Conservation of the African Penguin (Spheniscus demersus) South Africa

FINAL REPORT (April 2001- March 2004)

Earthwatch Institute (Europe) &
Avian Demography Unit, University of Cape Town

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Darwin Initiative for the Survival of Species

Final Report

1. Darwin Project Information

Darwin Project Information

Project Reference No.	162/10/005
Project title	Conservation of the African Penguin (*Spheniscus demersus*)
Country	South Africa
UK Contractor	Earthwatch Institute (Europe)
Partner Organisation (s)	Avian Demography Unit (ADU) , University of Cape Town, South Africa
Darwin Grant Value	£152,945
Start/End date	April 2001 – March 2004
Project website	www.aviandemographyunit.org
Author(s), date	Professor Les Underhill, Director, ADU Robert Llewellyn-Smith, Earthwatch Institute (Europe) 8th June 2004

2. Project Background/Rationale

The project represents a collaboration between Earthwatch Institute, University of Cape Town and University of Bristol to enhance the knowledge base of the African Penguin, in order to aid its conservation, and develop new technology for penguin monitoring with potentially global implications. The project focuses on penguin populations on the South African Cape coastline and various offshore islands.

The African Penguin *Spheniscus demersus* is classified as 'Vulnerable' and the overall trend in recent decades is decreasing at a rate of 2% per year. The species decreased by 90% in the 20th century. At present, the main factors influencing the adverse conservation status of the species are: competition with industrial fisheries for food (purse-seine nets extract large quantities of sardine and anchovy), oil spills, and displacement from breeding sites by burgeoning Cape Fur seal populations. Acute oiling events such as the *Treasure* spill of June 2000 made international headlines.

The project will collect baseline data to inform and establish a monitoring programme which can be continued beyond the life of the Darwin Grant. In order to monitor the effects of oil pollution, a resighting programme, of birds banded following the *Treasure* oil spill in June 2000, will be established. The project will field test a new plastic flipper band which, if successful, could be used for penguin studies worldwide, and will also develop materials which will assist local authorities exploit the penguin colonies for tourism.

The need for this project was identified as a result of concerns about the safety of the stainless steel flipper bands used on penguins. These concerns date back about 15 years, and have resulted in decisions by researchers to cease flipper banding of most genera of penguins including all Antarctic species (the four species of *Spheniscus* penguin, including the African Penguin, do not seem to suffer any significant damage as a result of stainless steel flipper banding). The development of a penguin-friendly flipper band would represent a huge breakthrough for penguin research because it would facilitate the monitoring of these species. Dr Peter Barham in the Physics Department of the University of Bristol is a specialist in plastic polymers, with a keen interest in penguins. He produced an entirely new design for flipper bands, made of a soft plastic. The bands were first tested in Bristol Zoo. Dr Barham teamed up with Professor Les Underhill of the Avian Demography Unit at the University of Cape Town to undertake the field testing of the new design. This was done on one of the most accessible penguin colonies in the world, on Robben Island, a World Heritage Site. The environmental department of the Robben Island Museum was also involved, as was the Marine and Coastal Management Branch of the South African Department of Environmental Affairs and Tourism; seabirds fall under the jurisdiction of this department. The entire project was conducted within the framework of the Earthwatch Institute, which provided, through its South African Penguins project, volunteers to assist with the fieldwork for this project. These volunteers worked in collaboration with staff and students from the University of Cape Town, Marine and Coastal Management, Robben Island Museum and Bristol Zoo.

3. Project Summary

Purpose:
To enhance the knowledge base of the African Penguin, in order to aid its conservation, and develop new technology for penguin monitoring with potentially global implications.

Objectives:

- The project will undertake penguin counts at offshore islands of the Western Cape in order to show trends from the earliest available count data. This will allow a long-term monitoring programme to be set up, based mainly on Robben island, which will ultimately be self-sustaining.
- The project will monitor the progress of penguins oiled by the sinking of the *Treasure* in June 2000 and establish a resighting programme of birds banded during the clean-up operation.
- The project will field test a new plastic flipper band which has the potential to replace the current bands used worldwide, which are thought may affect penguin survival rates.
- The project will develop tourism materials to assist the exploitation of the penguin colonies as tourist attractions.

The original objectives have not been modified during the project period. The Darwin Secretariat has agreed to our request to use the 10% funding element that is withhold until receipt of our final report, to be used to send two ADU penguin researchers to the Fifth Internal Penguin Conference in Tierra del Fuego from September 6-10, 2004, where they will present project related papers. This is a major event, held every four years and would allow the ADU to present aspects of their penguin work funded over the last three years by the Darwin Initiative. A conference report will be submitted to Darwin Secretariat after the event as they requested.

The project relates to Article 6 (Sustainable use - through tourism), Article 8 (In-situ conservation), Article 12 (Research and training), and Article 13 (Public education and awareness).
The project met all its objectives, but most of these represent ongoing, annual, tasks. During the three-year period, the support enabled these tasks to be performed to higher standards, and it is the intention to maintain these standards if at all possible.

The penguin census was conducted annually in 2001, 2002 and 2003 (and has also been undertaken in 2004). Over this period every colony in the Western Cape has been covered every year. The results of these surveys were astonishing – they showed a sustained increase in the size of the penguin population within this region, and although it is too soon to be certain, there are indications that the seemingly continuous decline in penguin populations in this region has bottomed out, and that populations are starting to increase. Several presentations at conferences and scientific papers submitted to journals have resulted from this census activity. A pamphlet, detailing the results of the penguin census between 1992 and 2003 was produced early in 2004; this represents the only accessible summary of information relating to penguins and other seabirds on the islands of the Western Cape.

