

## ***Dear Earthwatcher!***

We had seven teams and 29 volunteers in the 2008 Earthwatch “South African Penguin” project on Robben Island. So, thank you to all!

We hope you enjoyed your brief stay with us and learnt a little (or a lot?) about the feisty African Penguin. We monitored 352 breeding attempts from 346 penguin nests in all and saw 344 penguin chicks fledging; a total of 0.98 chicks per breeding attempt. Over the full breeding season, 12 nests were classified as breeding in open nests with no shade; 267 pairs nested under some sort of vegetation, 21 pairs made use of the buildings or other old man-made structures; 9 pairs excavated natural burrows; and 42 pairs made their homes in custom built artificial nests (boxes or burrows). Surprisingly, the highest success rate (in terms of chicks per breeding attempt) was obtained by the birds nesting in open nests (1.25 chicks/attempt) and the lowest was seen in the natural burrows (0.33 chicks/pair), although the sample sizes in these groups were low. Why this might be, and whether this pattern will be confirmed in later years remains to be seen. The birds nesting in artificial burrows also did well, fledging 15 chicks in total at a rate of 1.15 chicks/breeding attempt. This is encouraging and we wait with bated breath to see if more artificial burrows will be occupied nest season!

Thanks to all who battled, were pounded by flippers or covered in guano in the process of nest-checking and banding birds! Thank you for the help in digging-in artificial burrows; at the last count 76 new homes for penguins had been placed on Robben Island. Of these 13 were occupied at one point this season, which is a great improvement on 4 from 2007. Thank you to those of you that met and helped Alwyn to measure chicks – you will be pleased to know that he completed his project and graduated with honours this month. Also thanks for all your help in catching the oiled or injured birds that were sent to SANCCOB from Robben Island this year. Many of them have now been treated and returned to their rightful environment.

All the nest monitoring, retraps, moult counts, nest counts (area U), wader counts, game counts and BIRP forms that you worked so hard to complete all contribute to ongoing data that will help with conservation and management decisions on Robben Island, as well as population studies of the African Penguin and several other species in the Western Cape. The data has also been submitted to MCM and we hope it will assist in the decision-making process when the fisheries closure around Dassen comes up for review.

I hope you will never forget the delights of the close encounters with wildlife, South African wine, braais, prison tours, Robben's sunsets, shooting stars, the unique mix of wildlife and birds on the Island and the knowledge that you made a difference.

On behalf of Sue, Mario, Les, Pete, Rob and all the other project staff who shared time with you on Robben or help make this project what it is, thank you again. May we take this opportunity to wish you happy holidays and every success for the future.

If you are off on an Earthwatch project in the new year, we hope you enjoy it!



## **SOUTH AFRICAN PENGUINS**

### **Principal Investigators and Position/Affiliations:**

**Prof. Peter J Barham**, University of Bristol  
**Dr Robert J M Crawford**, Marine and Coastal Management  
**Mr Mario Leshoro**, Robben Island Museum  
**Prof Leslie G Underhill**, University of Cape Town

### **Research Site:**

Robben Island, Western Cape, South Africa (33°47'S, 18°21'E)

### **Local Management Status of the Research Site:**

World Heritage Site/ South African Department of Arts and Culture

### **Scientific names of the primary species being studied:**

African Penguin *Spheniscus demersus*

### **Key Research Objectives:**

- Monitor African penguin breeding season on Robben Island
- Monitor the effects of nest type on breeding success of the penguins
- Re-sighting penguins previously banded in oil spills - data are added to the SAFRING database to evaluate movements and survival of penguins
- Monitor the efficacy of rubber bands as a method to identify individual penguins over the medium to long term.
- Evaluate breeding productivity of the Bank Cormorant (although see section on project development)
- African penguin population monitoring
- Help with long-term conservation planning and management on Robben Island

