
Frontier Madagascar Environmental Research

REPORT 10

Monitoring of the red tailed tropic bird (*Phaethon rubricauda*) population, Nosy Ve



Frontier-Madagascar
2003

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Rix, C.E., Woods-Ballard, A.J., & Fanning, E. (eds)

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The Society for Environmental Exploration
UK

Toliara
2003

Suggested Technical Paper citation:

Frontier-Madagascar (2003) **Monitoring of the red tailed bird (Phaethon rubricauda) population, Nosy Ve.** Frontier-Madagascar Environmental Research Report 10. Society for Environmental Exploration, UK and the Institute of Marine Sciences, University of Toliara, Madagascar.

This report series was created in 2005 and incorporated previous reports published by Frontier-Madagascar. The previous citation for this report was:

Frontier Madagascar (2003) Rix C.E. and Woods-Ballard A.J. & Fanning E. (eds) **Monitoring of the red tailed bird (Phaethon rubricauda) population, Nosy Ve.** Frontier Madagascar Environmental Research Report 10. ISSN1479-120X. Society for Environmental Exploration, UK and L' Institut Halieutique et des Sciences Marines, Toliara.

The Frontier -Madagascar Environmental Research Report Series is published by:

The Society for Environmental Exploration
50-52 Rivington Street,
London, EC2A 3QP
United Kingdom

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Fax: +44 (0)20 7613 2992
E-mail: research@frontier.ac.uk
Web Page: www.frontier.ac.uk

ISSN 1479-120X (Print)
ISSN 1748-3719 (Online)
ISSN 1748-5126 (CD-ROM)

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Frontier-Madagascar

Madagascar, the fourth largest Island on the planet is renowned for its high biological and ecological diversity, characterised by its high abundance of endemic species. Madagascar is one of the poorest nations in the world and very dependent on the resources the natural environment provides. As a result conservation and development work is of paramount importance as efforts are made to preserve an environment under pressure from non-sustainable exploitation. Frontier Madagascar is in the process of carrying out baseline survey work in the southwest coastal region of Madagascar in an effort to provide biological and resource utilisation data for the preparation of sustainable management initiatives for the region.

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The Institute Halieutique et des Sciences Marines (IHSM) is part of the University of Toliara, in Madagascar. IHSM is a university centre of learning in the field of marine sciences and runs courses for both undergraduate and postgraduate students. IHSM also provides consultations to government institutions, NGOs and individuals.

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The Society is a non-profit making company limited by guarantee and was formed in 1989. The Society's objectives are to advance field research into environmental issues and implement practical projects contributing to the conservation of natural resources. Projects organised by The Society are joint initiatives developed in collaboration with national research agencies in co-operating countries.

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The Society for Environmental Exploration and The Institute Halieutique et des Sciences Marines (IHSM), part of the University of Toliara have been conducting collaborative research into environmental issues since 2000 under the title of Frontier Madagascar. Frontier Madagascar conducts research into biological diversity and resource utilisation of both marine and coastal terrestrial environments, of which one component is the Frontier Madagascar/Darwin Initiative: Madagascar Marine Biodiversity Training Program. Since October 2001 the initiative has been working with local stakeholders within the marine environment to promote sustainable resource use through training and education.

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EXECUTIVE SUMMARY

The island of Nosy Ve is located 3km west of the village of Anakao, 30km south of Toliara in Southwest Madagascar. It is a biologically important area in that it contains the only colony of Red-tailed tropicbirds (*Phaethon rubricauda*) in Madagascar.

P. rubricauda is a ground nesting species making them susceptible to predation from small mammals, particularly the black rat. Following evidence of rat infestation on Nosy Ve, Frontier-Madagascar and parties initiated a highly successful eradication programme during the winter of 2000.

Frontier-Madagascar subsequently implemented a monthly census of *P. rubricauda* in August 2002 with the aim of monitoring the population. Nesting sites were marked using a GPS and tagged with a numbered stone. Surveys were carried out by a team of 10 trained observers supervised by an experienced surveyor, noting the presence of chicks, juveniles and adults. Aerial counts were conducted to account for birds off the nest.