After the Treasure oil spill of 2000, 17287 cleaned penguins were released with flipper bands. The number of resightings of these birds is 45050; these are of 11176 different penguins with many birds being resighted multiple times. A large proportion of these resightings were made on Robben Island. Of the 19500 penguins that were translocated to Port Elizabeth so that they would not become oiled, 3362 had flipper bands; 1806 resightings have been made. Most of these birds came from Dassen Island, where monitoring intensity has not been as great as on Robben Island, so the resighting rate is not as large. All these resightings records are curated within the SAFRING (South African Bird Ringing Unit) database, and are available to researchers. A vast amount of effort was spent in bringing this database up to date, and keeping it this way. A paper on these results will be presented at the Fifth International Penguin Conference in Argentina in September 2004. The combination of this project and the Earthwatch volunteers have contributed to this incredible database.

The field testing of the Barham Band was less conclusive than we had hoped for at this stage. After what appeared to be a successful series of trials in 2001, we expected only to have to undertake minor tweaking of the design. In 2003, it finally became clear that it was the fundamental design concept that was unsatisfactory (occasionally, bands on wild birds would twist in such a way as to become a major hindrance to the streamlined flow over the swimming bird, a problem that never occurred in Bristol Zoo – this experience demonstrates the huge importance of thorough field testing of new devices to place on animals). In 2004, under the auspices of an ongoing Earthwatch Institute project, a new design concept is being tested – trials are currently underway on Robben Island. A paper on the preliminary results of the flipper band design project will be presented at the Fifth International Penguin Conference in Argentina in September 2004.

The project produced a brochure in its first year, which was distributed to subscribers of *Getaway* magazine; this magazine was chosen because its niche is tourism in southern Africa. In the second year, the project produced a poster, which was widely distributed via the Education Programme of the Two Oceans Aquarium in Cape Town, mainly to teachers at schools serving formerly disadvantaged communities in the area. In the third year, the project produced the pamphlet described above.

4. Scientific, Training, and Technical Assessment

Counts: The annual census is timed to take place during the peak of the breeding season each year. This normally falls between April and June, the early part of the

southern winter. Careful observation and experienced judgement are required to predict the best time to do the count at each colony each year. The count unit is the active nest site. This is the most reliable method available, and has been subjected to peer review. Counts have been conducted in a comparable way since the early 1980s, and there are few gaps in the record over this period. Missing counts for colonies are now a rarity. Papers presenting trends in African Penguin populations have been produced at roughly five-year intervals, with two papers emerging during the three year period of this project, one based on counts in the year immediately following the Treasure oil spill, when there was an unexpected increase in the breeding population (associated with a massive increase in food availability), and the second based on an analysis of 11 years of count data, 1993 to 2003 (these results were also presented at the European Ornithologists' Union conference in Chemnitz, Germany, in August 2003). The count is mainly coordinated by Professor Rob Crawford and his team at Marine and Coastal Management, but all team members assist to as great an extent as they are able with this hugely labour-intensive yet essential monitoring task.

Monitoring: A large effort has been put into gathering ring numbers of penguins; this project has made a huge contribution to this at Robben Island. The majority of the records come from monitoring using telescopes or binoculars to observe birds on the landing beaches and along the paths they take to and from the colony; these observations were made either early morning when the birds are going to sea, or late afternoon when they are returning. Further casual observations were made as volunteers and staff walked through the colony monitoring nests, etc. Observations were carried out most days when teams of Earthwatch volunteers were on Robben Island (12 weeks per year). The teams between them usually found 100 or more banded penguins per day, the majority of these were seen on the beaches or in transit to and from the main colony. These resightings are curated into the SAFRING database. A major analysis of this research has been accepted for presentation at the Fifth International Penguin Conference in Argentina in September. A paper is in preparation, and will be submitted for inclusion in the conference proceedings.

Plastic flipper bands. The possibility of using plastics to design a new generation of flipper bands was raised by Bernard Stonehouse at the Third International Penguin Conference in Cape Town in 1996. Dr Peter Barham at the University of Bristol's Physics Department designed two new types of band. These bands are made from silicon rubber and can be fitted simply by stretching the rubber and slipping the band up the bird's flipper. The first design was fundamentally different from the current bands. This band is intended to fit closely to the penguin's body, sitting perpendicular to the plane of the flipper with a thin, flexible, sleeve to hold it in place. The numbers, much larger than those embossed on conventional metal bands, are printed on the upright part and laminated over with a thin (0.2 mm) film of transparent plastic to ensure they will not wear away. These bands are much easier to read and are readable at much greater distances than conventional bands. The band is designed so that when the penguin swims the band should remain parallel to the penguin's body and thus lie along the streamlines so minimising drag. The band is further shaped so that it forms a partial aerofoil to keep it pressed against the penguin's body as it swims. Thus whenever the bird swims the band will be returned to its optimum position at the top of the flipper even if it has dropped down a little when the penguin has been on the land. The second design is very similar to that of steel bands – it is less "streamlined" than the first design, but is less prone to slipping down the flipper or turning upside down. A discussion of the results to date has been accepted for presentation at the Fifth International Penguin Conference in Argentina in September. A paper is in preparation, and will be submitted for inclusion in the conference proceedings.

Training and capacity building activities The students involved in this project have met the entrance standards required by the University of Cape Town (UCT); on top of this, the Avian Demography Unit has the luxury of selecting only the best students into its postgraduate research group. The project proposals of students meet UCT requirements. Most students are mentored and supervised by more than one team person; the most frequent combination is Professor Les Underhill of the ADU and Professor Rob Crawford of Marine and Coastal Management, both of whom are involved in this project and the associated Earthwatch Institute South African Penguins Project. PhD students at UCT are required to have three examiners, all of whom must be international subject specialists; it is exceptional for anyone resident in South Africa to examine a thesis. One student graduated with a PhD degree dealing with African Penguin rehabilitation success during the three year period of the project; all three examiners ticked the "A" box, indicating that the thesis could be accepted as is, without any changes needing to be made. This is an exceptional result.

5. Project Impacts

The steady flow of scientific papers and presentations (listed below) starting to emerge from project activities is evidence of the success of this project.