### **Date report completed:**

December 2008

## Data Collection and Results

### Data collected during past field season.

- 346 penguin nests were monitored (12 in scrapes with no shade; 267 nests under vegetation; 21 in buildings or under other man-made structures; 42 in custom built artificial nests; and 9 in natural burrows) which resulted in 353 breeding attempts from which 344 chicks fledged.
- 1539 re-sightings of previously banded penguins were collected, representing 663 individuals.
- 10 moult counts, 6 nest counts, 6 wader bird count, 12 game counts, and 11 beach cleanups were done

### Progress made towards achieving original objectives

All the data collected contributes to a long-term database that influences conservation planning on Robben Island and in the Western Cape. Several papers summarizing the results of the study on the effects of band type, oiling and food availability on breeding productivity are now published or in press. The rubber band design has been fine-tuned to be a workable alternative and in 2007 the first banding of chicks with the new design was undertaken. Mass-banding of chicks is planned to take place in the austral summer of 2009 as part of a chick bolstering and hand-rearing project.

### Summary of results

Penguin Nest summary 2008 at time of final Earthwatch team.

	Little/no shade		Under vegetation		Buildings/Other man-made		Artificial Nests		Natural Burrows	
Breeding attempts	12		267		21		43		9	
Abandoned Eggs	3	25 %	37	13.9 %	2	9.5 %	7	16.3 %	3	33.3 %
Abandoned Chicks	1	8.3 %	74	27.7 %	8	38.1 %	5	11.6 %	4	44.5 %
Successful (P3, P4)	8	66.7 %	156	58.4 %	11	52.4 %	31	72.1 %	2	22.2 %
Incubating at end	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %
Total Chicks Fledged	15		259		16		51		3	
Chicks per breeding attempt	1.25		0.97		0.76		1.19		0.33	
		100%		100 %		100 %		100 %		100 %

## Significance/Benefits of Research

### Impact at local, national, international levels (management strategies, biodiversity conservation action plans) and contribution to issues of sustainability

The main objective of this project is to monitor breeding productivity of the African Penguin which is classified as Vulnerable to Extinction in the IUCN threatened species categories. This is done by monitoring individual nests every six to seven days throughout the breeding season, as well as monitoring some nests over successive years. Nests are monitored in specific areas of the colony so that not all areas are subject to disturbance by the groups. Data are used to estimate demographic parameters of the penguin population as well as performance, behaviour and movements of individual birds. These data can also be used to assist in long-term conservation planning and investigating management related aspects such as the impact of tourism and fishing on the penguin colony.

Long term monitoring of penguin populations is dependent on individual bird identification, which has been done in the past by fixing steel bands to the penguins' flippers. The previous focus of this project was to assess a new silicon rubber flipper band designed for the African Penguin. Field tests over the last six years helped to slightly change and improve the design until this year when they were finalised for more wide scale use in wild penguins. The first banding of approx. 30 chicks on Robben took place during the 2007 field season and so far two chicks wearing the silicon bands have been resighted. Mass-banding of chicks from Robben, Dassen and Dyer Islands with the new design is planned to take place in the austral summer of 2009 as part of a chick bolstering and hand-rearing project.

There are various other important areas of research carried out by the Earthwatch groups on Robben Island. These are discussed below.

Long term monitoring of the African Penguin population is dependent on re-sightings of birds with flipper bands. Looking for banded birds and recording the band number is one of the main procedures that the Earthwatch groups are involved with. In the last few years Earthwatch teams have sighted approx. 10 000 different identifiable penguins. These data are used by SAFRING to evaluate movements, survival and the success of rehabilitating oiled, injured or sick penguins. Re-sightings are recorded at specific sights, such as the hide or near penguin crossing routes, or while walking through the colony monitoring nests.

Earthwatch groups are also involved with helping ongoing population monitoring that is carried out by Marine and Coastal Management staff. They are involved with counting nests (classified in specific categories) in one area of the penguin colony. Done on a monthly basis, this builds up a pattern of how the nest counts vary through-out the year. A monthly moult count is also carried out by the Earthwatch teams. Counting the number of penguins moulting at frequent intervals (at specific areas) through-out the year is another method of estimating the overall population of a colony.

