

**Sooty Terns on Ascension Island South Atlantic**

**Army Ornithological Society**

**Integrated Population Monitoring Programme**

**24<sup>th</sup> Report**

**April 2011**

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## Index

	Page
Summary	3
Background	3
Terms of Reference & Aims	3
Long Term Population Trends	5
Predation	5
Site Fidelity	6
Survival Rates	6
Other Activities	8
Survey Effort	10
Future Work	10
Acknowledgements	10

## Expedition Report 24 – April 2011

**Summary:** The expedition completed a full census of sooty terns. The colony size in early April 2011 was 181,000 AON. A further 2,526 sooty terns were ringed and 385 re-trapped. 20 sooty terns had geolocators fitted on metal rings on their legs which will require recovery next year. This will help us determine the movement of adults at sea between breeding periods. DNA samples were taken of brown noddies and white-tailed tropic birds. A survey of white terns was taken across the whole island and stacks.

### Population Dynamics of Sooty Terns – Long Term Monitoring Programme

#### Background

British military ornithological societies have monitored the colony of sooty terns *Onychoprion fuscatus* and other seabirds on Ascension Island in the South Atlantic since 1987. The first population census was completed in 1990 ten years prior to the commencement of the RSPB cat eradication on the Island. Sooty terns were closely monitored during the two years when cats were culled and now we continue the monitoring in the post eradication phase. This report contains the findings of the latest field trip and is the sixteenth AOS expedition. The longitudinal study has focused on the breeding biology of the sooty tern. The study has concentrated on establishing trends in the breeding population, identifying and recording levels of predation, site fidelity, sub-annual breeding, investigating nest and adult survival rates, and more recently to identify their migration sites.

#### Organisations

The long term monitoring programme on Ascension was not planned and there is no lead organisation dictating the direction of the project. The programme has evolved over time and the focus now is on publishing the information that has already been gathered, filling gaps in existing data sets and to continue with the monitoring work. Over the years the lead role has changed hands a number of times. The organisations involved are:

- Royal Air Force Ornithological Society (RAFOS) who mounted the first expeditions in Feb 87 and Nov 88 and contributed to most of the other expeditions.
- Army Ornithological Society (AOS) the main contributor who mounted expeditions in 1990, 1991, 1994, 1996, 1998, 2000, 2002, 2004, 2005, 2006, 2007, 2008, 2009 and the most recent in Mar/Apr 2011.
- Royal Navy Bird Watching Society (RNBWS) who contributed field workers and ringers.

#### Terms of Reference

The main aim of this long term monitoring programme is to facilitate the expansion of the breeding population by identifying and reducing threats to the sooty tern colony. The following process is carried out:

- Surveys of the breeding population are undertaken at regular intervals.
- The levels of predation in the colony are measured and recorded.
- A ringing and re-trap programme is maintained so that inter and intra colony movements can be monitored and survival rates determined.

- Perceived threats to the colony are investigated.
- Long term, quantifiable data that can be used as evidence for making conservation management decisions on sooty terns is collected and made available to interested parties.

### **Secondary Aims**

In addition to work on sooty terns the various military organisations maintain data bases on a wide variety of species and projects on Ascension. Sixteen different databases exist and all were started prior to the feral cat eradication programme. One database, holds records of breeding attempts by all avian species on three precisely defined study sites. The Royal Navy Bird Watching Society maintains a data base of some 35,000 birds seen from ships. There are also data based on the abundance and distribution of land birds and on sea-watches.

### **Aims of the March 2011 Expedition**

1. Population census of the sooty tern.
2. Survey the number of apparently occupied nests (AONs) of brown noddy *Anous stolidus* on fairs and Ascension Island frigate bird *Fregata aquila* on Letterbox.
3. AON survey of white tern *Gygis alba*.
4. Survey of red-foot booby *Sula sula*.
5. Collect blood samples of brown noddy and yellow-billed tropic bird *Phaethon lepturus*.