In addition, four papers arising directly out of the research of this project have been accepted for presentation at the Fifth International Penguin Conference in Argentina in September:

1. Impact of the Treasure spill on survival and breeding of African Penguins at Robben Island. Barham, P.J., Barham, B., Underhill, L.G., Crawford, R.J.M., Leshoro, T.M., Oschadleus, H.D., Wolfaardt, A.C. & Williams, A.J.
2. Differences in breeding success of African Penguins depending on types of flipper bands used. Barham, P.J., Underhill, L.G., Crawford, R.J.M., Leshoro, T.M. & Bolton, D.
3. Energy costs of steel flipper bands caused by feather wear. Barham, P.J., Crawford, R.J.M. & Underhill, L.G.
4. Resighting rates of African Penguins relocated or oiled following the Treasure oil spill in 2000. Barham, P.J., Crawford, R.J.M., Underhill, L.G., Leshoro, T.M., Meyer, M.A., Wolfaardt, A.C., Oschadleus, H.D. & Williams, A.J.

One unexpected bonus is discussed below. The link with Bristol Zoo has grown stronger than first envisaged, and the zoo has undertaken to do all the legwork at the European end to provide 100 captive-bred African Penguins per year to release into the wild population at strategic sites.

The results of the annual penguin census are of great monitoring importance, facilitating an understanding of the processes which have adverse impacts on penguins: the census is the key method to determine the extent, on a population scale, of negative impacts such as oil pollution, over fishing, seal predation at sea, seal displacement from breeding colonies, predation by terrestrial predators (e.g. feral cats on Robben Island, caracal at the mainland colony at Bettys Bay). For maximum effectiveness, it is essential that the census at every colony be undertaken annually. The information is presented to government in various forms. Two of the project leaders, Professor Les Underhill and Professor Rob Crawford are developing innovative overall indices which measure the health of the Benguela Ecosystem, based on the seabird census results including those for penguins, and presented a paper "Seabirds as indicators of the health of the Benguela ecosystem" at the Quantitative Ecosystem Indications for Fisheries

Management: International Symposium, Paris, France in March 2004.

Mario Leshoro, environmental officer on Robben Island, with particular responsibility for penguins, has had his knowledge of penguins dramatically extended and enhanced, as a result of increased contact with the remainder of the research team, especially through participating in the leadership of the teams the Earthwatch volunteers. He has also learnt valuable leadership and communication skills.

Phil Whittington was awarded his PhD in December 2002, having done intensive monitoring of oiled penguins cleaned after the Apollo Sea oil spill of 1994. He has moved to a postdoctoral position at the University of Port Elizabeth working on Kelp Gulls (important predators of penguin eggs and chicks!). He has applied to do a second postdoc at the ADU starting 2005, with a proposed project of following up the success of the exercise during the Treasure spill of rescuing 3500 orphan chicks (chicks with oiled parents); these birds were released with flipper bands, and the first of them will be starting to breed in 2004/2005.

Of the UCT students who have been supported by the project through part time work, mainly processing the enormous volumes of resighting data into the SAFRING database, Kathy Calf will submit her PhD (most fieldwork undertaken on Robben Island) in 2004, Jenny Griffin (MSc on penguins, working part time, fieldwork on Robben Island) continues with her post in the ADU and will submit in 2005, Janine le Roux (MSc on Swift Terns, fieldwork on Robben Island) has taken leave of absence from her studies, due to the long illness and death of her father, but is determined to complete her degree in 2005. These students will acknowledge Darwin Initiative support in the papers that flow from their theses.

The collaboration with the University of Bristol and with Bristol Zoo has been remarkable, and important and lasting links have been forged. One unexpected outcome of the project has been the decision by the Bristol Zoo to investigate providing about 100 captive-bred African Penguins for release into the wild from 2005. Preparations for this project are slowly being brought together; the objective will be to use these penguins to enhance the likelihood that colonies at the ends of the range in the Western Cape will not go extinct. The colony at Lamberts Bay (the northern most colony in South Africa, with a huge gap till the first colony in Namibia) is down to 15 pairs, and there is a newly established mainland colony in the De Hoop Nature Reserve, east of Cape Agulhas, which needs to be encouraged to grow (it will be the easternmost colony in the Western Cape, and reduce the isolation of the Eastern Cape colonies in the offshore islands of Algoa Bay). A large number of institutions will need to be involved; besides the partners of this project, the State Veterinarians will quarantine the birds before release.

The biggest beneficiary has been the penguins! The place to consider social impact has to be on Robben Island where the research took place. The island is a World Heritage Site, attracting hundreds of thousands of visitors per year to see Nelson Mandela's prison cell. The project has had no negative impact on this; we have had less positive impact than we could potentially have had, and we intend to rectify this in the near future. In the past few weeks, we have finally networked with the person in charge of the tour guides on the island, and we have been invited to give introductory biodiversity lectures to them.

6. Project Outputs

All project outputs are quantified in Appendix II using the coding and format of the Darwin Initiative Standard Output Measures

All outputs identified in the agreed schedule have been achieved. A 4th conference in Year 2 was attended to present findings, in addition to the three agreed in the schedule. An additional conference will be attended in Year 3 (technically after the grant period has

ended, in September 2004). Four presentations will be given at the Fifth International Penguin Conference, Argentina which are summations of the work of this project. It was agreed with the Darwin Secretariat to use the final 10% of the grant to fund two penguin researchers from the Avian Demography Unit to attend the conference.

Appendix III provides details of all publications and materials arising from the project.

We have used the full range of available dissemination opportunities. Our emphasis has been on presenting results to the scientific community. We have made presentations at many major conferences, and will continue to do so.

7. Project Expenditure

Costs	2001/2002	2002/2003	2003/2004

*includes an agreed increase of 3% to accommodate rise in staff costs. Agreed with Darwin Secretariat
**includes an agreed increase of 3% to accommodate rise in staff costs of UK salaries only. Agreed with Darwin.