Various activities are performed by Earthwatch groups which help with long-term conservation planning and management on Robben Island. A game census is performed during each team's visit. This provides data on population sizes of these species and any fluctuations that may impact on the island's vegetation. During these counts and at any other time, teams are on the look-out for sighting any cats. Cats are a real threat to any ground-nesting bird and when numbers increased in the early part of this decade there was a severe impact on birds such as the Swift Tern, African Black Oystercatcher and African Penguin. Thanks to a scheme to control

the cat population, the number remaining is now quite low (estimated to be in single digits). However, whilst a few remain there is still the potential for population expansion, so volunteers aid the programme by noting down sighting times and locations along with individual characteristics of the cats. This helps to provide an idea as to the numbers of cats remaining and to build a behavioural profile of the remaining individuals. Such information has been crucial in getting the numbers down to the present level.

A monthly wader bird census is also conducted with the help of Earthwatch teams and a weekly presence survey of all bird species is completed. These data contribute to an assessment of the levels of protection offered to different species within southern Africa and help with the long-term monitoring of different wader bird species and their movements on a global scale as many are migratory birds.

## Dissemination of Results

### Papers, management plans, presentations, popular articles, books

Three papers based on data collected by Earthwatch Teams had been published in peer reviewed journals prior to 2008: citations are provided.

**Barham PJ, Underhill LG, Crawford RJM & Leshoro TM.** 2007. Differences in breeding success between African Penguins (*Spheniscus demersus*) that were and were not oiled in the MV Treasure oil-spill in 2000. *Emu*, 107 (1): 7-13.

**Barham PJ, Crawford RJM, Underhill LG, Wolfaardt AC, Barham BJ, Dyer BM, Leshoro TM, Meyer MA, Navarro RA, Oschadleus D, Upfold L, Whittington PA & Williams AJ.** 2006. Return to Robben Island of African Penguins that were rehabilitated, relocated or reared in captivity following the Treasure oil spill of 2000. *Ostrich*, 77 (3-4): 202-209.

**Crawford RJM, Barham PJ, Underhill LG, Shannon LJ, Coetzee JC, Dyer BM, Leshoro TM & Upfold L.** 2006. The influence of food availability on breeding success of African Penguins *Spheniscus demersus* at Robben Island South Africa. *Biological Conservation*, 132 (1): 119-125.

One paper which had earlier been contributed to the Final Report of the BCLME (Benguela Current Large Marine Ecosystem) Project on Top Predators as Biological Indicators of Ecosystem Change in the BCLME has now been published in a peer-reviewed journal: citation provided.

**Barham PJ, Underhill LG, Crawford RJM, Altwegg R, Leshoro TM, Boltom D, Dyer BM, & Upfold L.** 2008. The efficacy of hand-rearing penguin chicks: evidence from African Penguins (*Spheniscus demersus*) orphaned in the *Treasure* oil spill in 2000. *Bird Conservation International*, 18: 144-152.

One further paper has been submitted for publication and is expected to be published in early 2009: title and abstract provided.

**Impact of flipper-banding on breeding success of African penguins *Spheniscus demersus* at Robben Island: comparisons among silicone rubber bands, stainless steel bands and no bands.**

From 2001–2006, two new designs of flipper bands made from silicone rubbers were tested on African penguins *Spheniscus demersus* on Robben Island, South Africa. We compared, over six years, the breeding success, from hatching to fledging, of three different groups of penguins: those with rubber bands, those with conventional stainless steel bands and those without bands. There was no significant difference in the breeding success of the three groups, suggesting that neither the currently used steel bands, nor any of the new rubber designs, were harmful during the seasons investigated. The rubber bands caused less wear of feathers than the steel bands.

Information on the influence of food on abstinence from breeding and breeding success of African Penguins will be made available to the Ecosystem Approach to Fisheries Working Group and the Pelagic Scientific Working Group of South Africa's Department of Environmental Affairs and Tourism, which advise on total allowable catches of pelagic fish off South Africa and are currently conducting experimental closures to Purse-Seine fishing of areas around African Penguin breeding colonies.