### **Expedition Booby 16 – Mar 11 - Participants**

Major Andrew Bray	Expedition Leader
Group Captian Martin Routledge	RAFOS
Lieutenant Colonel Roger Dickey	AOS
Capt Richard Seargent	AOS
Flight Lieutenant Simon Croson	RAFOS
Warrant Officer 2 Tony Tindale	RNBWS
Staff Sergeant Tony Giles	AOS
Sergeant Richard Agus	AOS
Mrs Beverley Fletcher	AOS
Dr Jim Reynolds	University of Birmingham
Colin Wearn:	RAFOS

Members of the expedition were on the island from 26 March to 09 April 2011. A total of 96 man days were spent in the field.

## Long Term Population Trends

The population survey this season was carried out close to peak abundance and 37-46 days after the first egg of the season was laid. The colony on Ascension is at its greatest 42-60 days after the first egg of the season is laid.

### Timings

Ascension Conservation Office is thanked for their reports where they recorded the first eggs of the season at Waterside on 17 February 2011 giving an estimate of hatch on 17 Mar 11. We estimate from our observations that the first egg that hatched was laid 25/26 Feb 11 and hatched 25/26 Mar 11.

### Survey

The area of the colony was determined from GPS observations. The GPS worked by constantly recording the position of the bearer and then the data is downloaded onto a computer. The GPS worked out the area of each sub-colony. This method did not require waypoints to be recorded as the surveyor walked around the different colonies. The colony this season was made up of 16 sub-colonies (8 per major site) and as in previous years a "Fair Description Sheet" was completed for each sub-colony. The total area occupied in March 2011 was 10.69ha.

### Nest Density

Nest densities were measured by counting all eggs that were passed over by a string 1.784m long, rotating 360 degrees around a stick, at random points within the sub-colonies. In total 5,694 AONs were counted in 308 quadrats giving an average density of 1.685 AONs per sq metre (Table 1).

### Population Size

At Mars Bay on 07 April 2011 the sub colony contained 69,000 (AONs) and at Waterside the sub colony contained 112,000 (AONs).

**Table 1** Breeding population of pairs of sooty terns at the two colonies on Ascension in April 2011. Population determined by multiplying area by density.

<b>Sub Colony</b>	<b>Area Hectares</b>	<b>No of Quadrats</b>	<b>No of Nests Counted</b>	<b>Av. Density Per sq. m</b>	<b>Population Size Pairs</b>
Waterside	5.47	Combined	Combined	2.05	112,161
Mars Bay	5.22	Combined	Combined	1.32	68,910
<b>Total</b>	<b>10.69</b>	<b>308</b>	<b>5694</b>	<b>1.685</b>	<b>181,072</b>

## Predation - Natural Limiting Factors

Exposure to predation and habitat studies were conducted to help ascertain breeding success.

### Dead Adults

Ten dead sooty terns were found, three at Waterside and seven at Mars Bay. There was a fissure on Mars Bay at grid 65723 15741 which had created a small cave where we found five dead sooty terns. It looked like they had fallen in and could not get out due to the small entrance. No

signs of any cat predation were found on any of these birds or on our three study sites during this field trip.

### Rat Index

We have been concerned about the high levels of predation by black rats *Rattus rattus* at both sites. We completed rat indexes on both these sites (Table 2). We used break back traps. On Waterside there was notable land crab *Gecarcinus lagostoma* activity around the traps. On Mars Bay there were large numbers of House mice *Mus musculus* caught. Mars Bay now has a grass (probably soft feather pappus grass *Enneapogon cenchroides*) growing across the fair which will provide alternate food to sooty terns.

**Table 2** Summary of rat indexes on three study sites on Ascension Island March/April 2011. The index is the count of the number of rats trap per 100 trap nights.

Location	Dates	Traps Set	Trap-nights lost	Corrected trap-nights	Captured	Index
West side of Waterside	5-7 Apr	64	26	40	2	5.0
North west side of Mars Bay	30 Mar – 3 Apr	66	33	33	6	18.2

### Frigate Predation

There was no time to spend on frigate predation. There were however 8-12 frigates over Waterside from 29 Mar.

### Myna Predation

Mynas *Acridotheres tristis* predate on sooty tern eggs. Mynas prick and destroy many more eggs than they devour. Nests were marked and egg survival rates measured. Mynas were seen on the breed colony most days. We monitored sighting of myna in the breeding colony and the frequency of occurrence this season was 52%. Of 100 nests monitored there were 43 failed nests and 7 of these were positively attributed to myna predation.

