708	R46791	Red-650	R46574	Red-651	
709	R47520	Red-450	R47544	Red-514	Broken egg
710	R47543	Red-539	R47519	Red-802	
711	R46658	Red-676	R46680	Red-540	
712	R42797	Red-841	R42711	Red-771	
713	R42710	Red-541	R42777	Red-708	
714	R46581	Red-844	R46773	Red-542	
715	R46429	Red-576	R49647	Red-543	
716	R42712	Red-516	R49648	Red-544	
717	R47034	Red-353	R47585	Red-252	
719			R46689	Red-545	Egg broken when nest found. Egg shell looks faulty.
720	R47576	Red-655	R47554	Red-640	
721	140-25115	Red-047	R42901	Red-487	
722	R43076	Red-048	R46411	Red-295	
724			R42723	Red-524	Egg broken, no bird present
726	R42625	Red-056	R46492	Red-062	
727	R42879	Red-633	R42902	Red-525	
728	R46491	Red-752	R49693	Red-694	
729	R49651	Red-296	R48090	Red-049	
730	R47558	Red-798	R48076	Red-795	
731	R46448	Red-815	R42976	Red-604	
732	140-34797	Red-760	R49571	Red-719	
733	R47560	Red-592	R43006	Red-605	
734	R42632	Red-755	R42727	Red-564	
736	R46802	Red-565	R46790	Red-588	
738	R42729	Red-814	R43083	Red-589	
739	R49590	Red-301	R49558	Red-526	
740	R47306	Red-084	R49592	Red-490	Egg broken but replaced with egg from nest 97. Candled on 4 Feb 99 and it was OK.
741	R42730	Red-527	R42638	Red-607	
742	R42639	Red-762	R43012	Red-658	
743	R47568	Red-763	R47594	Red-609	
745	R47044	Red-390	R49578	Red-101	
746	R46451	Red-780	R43056	Red-727	
747	R46473	Red-528	R46452	Red-398	
748	R47591	Red-063	R47562	Red-566	
749	R46825	Red-567	R43095	Red-709	
750	R49644	Red-529	R49879	Red-799	
751	R46505	Red-594	R43090	Red-593	
752	R46753	Red-634	R42620	Red-530	
753	R47049	Red-635	R49596	Red-764	
754	R42646	Red-531	R47595	Red-662	
755	R46804	Red-532	R46823	Red-765	
757	R47504	Red-125	R49597	Red-494	

NEST	MALE		FEMALE		COMMENTS
	METAL	DARVIC	METAL	DARVIC	
758	R49595	Red-126	R47048	Red-308	
759	R42732	Red-659	R42642	Red-568	
761	R49650	Red-570	R49851	Red-569	
762	R47051	Red-412	R47007	Red-159	
763	R46507	Red-612	R42959	Red-793	
764	R46509	Red-410	R42957	Red-132	
766	R42858	Red-615	R43020	Red-533	
767	R42955	Red-613	R46465	Red-534	
768	R42954	Red-317	R49645	Red-535	
771	R47509	Red-614	R47600	Red-837	
772	R42971	Red-718	R47510	Red-617	
773	R42739	Red-152	R42652	Red-320	
774	R46758	Red-636	R46569	Red-812	
775	R46510	Red-637	R46404	Red-620	
776	R42742	Red-404	R42655	Red-147	
777	R42656	Red-766	R42743	Red-663	
778	R49860	Red-664	R49646	Red-536	
779	R42744	Red-621	R42657	Red-537	
1353	R46529	Red-217	R46418	Red-341	