Darwin Initiative for Biodiversity

The Role of Tourism in the Sustainable use of Big Cats

Final Project Report

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Table of Contents

	Page
Darwin Project Information	2
Project Background/ Rationale	3
Project Summary	3
Scientific, Training and Technical Assessment	7
Project Impacts	12
Project Outputs	14
Project Expenditure	16
Project Operation and Partnerships	17
Monitoring and Evaluation, Lesson learning	17
Actions taken in response to annual report reviews	21
Darwin Identity	21
Leverage	22
Sustainability and Legacy	22
Value for money	25
Appendix I	26
Appendix II	27
Appendix III	32
Appendix IV	33
Appendix V: Logical Framework	34

Darwin Initiative

Final Report

1. Darwin Project Information

Project Reference No.	162/09/015
Project title	The Role of Tourism in the Sustainable use of Big cats.
Country	Zimbabwe
UK Contractor	Oxford University
Partner Organisation (s)	Parks and Wildlife Authority, Zimbabwe
Darwin Grant Value	£74 695.80
Start/End date	September 2003 – September 2005
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2. Project Background/Rationale

This project was a follow-up of Darwin Initiative Project *Big cat conservation and sustainable use in southern Africa* (162/09/015) and is entitled *The role of tourism in the sustainable use of big cats.* The Hwange Lion Project is situated in western Zimbabwe in and around Hwange National Park, the largest protected area in the country. The project was initiated with a Darwin Initiative for Biodiversity grant to investigate the impact of trophy hunting on the lion population of the park. The findings of the original project suggested that trophy hunting did indeed impact the lion population. This finding was taken seriously by the Parks and Wildlife Management Authority of Zimbabwe (PWLMA), our local partners, who greatly reduced hunting quotas in 2004 and implemented a lion trophy hunting moratorium in 2005. We were asked by PWLMA to assist with monitoring of this altered management strategy for lions in the Hwange region. At the same time we were invited to apply for follow-up Darwin Initiative funding by the Darwin Initiative Secretariat. The extended funding made possible by the Darwin Initiative gave us the opportunity to cement the legacy left by the original project.

In addition the project intended to continue the highly successful conservation education programme (Ingonyama players – a theatre group set up to disseminate a conservation message locally). The follow-up project aimed to evaluate the success of this conservation education initiative. The project also aimed to undertake a questionnaire survey to determine what value tourists visiting Hwange attributed to the presence of lions in the park. We aimed to assist PWLMA with setting up a database for recording trophy animals hunted (including digitising over 30 years of historical data) in the Matetsi Safari Area, adjacent to Hwange. Finally the follow-up project aimed to compile a manual introducing census methods to local landowners to encourage a more sustainable approach to hunting quota setting. The final three aims were all in response to a need to highlight a more sustainable approach to management of tourism and trophy hunting, particularly the big cats, in the area around Hwange National Park.

3. Project Summary

The stated purpose of the project was to encourage sustainable use of wildlife resources in Hwange and elsewhere in southern Africa (particularly lions - an important umbrella species), and to highlight alternatives to consumptive use to balance loss of revenue due to reduced hunting quotas, where pressure to shoot lions for hard cash places massive pressure on wildlife populations. We did not alter or modify the original objectives of

the project during the lifetime of the follow-up DI project.

The project had five main objectives.

1) Based on the findings of the initial Darwin Initiative project we aimed to monitor the effect of any changes made to the management strategy for lions in and around Hwange National Park, particularly the effect of changes to hunting quotas. The original Darwin Initiative project recommended that lion trophy hunting quotas be substantially reduced. We anticipated that hunting would be reduced based on meetings with PWLMA and local stakeholders and therefore we expected that we would be able to monitor the response of the population once hunting pressure was reduced. As it turned out lion trophy hunting was entirely suspended in 2005 and we were well placed to monitor changes. This was seen as a very important consolidation of the initial Darwin Initiative project- and a strong justification for follow-up Darwin Initiative funding.

2) Because of our well established relationship with local hunting operators, landowners and PWLMA we were well placed to provide advice on the setting of hunting quotas for wildlife on hunting concessions surrounding the park. Our objective was to formulate and disseminate a document advising stakeholders on censusing wildlife populations in order to allocate sustainable quotas for hunting offtakes. In addition we wanted to highlight the importance of photographic tourism in the area, and particularly the importance of lions to photographic operations. This component of the project was to take the form of a questionnaire survey, targeted at tourists visiting the National Park on photographic safari holidays.

3) The third objective of the project was continue with the very successful conservation education initiative put in place by the initial Darwin Initiative project. We aimed to provide more advanced training for the young actors presenting the conservation education plays. In addition we aimed to undertake a short study to determine if the conservation message presented in the plays was effectively disseminated to local audiences and whether or not this message was understood and retained.

4) Our fourth objective was to facilitate another Lion Conservation Workshop in the series of workshops organised and facilitated by the original Darwin Project, thereby maintaining and building on the network of conservationists in southern Africa that the initial project had set up. We hoped that our experiences in setting up these workshops would catalyse the organisation of high profile international

conference on Felid Biology and Conservation, to be held at Oxford University, UK.

5) Our final objective was to digitise and analyse trophy hunting records from the adjacent Matetsi Safari Area. These records have been maintained since 1974 on datasheets kept at the Matetsi Safari Area headquarters. Our priority was to build a database of all lion and leopard hunts over that period and undertake an analysis of trends. If time and resources allowed we aimed to expand the database to include all the species hunted in the safari area. We aimed to assist the PWLMA staff at Matetsi HQ with setting up the database, providing a computer and training to PWLMA staff in maintenance of the database once the initial data entry had been completed.

In terms of the Convention on Biological Diversity the project aimed to continue to foster co-operation locally and regionally in the field of conservation and sustainablity, drawing on local, regional and international expertise (Article 5, CBD). The follow up project intended to continue to contribute to and put in place strategies, recommended by the original Dawin Initiative Project, for conservation and sustainable use of lions (Article 6a), an important umbrella species and component of the ecosystem and local and regional tourist industry (Article 7a, b, c, Annex I). The follow-up project aimed to continue to foster *in situ* conservation and sustainable use of big cats and other wildlife. by monitoring the effects of altered management strategies (hunting quota reduction) for the lion population in and around Hwange National Park (Article 8, 10, 12). We aimed to continue to train local PWLMA staff, building local knowledge and capacity (Article 12). The conservation education initiative set up by the original project was intended to continue to inform and educate the local community, especially school children on conservation issues (Article 13).