8. Project Operation and Partnerships

There were three main local partners involved with this project (Avian Demography Unit, UCT, Marine and Coastal Management, Robben Island Museum); all planned partners participated, and 2 additional partners played a relatively small role (Western cape Nature Conservation Board, Southern African Foundation for the Conservation of Coastal Birds, SANCCOB). All partners play important, but varying, roles in biodiversity issues, from student training to policy development and implementation.

Avian Demography Unit (ADU), University of Cape Town. ADU Staff and postgraduate students provided much of the key leadership to this project. For virtually all 36 weeks of fieldwork for the Earthwatch Project on Robben Island over the three years, at least one ADU student or staff member was present, providing leadership or co-leadership. Where students were understudying a more senior staff member of the ADU, or from Marine and Coastal Management, the students were receiving training and mentoring in project leadership. Students also participated in census fieldwork. Several students had part-time posts processing data relating to this project; not all these students were necessarily doing research on penguins, but all were working on seabirds and shorebirds. These students have acknowledged support from the Darwin Initiative, resulting in a diversity of papers acknowledging Darwin Initiative support. Most of these students also received a measure of support from the National Research Foundation

(NRF), the South African research funding mechanism, which in turn receives its funding from the South African Department of Science and Technology (In South Africa, NRF bursaries for students represent less than half what a student needs to survive; the co-funding received from this project has been critical in providing students with part-time posts which have enabled them to continue their studies). The relevant NRF grant is to Professor Les Underhill for a research plan entitled “Seabirds, Shorebirds and Seals: Research, Conservation and Management”. The research motivation underpinning this NRF grant is largely to undertake research relating to South Africa’s commitments in terms of the CBD, and other environmental conventions, such as the Bonn Convention and its daughter agreements (African Eurasian Waterbird Agreement and the Agreement on the Conservation of Albatrosses and Petrels) and the Ramsar Convention.

Robben Island Museum (RIM), especially the environmental section of the Heritage Department. This is the small group of three persons, two from previously disadvantaged communities, who are responsible for all biodiversity issues on this World Heritage Site. The project played a substantial role in supporting them and training them. For example, Mario Leshoro, RIM, besides being involved with all fieldwork on Robben Island, participated in penguins surveys on other islands. The project personnel represented an important “biodiversity presence” on the island, gentling educating other RIM staff, especially the tour guides, in the importance of Robben Island as a biodiversity hotspot, besides its more obvious importance as a site of immense cultural significance.

The small group of three seabird researchers at the Marine and Coastal Management branch of the South African Department of Environmental Affairs and Tourism played a key role in the project, especially in the leadership and coordination of the annual penguin census. This group was also actively involved in providing team leadership for the teams of volunteers participating in the Earthwatch Project.

Staff of the Western Cape Nature Conservation Board participated in the annual penguin surveys, and provided team leaders for the Earthwatch Project on Robben Island. One of the Earthwatch teams spent two weeks on Dassen Island, a nature reserve of the Western Cape Nature Conservation Board; they participated in the annual penguin census there. Dassen Island is the largest African Penguin colony of all, and it takes several person weeks of fieldwork to conduct the census there. The Western Cape Nature Conservation Board was not originally conceived as a partner.

SANCCOB (Southern African Foundation for the Conservation of Coastal Birds). SANCCOB is the institution responsible for the rehabilitation of oiled seabirds, mostly penguins, in the Western Cape. The veterinarian at SANCCOB, Dr Nola Parsons, has participated in the leadership of teams of Earthwatch volunteers.

The project participated in a workshop called by the Marine and Coastal Management Branch of the South African Department of Environmental Affairs to develop recommendations for a Seabird, Shorebird and Seal Policy for South Africa. This document was published in April 2004 for comment in a Government Gazette.

There were three main international partners: Earthwatch Institute, University of Bristol, and Bristol Zoo.

The local partners continue to work together. There is no doubt that the Darwin Initiative project was a powerful catalyst in strengthening relationships over the past three years, and we are committed to ongoing collaboration. The project leadership has forged strong links with each other, and there can be no doubt that we represent a formidable team to influencing biodiversity strategies relating to seabirds and shorebirds in the Western Cape in particular and in South Africa in general.

9. Monitoring and Evaluation, Lesson learning

No formal evaluation has taken place, apart from that required by the Earthwatch Institute to decide whether they would renew the project as a volunteer experience for a further three years; 2004 is the first year of the second cycle. Our scientific work is evaluated through the normal review process; through the presentation of results at conferences, and the refereeing that takes place when papers are submitted for publication in good journals.

We have no special insights into how the experience could be improved. We would have appreciated a more positive response and interest in the project from the British Embassy in Cape Town; we did try to make this contact right at the start.

10. Actions taken in response to annual report reviews (if applicable)

All reviews have been encouraging and positive, and there have been no recommendations for modifications.

We were asked in the first review to comment on the MoU between South Africa and Namibia. The reviewer states "In the grant application, a MoU between South Africa and Namibia is mentioned. It would be useful for future reviewers if some more information could be supplied about this MoU - when it may be produced, the status of the document, the role of the ADU in informing the document. This issue need not be addressed until the Final Report if appropriate”

To answer this, a workshop was held in Cape Town in February 2002. The workshop was attended by most of the people involved with the project, both staff and students. It produced the report:

Du Toit M, Boere GC, Cooper J, de Villiers M, Kemper J, Lenten B, Simmons RS, Underhill LG, Whittington PA 2003. Conservation assessment and management plan for southern African coastal seabirds. Cape Town: Avian Demography Unit and Apple Valley: Conservation Breeding Specialist Group.