Findings from this report point towards a year-round breeding season, however further monitoring of the population is needed. It was noted that birds were spreading to new areas of the island and were nesting under new species of trees and bushes, which may indicate that suitable nesting sites are becoming a limiting factor.

The introduction of standardised survey methods by Frontier-Madagascar ensure that long-term population monitoring of *P. rubricauda* on Nosy Ve can be implemented resulting in further information on the population dynamics of this colony.

ACKNOWLEDGEMENTS

This report is the culmination of the co-operation, hard work and expertise of many people. In particular acknowledgements are due to the following:

L'INSTITUT HALIEUTIQUE ET DES SCIENCES MARINE (IHSM)

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We would like to express our gratitude towards the residents of the village of Anakao, Southwest Madagascar, in particular FI.MI.MA.NO for their co-operation during this study.

INTRODUCTION

Nosy Ve is a small island, located 3km west of the fishing village of Anakao, and 30km south of Toliara in the Southwest of Madagascar, $S23^{\circ}38'57''$, $E043^{\circ}36'15''$ (WGS84 projection) (see Figure 1). It is 1.4km long and 350m across at its widest point with a total area of a little over 100ha. The island's vegetation is typical of the dry Southwest region of Madagascar, and there are no sources of fresh water on the island.

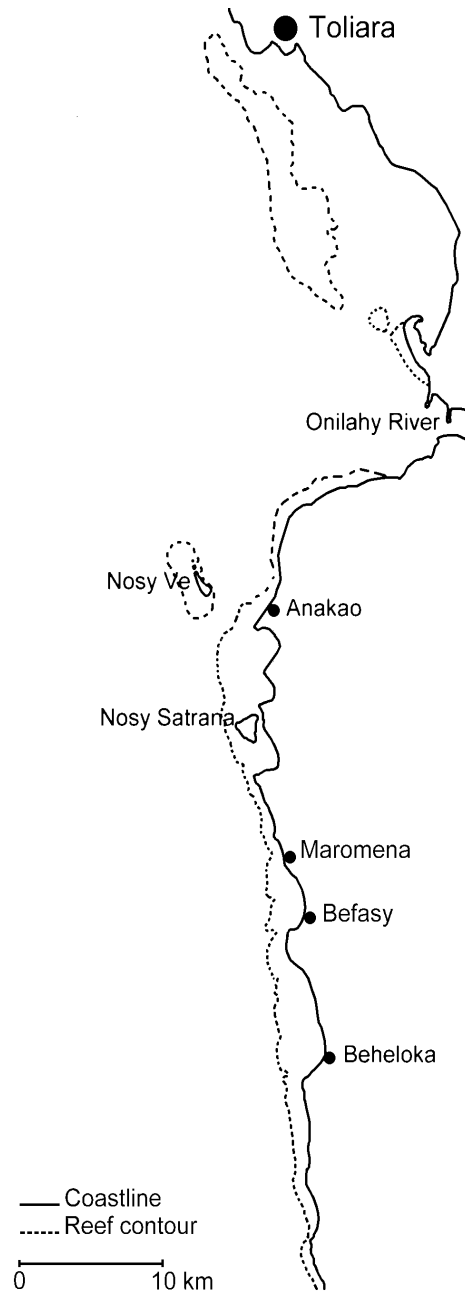


Figure 1. Map showing Nosy Ve in relation to Toliara and the Anakao region, Southwest Madagascar.

The area around Toliara experiences around seven or eight dry months per year and receives approximately 30cm of rain annually. The temperature in the dry winter (April to October) can fall to 10°C or less at night and in the wetter summer (November to March) temperatures in the day regularly reach 30°C or more (Bradt, 1999).

The island was occupied by European settlers from the 17th century to the end of the 19th century. It is traditionally regarded as sacred by the Vezo of Anakao (one of the 18 tribes of Madagascar) and a sacrifice of goat is made at the Northern end of the island every year. It is *fady* (locally taboo) to camp, light fires, cut any vegetation or leave any human waste on the island without special permissions.

