



Darwin Initiative for the Survival of Species

Final Report July 2007: Ref 13/014

Capacity building in mammal management for Western Cape nature reserves

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Final Report

1. Darwin Project Information

Project Reference No.	13/014
Project title	Capacity building in mammal management for Western Cape nature reserves
Country	South Africa
UK Contractor	Durham University
Partner Organisation (s)	CapeNature (formerly Western Cape Nature Conservation Board)
Darwin Grant Value	£98,306
Start/End date	1 st October 2004 – 31 st March 2007
Project website	http://www.dur.ac.uk/r.a.hill/zebra_conservation.htm
Author(s), date	Dr Russell Hill, Dr Rebecca Smith, July 2007

2. Project Background/Rationale

- Describe the location and circumstances of the project

Traditionally, the Western Cape, South Africa, has been a region where the majority of conservation efforts have been directed at preserving the unique local flora; the Cape Floral Region is home to a diverse and sensitive flora with large numbers of locally endemic and globally threatened plant species. Large mammals are relatively rare in Western Cape reserves and as a consequence large mammal censuses were not a feature of CapeNature policy. Nevertheless, the Western Cape is home to a number of rare mammal species, including Cape mountain zebra (*Equus zebra zebra*: IUCN Endangered, CITES Appendix I), such that the capacity for long-term monitoring was essential in developing future management programs. Planned reintroductions of large native fauna (including flagship species such as black rhino) highlighted the need to build local capacity and methodology for sustainable mammal censusing as part of a sound management strategy.

- What was the problem that the project aimed to address?

This Darwin Initiative project worked towards implementing sustainable census methodology for Cape mountain zebra at De Hoop Nature Reserve. De Hoop is itself a high biodiversity priority since its limestone fynbos is a hotspot of endemic richness. The De Hoop Cape mountain zebra population is also extremely important as it is the only population to have originated from individuals from two of the original relic populations; it is thus the most genetically diverse Cape mountain zebra population and long-term monitoring is essential for its successful management. The project aimed to use computer software produced by CyberTracker Conservation in South Africa. The software is specifically designed to allow non-literate users to gather large quantities of geo-referenced data from field observations for projects that range from intensive monitoring of endangered species to large-scale regional programs and long-term monitoring of

ecosystems. Through assessing the suitability of this software within the framework of monitoring the Cape mountain zebra population at De Hoop, the study aimed to develop the capacity for sustainable management of Western Cape large mammal populations. In the later stages the project aimed to extend this census methodology and capacity to include Kammanassie and Gamkaberg Nature Reserves, the two remaining natural populations of Cape mountain zebra managed by CapeNature. Ultimately, therefore, the project was designed to implement sustainable monitoring of Cape mountain zebra in three of the most important populations within the Western Cape.

- Who identified the need for this project and what evidence is there for a demand for this work and a commitment from the local partner?

Following the 2001 International Theriological Conference in South Africa the Project Leader contacted Peter Lloyd of Western Cape Nature Conservation Board (WCNCB) with a view to initiating a project on the conservation genetics of Cape mountain zebra at De Hoop, where he had worked in 1996-7. Mr Lloyd indicated that due to recent restructuring of WCNCB (now CapeNature), and associated staff changes at De Hoop, the loss of field rangers trained in zebra monitoring meant that long-term records maintained since 1975 had ceased in 1999. While a project on conservation genetics was of interest to CapeNature, re-establishing monitoring of Cape mountain zebra was the priority. An equally pressing concern was that any monitoring programme should be sustainable with current field staff and the censusing methodology employed for Cape mountain zebra should be applicable to both other Cape mountain zebra populations and to other large mammal species. Due to financial and operational constraints, the monitoring of all species in Western Cape reserves had declined, but the capacity for long-term monitoring was essential in developing future management plans. CapeNature therefore requested the assistance of Dr Hill in designing and implementing sustainable monitoring of large mammals within its nature reserves.

3. Project Summary

- What were the purpose and objectives (or outputs) of the project? Please include the project logical framework as an appendix if this formed part of the original project proposal/schedule and report against it. If the logframe has been changed in the meantime, please indicate against which version you are reporting and include it with your report.

The project had four primary objectives:

- i) Re-establish long-term monitoring of endangered Cape mountain zebra at De Hoop Nature Reserve, and to establish monitoring at Kammanassie and Gamkaberg Nature Reserves in line with IUCN (2002) recommendations for successful management of small populations.
- ii) Develop a rigorous methodology for monitoring of flagship threatened mammal species using icon-driven handheld computer technology suitable for semi-literate to illiterate conservation field staff.
- iii) Develop clear large mammal census techniques for Western Cape nature reserves for new management policy of current reserves and to develop capacity for planned development of mega-reserves and reintroductions.
- iv) Integrate outputs of established monitoring into a comprehensive database to facilitate local and regional assessment of long-term trends and local stability of populations of target species.

The original project logical framework is included as Appendix V.

- Were the original objectives or operational plan modified during the project period? If significant changes were made, for what reason, and when were they approved by the Darwin Secretariat?

No changes were made to the project objectives during the project period. Due a change in Project Officer prior to the start of the project and the need to advertise the position, the project timetable was revised in agreement with the Darwin Secretariat and a new start date of October 2004 was set. No further changes were made following the start of the project.

- Which of the Articles under the Convention on Biological Diversity (CBD) best describe the project? Summaries of the most relevant Articles to Darwin Projects are presented in Appendix I.