One of the key areas the follow-up project sought to achieve was to assist PWLMA with implementation and monitoring of a lion trophy hunting moratorium. This moratorium was put in place in 2005, in response to the results of the original Darwin Initiative Project. The moratorium has remained in place until 2007. The policy has been reviewed on a yearly basis, with the project providing the data and expertise with which PWLMA decision makers could set quotas for trophy hunting or decide to maintain the moratorium. We have continued to collect demographic and behavioural data for the Hwange lion population. We have also monitored the population demography of the

study area and surrounding hunting areas using an indirect index of abundance (spoor density surveys). This is a more cost effective method of monitoring the population as it does not require capture of study animals or fitting of relatively expensive radio-telemetry equipment. PWLMA staff have been trained in this method and we hope that it will be used in the future to monitor the population and ensure that future lion hunting quotas are realistic and sustainable.

The questionnaire survey designed to determine the value of lions to photographic safaris in Hwange was administered at 13 photographic safari lodges in and around Hwange National Park. The aim was to determine the level of importance tourists attributed to being able to view lions whilst on holiday in the area and whether the chance of viewing a lion in the wild was important in determining whether or not tourists chose to pay for a holiday in Hwange National Park rather than travel elsewhere. We aimed to use this information to derive a value for lions in the area. A total of 484 tourists were interviewed, using a questionnaire survey designed by a UK marketing research company (Added Value, UK).

In collaboration with the French CNRS (Herd project) we produced a population censusing and quota setting manual to assist PWLMA and local landowners with setting of viable trophy hunting quotas in the surrounding hunting areas. This manual was made available locally and distributed to most of the land-owners and wildlife managers.

The project's conservation education initiative (the Ingonyama Theatre Group) continued to operate in the local community supported by the project. The theatre group received training from and were mentored by a professional artist based in the local area. We undertook a survey to determine the impact of the conservation education initiative. This involved administering a questionnaire survey to a sample of 100 school children in the local area who had seen the plays performed by the theatre group. Results suggested that the conservation theatre group was an effective means of disseminating a conservation message to schools in the predominantly rural Hwange area.

A regional lion conservation workshop was held at Mabula Lodge, South Africa and was attended by conservation practitioners from Zimbabwe, South Africa, Botswana, Kenya, UK, USA and Denmark. A proceedings of this workshop was published and disseminated to all participants and widely within the wildlife conservation fraternity in southern Africa. A spin-off result of this and previous lion workshops is the planned Felid Conservation Biology conference to be held in Oxford in September 2007. This will be attended by most of the participants in the lion workshops organised and facilitated by the project.

Finally we set-up a computer database and digitised trophy hunting data collected from 1974 to 2005 at the Matetsi Safari Area. We began by inputting only data for the big cats (lion and leopard). However in 2006 the project arranged for three Oxford Masters students to digitise the remaining data. This included trophy hunting data for elephant, buffalo, kudu, eland, reedbuck. Impala, warthog, sable and waterbuck. This amounted to over 17 000 trophy hunting records and is set to be an invaluable management and research resource. We have undertaken preliminary analyses on trophy trends for these species and hope to publish these data in a peer reviewed paper.

4. Scientific, Training, and Technical Assessment

- **Research**

Monitoring the impact of trophy hunting

While there has been a general decline in lion populations across the African continent, one view is that with careful management sport hunting can be sustainably managed and, perhaps counter-intuitively, even contribute to the conservation of the species. However, until recently, high quotas in western Zimbabwe (3-6 times higher than in equivalent areas of Tanzania) were allocated to sport hunt lions each year in the hunting concessions neighbouring Hwange National Park. These quotas were set with little or no ecological information on the lion population, or indeed on the impact of these levels of hunting on the sustainability of the population. The early findings of the project indicated that male lions were hunted at levels which had a serious risk of becoming unsustainable. We found that on average 40% of the adult male lions in our study area were shot each year with over 70% of radio-collared males lions shot over the entire study. This off-take is ten times the recommended sustainable harvest of males from a population of large carnivores. The adult population was also found to be heavily biased towards females (with only around 13-18% of adults being male compared to around 30% in an undisturbed population). The low density of adult males may also be responsible for a number of behavioural anomalies in Hwange males. Male lions in Hwange always consort with two or three female prides (occasionally more) and move extensive distances between prides. In contrast, in undisturbed populations most males consort with a single pride and only large coalitions of males are generally able to dominate more then one female pride. Furthermore, low male density induces males to traverse extensive areas in search of mates without encountering competing males. This greatly inflates the ranges of males and intensifies their vulnerability by increasing the probability that they will leave the protection of the National Park.

Since 2005 we have monitored changes in the lion population resulting from the hunting suspension. Perhaps unsurprisingly one of our key findings has been that the number of male lions in the population has increased dramatically now that large numbers of males are no longer removed from the population. As an illustration, between 2003 and 2004 we had 9-10 males in 7 home ranges in the study site. During 2005 the number of adult males increased to 17 and the number of home-ranges increased to 11 within the same area. This is strong evidence that sport hunting outside the park did in fact have substantial impact on the park population and provides justification for altering management policy for lions in the areas around the park. Monitoring these changes (which now takes the form of a large scale experiment, comparing pre-suspension and post-suspension phases), offers what we believe is a unique opportunity to further explore the fundamentals of lion socio-ecology, and to understand processes that will be relevant to lion populations depleted (for whatever reason) by people elsewhere.

The main opportunity provided by the follow-up DI project was the implementation of a sustainable, scientifically sound management strategy for lions in the Hwange National Park area, including limited sport hunting at levels that would not impact the behavioural ecology and conservation status of the park population. The collection of these crucial data on the recovery of the population in the absence of sport hunting is ongoing. These findings will be critical in underpinning the implementation of future conservation management policy when sport hunting is finally re-introduced in the area and ensure that hunting quotas do not return to previously unsustainable levels. This will achieve our key goal of ensuring the viability of the Hwange lion population into the future and enable us to learn and disseminate lessons on the conservation of big cats in protected areas. These in turn can be applied to similar problems elsewhere.

Determining the value of lions to local tourism

A questionnaire survey designed to determine the value of lions to photographic safaris in Hwange was administered at 13 photographic safari lodges in and around Hwange National Park. The aim was to determine the level of importance tourists attributed to being able to view lions whilst on holiday in the area and whether the chance of viewing a lion in the wild was important in determining whether or not tourists chose to pay for a holiday in Hwange National Park rather than elsewhere. We aimed to use this information to derive a value for lions in the area. A total of 484 tourists were

interviewed, using a questionnaire survey designed by a UK marketing research company (Added Value, UK).