Nosy Ve is unique in that it contains the only colony of Red-tailed Tropicbirds (*Phaethon rubricauda*) in Madagascar. This is the Southern most colony known, nesting just outside the tropics. The birds also nest on other islands in the Indian and Pacific Oceans, including Aladabra, Christmas, Europa and Round (Cooke and Randriamanindry, 1996).



Figure 2. Photograph showing *P. rubricauda* adult in flight (Morris and Hawkins, 1998).

P. rubricauda were first observed on Nosy Ve in 1980, when two pairs were noticed, numbers have increased since then with 12 pairs occupying the island in 1983, 16 in 1985 (COUT and Cooke, 1994) and further increases over recent years. The main nesting colony is in the Southeast of the island in an area slightly sheltered from the prevailing wind and the shrubs *Psiadina altissima*, *Salvadora augustifolia*, *Poupartia minor*, and *Pluchea* sp are common (COUT and Cooke, 1994). It is under the latter three of these species that *P. rubricauda* usually make their nests.

P. rubricauda is the most pelagic of the tropicbirds, it usually flies high above the surface of the water and feeds mainly by plunge diving (Morris and Hawkins, 1998). They nest on the ground under bushes, which makes them easy to observe and monitor. Unfortunately this makes them vulnerable and susceptible to predation from small mammals including rats. LeCorre and Jouventin (1997) noted that the colony of *P. rubricauda* nesting on Europa were most at threat from predation by the black rat *Rattus rattus*. COUT and Cooke (1994) noted evidence of rat infestation on Nosy Ve and a programme of eradication was undertaken by Frontier-Madagascar and partners during the austral winter of 2000 (Frontier-Madagascar, unpublished data). This was highly successful and no *Rattus rattus* have been identified on the island to date. Frontier-Madagascar subsequently initiated a monthly census of *P. rubricauda* in

August 2000, the aim of which was to monitor the population of Madagascar's only *P. rubricauda* colony.

MATERIALS AND METHODS

Since August 2000, approximately monthly counts of the total number of *P. rubricauda* observed in nests as well as the individual number of adults, sub adults and chicks has been recorded.

Adults are classified as sea gull sized birds with white feathers and some black markings on their wings. They have red bills and the characteristic long red tail streamers. Juveniles can grow to the same size as adults but are recognised by having more black markings. The bills are black and they lack the long red tail streamers. Chicks are covered in grey fluffy down however as the chicks get older their down is replaced by flight feathers, so to avoid confusion between chicks and juveniles - if the head is still covered in down they are classified as chicks, and if the head is free from down and there are only a few tufts left of it on the body then they are classified as juveniles.

The position of all existing nests has been marked using a GPS and tagged with a stone, which has a number corresponding to the nest painted on, placed at the entrance to the nest.

To carry out each survey approximately ten observers (trained volunteers under the stewardship of at least one experienced surveyor) form a line such that the width of the area occupied by the main colony is covered. The area beyond the extent of the colony is searched to ensure any new nests are incorporated into the results. Forming a line and the use of rocks as nest markers ensures that double counting of nests does not occur. The observers walk slowly through the vegetation looking under each bush and recording the number of the nest and whether it is unoccupied, or occupied. For occupied nests the number of adults, juveniles, and chicks in the nest is recorded. If the nest is a new nest, that has no numbered stone the GPS of the nest is recorded, a new stone with the next sequential number painted on positioned at the entrance to the nest, and the number of adults, juveniles, and chicks recorded. An aerial count is conducted every thirty minutes, to account for birds off the nest.

RESULTS

Figure 3 shows the position of each individual *P. rubricauda* nest. It can be seen that the main nesting colony is in the Southeast of the island, with a small scattering further up the island.