The project has addressed a number of Articles within the Biodiversity Convention. In particular, this project supported the implementation of Articles 5 (facilitating cooperation between partners, UK and South Africa), 6 (general conservation plans: 10%) 7 (monitoring priority components of biodiversity: 30%), 8 (aiding *in situ* conservation: 10%), 12 (research and training programs: 25%), 13 (public education and awareness: 5%), 16 (access and transfer of technology: 10%), 17 (facilitating information exchange through scientific and popular publication and education/training: 10%), 18 (promoting scientific and technical cooperation) and 20 (providing financial sources from UK with matched funds from South Africa). The percentage values have been entered in Appendix I.

- Briefly discuss how successful the project was in terms of meeting its objectives. What objectives were not or only partly achieved, and have there been significant additional accomplishments?

The project has been extremely successful and all of the objectives have been largely achieved. Efficient monitoring of Cape mountain zebra using icon-driven CyberTracker computer units has been established at De Hoop Nature Reserve. Although CyberTracker appears less useful for the mountainous terrain of Kammanassie and Gamkaberg Nature Reserves the monitoring databases and methodologies have been passed on to the staff at these reserves via a training workshop. A comprehensive assessment of large mammal census techniques was conducted, incorporating aerial, ground-based and indirect methodologies, with the recommendations of these evaluations provided in a detailed management report to CapeNature. While aerial surveys appear most suitable for the rugged terrains of Kammanassie and Gamkaberg Nature Reserves, aerial surveys plus dedicated ground-based Cape mountain zebra monitoring is recommended for De Hoop Nature Reserve. These recommendations have been incorporated into extensive management documents for Cape mountain zebra, along with additional information on elements such as carcass sampling and sarcoid virus that are essential to the management of the species. An additional analysis of Cape mountain zebra diet and habitat preferences at De Hoop was also conducted, with recommendations made on the future management of this population on the basis of these investigations. Overall, therefore, the project has exceeded its original objectives.

4. Scientific, Training, and Technical Assessment

- Please provide a full account of the project's research, training, and/or technical work.
- **Research** - this should include details of staff, methodology, findings and the extent to which research findings have been subject to peer review.

The research on the project can be broadly categorised into two areas (i) assessment of census methodologies for large mammals at De Hoop Nature Reserve and (ii) diet and habitat use of Cape mountain zebra. The assessment of census methodologies involved De Hoop field staff and a research volunteer (Emma Ryan) who assisted with the project. The study assessed a large range of census techniques including aerial (helicopter and microlight), ground-based (original driven surveys, Distance, mark-recapture) and indirect signs (dung sampling), with the ground-based and indirect methods assessed within each season and the helicopter surveys assessed within two seasons. The initial stage of the research, and an important objective of the Darwin project, was to update the photographic database for Cape mountain zebra at De Hoop so that the precise population size was known and could serve as the baseline against which all of the survey methods could be assessed. The results of the status update for the De Hoop population have been submitted to the *African Journal of Ecology* for publication and a draft copy of the manuscript is included with this report. The results of the assessment of the census methodologies are currently being prepared for publication. Broadly, both aerial helicopter surveys and Distance provide reliable estimates of population size, but the time required to complete the surveys for Distance makes it unworkable as a sustainable management methodology. An annual helicopter survey, however, does offer a viable methodology for censusing Cape mountain zebra and other large mammals provided it is conducted at the time of year when habitat visibility is greatest. This method is particularly valuable in the mountainous terrains of the Gamkaberg and Kammanassie where many areas are inaccessible, but for De Hoop additional ground surveys are recommended for Cape mountain zebra to ensure that the individual database is updated. The main findings have been communicated to CapeNature in the management documents (copies included with report).

The second research project assessed the diet and habitat use of Cape mountain zebra and again involved De Hoop field staff along with two research volunteers (Emma Ryan and Dr Emma Morley). We identified early in the Darwin project that the Cape mountain zebra were heavily concentrated on transformed lands within De Hoop Nature Reserve and that this could have important management implications if the natural vegetation was being avoided by zebra. In response to this we applied for additional funds from the British Ecological Society to support the detailed study of diet and habitat use at De Hoop. The findings confirmed that the zebra were generally avoiding the natural fynbos vegetation and were concentrating their foraging on the transformed grasslands. Furthermore, within these grasslands the zebra were preferentially selecting 'exotic' grasses. This has important implications for the future management strategy for Cape mountain zebra at De Hoop since while large areas of De Hoop are not utilised by the zebra these areas are devoid of transformed lands. As a consequence De Hoop may already be reaching carrying capacity (something that is suggested by relatively high levels of animals in poor condition) and thus the reserve must either be managed to produce further suitable habitat for zebra or animals should now be considered for translocation away from De Hoop. These findings have been communicated to CapeNature and are currently being prepared for submission to the *Journal of Applied Ecology*.

- **Training and capacity building activities** – this should include information on selection criteria, content, assessment and accreditation.

Training was one of the most important elements of the project. Initially we trained the 6 existing field rangers and two nature conservators at De Hoop Nature Reserve. The staff received approximately 4 weeks of initial training working in pairs with the Project Officer followed by 5 months of in-service training and development. Throughout this latter period the staff were constantly monitored and assisted by the Project Officer to ensure that data incorporated into the management database were accurate and of high quality. As the project progressed this role in overseeing the management of the database was taken up by one of the nature conservators who then managed the field rangers in Cape mountain zebra monitoring. The success of the training was formally evaluated in March 2006 using a series of mock 'sightings' created with a photo-book (a copy of the assessment was included with the last annual report). Although the rangers generally performed well some were better at identifying zebra and inputting the data into CyberTracker, whilst others were better at downloading and reviewing these data onto the main computer. As a result of this assessment it was recommended that the field rangers work in pairs in future where their skills compliment each other to ensure the maximum quality of data.