The recommendation of the workshop was that several seabird species should be proposed by South Africa for inclusion in the Appendix of the African Eurasian Waterbird Agreement. This was achieved at the Meeting of the Parties later in the year. In addition, it was recommended that a multilateral committee be established between Angola, Namibia and South Africa to establish joint management of these species. This committee will report to the Technical Committee of the African Eurasian Waterbird Agreement. The Avian Demography Unit is currently undertaking a contract, funded by the African Eurasian Waterbird Agreement, to draft the multinational management plan for these species.

In our initial application (Que 11 - How was the work identified) we said " Likewise, an IUCN-led Spheniscus workshop in Chile in September 2000 recommended that South Africa and Namibia produce a MoU for the African Penguin, into the creation of which the ADU will directly feed data from this research"

This statement was used as the primary motivation for the February 2002 workshop. Additional funding for the workshop was obtained from WWF South Africa. Because the conservation problems facing the African penguin are similar to those facing other seabirds in the region, it was decided at an early stage to broaden the scope of the workshop beyond merely penguins.

11. Darwin Identity:

The Darwin Initiative logo has been used on five issues of *Bird Numbers*, the journal of the Avian Demography Unit. It was displayed prominently on all posters relating to penguins presented at conferences (for example, the June 2003 conference of the Zoological Society of South Africa in Cape Town, the August 2003 conference of the European Ornithologists' Union in Chemnitz, Germany, and on the papers/posters planned to be presented at the International Penguin Conference in Argentina in September 2004, at which much of the final results of this project will be presented, and also at the Southern African Marine Science Symposium in Durban in July 2005. The Darwin Initiative was also acknowledged in all oral presentations relating to penguins at conferences (detailed below), including a paper at the prestigious International Ornithological Congress in Beijing, China, in 2002.

There are several Darwin Initiative projects taking place in South Africa (or partly in South Africa). The Darwin Initiative is developing a strong "brand image" here. In particular, members of BirdLife South Africa have been exposed to the aims of the Darwin Initiative.

Darwin Initiative funding was not dwarfed. The co-funding from the Earthwatch Institute and the National Research Foundation was substantial, as was institutional and/or logistical support from the University of Cape Town, Marine and Coastal Management and the Robben Island Museum.

12. Leverage

Co-funding was from the Earthwatch Institute, National Research Foundation.

An attempt was made to link the Avian Demography Unit with the British High Commission in Pretoria following a meeting there by an Earthwatch project staff member. The Avian Demography Unit had submitted a draft proposal for a seabird manual and a GPS technology proposal but in each case there was no obvious role for Earthwatch as the British NGO. However, the High Commission was still willing to consider proposals direct from the Avian Demography Unit, but only for consideration in the financial year starting 1st April 2003. The Avian Demography Unit could revive this if they so wish.

13. Sustainability and Legacy

The annual penguin census will be maintained, using mainly government resources. The monitoring project on Robben Island will be maintained, as a result of the ongoing Earthwatch Institute "South African Penguins" project, as will the field testing of the new flipper bands designed by Dr Peter Barham in Bristol. The short answer is "yes", the partnerships will persist. Strong research connections have been made. The project staff were mainly postgraduate students on short term employment contracts (most frequently to assist with the penguin resighting database); the completion of the project means that fewer students have the opportunity to undertake studies.

We are less far down the flipper band design road than we would have hoped. We are glad that we have had the opportunity to test the designs so carefully – it is crucially important that the marking devices employed on endangered species – which is where most penguins are classified – should not themselves further endanger the species. We believe that there is a strong need to continue this aspect of the project for a further two

years.

Support for some of the key research aspects of the project, especially the resighting programme of flipper banded birds, has been applied for from the National Research Foundation, but this at best provides only partial support. Some funding will be sought from the Marine Living Resources Fund.

14. Post-Project Follow up Activities *(max. 300 words)*

- **This section should be completed ONLY if you wish to be considered for Post Project Funding.** We were not invited to apply

15. Value for money

The benefits were large. Some of them are intangible, and the most of important of these are the linkages with the Earthwatch Institute (and especially the European section), University of Bristol and Bristol Zoo.

Appendix I: Project Contribution to Articles under the Convention on Biological Diversity (CBD)

Please complete the table below to show the extent of project contribution to the different measures for biodiversity conservation defined in the CBD Articles. This will enable us to tie Darwin projects more directly into CBD areas and to see if the underlying objective of the Darwin Initiative has been met. We have focused on CBD Articles that are most relevant to biodiversity conservation initiatives by small projects in developing countries. However, certain Articles have been omitted where they apply across the board. Where there is overlap between measures described by two different Articles, allocate the % to the most appropriate one.

Project Contribution to Articles under the Convention on Biological Diversity		
Article No./Title	**Project %**	**Article Description**
6. General Measures for Conservation & Sustainable Use	5	Develop national strategies which integrate conservation and sustainable use.
7. Identification and Monitoring	10	Identify and monitor components of biological diversity, particularly those requiring urgent conservation; identify processes and activities which have adverse effects; maintain and organise relevant data.
8. In-situ Conservation	5	Establish systems of protected areas with guidelines for selection and management; regulate biological resources, promote protection of habitats; manage areas adjacent to protected areas; restore degraded ecosystems and recovery of threatened species; control risks associated with organisms modified by biotechnology; control spread of alien species; ensure compatibility between sustainable use of resources and their conservation; protect traditional lifestyles and knowledge on biological resources.
9. Ex-situ Conservation	0	Adopt ex-situ measures to conserve and research components of biological diversity, preferably in country of origin; facilitate recovery of threatened species; regulate and manage collection of biological resources.
10. Sustainable Use of Components of Biological Diversity	0	Integrate conservation and sustainable use in national decisions; protect sustainable customary uses; support local populations to implement remedial actions; encourage co-operation between governments and the private sector.
11. Incentive Measures	0	Establish economically and socially sound incentives to conserve and promote sustainable use of biological diversity.
12. Research and Training	30	Establish programmes for scientific and technical education in identification, conservation and sustainable use of biodiversity components; promote research contributing to the conservation and sustainable use of biological diversity, particularly in developing countries