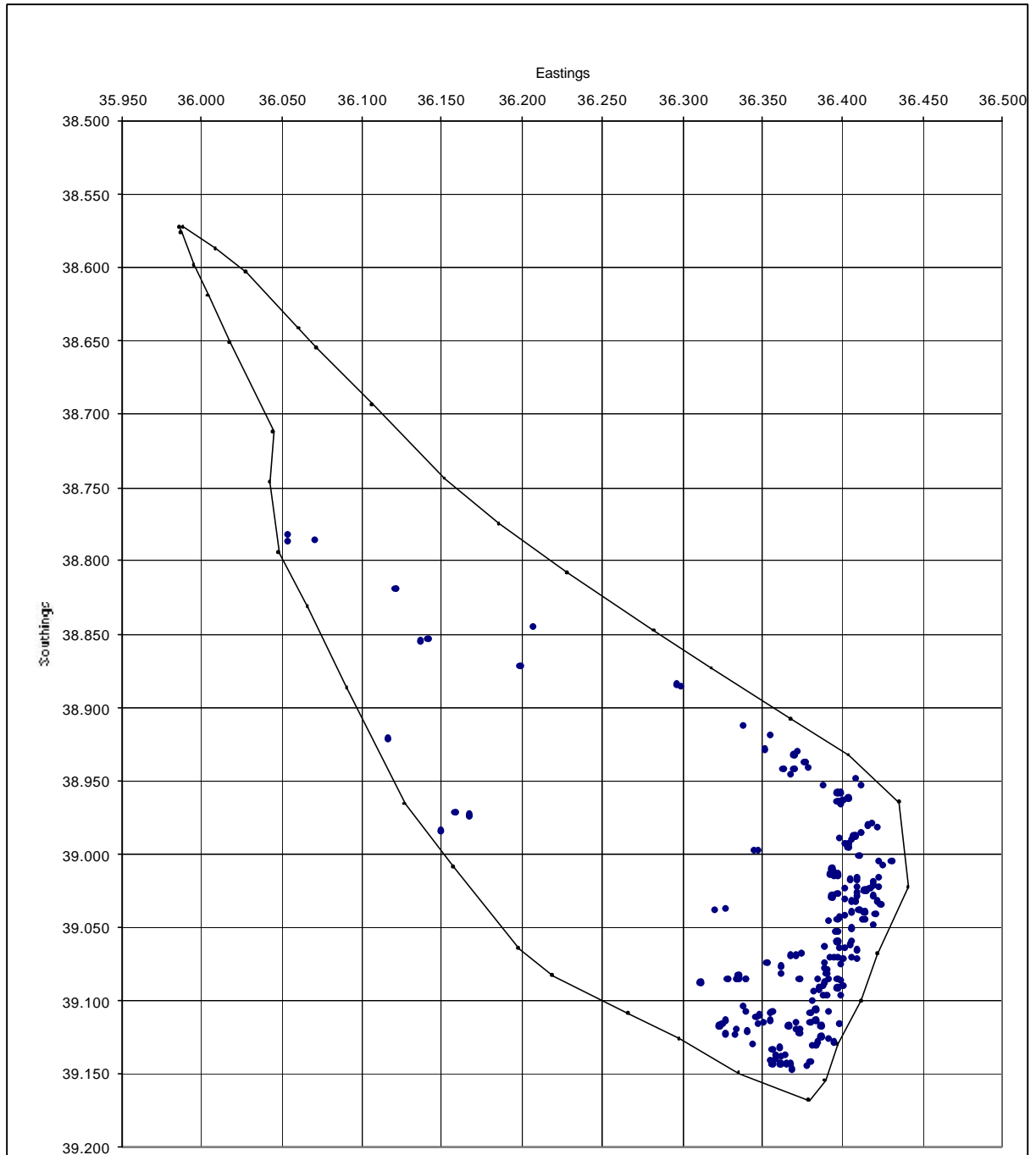


Figure 3. Example graph to show the position and extent of the colony of the *P. rubricauda* nests on Nosy Ve in December 2002.

Table 1 shows the historical data of the *P. rubricauda* population. It has gradually increased from 4 individuals in 1980 to 107 individuals in November 1995. The population then decreased to 67 individuals in October 1996.

Date	Total Birds	Adults	Juveniles	Chicks	Aerial Count
1980	4	4			
1983	24	24			
1985	32	32			
09/10/91	>15				
21/11/92	40				35
04/93	15	15			
09/93	7	7			
15/11/94	50	35		15	
16/11/95	107	81		26	45
10/96	67	55		12	

Table 1. Table to show historical data of the Nosy Ve *P. rubricauda* colony. Based on Gardner, 1992; COUT and Cooke, 1994; Cooke and Randriamanindry, 1996; and ISHM, 1999.