In October 2006 a training workshop was held at De Hoop where field and management staff of Gamkaberg and Kammanassie Nature Reserves were invited to attend along with members of the regional management. The workshop primarily focussed on implementing the Cape mountain zebra monitoring database. Although time was spent using the CyberTracker units this did not form a large part of the training since the preliminary assessment of the reserves had indicated that aerial surveys were likely to be the most effective form of monitoring and CyberTracker may not produce any benefits over pen and paper in this respect (and reviews of CyberTracker were incorporated into a number of management reports produced by the project). The important element of the training was thus to ensure the flow of the correct data from the nature reserves to CapeNature scientific services and so focussing on the database and general censusing issues was of greatest importance. Although the long-term benefits of this element of the training could not be formally assessed by the end of the project the informal feedback from the Mountain Zebra Working Group was positive indicating an increased quality of data being fed to the central database.

5. Project Impacts

- What evidence is there that project achievements have led to the accomplishment of the project purpose? Has achievement of objectives/outputs resulted in other, unexpected impacts?

The purpose of our Darwin project was to “produce sustainable capacity for large mammal management in Western Cape nature reserves through development of icon driven computer software”. That this has been successfully achieved was clearly illustrated in October 2006 when the Project Officer presented the results of our project at the Mountain Zebra Working Group meeting at Mountain Zebra National Park. This meeting was attended by the decision-makers for the management of the Cape mountain zebra meta-population, including members of South African National Parks, Provincial and Private Reserves. It was clear from the meeting that the De Hoop Cape mountain zebra population is now monitored more efficiently than the majority of other populations throughout South Africa and that the framework is in place for such monitoring at Gamkaberg and Kammanassie Nature Reserves. This was in stark contrast to the situation for some other populations where the managers were unable to even estimate the total number of Cape mountain zebra on their reserves. Given that De Hoop had not been able to present a population estimate since 1999 the impact of the project in achieving its purpose is clear. Furthermore, on the strength of this De Hoop offered to host the 2007 Mountain Zebra Working Group meeting. Our Darwin project has created significant momentum within the Mountain Zebra Working Group and a key outcome of the meeting was a unanimous request that further training be made available to all managers and field rangers responsible for Cape mountain zebra populations in both State and private reserves. Although ensuring that field rangers have the capacity to train colleagues in CyberTracker was a fundamental objective of our current project, such training was only envisaged to accommodate staff turnover. As a consequence we are now working with the Mountain Zebra Working Group to fund and support a much larger training network.

- To what extent has the project achieved its purpose, i.e. how has it helped the host country to meet its obligations under the Biodiversity Convention (CBD), or what indication is there that it is likely to do so in the future? Information should be provided on plans, actions or policies by the host institution and government resulting directly from the project that building on new skills and research findings.

Two key areas in which the project has assisted South Africa in its obligations under the Biodiversity Convention are in 'developing general conservation plans' and the 'monitoring of priority components of biodiversity'. Detailed management documents have been produced as one of the key outputs of the project (copies enclosed) and this will allow CapeNature and other South African conservation organisations to implement sustainable monitoring of Cape mountain zebra and other large mammals within the Western Cape. Since the South African National Biodiversity Bill requires that management plans be drawn up for species of special concern the success of the project will thus greatly assist the South African government and the Mountain Zebra Working Group in conserving Cape mountain zebra. The invigoration of the Mountain Zebra Working Group is an important achievement, since its broad base of membership incorporates all stakeholders in Cape mountain zebra monitoring and conservation. The South African National Biodiversity and Action Plan states that all stakeholders should participate in the monitoring and implementation of the National Biodiversity Framework. The working group is thus fundamental to the development of a sustainable meta-population strategy for Cape mountain zebra. In the long-term, the capacity developed by such collaborations will be fundamental to planned reintroductions of large native fauna into CapeNature reserves (including flagship species such as black rhino).

- Please complete the table in Appendix I to show the contribution made by different components of the project to the measures for biodiversity conservation defined in the CBD Articles.

Appendix I completed.

- If there were training or capacity building elements to the project, to what extent has this improved local capacity to further biodiversity work in the host country and what is the evidence for this? Where possible, please provide information on what each student / trainee is now doing (or what they expect to be doing in the longer term).

The project has clearly enhanced the capacity for monitoring of Cape mountain zebra at De Hoop Nature Reserve and this has obviously has implications for the monitoring of all large mammal species (including endangered species such as the bontebok – CITES Appendix II). Similar levels of monitoring should develop for Cape mountain zebra at Kammanassie and Gamkaberg and in the long-term such capacity will facilitate the re-introduction of native fauna to these regions (such as black rhino at De Hoop). All of the field rangers trained as part of the project remain in employment with CapeNature at their original reserves and one (Nickel Fortuin) has subsequently been promoted to the management staff at De Hoop.

- Discuss the impact of the project in terms of collaboration to date between UK and local partner. What impact has the project made on local collaboration such as improved links between Governmental and civil society groups?

The project built on an existing relationship between the Project Leader and CapeNature and as a result of the work over the past 2-3 years the strength of the collaboration between Cape Nature and the UK project partners has grown and both partners are keen to explore way of building upon the success of the project to fully embed the findings of the work into management policy. An additional impact, however, has been on the Mountain Zebra Working Group where we have created a real impetus for enhanced monitoring of Cape mountain zebra and the development of a detailed metapopulation and translocation strategy for the sub-species. Our project has clearly illustrated what can be achieved in a relatively short timescale and the Mountain Zebra Working Group is adamant that the momentum generated by this work should not be lost. This should foster an increased level of cooperation between the government conservation organisations and reserves supporting populations of Cape mountain zebra.