The survey was administered at random by Ms Kate Smith (one of the project staff members) and represented a cross section of tourists visiting the Park. The results of the survey are expected to form part of Mr Zeke Davidson's D.Phil. thesis at Oxford University, which will contain a full analysis of the results. However preliminary analyses show that lions are one of the most popular and sought after species present in the national park, with over 25% of those interviewed stating that lions were the species they would most like to see during their game viewing holiday. Furthermore 24% of interviewees stated that they would not come on holiday to Hwange if they knew that lions were not present in the park. We were able to calculate the average annual revenue for a tourist lodge in the Hwange area during the study based on rates and tourist occupancy. Using this figure we were able to determine, based on the proportion of tourists who stated they would not visit Hwange if lions were not present, the revenue that would be lost if lions were extirpated from the park. The loss of revenue would theoretically amount to US$80 000 per lodge per year. We used this value as a measure of the annual value of maintaining a healthy lion population in the park for an individual tourist lodge. The findings and conclusions of the study were complicated by a crash in the number tourists visiting Zimbabwe during the study. Nevertheless the study provides a 'minimum' value of maintaining a viable lion population- during a period when tourism revenues were severely depressed. Values could be expected to be much higher if tourism volumes were to return to levels seen in early to late 1990s. However it is clear that lions are integral to the wilderness 'product' that tourists travel to Hwange National Park to experience. Extirpation of lions would result in a loss of revenue to local photographic tourist operations and this should be reflected in management strategies for the species. Once the data are fully analysed we hope to publish this study in a relevant peer reviewed journal.

Evaluation of trophy hunting and trophy quality over 30 years in Matetsi Safari Area.

Details of every animal shot at MSA over the last 32 years have been recorded by PWLMA. This data was digitally harvested by entering all paper carcass records kept between 1974 and 2005 into a Microsoft Access database constructed prior to fieldwork. This database records all information provided by the paper records. Carcass records provide the following information either in part or in totality about every animal shot in MSA since 1974: concession unit; species; date; parks reference number; cost; locality; sex; age; trophy; status; whether lower jaw was collected; client; notes; trophy attribute;

and trophy measure. The combination of the unit, species, date and parks reference number makes up a key for each record, which is unique to that individual animal. The parks reference number is assigned as either T or M primarily, referring to *trophy* or *management* animals respectively. Trophy animals are those hunted for their trophy attribute, and are always adult males, with the exception of leopard, in which females were formerly recognised as trophies too. Management animals are shot for the purposes of culling or for meat which goes to rations, bait or is sold. The revenue recorded is the amount paid by the client to the PWLMA for hunting that animal and is not the entirety of the cost incurred by the client. Locality refers to the area within each unit where the animal was shot. Age data was found to be incompletely recorded in the carcass records. Trophies are not aged individually but MSA officers wait until a significant number of lower jaws have been collected and then age several at once, based on the development level of teeth. Therefore, often, the information is recorded elsewhere. Trophy status refers to whether the animal was killed, wounded or captured. Whether or not the lower jaw was collected is recorded because if collected, it may be aged, so the likelihood is that elsewhere, age data is available for the animal. Each record reports the name of the client who shot the animal, and a box is provided for any further information that is pertinent. The trophy type collected (e.g. skull or horn) and its measurements are finally recorded.

Analysis of the data aims to determine if and how trophy size has changed through time. Trends were analysed for the entire group of each species, but also for the sub-group comprising the largest few trophies taken annually. (It is likely that larger trophies will be shot preferentially to younger and smaller trophy animals. As such, whether these most attractive trophy animals remain within the population may prove to be a powerful early marker of wider population problems. If a decrease in trophy quality is occurring, it may first be seen in the largest trophies).

Also available at Matetsi are age and utilisation records. Utilisation records are information about the quota and the degree to which it was achieved per year. This data has also been digitised, this time directly into a Microsoft Excel spreadsheet to investigate big game availability trends and quota utilisation figures. These are commonly viewed to be proxies for prey abundance, that is the abundance of the particularly sought after larger trophy animals. An underused quota may indicate a lower probability of success possibly due to fewer animals being available. Investigation of the extent to which the quota itself changes over time will highlight managers' perceptions of

changing population sizes.

The data entered into the database was analysed and written up in three Oxford Master's theses (details are tabulated in Appendix III). We are in the process of preparing a scientific paper for submission to a peer reviewed journal. The results indicate that for certain species declines in trophy quality have occurred (sable, buffalo, reedbuck, lion, waterbuck and impala), most likely due to high hunting quotas and selective removal of territorial males from the population. Other species showed no trends (e.g. leopard) or increasing trophy quality (e.g. elephant, warthog, kudu and eland), suggesting that trophy hunting of these species was sustainable. While long term analyses of trophy trends have been undertaken for European and North American species this may be the first data set analysed for African trophy species and could potentially go a long way to informing management of these species for sustainable utilisation.

Theatre Group Impact Survey.

The aim of this survey was to investigate the impact that the Ingonyama Theatre Group had on conservation awareness in the Hwange area. More specifically, the study's main focus was to assess the extent to which the conservation messages dramatised by the theatre group were received and understood by its school-aged audience. The 'impact' of the initiative to be investigated was therefore best understood as an assessment of the comprehension and assimilation of the conservation messages by the children who had attended a performance of the Ingonyama Players. Any investigation or measurement of how the messages may have impacted upon behaviour are beyond the remit of the study. The survey was undertaken in five local schools with a total of 100 school students interviewed. A full explaination of the rationale, methodology and results of this survey is included in the write up of this survey (Telford, J. 2006. Study of the Impact of the Ingonyama Theatre Group on Conservation awareness in the Hwange area), which accompanies this report.

While it is clear from our findings that the Ingonyama Players is not the sole source of information on conservation and that these school children are exposed to a range of messages – at home, at school and through other conservation initiatives such as the Painted Dog Project bush camp. What is unique about this programme is that it harnesses a medium that is easily understood, is accessible, and which is highly enjoyable. As such it has an important role to play in making conservation something

more than a subject that is taught as part of the curriculum. It is something that is regarded as fun and the actors of the Ingonyama are heroes and role models at the same time. They are aspirational figures and accordingly their message is well received and regarded as something important and worth listening to. The Ingonyama Players do fulfil a useful and important niche within the community and act as a conduit for information to flow seamlessly and effectively from conservationists and researchers to the local communities.