		(in accordance with SBSTTA recommendations).
13. Public Education and Awareness	20	Promote understanding of the importance of measures to conserve biological diversity and propagate these measures through the media; cooperate with other states and organisations in developing awareness programmes.
14. Impact Assessment and Minimizing Adverse Impacts	10	Introduce EIAs of appropriate projects and allow public participation; take into account environmental consequences of policies; exchange information on impacts beyond State boundaries and work to reduce hazards; promote emergency responses to hazards; examine mechanisms for re-dress of international damage.
15. Access to Genetic Resources	0	Whilst governments control access to their genetic resources they should also facilitate access of environmentally sound uses on mutually agreed terms; scientific research based on a country's genetic resources should ensure sharing in a fair and equitable way of results and benefits.
16. Access to and Transfer of Technology	10	Countries shall ensure access to technologies relevant to conservation and sustainable use of biodiversity under fair and most favourable terms to the source countries (subject to patents and intellectual property rights) and ensure the private sector facilitates such assess and joint development of technologies.
17. Exchange of Information	10	Countries shall facilitate information exchange and repatriation including technical scientific and socio-economic research, information on training and surveying programmes and local knowledge
19. Bio-safety Protocol	0	Countries shall take legislative, administrative or policy measures to provide for the effective participation in biotechnological research activities and to ensure all practicable measures to promote and advance priority access on a fair and equitable basis, especially where they provide the genetic resources for such research.
Total %	**100%**	**Check % = total 100**

16.

Appendix II Outputs

Please quantify and briefly describe all project outputs using the coding and format of the Darwin Initiative Standard Output Measures.

Code	Total to date (reduce box)	Detail (←expand box)
Training Outputs		
1a	Number of people to submit PhD thesis	1 – South African
1b	Number of PhD qualifications obtained	1 – British
2	Number of Masters qualifications obtained	1 – South African
3	Number of other qualifications obtained	1 – South African (BSc Hons)
4a	Number of undergraduate students receiving training	1 – South African
4b	Number of training weeks provided to undergraduate students	4
4c	Number of postgraduate students receiving training (not 1-3 above)	10 – South African (9), Spanish (1)
4d	Number of training weeks for postgraduate students	32 weeks of fieldwork training on Robben Island
5	Number of people receiving other forms of **long-term** (>1yr) training not leading to formal qualification(i.e not categories 1-4 above)	
6a	Number of people receiving other forms of **short-term** education/training (i.e not categories 1-5 above)	2 – South African students from other institutions who participated during fieldwork, receiving supervision on Robben Island
6b	Number of training weeks not leading to formal qualification	2
7	Number of types of training materials produced for use by host country(s)	1 field instruction manual for the project; 1 poster for use in schools
Research Outputs		
8	Number of weeks spent by UK project staff on project work in host country(s)	17 (Earthwatch Institute (Europe) staff, Bristol University staff; Bristol Zoo staff (two members)
9	Number of species/habitat management plans (or action plans) produced for Governments, public authorities or other implementing agencies in the host country (s)	ADU staff and postgraduate students participated in a workshop to develop the new policy on seabirds, seals and shorebirds; the policy was published in the Government Gazette in March 2004.
10	Number of formal documents produced to assist work related to species identification, classification and recording.	None needed
11a	Number of papers published or accepted for	13

Code	Total to date (reduce box)	Detail (←expand box)
	publication in peer reviewed journals	
11b	Number of papers published or accepted for publication elsewhere	5
12a	Number of computer-based databases established (containing species/generic information) and handed over to host country	The SAFRING penguin database was copied to CDRom and provided to research staff both Department of Environmental Affairs and Tourism and the Western Cape Nature Conservation Board
12b	Number of computer-based databases enhanced (containing species/genetic information) and handed over to host country	1. A major contribution of the project was in providing assistance to bring the African Penguin database of ringing records and resightings up to date; this involved both the capture of information dating back to 1972, so that all penguin banding records are computerized, and keeping the database up to date (approximately 10 000 resightings per year). Each record entering the database needs verification.
13a	Number of species reference collections established and handed over to host country(s)	Not needed
13b	Number of species reference collections enhanced and handed over to host country(s)	Not needed

Dissemination Outputs		
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work	0
14b	Number of conferences/seminars/ workshops **attended** at which findings from Darwin project work will be presented/ disseminated.	2001 European Bird Census Council 15th conference, Hungary (plenary using penguin oil spill as case study). 2001 European Ornithologists' Union, the Netherlands (two posters) 2001 International Wader Study Group Conference, The Netherlands (two orals, one poster) 2001 Earthwatch Institute annual conference, USA (invited oral presentation) 2002 Southern African Marine Science Symposium, Namibia (two posters) 2002 International Ornithological Congress, China (symposium presentation) 2002 Medmaravis Conference on Oil Pollution and Conservation of Biodiversity, Italy (invited oral presentation) 2002 International Wader Study Group conference, Poland (two orals). 2003 Zoologtical Congress of Southern Africa, South Africa (one plenary, two posters) 2003 European Ornithologists' Union (Germany) (one oral, one poster) 2003 Seventh Effects of Oil on Wildlife Conference, Germany (three invited orals) 2004 (April) Waterbirds Around the World, Edinburgh (one plenary, four posters, Jenny Griffin's poster on penguin movements (based on the database) was awarded one of six "best poster" prizes. 2004 (September) Four presentations at the Fifth International Penguin Conference, Argentina (listed above) are particular summations of the work of this project. 2005 Southern African Marine Science Symposium (South Africa). We have negotiated a session to present our seabird research, with a strong focus on penguins.