- In terms of social impact, who has benefited from the project? Has the project had (or is likely to result in) an unexpected positive or negative impact on individuals or local communities? What are the indicators for this and how were they measured?

The social impact of the project is difficult to assess since the major achievements have been in the development of conservation strategies for Cape mountain zebra. Nevertheless, informal feedback from the field rangers at De Hoop suggested that they had viewed the training and work on the project positively and that they had a greater understanding of how monitoring data were used. They also had a greater understanding of the Cape mountain zebra population and recognised the movements and association patterns of individually recognised animals suggesting that the project is likely to have had a positive impact on job satisfaction.

6. Project Outputs

- Quantify all project outputs in the table in Appendix II using the coding and format of the Darwin Initiative Standard Output Measures.

All of the project outputs are listed in Appendix II.

- Explain differences in actual outputs against those in the agreed schedule, i.e. what outputs were not achieved or only partly achieved? Were additional outputs achieved? Give details in the table in Appendix II.

The actual outputs produced by the project are largely in line with the original proposal and where slight differences exist this is largely due to extra outputs being produced (for example, additional weeks were spent by UK project staff in South Africa (Output 8: 92 vs 88 weeks) and additional national and international conferences were attended to present the project results (Output 14b: 6 vs 2 conferences). There were no proposed project outputs that were not achieved by the end of the project.

- Provide full details in Appendix III of all publications and material that can be publicly accessed, e.g. title, name of publisher, contact details, cost. Details will be recorded on the Darwin Monitoring Website database.

We are currently preparing three papers for publication in academic journals and one of these has already been submitted to the African Journal of Ecology. Details of the publication outlets will be passed on to the Darwin Initiative as the manuscripts are accepted for publication.

- How has information relating to project outputs and outcomes been disseminated, and who was/is the target audience? Will this continue or develop after project completion and, if so, who will be responsible and bear the cost of further information dissemination?

The principal methods for disseminating the project findings have been in management documents for CapeNature, peer-reviewed publications and presentations at academic conferences. A detailed management report (including reviews of census methodology and CyberTracker, monitoring guides and management recommendations) was produced (copies enclosed) and provided to the key staff at Cape Nature as well as the Mountain Zebra Working Group. The files were provided in such a way that CapeNature could use put together management guides for individual reserves incorporating the documents of greatest relevance. The costs of printing new guides will be borne by CapeNature.

The project findings will also be disseminated through a series of 3 peer-reviewed publications and three conference and workshop presentations have already been made. The Project Officer is due to present papers at the Society for Conservation Biology Conference in July 2007 (Port Elizabeth, South Africa) and the British Ecological Society Conference in September 2007 (Glasgow) ensuring a broad academic audience for the results of the project.

7. Project Expenditure

- Tabulate grant expenditure using the categories in the original application/schedule.

Cost	Budget in Proposal (£)	Actual Expenditure (£)	Difference (£)
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- Explain any variation in expenditure where this is +/- 10% of the budget.

The project was completed within budget and broadly in line with the proposed expenditure in the original application. Three budget areas do show differences of greater than 10%, and the explanations are linked. There is a £1768 overspend on travel although this partly reflects Durham University accounting practice since one international airfare to attend a conference is actually included under travel rather than the conference heading (thus accounting for the £857 underspend on conferences). Combining the two budget headings results in an overspend figure of just £911 (8.6%) for travel and conferences. This overspend is largely explained by the increase in fuel prices since the original application and the effect this had on both airfares and running a vehicle in South Africa. When the projected travel overspend became apparent, therefore, we were able to compensate by sourcing Garmin CyberTracker equipment from America and thus balance the budget overall.

8. Project Operation and Partnerships

- How many local partners worked on project activities and how does this differ from initial plans for partnerships? Who were the main partners and the most active partners, and what is their role in biodiversity issues? How were partners involved in project planning and implementation? Were plans modified significantly in response to local consultation?

CapeNature (formerly Western Cape Nature Conservation Board) were the main overseas partner. CapeNature were involved in the regional coordination of the project and are now responsible for the sustainable implementation of the management plan on a wider scale. Within CapeNature we worked with Dr Donovan Kirkwood (Regional Ecologist), Peter Lloyd (Specialist Scientist - Cape mountain zebra), Dr Helen De Klerk (GIS Scientist), Andrew Turner (Biodiversity Database Manager) and Guy Palmer (Assistant Director), all of whom are based at Jonkershoek Scientific Services. In the latter stages of the project some of the coordination was adopted by Ivan Donian, regional manager for the George (Gouritz Megapark Business Unit) region and responsible for Kammanassie and Gamkaberg Nature Reserves. The Mountain Zebra Working Group (coordinated through Hannes Stadler at CapeNature) became similarly important as the project developed and was the key partner that assisted in the dissemination of the project results to all interested stakeholders in Cape mountain zebra conservation. All of these partners were important at the strategic level and it was an existing relationship between the Project Leader and Peter Lloyd that identified the pressing need for the project and assisted in its planning and development.

At De Hoop Nature Reserve the management of the project was implemented in collaboration with Peter Chadwick, the reserve manager. Peter was particularly important in coordinating the field rangers and with one of his conservation staff (Andrae Marais) took greater responsibility for the monitoring of Cape mountain zebra as the project developed. The importance of these partners in driving forward the project, and ensuring its sustainable legacy, as well as the critical role of Peter Lloyd in planning the original project, is reflected in them being included as authors on the first peer-reviewed publication arising from the work.