Table 2 and Figure 4 show that in August 2000, when Frontier- Madagascar first began surveying the population of *P. rubricauda* there was a total of 98 individuals, it reached a peak of 145 individuals in October 2000, and declined to 66 individuals in December 2000. In 2001 the population fluctuated between 51 and 90 individuals in between January and June, and then gradually increased reaching its peak of 148 in November 2001. A similar pattern occurred in 2002, with low numbers recorded between January and June, and then gradually increasing, reaching a peak of 170 individuals in October 2002. The numbers have remained high in November and December at 143 and 133 respectively. At the beginning of 2003 and numbers decreased again to 91 individuals in January and 61 individuals in March.

The total number of adults reached a peak in October 2000, November 2001, and October 2002. Juveniles reached a peak in November 2000, August 2001, and October 2002. Chicks reached a peak in October 2000, October 2001, and August 2002.

The maximum number of aerial birds recorded varied from 0 to 14 during the course of the study.

Table 2. Table to show the number of *P. rubricauda* in the Nosy Ve colony since Frontier-Madagascar started surveying the population in August 2000 to March 2003.

Date	Total Birds	Adults	Juveniles	Chicks	Aerial Count
23/08/00	98	62	26	0	10
23/09/00	120	76	14	18	12
23/10/00	145	85	24	25	11
22/11/00	116	53	44	12	7
23/12/00	66	30	19	13	4
23/01/01	61	29	25	5	2
24/02/01	90	43	22	11	14
28/03/01	51	31	14	5	1
24/04/01	62	38	12	12	0
22/05/01	87	54	10	18	5
23/06/01	89	66	13	10	0
24/07/01	103	65	20	14	4
25/08/01	114	67	32	9	6
13/10/01	105	56	25	24	0
10/11/01	148	92	31	21	4
16/01/02	48	18	17	13	0
12/02/02	75	42	13	15	5
11/03/02	55	26	12	6	11
08/05/02	84	62	18	4	0
01/06/02	69	46	12	11	0
17/07/02	100	75	14	11	
20/08/02	134	81	11	34	8
23/10/02	170	92	39	27	12
18/11/02	143	87	25	27	4
03/12/02	133	77	24	28	4
29/01/03	91	52	20	14	5
04/03/03	61	41	9	6	5