## **Volunteer Tasks and Accomplishments**

### **Ideas, skills, expertise, motivations**

Each volunteer brings their own set of skills and expertise to the project from writing data down, using the GPS, evaluating nest status, handling and banding penguins, re-sightings of banded penguins, counting nests and moulting birds, observing penguins crossing roads, counting game species, being on the look-out for cats, helping with collecting rubbish off the beach, data entry onto the computer, writing the diary, preparing food and contributing to each team's unique "character".

### **Data collection**

It would be very difficult and time-consuming for the principal investigators and the team leaders to collect this data without the help of the volunteers. Essentially they do all the data collection and are aided and guided by the team leaders.

## **Project Development**

### **Upcoming research**

The long-term monitoring of seabirds at Robben Island has proved most useful in gauging the success of conservation interventions, as were applied during the *Treasure* oil spill in 2000, and in advising fisheries managers on the food requirements of seabirds. It is important that this monitoring be continued into the future so that long-term changes in the Benguela Ecosystem can be explored.

In addition, a new non-invasive automated computer vision monitoring system is being developed on Robben Island and the data collected by the volunteers in this project will be extremely valuable in guiding the trial stages of this work. These data will set the benchmark for the new automated system and will be incorporated into any new monitoring strategies so that future monitoring can make reference to long-term differences.

## **Educational Opportunities**

### **Involvement of local communities, students, career scientists, other how involved**

The team leaders consist of MCM staff, ADU staff and students, other University of Cape Town students, Robben Island conservation staff and University of Bristol staff and students.

### **Assisting understanding and action toward the conservation of a sustainable environment**

The MCM staff are involved in collecting data from the different seabird colonies around South Africa and therefore have a good understanding of conservation involved on Robben Island. The students involved in the project are exposed to working on an island that is vitally important to seabird conservation but is also a major tourist attraction because of the cultural heritage. It therefore presents management challenges to conserving the sustainable environment on Robben Island.

### **Impact on further education theses and projects**

- 1 x University of Cape Town BSc Honours project
- 1 x University of Cape Town MSc project
- 1 x University of Bristol PhD project
- 2 x University of Bristol, Postdoctoral research projects

## **Partnerships**

Marine and Coastal Management, Department Environmental Affairs and Tourism

- staff, equipment, support

Animal Demography Unit, University of Cape Town

- staff, students, equipment, co-ordinators, support, student project

University of Bristol

- staff, students, database, rubber bands, computer support, student project

Bristol Zoological Gardens

- preliminary rubber band testing

Robben Island Museum

- staff, equipment, support, ferry transport, accommodation, transport of penguins

SAFRING, ADU, University of Cape Town

- database of recaptured birds

SANCCOB (Southern African Foundation for the Conservation of Coastal Birds)

- rehabilitates oiled, weak, injured and orphaned seabirds

### **How data is shared and used**

Marine and Coastal Management, Department Environmental Affairs and Tourism

- Long term data set for conservation priorities on Robben Island

- Long term data sets on numbers of African Penguins breeding and breeding success of African Penguins to relate to trends in fish biomass and advise on an ecosystem approach to fisheries (EAF)
- Bank Cormorant breeding evaluation to help with conservation of this endangered species, short term report on breeding success in 2007 and 2008 as well as long term dataset on breeding and population trends

#### University of Bristol

- Short term evaluation of the rubber band design used from 2004 to 2008
- Medium term evaluation of how the new rubber band design survives at sea
- Medium term evaluation of breeding success in different nest types to aid provisioning and placement of artificial nests on Robben Island.
- Long term evaluation of breeding success of penguins with rubber bands compared to unbanded and metal-banded penguins
- Long term data set on resightings of banded penguins for comparisons with data produced from new monitoring methods.

#### Robben Island Museum

- Long term datasets for conservation and management priorities on Robben Island
- 

#### SAFRING, ADU, University of Cape Town

- Long term dataset for monitoring the African Penguin population in terms of movements, survival and the success of rehabilitation