- During the project lifetime, what collaboration existed with similar projects (Darwin or other) elsewhere in the host country? Was there consultation with the host country Biodiversity Strategy (BS) Office?

There was no interaction with other Darwin Projects in South Africa over the course of the project, although to our knowledge no other projects were operating in the country at the time. All work was directed through the local government partner, CapeNature, rather than through contact with the host country Biodiversity Strategy Office.

- How many international partners participated in project activities? Provide names of main international partners.

There were no international partners outside of the organisations we worked with in South Africa.

- To your knowledge, have the local partnerships been active after the end of the Darwin Project and what is the level of their participation with the local biodiversity strategy process and other local Government activities? Is more community participation needed and is there a role for the private sector?

The Mountain Zebra Working Group remains active following the completion of the project and a new meeting is planned for late 2007 to be hosted by De Hoop Nature Reserve. There is nevertheless a role for the private sector as the working group moves towards implementing a metapopulation and translocation strategy. Many of the critical Cape mountain zebra populations, including De Hoop, Gankaberg and Kammanassie, are bordered by private farmland. Since our research has shown that transformed grassland are particularly important to Cape mountain zebra collaboration with neighbouring farmers to permit access to their land may be the most efficient way to maximise population growth in these critical populations. Partnerships between government conservancies and private farmers are thus likely to be increasingly important in future efforts to conserve Cape mountain zebra.

9. Monitoring and Evaluation, Lesson learning

- Please explain your strategy for monitoring and evaluation (M&E) and give an outline of results. How does this **demonstrate** the value of the project? E.g. what baseline information was collected (e.g. scientific, social, economic), milestones in the project design, and indicators to identify your achievements (at purpose and goal level).

The goal of all Darwin Initiative projects is to utilise UK expertise in collaboration with overseas partners to assist in the conservation of biological diversity. The purpose of our project was to develop a sustainable methodology for large mammal management in the Western Cape, South Africa, focussing in particular on the endangered Cape mountain zebra at De Hoop Nature Reserve. Prior to our project starting no monitoring data for De Hoop had been received by CapeNature Scientific Services since 1999, and records had been patchy since 1997. This is despite the Cape mountain zebra population at De Hoop being among important, particularly in terms of genetic diversity. By the Mountain Zebra Working Group meeting in 2006, however, it was clear that the De Hoop population is now the among best monitored population, and the reserve was able to provide the most accurate population estimate to the working group. This alone demonstrates the success and value of the project.

The role of monitoring and evaluating the project was the responsibility of the Project Leader, with the Project Officer undertaking the day-to-day management of the project in the South Africa. Evaluation and monitoring were achieved through regular communication between the Project Leader, Project Officer and host country partners, and this was further facilitated through regular visits by the Project Leader to South Africa. The progress and success of the project was assessed against the original project timetable and key milestones, and despite some small delays at the start of the project, all of the key milestones and outputs were achieved on time. Evaluation of the success of this project has thus been relatively straightforward and the work has provided CapeNature with a greatly enhanced capacity in mammal management.

- What were the main problems and what steps were taken to overcome them?

Other than the delay to the initial start date of the project there have been no major problems with the operation of the project and the work experienced only minor difficulties. At De Hoop Nature Reserve, access restrictions to the neighbouring Denel Corporation Overberg Test Range at certain times of year were always recognised as an operational constraint, and minor software issues are to be expected with any computer-based work. In the final stages of the project it became clear that the differences in terrain between De Hoop and the mountainous landscapes of Kammannassie and Gamkaberg meant that the methodology developed for De Hoop wasn't directly transferable and aerial surveys were considered the only viable option for censusing these populations. While CyberTracker can be used in conjunction with aerial surveys (see interim report in last annual report) they may not offer substantial benefits to pen and paper. As a consequence, CyberTracker may not be a necessary component of large mammal censusing and a report on the value and assessment of CyberTracker has been provided to CapeNature for consideration (document included with report) and the feedback was also provided to CyberTracker. Nevertheless the evaluation of census methods should lead to substantial improvements in Cape mountain zebra and large mammal monitoring even if CyberTracker is not adopted as standard across CapeNature reserves.

- During the project period, has there been an internal or external evaluation of the work or are there any plans for this?

An important issue for the project was to identify methods to assess the training progress of the field rangers involved in Cape mountain zebra monitoring and their proficiency using the CyberTracker system. In March 2006 we conducted an assessment of the ranger's ability to use CyberTracker using a written test where 'sightings' were created using a photograph book. Although the reserve had experienced computer problems in the run-up to the assessment, such that CyberTracker had been used only infrequently in the preceding two months, only one field ranger struggled with the task (details were provided in the last annual report). Nevertheless, certain individuals performed better on identifying zebra and data entry than on data download, and vice versa. As a consequence it was recommended that field rangers should work in pairs where their skills are matched.

- What are the key lessons to be drawn from the experience of this project? We would welcome your comments on any broader lessons for Darwin Initiative as a programme or practical lessons that could be valuable to other projects, as we would like to present this information on a website page.

Since the project was successful and ran largely in line with the proposed project objectives and timetable the experience of this Darwin project was generally very good. The only area in which I could foresee potential problems with similar projects in the future relates to the budget and the apparent lack of flexibility with annual deadlines and carrying over funds. It is difficult to predict cost increases at the time of application, particularly in relation to staff costs, and delays to the start of the project (such as the one we experienced) can place pressure on the original budget. Similarly, field-based projects can be subject to delays that cannot be predicted or avoided. If these are close to the end of year then the underspend of costs could represent a problem. This may simply be my impression since it is not a problem that we encountered. Nevertheless, future projects may benefit from not timetabling major new phases of work to commence in the run-up to the end of year where delays could cause budget problems.