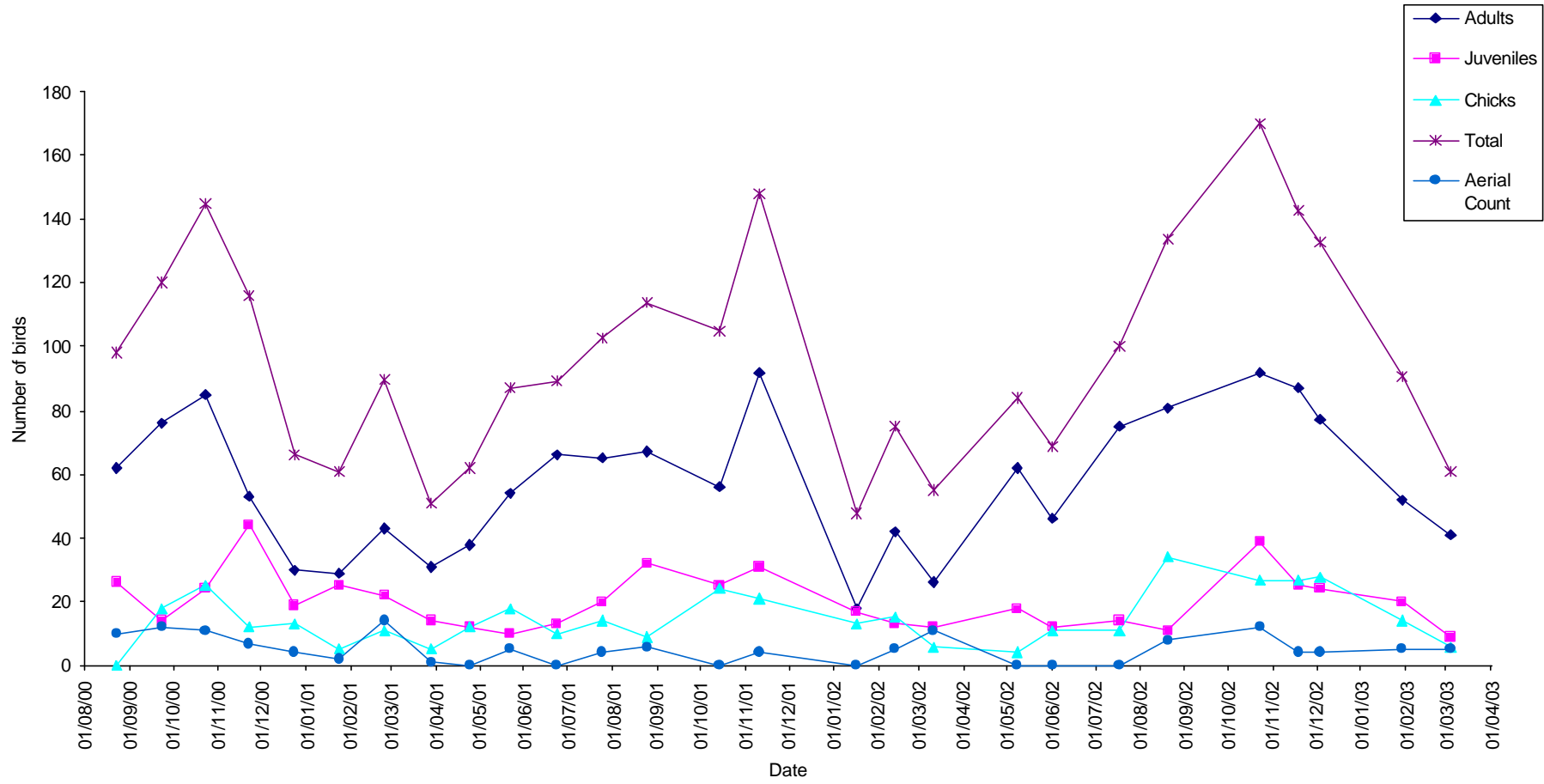


Figure 4. Graph to show the population characteristics of the *P. rubricauda* colony from August 2000 to March 2003.

DISCUSSION

The presence of chicks and sub adults all year round suggests a year round breeding season, however there are peaks of chicks and sub adults in the austral summer. This is consistent with Cooke and Randriamanindry (1996) who stated that the low counts and absence of chicks in April and August 1993 are consistent with a spring/summer breeding season. The population will have to be continued to be monitored on a monthly basis to gather more data to confirm the observed variation as statistically significant and provide a more complete picture of the breeding season.

The *P. rubricauda* population reaches a peak in October, November and December of each year and then declines through the austral winter. It is unfortunate that it is not known where these birds go to at this time, however birds do return for the austral summer. In the near future it is hoped to implement a tagging programme whereby it will be established if the same birds return, and if in fact they use the same nesting areas.

It was noted during the most recent surveys that the birds are spreading to new areas of the island again and that they are choosing to nest under new species of bush and tree. This could mean that the availability of suitable nest sites is becoming a limiting factor, forcing the birds to use new sites. There are however only a limited number of new sites left for birds and they are starting to crowd together within the main colony. As can be seen from the results the population growth is not huge since monitoring started and the population may have reached carrying capacity for the island.

Recordings of the aerial birds is a poor indicator of any facet of the population and its usefulness is questionable. Birds may be more likely to leave their nests when disturbed by a less careful team of researchers for example, and additionally there did seem to be an increased number of aerial birds in the afternoons. It is useful however to obtain a more complete picture of the total population numbers.

Frontier-Madagascar have introduced a standard survey methodology that will be continued as long as Frontier-Madagascar remain in the region. It is hoped that over the forthcoming years more information will be gathered to give a more accurate picture of the population dynamics of the *P. rubricauda* colony on Nosy Ve.

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