- **Training and capacity building activities** –

The follow-up project did not include specific training components, however the project did provide training to PWLMA staff throughout the project. Ecological staff accompanied project staff on most fieldwork and gained exposure to methods used to monitor populations through spoor density tracking, capture and radio-collaring of study animals and radio-telemetry. The project provided computer and database management training to ecological staff at Matetsi Safari Area headquarters. A computer and software were donated, improving the capacity of PWLMA staff to update, collate and analyse hunting trophy records in Matetsi safari Area.

5. Project Impacts

The purpose of the project was to encourage sustainable use and conservation of wildlife resources (in particular big cats), in the Hwange and the southern African region. At the centre of the follow-up project was the implementation of a moratorium on the trophy hunting of lions around Hwange National Park. This has had huge impact both on the population dynamics of the Hwange lions and on conservation policy. This is the first time a measure such as this has been taken in Zimbabwe. The project has been central in setting up the moratorium and monitoring the effects. This has had a large impact on the sustainability of the local lion population. In addition we have provided technical expertise to assist PWLMA with wildlife census techniques and quota setting for species other than lions. We have helped to set up a trophy hunting database for big cats and other species and have provided training to PWLMA staff to maintain and update the database in the future. This has improved the capacity of PWLMA to manage hunting resources. Analysis of trophy trends is an effective way of monitoring the sustainability of trophy hunting and provides a means by which appropriate trophy hunting quotas can be set and assessed. This potentially has a substantial effect on the way in which this resource is managed into the future. Finally

the project has had impact by setting up during the original project and maintaining during the follow-up project a network of regional conservationists involved in large carnivore conservation. This has encouraged exchange of ideas and collaborations *within the region.* The project works closely with local landowners and with the local PWLMA staff to assist with the technical aspects of quota setting and wildlife management. The core area of the project's work is ensuring that use of the lion population in Hwange is sustainable in the long term, this will ultimately benefit hunting operators, photographic tourism operators, land owners and local people.

The project has had an impact in the local community. The conservation education initiative is active within local schools and is composed of nine local people as part of the theatre group, providing much needed employment in the area. While the aim of the initiative was to increase education and understanding of environmental issues, it has also delivered additional results in unexpected areas. Some examples are outlined below.

Two members of the Ingonyama Players resigned from the group to take up full time formal employment with the Parks and Wildlife Authority. Owing largely to their experience with the group, and their exposure to the project, both Nkululeko (Freedom) Hlongwane and Philani Dladla were able to secure posts in the ecological section at Hwange Main Camp. Mr Hlongwane has received further training in computer literacy and ecological monitoring, and thrives in his role as a field ecology ranger where he prepares biological records and type specimen collections while on patrol with the parks management units. Philani has gone on to become an indispensable part of the clerical team at Hwange's Main Camp management office.

In 2004 the theatre group recorded a CD featuring songs written and performed by themselves. All the lyrics, vocal arrangements, and sound effects are their own. And this is despite the fact that the group members, now numbering 9 young men in total, have had no musical training and they do not read music or play instruments other than the traditional drum. All are from Dete or the very poor rural surrounding areas and all have minimal formal education. The songs reflect on subjects as diverse as the difficulties of life in rural Zimbabwe, relationship problems, and pride in the group's work. This CD has been distributed throughout Europe and North America amongst their growing network of supporters and has received much acclaim. A copy of this CD accompanies this report.

Project Outputs

Project Outputs are listed in Appendix II. Publications and project materials are listed in Appendix III.

Project results have been disseminated at the following fora.

Project staff attended the Johannesburg Regional Conservation Strategy meeting for the lion in Eastern and Southern Africa (8-13th January 2006). We contributed to one of the main working papers at this meeting (see Packer et al 2006 in Appendix III). This meeting was attended by delegates from all southern and East Africa lion range states, which ensured wide dissemination of project findings. A full report of this meeting, prepared by the IUCN-SSC cat specialist group is available at *www.felidae.org*.

In collaboration with other workers we presented a talk at the IUCN Sustainable Use Specialist Group conference, held at the Zoological Society of London in September 2006. This talk highlighted some of the findings of the project. In addition we presented a short talk on the project at the South African Wildlife Management Association conference, South Africa in October 2004. Finally the work of the project has been presented at one international and one national lion conservation workshop. The international workshop was held at Kasane, Botswana in February 2005, the national workshop was held in Harare in October 2006. The Harare workshop was held to produce a National Conservation Strategy for the African Lion in Zimbabwe. Findings of the project on the impact of trophy hunting of lions was presented at this forum.

The proceedings of the lion conservation workshop facilitated by the Darwin Follow-up project- held at Mabula Lodge, Johannesburg, RSA was distributed to all participants, local wildlife management departments in South Africa, Botswana and Zimbabwe. A copy of the publication accompanies this report. Additional copies of this report are available on request from *www.wildcru.org*.

6. Project Expenditure

Budget category	Darwin Budget	Expenditure
Staff costs		
Rents, rates, lights, heating, cleaning and overheads		
Office costs		
Travel and subsistence		
Conferences, seminars		
Capital items		
Other costs Overhaul of equipment Running costs		
Total Cost		

The total budget (including DI and leveraged funds) for the Darwin follow-up project was £131 469 in year one and £72 690 in year two (total £204 159). The Darwin Initiative component of the project's funding totalled £60 129.80 in year one and £14 566 in year two, totalling £74 695. In addition we were able to leverage a total of £89 127 during the lifetime of the project, along with £49 635 of funding originally in hand giving a total of £138 762 raised in addition to DI funding. With funds from the Darwin Initiative the total running budget for the project was £213 457.

Finances from leveraged funds were used to cover office costs, conferences and capital items and to augment DI funds in all other budget categories. In all other budget categories expenditure was within the 10% leeway permitted by the Darwin Secretariat with the exception of project running costs.

Overspend in this budget category was largely due to escalating costs and unavailability of consumables such as fuel, vehicle parts and local staff salaries between 2003 and 2005. Because of widespread unavailability of fuel in Zimbabwe throughout

most of the project period (and indeed up until the present time) the project was forced to import fuel from South Africa through local fuel companies rather than buying fuel at fuel stations when required. This greatly inflated running costs. Similar problems were faced when obtaining most consumables in the country.

7. Project Operation and Partnerships

Our local partner was the PWLMA. One of the main goals of the project was assist the PWLMA with implementation of a lion trophy hunting moratorium. We have worked closely with local ecological staff in PWLMA and continue to provide the technical input required to monitor the moratorium. Because the Hwange lion project continues to function we have maintained the essential partnership with PWLMA.