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

- Have you responded to issues raised in the reviews of your annual reports? Have you discussed the reviews with your collaborators? Briefly summarise what actions have been taken over the lifetime of the project as a result of recommendations from previous reviews (if applicable).

Two annual reports were submitted during the course of the project. In response to the first report in 2005 the recommendation was that two additional census methods (mark-recapture and indirect signs) were included in our assessment of large mammal census techniques in fynbos habitats. These methods were thus included in our assessment and although mark-recapture ultimately proved unworkable due to a low frequency of accurate identification in census surveys, the indirect methods based on dung sampling did prove viable and the results of this method are currently being analysed.

The feedback on the 2006 report was extremely positive and only two small suggestions were raised, again in relation to the census methodologies under test. It was recommended that two issues be considered (1) the costing of aerial versus ground-based census methods (particularly in relation to staff costs) and (2) the possibility of conducting look-out based surveys of large mammals in Kammanassie and Gamkaberg Nature Reserves to test the comparative accuracy and cost of aerial and ground-based techniques in mountainous regions of the Western Cape. Given the staffing levels at Kammanassie look-out based surveys weren't feasible in staffing terms, but the costing implications of the different survey methods are considered in the final management report for De Hoop.

11. Darwin Identity

- What effort has the project made to publicise the Darwin Initiative, e.g. where did the project use the Darwin Initiative logo, promote Darwin funding opportunities or projects? Was there evidence that Darwin Fellows or Darwin Scholars/Students used these titles?

The project was always described within South Africa as the 'Darwin Project' and the Darwin Initiative logo featured on all of the material produced by the project. The logo appears prominently on the project web site (http://www.dur.ac.uk/r.a.hill/zebra_conservation.htm) and the site is linked from the CapeNature pages and will soon be linked to the IUCN Equid Specialist Group pages as their web site is revamped; both links will increase awareness of the project and the Darwin Initiative even though the formal work has now finished. The logo featured on the poster and leaflets displayed and distributed in South Africa (these were included in an earlier report). This advertising led to Khaki Fever Workwear in South Africa selecting the project for sponsorship. The project receives money from sales of Olive Epauletted Short Sleeve Shirt and the project and the Darwin Initiative are advertised on the clothing tag. Finally, the Darwin Initiative will be acknowledged in all publications arising from the project, one of which is included with this report. There were no Darwin Fellows or Scholars associated with the project.

- What is the understanding of Darwin Identity in the host country? Who, within the host country, is likely to be familiar with the Darwin Initiative and what evidence is there to show that people are aware of this project and the aims of the Darwin Initiative?

The objectives of the Darwin Initiative are well understood by the conservators within CapeNature, the primary project partners in South Africa. Furthermore, through our links with the Mountain Zebra Working Group, the Darwin Initiative has been brought to the attention of almost all of the government conservation organisations and private individuals associated with Cape mountain zebra within South Africa. The sponsorship of the project by Khaki Fever Workwear has ensured that the Darwin identity has reached a far broader audience, however. The fact that the project was approached by this clothing company is evidence of the fact that we had already successfully created awareness outside of individuals directly involved in nature conservation. Since the sponsorship of the project continues, this will ensure a long-term legacy of awareness of the Darwin Initiative in South Africa.

- Considering the project in the context of biodiversity conservation in the host country, did it form part of a larger programme or was it recognised as a distinct project with a clear identity?

Although the project began as a distinct project with a clear identity, the impetus created by the work led to it forming the basis of the future priorities for the Mountain Zebra Working Group. As a consequence the project is now likely to form an important framework for Cape mountain zebra conservation in South Africa, and biodiversity conservation more generally, over the next few years.

12. Leverage

- During the lifetime of the project, what additional funds were attracted to biodiversity work associated with the project, including additional investment by partners?

The Project Officer was successful in obtaining a grant of £2348 from the British Ecological Society (Small Project Grant) to conduct research into “*Resource use by the endangered Cape mountain zebra in unique fynbos habitat*”. This money provided additional transport and consumable costs to allow a detailed assessment of the habitat use and diet of Cape mountain zebra at De Hoop Nature Reserve. The results are currently being prepared for publication and had some important implications for the management strategy for zebra on the reserve, not least since the project has identified animals using concentrating their foraging on transformed grasslands, the conservation of which would be contrary to the management strategies for the native fynbos flora.

As stated above the project has also obtained sponsorship from Khaki Fever Workwear. Although the sums involved are reasonably small at present, they should be sufficient to fund the replacement of CyberTracker units when required. Finally, CapeNature funded the Microlight and helicopter surveys that formed part of the assessment of censusing methodologies at De Hoop.

- What efforts were made by UK project staff to strengthen the capacity of partners to secure further funds for similar work in the host country and were attempts made to capture funds from international donors?

During the initial stages of the project, further funding was sought from a variety of sources including the People's Trust for Endangered Species Scientific Research and Conservation Grants (UK), British Ecological Society Early Career Awards (UK), Crowder Messersmith Conservation Fund (US) and the Seaworld Busch Gardens Conservation Fund (US). Although the feedback was positive we were unsuccessful in these attempts. Nevertheless, we continue to seek additional funding to further support Cape mountain zebra conservation (see 13 below) in collaboration with our South African partners.

13. Sustainability and Legacy

- What project achievements are most likely to endure? What will happen to project staff and resources after the project ends? Are partners likely to keep in touch?