## Site Fidelity

### Re-trap Adults

In total 385 sooty terns were re-trapped this season none of these were controls. Time allocation to re-trapping this season was 102 hours. One tern ringed as a chick on 24 Oct 2005 was re-trapped while incubating on 20 Jul 2011 at Fernando de Noronha, Brazil.

### Desertion

It is common for a minority of the sooty tern population to desert their eggs. This season two sub colonies at Waterside and Mars Bay had areas that were deserted. These were not surveyed.

## Life History - Survival Rates

A further 2526 sooty terns were ringed by Colin Wearn (with assistance from Roger Dickey, Martin Routledge and Jim Reynolds); details are below (Table 3). When this figure is added to our total and ringing completed by the RSPB and Dr Gale in Nov 1975 who used USA rings the overall total of ringed sooty terns on Ascension is 20,926.

**Table 3** Summary of ringing data.

Ring No	Number Ringed	Date	Location
DE47001 DE47500	500	28-Mar-11	Waterside
DE45001 DE45700	700	29-Mar-11	Waterside
DE45701 DE45950	250	29-Mar-11	Mars Bay
DE46001 DE46100	100	29-Mar-11	Mars Bay
DE45951 DE46000	50	30-Mar-11	Mars Bay
DE46501 DE46900	400	30-Mar-11	Mars Bay
DE46901 DE47000	100	31-Mar-11	Mars Bay
DD99322 DD99348	26	31-Mar-11	Mars Bay
DE46201 DE46450	350	06-Apr-11	Mars Bay
DE46451 DE46500	50	08-Apr-11	Mars Bay

### Movement at Sea

A major task this trip was to attach geolocators to 20 birds. The geolocators were funded by the University of Birmingham, The RSPB, The Royal Navy Bird Watching Society and the AOS. We have good long term data for the birds whilst breeding but we have no evidence of where they go once they head out to sea. All we have is anecdotal evidence from passing yachts stopping at Ascension. We know the young spend 5 years at sea on the wing before they return to breed. We suspect the adults head to parts of the ocean that are rich in sprat and squid; where deep cold currents mix with warmer waters. On a previous trip we had experimented with attaching geolocators to birds using a harness however this did not work well. Technology now allows us to attach these tracking devices to rings on legs. The geolocators are programmed to record the time of daylight from which we can determine longitude and latitude. The devices have to be recovered to download the data. To enhance the chances of re-trapping a bird with a device we have marked the birds with additional coloured rings and about 120 of their neighbours. We know that the birds are neighbour faithful rather than site faithful so if we locate one bird with the additional coloured rings, the birds with a geocator will be close by. Unfortunately there are many things that could prevent the birds returning. To improve the likelihood of the birds returning, we ringed birds in a small group on Mars Bay separated from the main group and thus likely to fail in breeding which will mean that they should be in the first wave of returning birds. Our first attempt at re-trapping will happen in early January 2012 and there will be another opportunity in October 2012.

The geolocators have to be attached after the ring has been fitted. This is a delicate job as the ring has to be firmly in place and a special licence is required. They have only a miniscule impact on the bird and with the rings weigh less than 2 grams. Once a bird was captured full biometrics were taken. These were put into a formula that had been devised from previous

studies<sup>1</sup> to determine if it was likely to be a male or female. A blood sample was taken for each bird which will be used to confirm the sex of the bird as measurements only provide a 78% certainty. The aim was to have 10 male and 10 females. We put a numbered ring and coloured ring on the right leg of the bird. We then put a coloured ring and a plain metal ring on the left leg of the bird. We then wrapped sticky tape around the plain metal ring which bonds as it is stretched. We then use 2 plastic tie grips to attach the geolocator to the ring. Thus the geolocator is stuck to the rings and as well as secured using the tie grips. The grips are then cut to remove the excess. The whole operation takes about 30 minutes per bird. The birds are re-trapped a few days later to ensure that the rings still fit comfortably and there is no chaffing to the leg.

### Food Availability

On the previous trip there was concern that the staple diet seemed to be squid rather than sprat. Squid does not have the same calorific content as sprat and thus could affect the fledging of chicks. During ringing we monitored the regurgitation of food (Table 4). Of the 10 examples only 1 was squid.