During the project we collaborated with another former Darwin Initiative project, also based near Hwange National Park, the Painted Dog Conservation Project. Staff from this project (Ms W. Blakeley) assisted this project with mentoring and training of the theatre group. In the future we plan to integrate some of the activities of the theatre group with conservation education delivered by the Painted Hunting Dog 'Bush Camp' (a learning environment for local school children). Details of this potential collaboration are given in the attached conservation education initiative report (Telford, J. 2006. Study of the Impact of the Ingonyama Theatre Group on Conservation awareness in the Hwange area). In addition the two projects shared fuel imports, greatly reducing the logistical difficulties of doing so.

8. Monitoring and Evaluation, Lesson learning

At the outset of the project we set ourselves the following targets to demonstrate that the project was achieving the project purposes and through these the main goal of sustainable use of lion populations in the Hwange area. All the main project goals were achieved over the lifetime of the project. There has been no external evaluation of the Project, apart from peer review of a scientific papers published.

1) During project:- The field study collars 30 lions and monitors these study animals during study period. At end:- New data analysed and compared with data already collected on the population.

By the end of the follow-up project the project had radio-tagged over 70 lions in Hwange

National Park and collected data on all these animals. These valuable datasets are currently being used to compare demographics of the lion population during a period when trophy hunting mortality was severe, with a period when trophy hunting has been suspended. One scientific paper has already been published on the impact of trophy hunting of lions. We are currently in the process of analysing more recently collected data for publication. These data will contribute to the way in which management policy for sustainable use of lions in and around Hwange NP s formulated over the coming years. This was the core purpose of the follow-up project.

In addition much of the data is derived from GPS telemetry. These data are very high resolution and we are currently exploring collaborations with colleagues from Hwange and CNRS, France who have collected data on herbivore densities and distributions in Hwange over a contemporaneous time period. We hope to explore some of the theoretical aspects of foraging behaviour in lions- using fine scale lion movement patterns from our GPS data and herbivore distributions and densities. This is an additional use of data collected by the Darwin follow-up project and adds value over and above that of the data collected on the impact of trophy hunting.

2) During project:- Approximately 300 tourists interviewed. At end:-Results survey analysed and value of wildlife to photographic tourism highlighted.

This component of the project went ahead as planned as outlined above. A total of 484 surveys were administered and preliminary analyses of these data undertaken. Early results suggest that lions are an integral part of the tourist package that photographic tourists travel to Hwange to experience. Loss of lion populations would have an impact on tourist revenues. Photographic tourism is another form of sustainable use that attributes value to lions and provides incentives for conservation. Revenues from photographic tourism can be used to offset reduced hunting revenues. These data will contribute to our knowledge of sustainable use of this species.

3) During project:- Conservation liasion officer and conservation education theatre group in place, community education carried out. Penetration survey carried out by CLO and project staff. At end:-Results analysed and disseminated.

The conservation education initiative continued to function both in the local area and more widely. Conservation education plays continued to be presented in local schools by the Ingonyama Players (the theatre group set up by the original Darwin Project). The theatre group was supported by leveraged funds raised by the project. The use of a conservation liaison officer was not as practical as we had at first hoped. The person we had hoped would undertake this role was Mr N. Hlongwane. Unfortunately for the project

he moved into a more formal role within the research branch of PWLMA. While this was unfortunate for the conservation education initiative the training we had provided for Mr Hlongwane during the project went to augment capacity within the PWLMA to undertake research, which in itself was a desirable outcome. We filled the CLO position through the voluntary mentorship by an American performing artist, Ms W. Blakeley, who works with the Painted Dog Conservation Project Arts Centre in the local area. The Ingonyama Players have had the opportunity to travel to Namibia on three occasions over the last two years. They have performed conservation plays and other material at schools in the Windhoek area. In addition the group performed at the Harare Arts Festival in 2006 and met with wide acclaim. We undertook an evaluation of the effectiveness of theatre as a means of disseminating a conservation message in local communities. This short study was undertaken by Ms J. Telford, an Oxford sociologist. Details of the study are given in the accompanying report. The study shows that conservation plays performed in schools were well received by school children and that broadly speaking the conservation message was discernable and was retained by the children. The study recommended various ways in which the presentation could be improved, including closer ties with other conservation groups in the area. These recommendations are currently being implemented.

4) During project:-Regional workshops organised and proceedings compiled.

The project organised and facilitated a Lion Conservation workshop at Mabula Lodge, South Africa in early 2004. This was attended by conservationists from the southern African sub region including Zimbabwe, Botswana, South Africa, Kenya. International conservationists from Denmark, UK and USA also attended the workshop. A proceedings entitled 'Lion Conservation Research- workshops 3 and 4: from conflict to socio-ecology' was compiled and published. The accompanying copy of this report includes lists of participants at the two workshops. We had originally intended to hold another workshop in 2005, however a number of international lion conservation workshops (in Douala Cameroon and Joburg, South Africa) were planned for this period, hosted by IUCN-SSC, to discuss the conservation status of the African lion and put in place conservation strategies for this species. As most of the core network of conservationists involved in the four lion workshops organised by this and the original Darwin project were involved in the planned IUCN meetings it was felt that additional fora at which the group could meet were unnecessary and potentially a duplication of effort.

5) At end project:- Results of study disseminated in final Hwange workshop, attended by

DNPWLM and stakeholders.

A number of workshops to disseminate the work and findings of the lion project were held and attended towards the end of the project period. In particular, project staff presented results of the project's monitoring activities at PWLMA trophy hunting quota setting meetings in 2005 and 2006. These meetings, based on results presented by the project, resolved to keep the lion trophy hunting ban in place until at least the end of 2007.

6) During project:- Databases set up and DNPWLM staff trained to maintain them.

The project, with the assistance of three Oxford University Masters students, set up a trophy hunting database for the Matetsi Safari Area adjacent to Hwange National Park. Training and computer equipment were given to the local ecological staff at the Matetsi Safari Headquarters. Historical trophy hunting data were digitised into the database and preliminary analyses of trophy quality trends for a number the key trophy species (including lion) were undertaken. Three Masters Research projects were written up on the basis of these analyses. A scientific paper is currently in preparation. The database has been handed over to PWLMA and new data will be added to the database in the future by PWLMA staff.

While for the most part the project ran relatively smoothly we did encounter a number of problems, mostly stemming from Zimbabwe's declining economy, spiralling inflation and political instability. We found that the logistics of functioning as a research project became increasingly difficult, commodities such a fuel and spare parts for vehicles became scarce. Extremely high inflation made financial planning a challenge. This made the running costs of the project more expensive and the project had to import its own fuel (in collaboration with other research projects in the area) at premium prices from South Africa, via fuel companies. Planning for shortages of fuel and other commodities and sourcing these items was time consuming and often frustrating. Nevertheless despite this and similar supply problems we were still able to undertake fieldwork. Additionally both PWLMA and the project have come under political pressure because of the lion trophy hunting moratorium, despite the fact that the moratorium is generally perceived as beneficial and supported by professional hunting guides and landowners. Political involvement in illegal lion hunting and a desire to conceal these illegal activities has placed a great deal of pressure on PWLMA managers. Nevertheless it seems that despite this pressure PWLMA are resolved to ensure that the moratorium remains in place for as long as is necessary. Data that the project is able to provide goes a long way in providing the necessary justification for doing so.