The sustainable monitoring program implemented at De Hoop Nature Reserve is almost certain to persist in the long-term. Given the enormous genetic importance of this Cape mountain zebra population this is a significant achievement that will have long-term implications for the survival of the sub-species. The South African staff involved in the project will remain in post for the foreseeable future such that any staff turnover should not influence the monitoring program in the long-term since a substantial knowledge base will remain. Even if CapeNature do not adopt CyberTracker as standard for all of their reserves (due to the costs of the handheld units and/or limited utility in conjunction with aerial surveys) the general census methodology and Cape mountain zebra databases will remain invaluable. At the very least this will ensure an elevated level of monitoring of Cape mountain zebra at three of the most important populations in South Africa. Similarly, the enhanced profile of Cape mountain zebra and the reinvigoration of the Mountain Zebra Working Group should ensure a long-term legacy for Cape mountain zebra conservation.

- Have the project's conclusions and outputs been widely applied? How could legacy have been improved?

The original proposal was to implement CyberTracker and new censusing methodology at De Hoop, Kammannassie and Gamkaberg Nature Reserves, and to that extent the project has been implemented as widely as anticipated. However, the project's outputs and conclusions were widely publicised at the Mountain Zebra Working Group meeting in October 2006 and there was strong support for implementing the methodology at other reserves with Cape mountain zebra populations. Although the training required for this was not possible within the framework of this project, it is hoped that good practice will be disseminated through the working group. Nevertheless, we are seeking additional funding (see below) to ensure that these methodologies become fully embedded as quickly as possible so that the impetus created by this project is not lost.

- Are additional funds being sought to continue aspects of the project (funds from where and for which aspects)?

Unfortunately a post-project funding application to the Darwin Initiative in 2007 to extend the project legacy through developing a metapopulation and translocation strategy for Cape mountain zebra in collaboration with the Mountain Zebra Working Group was unsuccessful. Since then, we have been in discussion with WWF (South Africa) and European Zoo Equid Advisory Group and have a preliminary offer of support from Duisberg Zoo (Germany). We will continue to seek additional funding in collaboration with our project partners to allow us to push forward with the metapopulation strategy, with applications to bodies such as the Endangered Wildlife Trust and the National Geographic Society planned for the next few months.

14. Value for money

- Considering the costs and benefits of the project, how do you rate the project in terms of value for money and what evidence do you have to support these conclusions?

In today's funding climate with full economic costing, the project represents exceptional value for money. All of the project objectives were successfully achieved and additional outputs to those proposed in the original application were also produced. Given the impetus that this project has provided to the Mountain Zebra Working Group and CapeNature in establishing and acting upon a detailed metapopulation strategy for Cape mountain zebra (including a larger training network for field rangers), the current and future conservation benefits more than justify the expenditure on the project.

15. 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	10%	Develop national strategies that integrate conservation and sustainable use.
7. Identification and Monitoring	30%	Identify and monitor components of biological diversity, particularly those requiring urgent conservation; identify processes and activities that have adverse effects; maintain and organise relevant data.
8. In-situ Conservation	10%	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		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		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		Establish economically and socially sound incentives to conserve and promote sustainable use of biological diversity.
12. Research and Training	25%	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	5%	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		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		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		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		
6a	Number of people receiving other forms of short-term education/ training (i.e not categories 1-5 above)	8: Training of 6 field rangers and two conservators in South Africa
6b	Number of training weeks not leading to formal qualification	26 weeks for each staff member
7	Number of types of training materials produced for use by host country(s)	2: <i>Cape mountain zebra monitoring guide</i> and <i>De Hoop Cape mountain zebra monitoring guides</i> (copies enclosed)
Research Outputs		
8	Number of weeks spent by UK project staff on project work in host country(s)	92 (Project Leader 12 weeks; Project Officer 80 weeks)
9	Number of species/habitat management plans (or action plans) produced for Governments, public authorities or other implementing agencies in the host country (s)	2: <i>Review of Census Methodologies for large mammals in Western Cape Nature Reserves</i> and <i>Cape mountain zebra Management Recommendations</i> (includes a series of sub-documents all proposed outputs – enclosed with report)
10	Number of formal documents produced to assist work related to species identification, classification and recording.	2: <i>Cape mountain zebra monitoring guide</i> and <i>De Hoop Cape mountain zebra monitoring guides</i> (copies enclosed)
11a	Number of papers published or accepted for publication in peer reviewed journals	3: papers in submitted/in preparation: RK Smith, A Marais, P Chadwick, PH Lloyd & RA Hill (in review) <i>Monitoring and management of the endangered Cape mountain zebra <i>Equus zebra zebra</i> in the Western Cape, South Africa</i> . Submitted to <i>African Journal of Ecology</i> ; RK Smith, E Ryan, E Morley E & RA Hill (in preparation) <i>Resource use by the endangered Cape mountain zebra in unique fynbos habitat: resolving management conflicts</i> . For submission to <i>Journal of Applied Ecology</i> ; RK Smith, E Ryan & RA Hill (in preparation) <i>Evaluation of census techniques for large mammals in fynbos habitats</i> .
11b	Number of papers published or accepted for publication elsewhere	1: Hill RA & Smith RK (2007) <i>Bright future for Cape mountain zebra?</i> <i>Darwin News</i> Issue 9, 3
12b	Number of computer-based databases enhanced (containing species/genetic information) and handed over	1: Enhanced and updated Cape mountain zebra database