15a	Number of national press releases or publicity articles in host country(s)	3
15b	Number of local press releases or publicity articles in host country(s)	6
15c	Number of national press releases or publicity articles in UK	1
15d	Number of local press releases or publicity articles in UK	4
16a	Number of issues of newsletters produced in the host country(s)	6 (Bird Numbers twice yearly)
16b	Estimated circulation of each newsletter in the host country(s)	3000 copies
16c	Estimated circulation of each newsletter in the UK	40
17a	Number of dissemination networks established	0
17b	Number of dissemination networks enhanced or extended	0
18a	Number of national TV programmes/features in host country(s)	1 (team 1 featured in eTV News)
18b	Number of national TV programme/features in the UK	1
18c	Number of local TV programme/features in host country	(only national TV)
18d	Number of local TV programme features in the UK	
19a	Number of national radio interviews/features in host country(s)	3
19b	Number of national radio interviews/features in the UK	
19c	Number of local radio interviews/features in host country (s)	3
19d	Number of local radio interviews/features in the UK	1
Physical Outputs		
20	Estimated value (£s) of physical assets handed over to host country(s)	£2,500
21	Number of permanent educational/training/research facilities or organisation established	None
22	Number of permanent field plots established	1 on Robben Island
23	Value of additional resources raised for pro	80 000 UK pounds

Appendix III: Publications

Provide full details of all publications and material that can be publicly accessed. Details will be recorded on the Darwin Monitoring Website Publications Database.

Mark (*) all publications and other material that you have included with this report

Type * *(e.g. journal paper, book, manual, CD)*	Detail *(e.g. title, authors, journal, year, pages)*	Publishers *(name, city)*	Available from *(e.g. contact address, email address, website)*	Cost £
* Paper	Shoreline birds of Robben Island, Western Cape, South Africa. Underhill, L.G., Whittington, P.A. & Calf, K.M. 2001. Wader Study Group Bulletin 96: 37-39	International Wader Study Group	Editor: Humphrey Sitters, hsitters@aol.com	
* Paper	Waders (Charadrii) and other Waterbirds at Dyer Island, Western Cape, South Africa. Venter, A.D, Underhill, L.G., Whittington, P.A. & Dyer, B.M. 2002 Wader Study Group Bulletin 98: 20-24	International Wader Study Group	Editor: Humphrey Sitters, hsitters@aol.com	
* Paper	A handicapped Ruddy Turnstone *Arenaria interpres* loses mass and delays primary moult. Underhill, L.G. 2002. Wader Study Group Bulletin 98: 44-45	International Wader Study Group	Editor: Humphrey Sitters, hsitters@aol.com	
Paper	African Black Oystercatcher chicks dive to escape danger,. Calf, K.M. 2002. Wader Study Group Bulletin 98: 46	International Wader Study Group	Editor: Humphrey Sitters, hsitters@aol.com	
Paper	Predation on a Kittlitz's Plover chick by a Blacksmith Plover. Calf, K.M. 2002. Wader Study Group Bulletin 98: 44-45	International Wader Study Group	Editor: Humphrey Sitters, hsitters@aol.com	

* Paper	Flesh-Footed Flesh-Footed Shearwater *Puffinus carneipes* and White-Faced Storm Petrel *Pelagodroma marina* at Dyer Island, South Africa. Underhill, L.G., Calf, K.M., Crawford, R.J.M., du Toit, M., Waller, L. & Whittington, P.A. 2003. Atlantic Seabirds 5: 35-37.	Atlantic Seabird Group	Netherlands Institute for Sea Research (NIOZ), Texel, The Netherlands
Report	Luna, G., Hennicke, J., Wallace, R., Simeone, A., Wolfaardt, A., Whittington, P.A., Ellis, S. & McGovern, M. (eds). 2002. Spheniscus Penguin Conservation Workshop: Final Report.	IUCN/SSC Conservation Breeding Specialist. Group:Apple Valley, USA.	IUCN/SSC Conservation Breeding Specialist Group, Apple Valley, USA
Newsletter	Dyer - island of surprises. Whittington, P.A. 2002 Promerops 250:19-21	Cape Bird Club	
Thesis	Survival and movements of African Penguins, especially after oil spills. Whittington, P.A. 2002. PhD Thesis, University of Cape Town. 286 pp.	Avian Demography Unit, UCT	Avian Demography Unit, University of Cape Town, Rondebosch, South Africa http://web.uct.ac.za/depts/stats/adu/
*Booklet	Rehabilitation of oiled African Penguins: a conservation success story. BirdLife South Africa and Avian Demography Unit, Cape Town	BirdLife South Africa and Avian Demography Unit, Cape Town	Avian Demography Unit, University of Cape Town, Rondebosch, South Africa http://web.uct.ac.za/depts/stats/adu/
Paper	Post-release survival of rehabilitated African Penguins. Whittington, P.A. 2002. In: Nel, DC & Whittington, P.A. (eds) Rehabilitation of oiled African Penguins: a conservation success story, pp 8-18.	BirdLife South Africa and Avian Demography Unit, Cape Town	Avian Demography Unit, University of Cape Town, Rondebosch, South Africa http://web.uct.ac.za/depts/stats/adu/
Paper	Are African Penguins tough enough? A perspective on the rehabilitation of oiled birds. Underhill, L.G.. 2002In: Nel, DC & Whittington, P.A. (eds) Rehabilitation of oiled African Penguins: a conservation success story, pp 30-31	BirdLife South Africa and Avian Demography Unit, Cape Town	Avian Demography Unit, University of Cape Town, Rondebosch, South Africa http://web.uct.ac.za/depts/stats/adu/