The original Darwin Project was hugely successful with a wide network of contacts made locally and internationally and produced a very tangible set of results. The findings of the project- that trophy hunting of lions was most likely unsustainable in the hunting concessions around Hwange- were presented and taken seriously by the Parks and Wildlife Management Authority. These findings catalysed major changes in management policy for lions in western Zimbabwe just as the original Darwin Project funding ended. The 2005 ban on trophy hunting of lions was (and is) an unprecedented conservation success. The outputs of the follow–up project are no less crucial. With the follow-up project in place we were able to cement the changes in management policy and ensure that these were implemented. Because policy changes are often made slowly and with input from a wide range of stake-holders (in this case local landowners, professional hunters, PWLMA researchers, PWLMA decision makers, government officials and external researchers) it is crucial that projects such as the Hwange Lion Project stay in place over the long term. Without the follow-up funding the lion hunting moratorium would probably not have been implemented, or at least only partially implemented, and may have been quickly reversed. The project continues to provide crucial monitoring data and is a major stakeholder when it comes to making future management decisions as management policy for lions evolves in Zimbabwe. For us, a key lesson is that the long term conservation legacy of a project is often determined by its ability to change conservation policy. This is often only possible with long term commitments from project staff, local institutions and external funders. This is the area where this Darwin Initiative follow-up project has been enormously successful.

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

Reports to date have been positive. One suggestion was that reporting should distinguish more clearly between the initial Darwin Initiative Project and the Follow-up Darwin Initiative Projects. We have attempted to do so in this report.

10. Darwin Identity

The Darwin Initiative name and logo has been used on all our publications and every effort has been made to link the Darwin logo with the identity of the project. The Darwin logo is displayed conspicuously on project publications and website and the Darwin Initiative has been acknowledged in published peer reviewed papers. The project was not part of a larger programme as was recognised locally and amongst other donors,

partners and participants as a distinct project.

11. Leverage

During the lifetime of the follow-up DI project we were able to leverage additional funds amounting to a total of £89 127 to continue the work of the project and support project staff. We received two grants from the Disney Conservation Fund and a grant from Marwell Preservation Trust to support core project staff and costs
and two grants from the Eppley Foundation for Research to support Dr Loveridge's postdoctoral salary . Our conservation education initiative received support from the Simon Gibson Charitable Trust and Mitsubishi Fund for Europe and Africa . In addition we were able to leverage a number of donations from private individuals . These funds were all leveraged on the basis of having in existence a functional research project and ongoing research with partial funding from the Darwin Initiative. In addition to financial support, our fieldwork was supported in kind by a number of safari operators in the area (Wilderness Safaris, The Hide safaris and Miombo safaris). These operators provided access to their concessions, accommodation and logistical assistance while working in their areas. Due to the constraints of the current economic environment in Zimbabwe the Parks and Wildlife management Authority, our local institutional partner, was unable to provide financial assistance. However the Authority supported the work by allowing the project to utilise rangers and staff from the research section at Hwange Main Camp to assist with research and by allowing the project to use a house and aircraft hanger at minimal cost. Since the end of the Darwin Initiative follow-up project we have raised a total of £111 700 from charities in the USA to support future work undertaken by the Hwange Lion Project. This work will strengthen ties with local partners in Zimbabwe and continue the conservation work the project has undertaken over the last 6 years.

12. Sustainability and Legacy

In terms of legacy the main output of the project has been to assist PWLMA to implement and monitor a lion trophy hunting moratorium. This output has had very real impact on the way that the lion population is managed in western Zimbabwe. The implementation of a lion trophy hunting moratorium in the areas around Hwange National Park is a huge achievement- particularly considering the unstable socio-political environment in Zimbabwe. The fact that the moratorium was implemented in 2005 and is still in place is due in no small part to the fact that, thanks to DI post project funding, the project was able to continue. While it is probable that lion trophy hunting will be

reintroduced in the hunting concessions around Hwange, our understanding, gained during both the original and follow up Darwin projects, of lion population dynamics in the area is likely to be used to dictate the quota levels and ensure that any future exploitation remains within sustainable limits. Improved understanding of the impact of trophy hunting on this lion population and resultant improvements in management is a lasting outcome of the project. Furthermore our assistance with wildlife population monitoring and the technical manual we have produced in partnership with PWLMA and CIRAD will assist in setting and maintaining viable and sustainable trophy hunting quotas for many of the species in the area. The databases we have set up, along with training of PWLMA staff, in the adjacent hunting areas will provide a basis for long term monitoring of local wildlife populations into the future.

The project has facilitated a number of workshops on lion conservation, one of which was organised as a direct result of the follow up Darwin Initiative project. A workshop proceedings entitled '*Lion Conservation Research. Workshops 3 &4: from conflict to socioecology'* has been printed. This workshop report has been widely distributed. Our involvement in facilitating and organising the four lion conservation workshops during the original and follow-up DI projects has catalysed the organisation of an international Felid Conservation Conference, to be held in Oxford in 2007 (see www.felidconf2007.co.uk). We will also edit a book on the Conservation and Biology of Wild Felids (contract agreed with Oxford University Press, book to be edited by Prof. D.W. Macdonald and Dr A. J. Loveridge). Although both conference and book will have a much broader remit than just conservation and management of African lions, the network of contacts we have created during the Darwin project forms a core of expertise that will be at the heart of the conference. Many of the conservationists who attended the lion workshops will also play a significant role at the Oxford conference and will be key contributors to the Felid Conservation and Biology Book.

Our theatre based conservation education initiative – Ingonyama Players has continued to operate in the Hwange area. We undertook a short study to determine if messages in the plays performed by the theatre group were accessible and easily retained by the school audiences the plays were performed for. The study indicates that the message is appreciated and understood, which suggests that the plays could potentially have impact on conservation orientated behaviour in the local community. Schoolchildren clearly value and appreciate the need to conserve natural resources, however future behaviour might equally be determined by socio-economic factors in the face of worsening poverty in rural Zimbabwe. The project continues to support the conservation education initiative and has sourced funding from the Mitsubishi Fund for Europe and Africa for 2007 and

potentially 2008. In addition a Community Arts worker has joined our team at Hwange and we hope to expand the remit of the conservation education project in local schools.