**Table 4** Summary of regurgitation.

Date	Location	Qty	Food
26-Mar-11	Mars Bay	1	Sprat
29-Mar-11	Waterside	6	Sprat
30-Mar-11	Mars Bay	1	Sprat
31-Mar-11	Mars Bay	1	Squid
08-Apr-11	Mars Bay	1	Sprat

### Egg Survival Rate

Egg survival rates were monitored using the Mayfield technique. 754 egg days was recorded with 43 failed nests and the survival rate calculated. Of the 100 nests that were monitored 43 failed. Nest survival rate this season varied from 0.61 in the core of the colony to 0.38 on the periphery. The causes of failure were: seven broken (probably Myna), 31 nests were deserted and five due to heavy rainfall (moved/buried).

## Other Activities

### Training and Support

We delivered two days of ringing training to two staff from the Ascension Island Government. We provided conducted tours of the Mars Bay site and explained our activities to three workers from the Conservation Office. We are currently developing a guide to monitoring of sea-birds on Ascension for use by future expeditions and the Conservation Office.

### DNA Records

We took nine blood samples from brown noddy for the University of Copenhagen. The university have requested more samples of all seabirds. In addition 20 blood samples of white-tailed tropic birds were taken for the University of Reunion.

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<sup>1</sup> S. J. Reynolds, G. R. Martin, L. L. Wallace, C. P. Wearn & B. J. Hughes (2008). Sexing sooty terns on Ascension Island from morphometric measurements. *Journal of Zoology* **274**, 2–8  
Field Report Number 24

## Mexican Thorn

The spread of mexican thorn *Prosopis juliflora* to the edge of the sooty tern colonies was first recorded in 1998. Since that date the steady but relentless progress of encroachment by this plant onto the nesting ground has been mapped using GPS. The height, spread and co-ordinates of five thorn bushes at Waterside and 11 at Mars Bay in the close vicinity of the colonies were measured. At the moment ample open space is available for sooty terns to find nest sites. However, the bush provides rats with food when sooty terns migrate.

## Study Sites

Once again all bird species attempting to breed on the three study sites established in 1990 were noted (Table 5). At Mars Bay there were three brown noddy nests with eggs besides the sooty tern sub-colony. This is the first time that we have recorded brown noddy nesting on the site. At Waterside in addition to the sooty terns, 69 brown noddy nests were identified of which 58 contained an egg. Of note was that all nest sites identified were on the edge of the sooty tern occupied areas, also that there was no pattern to nest sites. In some cases there could be four pairs nesting very close to each other and in other cases a pair could be a good distance from another pair.

On the Letterbox study site the Conservation Office already has a masked booby *Sula dactylatra* nest marking scheme as there are so many nests now-a-days. The team did search for any frigate bird nests but only found roost sites. Of note is that masked booby are nesting on a larger area of the southeast side of the island than before. They range from Crater Cliff to below the cliffs of White Hill.

**Table 5** Summary of breeding pairs on three long term study sites on Ascension – Apr 2011

Species	Waterside	Mars Bay	Letterbox
Sooty Tern	© 112,000	© 36,000	Nil
Masked Booby	Nil	Nil	Not monitored. Conservation office counting nests.
Brown Booby	Nil	Nil	Nil
Tropicbirds	Nil	Nil	Nil
Brown Noddy	58 pairs	3 pairs	Nil
Frigates	Nil	Nil	Nil

## White tern

A full population survey of the white terns was carried out and a separate report will be prepared.

## Red-footed booby

A boat was used to survey the cliffs of Boatswain Bird Island. During the survey of white tern's 12 Red-foot Booby were counted.

## Ringling

During the field season the following additional birds were fitted with a ring:

Masked booby – 12.

White-billed tropic bird – 18.

Brown noddy – 10.

### **Survey Effort**

Long term monitoring programmes are an expensive business. We are fortunate to have a dedicated team that has been willing to self fund to ensure continuation of the project. The majority of the funding has come from the MoD by providing facilities.

### **Future Work**

The next expedition is scheduled for January 2012. This will be a short visit with a team of five and the aim is to re-trap sooty terns fitted with geolocators. A second expedition in October 2012 is also planned to carry out a population survey and predation monitoring. Effort will be devoted to locating other geolocators and re-trapping.

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