Code	Total to date (reduce box)	Detail (←expand box)
	to host country	
Dissemination Outputs		
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work	1: Training Workshop on Monitoring Cape mountain zebra at De Hoop Nature Reserve
14b	Number of conferences/seminars/workshops attended at which findings from Darwin project work will be presented/disseminated.	6: Project Leader: Mountain Zebra Working Group meeting 2004; International Mammalogy Conference (Equid Symposium) 2005, Japan; Project Officer: Mountain Zebra Working Group meeting 2004; Mountain Zebra Working Group meeting 2006; Society for Conservation Biology Conference 2007, South Africa; British Ecological Society Conference 2007, Glasgow
15b	Number of local press releases or publicity articles in host country(s)	1: Local press release through CapeNature coinciding with listing of project on web site
19d	Number of local radio interviews/features in the UK	1: Project leader on Radio Teeside
	Web sites	1: Project web site at http://www.dur.ac.uk/r.a.hill/zebra_conservation.htm
	Display posters and information leaflets	1 poster and 1000+ leaflets distributed at De Hoop
Physical Outputs		
20	Estimated value (£s) of physical assets handed over to host country(s)	£8600 – 18 handheld Garmin GPS units for Cybertracker
23	Value of additional resources raised for project	£2600 – British Ecological Society Small Project Grant (£2348) plus sponsorship from Khaki Fever Workwear

17. Appendix III: Publications

Provide full details of all publications and material that can be publicly accessed, e.g. title, name of publisher, contact details, cost. Details will be recorded on the Darwin Monitoring Website Publications Database that is currently being compiled.

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

Details of all peer-reviewed publications resulting from the project will be forwarded to the Darwin Initiative once the manuscripts appear in print.

Type * (e.g. journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (e.g. contact address, website)	Cost £

18. Appendix IV: Darwin Contacts

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

Project Title	Capacity building in mammal management for Western Cape Nature Reserves
Ref. No.	13/014
UK Leader Details	
Name	Dr Russell Hill
Role within Darwin Project	Project Leader
Address	Evolutionary Anthropology Research Group, Department of Anthropology, Durham University, 43 Old Elvet, Durham, DH1 3HN
Phone	
Fax	
Email	
Other UK Contact (if relevant)	
Name	Dr Rebecca Smith
Role within Darwin Project	Project Officer
Address	Evolutionary Anthropology Research Group, Department of Anthropology, Durham University, 43 Old Elvet, Durham, DH1 3HN
Phone	
Fax	
Email	
Partner 1	
Name	Dr Donovan Kirkwood
Organisation	CapeNature
Role within Darwin Project	Host Country Partner
Address	Scientific Services, Private Bag X5014 Stellenbosch 7599, South Africa
Fax	
Email	

19. Appendix V: Logical Framework

<i>Project summary</i>	<i>Measurable indicators</i>	<i>Means of verification</i>	<i>Important assumptions</i>
<p>Goal:</p> <p>To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but poor in resources to achieve</p> <ul style="list-style-type: none"> • the conservation of biological diversity, • the sustainable use of its components, and • the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources 			
<p>Purpose</p> <p>To produce sustainable capacity for large mammal management in Western Cape nature reserves through development of icon driven computer software</p>	<p>i) Re-established monitoring of CMZ at DHPNR, new monitoring implemented at KPNR and GPNR, and a general increase in large mammal censusing</p> <p>ii) Operational icon-driven computer software for use by field rangers</p> <p>iii) Effective management plan for censusing of large mammal populations in Western Cape provincial nature reserves</p>	<p>i) DHPNR management reports, CMZ database</p> <p>ii) Software adopted by WCNCB available from CyberTracker conservation</p> <p>iii) Peer reviewed publications (copies to Darwin initiative); management plan available from WCNCB</p>	<p>CyberTracker continue free software development</p> <p>Continued cooperation from DCOTR</p>
<p>Outputs</p> <p>Increased capacity for mammal surveying and management through staff training</p>	<p>8 field rangers trained in data collection at DHPNR; field rangers act as trainers for staff from other reserves</p>	<p>Field survey reports</p> <p>DHPNR management reports</p> <p>KPNR and GPNR management reports</p>	<p>Current field ranger levels maintained at DHPNR</p>
<p>Enhanced and updated CMZ monitoring and records</p>	<p>Complete population records for DHPNR and DCOTR conservancy</p>	<p>CMZ database available in enhanced electronic format</p> <p>Peer reviewed publications (copies to Darwin initiative)</p>	<p>Continued cooperation from DCOTR</p>
<p>Management plan for mammal surveys and conservation in Western Cape provincial nature reserves</p>	<p>Report on census techniques</p> <p>Recommendations to WCNCB management on future policy</p>	<p>Peer-reviewed publications (copies to Darwin initiative)</p> <p>Management plan available from WCNCB</p>	
<p>Activities</p> <p>Training programs</p>	<p>Activity Milestones (Summary of Project Implementation Timetable)</p> <p>Yr 1: Initial game ranger training (Apr 05) followed by in-service training with field ranger feedback at DHPNR (May 05 – Oct 05); Yr 3 field ranger led training seminar at Potberg for rangers from KPNR and GPNR (Oct 06)</p>		
<p>Software development</p>	<p>CyberTracker software developed for CMZ monitoring at DHPNR by Sep 04; field tests and development to produce final version by Oct 05</p>		
<p>Field research</p>	<p>Yr 1: Monitoring re-established for CMZ at DHPNR with long-term records updated in enhanced digital format by Oct 05; Assessment of CyberTracker software and census techniques completed by Oct 05; Yr 2: Pilot study of CyberTracker software on DHPNR CMZ completed by Oct 06; Yr 3: Introduction and assessment of CMZ monitoring and management plan at KPNR and GPNR from Nov 06</p>		