The Hwange Lion Project is set to continue. Our original objectives of investigating the impact of trophy hunting are still relevant in that we continue to monitor population recovery in the absence of trophy hunting. In addition to the issue of trophy hunting it is clear that lions are heavily impacted by illegal snaring and illegal problem animal control (by local pastoralists). A new component of the project will be to investigate the impact of illegal (killing of lions by local people on the park boundary) and accidental killing of lions (in snares and traps set for wildlife) as well as an investigation of the impact of lions (through livestock raiding) on the livelihoods of local people in areas around the park. The project aims to look for solutions to these conflicts thereby improving prospects for the lion population and potentially enhancing local livelihoods (by introducing improved livestock husbandry). The project staff and resources put in place by the original and follow-up DI project are still in place in Hwange National Park and will form the core of future work. We have already sourced additional funding from private donors to support both population monitoring and the linked investigation of human-lion conflict.

Lion conservation and management have become a major focus in international conservation circles. In January 2006 a lion conservation and management forum was held under the auspices of IUCN-SSC in Johannesburg, South Africa. Insights gained on the impacts of hunting by this project were widely disseminated at this forum. Dr Loveridge was asked to co-author the IUCN working paper entitled '*Impacts of Trophy Hunting on Lions in East and Southern Africa: Recent offtake and future recommendations*' (see below for full reference). The workshop was attended by conservation professionals and governmental representatives from the whole of eastern and southern Africa and this ensured wide dissemination of project results.

As noted above additional funds have been sought and obtained to continue the work of the Hwange Lion Project in Zimbabwe. These funds were raised from charities in the USA and will be used to undertake further research on large carnivores in Hwange National Park and to continue to support our local conservation outreach and lion population monitoring work.

13. Value for money

Through leveraging funding from other sources, based on having follow-up DI funding in place, we were able to more than double the funding allocated to this project after the

end of the original Darwin Project. In addition we already had in place equipment and personnel from the original Darwin Project. Much of the equipment required only to be overhauled which was considerably cheaper than purchasing new equipment for the project. This greatly increased the cost effectiveness of the follow-up funding work, allowing us to allocate resources to staff costs and ensuring that running costs were effectively resourced. This greatly increased what we were able to achieve.

Follow-up funding enhanced the benefits of the original project and ensured that outcomes from the original project were consolidated. Continued investment in the project ensured that the results of the original Darwin Project (and the funding invested by DI in this project) had a long lasting impact. Greater impact and long lasting legacy will provide extensive value for money over the coming years as policies implemented during the follow up project affect conservation and sustainable use of lions in the Hwange area. It is possible that without follow-up funding none of the changes in policy could have been achieved.

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

Project Contribution to Articles under the Convention on Biological Diversity		
Article No./Title	**Project %**	**Article Description**
6. General Measures for Conservation & Sustainable Use	20	Develop national strategies that integrate conservation and sustainable use.
7. Identification and Monitoring	20	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	20	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	15	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	10	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	10	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	0	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	0	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	5	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**

15. 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)

Code	Total to date (reduce box)	Detail (←expand box)
Training Outputs		
1a	Number of people to submit PhD thesis	(1) Mr Z. Davidson is expected to submit a D.Phil. thesis in early 2008. Fieldwork for this thesis was undertaken during and supported by the DI project
1b	Number of PhD qualifications obtained	
2	Number of Masters qualifications obtained	
3	Number of other qualifications obtained	
4a	Number of undergraduate students receiving training	(4). Four masters students from Oxford University undertook fieldwork projects at Hwange. These projects fulfilled a major requirement of the Oxford masters course. Thesis titles are given in Appendix III
4b	Number of training weeks provided to undergraduate students	
4c	Number of postgraduate students receiving training (not 1-3 above)	
4d	Number of training weeks for postgraduate students	
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) Two PWLMA staff at Matetsi Safari Headquarters trained in use of hunting database. Computer with database donated to station.
6b	Number of training weeks not leading to formal qualification	
7	Number of types of training materials produced for use by host country(s)	(1) Manual outlining wildlife census methods produced and distributed locally
Research Outputs		
8	Number of weeks spent by UK project staff on project work in host country(s)	Approximately 25 weeks were spent by UK project staff in the host country during the follow-up project.
9	Number of species/habitat management plans (or action plans) produced for Governments, public authorities or other implementing agencies in the host country (s)	
10	Number of formal documents produced to assist work related to species identification, classification and recording.	
11a	Number of papers published or accepted for publication in peer reviewed journals	(2) two peer reviewed papers published from work undertaken by the DI project staff in Hwange National Park
11b	Number of papers published or accepted for publication elsewhere	

Code	Total to date (reduce box)	Detail (←expand box)
12a	Number of computer-based databases established (containing species/generic information) and handed over to host country	(1) database of hunting trophies taken in Matetsi Safari Area 1974-2005 created and digitised. This database includes information on over 17 000 trophies hunted over this time period. Database handed over to PWLMA.
12b	Number of computer-based databases enhanced (containing species/genetic information) and handed over to host country	
13a	Number of species reference collections established and handed over to host country(s)	
13b	Number of species reference collections enhanced and handed over to host country(s)	

Dissemination Outputs		
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work	(1). One international lion conservation workshop was organised in early 2004 at Mabula Lodge, South Africa. A proceedings was published and disseminated.
14b	Number of conferences/seminars/ workshops **attended** at which findings from Darwin project work will be presented/ disseminated.	(3) Three international conferences attended and project results presented. These were South African wildlife management association conference, Oct 2004, IUCN/ WCS lion conservation strategy meeting, January 2006, Joburg RSA and Sustainable use specialist group conference September 2006, ZSL London. (1) National workshop to plan and implement a lion conservation strategy for Zimbabwe attended in October 2006. (1) One international lion conservation workshop held at Kasane, Botswana, February 2005.
15a	Number of national press releases or publicity articles in host country(s)	
15b	Number of local press releases or publicity articles in host country(s)	
15c	Number of national press releases or publicity articles in UK	
15d	Number of local press releases or publicity articles in UK	
16a	Number of issues of newsletters produced in the host country(s)	
16b	Estimated circulation of each newsletter in the host country(s)	
16c	Estimated circulation of each newsletter in the UK	
17a	Number of dissemination networks established	
17b	Number of dissemination networks enhanced or extended	
18a	Number of national TV programmes/features in host country(s)	
18b	Number of national TV programme/features in the UK	(2) Interview on SKY news, London March 2004; Feature Protecting lions, Central News, 1830-1845, 03/01/05
18c	Number of local TV programme/features in host country	
18d	Number of local TV programme features in the UK	
19a	Number of national radio interviews/features in host country(s)	
19b	Number of national radio interviews/features in the UK	(1) BBC radio 4 interview. 12/01/04, 9pm, presented by Lionel Kelleway.
19c	Number of local radio interviews/features in host country (s)	

19d	Number of local radio interviews/features in the UK	
Physical Outputs		
20	Estimated value (£s) of physical assets handed over to host country(s)	
21	Number of permanent educational/training/research facilities or organisation established	
22	Number of permanent field plots established	
23	Value of additional resources raised for project	£89 127 raised to support the project during the lifetime of the DI project. Since the end of the DI project £111 700 has been raised to support continued research and conservation work.