Paper	Results of the 2001 census of African Penguins *Spheniscus demersus* in South Africa: first measures of the impact of the *Treasure* oil spill on the breeding population. Wolfaardt, A.C., Underhill, L.G., Crawford, R.J.M. & Klages, N.T.W. 2001 Transactions of the Royal Society of South Africa 56: 45-49	Royal Society of South Africa	PD Hahn Building, University of Cape Town, Rondebosch, South Africa 7701
*Paper	Productivity of African Black Oystercatchers *Haematopus moquini* on Robben Island in the 2001/02 breeding season. Calf K.M. & Underhill L.G. 2002. Wader Study Group Bulletin 99: 45-49	International Wader Study Group	Editor: Humphrey Sitters, hsitters@aol.com
Paper	Leach's Storm Petrels *Oceanodroma leucorhoa* off southern Africa: breeding and migratory status, and measurements and mass of the breeding population. Underhill L.G., Crawford R.J.M., Camphuysen C.J. 2002. Transactions of the Royal Society of South Africa 57: 43-46	Royal Society of South Africa	PD Hahn Building, University of Cape Town, Rondebosch, South Africa 7001
* Paper	First breeding records of Kelp Gulls *Larus dominicanus vetula* at Robben Island, Western Cape, South Africa. Calf, K.M., Cooper, J. & Underhill, L.G. 2003. African Journal of Marine Science 25: 391-393	Marine and Coastal Management, Department of Environmental Affairs and Tourism	Private Bag X2, Roggebaai, Cape Town, 8012 South Africa
*Article	International funding supports Conservation of the African Penguin	Africa Environment & Wildlife (now Africa Geographic)	www.africamag.co.za
*Article	Keeping watch over Cape Penguins	Monday paper – weekly newspaper of the University of Cape Town	www.uct.ac.za/general/monpaper/2001no08/penguins.htm
*Press release	Triumph in adversity: Earthwatch announces unexpected results of African Penguin Census	Earthwatch Communications Department	Earthwatch Institute (Europe) www.earthwatch.org/europe

*Article	Breeding boost for Robben Island penguin population	Green Features Page 10.	Earthwatch Institute (Europe)
*Newspaper article	Rubber bands solve the penguins' identity crisis	The Daily Telegraph	Earthwatch Institute (Europe)
*Poster	African Penguins – Africa's only resident penguin is vulnerable to extinction because of dramatic and sustained decrease in population size	Avian Demography Unit	Avian Demography Unit, University of Cape Town, Rondebosch, South Africa http://web.uct.ac.za/depts/stats/adu/
Briefing	Barham PJ, Underhill LG, Crawford RJM 2002. Expedition briefing: South African Penguins.	Earthwatch Institute	Earthwatch Institute www.earthwwatch.org
* Leaflet	The African Penguin	Avian Demography Unit	Avian Demography Unit,
*Booklet	African Penguin populations in the Western Cape, South Africa	Avian Demography Unit	Avian Demography Unit,
*Poster	Patterns of Movement of African Penguins in South Africa and Namibia	Avian Demography Unit	Avian Demography Unit,
	Trends in African Penguin Populations in the Western Cape, South Africa 1992-2002	Avian Demography Unit	Avian Demography Unit
Paper	Effect of a storm on breeding African Penguins Spehniscus Demursus at Foxy Beach, Boulders Penguin Colony, Simon's Town Marienne de Villiers	Avian Demography Unit	Avian Demography Unit

Appendix IV: Darwin Contacts

To assist us with future evaluation work and feedback on your report , please provide contact details below.

Project Title	Conservation of the African Penguin (*Spheniscus demersus*)
Ref. No.	162/10/005
UK Leader Details	
Name	Julian Laird followed by Robert Llewellyn-Smith
Role within Darwin Project	Coordinate Earthwatch teams, Darwin financial administration, reporting, UK publicity
Address	Earthwatch Institute (Europe), 267 Banbury Road, Oxford OX2 7HT
Phone	
Fax	
Email	
Other UK Contact (if relevant)	
Name	Dr Peter Barham
Role within Darwin Project	Earthwatch team leader and designer of penguin rubber bands
Address	HH Wills Physics Laboratory University of Bristol, Tyndale Avenue, Bristol. BS8 ITL
Phone	
Fax	
Email	
Partner 1	
Name	Professor Les Underhill
Organisation	Director, Avian Demography Unit, University of Cape Town
Website address	www.uct.za/depts/stats/adu
Role within Darwin Project	Main project partner and host country coordinator
Address	Avian Demography Unit (ADU), Department of Statistical Sciences, University of Cape Town, Rondebosch, 7701, South Africa.
Fax	
Email	
Partner 2 (if relevant)	
Name	
Organisation	
Role within Darwin Project	
Address	
Fax	
Email	

Appendix V. Logical framework.

Project summary	Measurable indicators	Means of verification	Important assumptions
Goal To assist countries rich in biodiversity but poor in resources with the conservation of biological diversity and implementation of the Biodiversity Convention			
Purpose The project will enhance the knowledge base of the African Penguin and establish a monitoring programme, in order to aid its conservation, and will develop new technology for penguin monitoring with potential global implications, as well as materials to help exploit the tourism potential of the bird.	Reports published from the field work and data available on African penguin numbers and trends. Success of new flipper bands.	Project reports. Project reports.	Political situation does not change unfavourably. Colonies under study are extant for duration of study. Political will exists to implement conservation recommendations.
Outputs Information from counts used to show trends from earliest available count data. Resighting programme in place. Results of resighting work analysed. Results of flipper band field tests analysed. Ecotourism materials produced and used.	Information from counts processed. Database is fully updated. Report written on resightings. Report written on flipper band testing. Ecotourism materials in place.	Reports from penguin counts. Project reports. Project reports. Project reports. Ecotourism materials available. Project reports.	Further catastrophic events (oil spills, fire) do not hamper field work. Earthwatch volunteers able to work in South Africa. Penguins remain attractive to tourists.
Activities Penguin counts undertaken at offshore islands of the Western Cape. Resighting work of *Treasure* (oiled) penguins. New flipper bands field tested. Ecotourism materials developed.	Results from counts available for processing. Results from resighting work available for databasing and analysing. Results from field tests available. Draft materials developed and approved by ADU.	Project reports. Project reports. Project reports. Ecotourism materials available. Project reports.	Earthwatch volunteers able to work in South Africa. Further catastrophic events do not hamper field work.