16. 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

Type * (e.g. journals, manual, CDs)	**Detail** (title, author, year)	**Publishers** (name, city)	**Available from** (e.g. contact address, website)	**Cost £**
Published report*	Loveridge, A.J., Lynam, T., and Macdonald, D.W. 2005. Lion Conservation Research. Workshop 3 & 4. From conflict to socioecology	WildCRU, Oxford University. Abingdon Rd, Tubney, Abingdon, OX13 5QL	www.wildcru.org	£20.00
Magazine Article	Michler, I. 2006. Business as usual: Lions rest easy	Africa Geographic, August 2006, CapeTown	www.africageographic.com	-
Scientific paper*	Loveridge, A.J., Hunt, J.E., Murindagomo, F. and Macdonald, D.W. 2006. The influence of drought on the predation of elephant calves by lions in an African wooded savanna	Journal of Zoology, London	The Zoological Society, London	-
Scientific paper*	Loveridge, A.J., Searle, A.W., Murindagomo, F. and Macdonald, D.W. 2006. The impact of sport hunting on the population dynamics of a lion population in a protected area	Biological Conservation	www.elsevier.com/locate/biocon	-
Scientific paper*	Packer, C., Whitman, K., Loveridge, A.J., Funston, P. and Jackson, J. 2006. The impact of trophy hunting on lions in east and southern Africa. Recent offtake and future recomendations	Paper presented at the IUCN lion conservation strategy workshop, Joburg, January 2006	http://www.felidae.org/JOBURG/lion.htm	
Unpublished manual*	Valiex, V. and Smith, K. 2005. Game Counting Techniques	Unpublished		-
Unpublished report	Davidson, Z. and Loveridge, A.J. 2006 The Gwaai Conservancy. Lion density and quota recommendations based on spoor density estimation	Unpublished report presented to PWLMA at request of their quota setting committee		-

Masters Thesis	Bamford, P. 2006. The effects of sport hunting on ungulate species in Matetsi Safari Area, Zimbabwe	Zoology Department, Oxford University	Available from The University of Oxford Library	
Masters Thesis	Jew, E. 2006. An investigation into the effects of trophy hunting on horn size in three species of African antelope in the Matetsi Safari Area, Zimbabwe	Oxford University Centre for the Environment	Available from The University of Oxford Library	
Masters Thesis	Cope. R. 2006. Trophy hunting as a tool of conservation? An assessment of trends in trophy quality over time in the Matetsi Safari Area, Zimbabwe	Oxford University Centre for the Environment	Available from The University of Oxford Library	
Masters Thesis	Van Kesteren, F. 2006. An analysis of the diet of African lions (Panthera leo) in Hwange National Park	Zoology Department, Oxford University	Available from The University of Oxford Library	

Appendix IV: Darwin Contacts

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

Project Title	Big cat conservation and sustainable use in southern Africa
Ref. No.	162/09/015
UK Leader Details	
Name	Prof. D.W. Macdonald
Role within Darwin Project	Project Leader
Address	Wildlife Conservation Research Unit Oxford University Tubney House Abingdon Rd, Tubney Abingdon OX13 5QL
Phone	
Fax	
Email	
Other UK Contact (if relevant)	
Name	
Role within Darwin Project	
Address	
Phone	
Fax	
Email	
Partner 1	
Name	Dr A.J. Loveridge

Organisation	Hwange Lion Research Project
Role within Darwin Project	Project manager
Address	PO Box 44, Dete, Zimbabwe
Fax	
Email	
Partner 2 (if relevant)	
Name	
Organisation	
Role within Darwin Project	
Address	
Fax	
Email	

Appendix V

LOGICAL FRAMEWORK

28.Please enter the details of your project onto the matrix using the note at Annex 2 of the Guidance Note.

Project summary	Measurable indicators	Means of verification	Important assumptions
Goal: 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 • 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			
Purpose To encourage sustainable use and conservation of wildlife resources (in particular big cats), in the Hwange and the southern African region	New knowledge gained of a big cat population recovering from high levels of hunting Measures of the value of wildlife to tourism and sustainable use. Measures of the impact and penetration of conservation education initiatives Co-operation of conservation scientists in the region. Exchange of ideas.	Report on sustainable use and management of lions, (further suggestions of management based on new data), value of wildlife to tourism and impact of conservation education presented to DNPWLM. Databases of trophy hunting in place for use by DNPWLM	Continued commitment to reduce lion hunting quotas by DNPWLM, and manage populations sustainably. Adoption of further management suggestions based on new data. Continued support of research by stakeholders Continued attendance by regional workers at regional meetings.
Outputs			

Yearly regional workshops held.	Workshops attended by regional scientists.	Two proceedings compiled based on workshops.	Continued regional interest in lion conservation workshops.
Data obtained on lion population recovery after quota reduction.	Prides of lions collared and monitored effectively. Data compared to current data from period of high trophy hunting pressure.	Data base of lion population, indentification and home range use and report compiled.	Co-operation between project, DNPWLM, safari companies and stakeholders maintained.
Data on value of wildlife (in particular lions) to tourism revenue collected.	300+ tourists interviewed.	Tourism questionaires completed. Relevant scientific paper submitted.	Access gained to tourists in local lodges and the National Park.
Data on effect of conservation education obtained.	Conservation liasion officer (CLO) and project staff survey local community to assess conservation education impact.	Conservation education impact questionaires completed. Relevant report/ scientific paper submitted	CLO and theatre group have access to schools and villages in the area.
Final workshop presents results	Final workshop attended by project staff, DNPWLM staff and stakeholders	Results of lion research, and questionaire surveys reported to DNPWLM and stakeholders.	Project successfully collects data on recovering population.
Conservation education outreach continues	CLO and theatre group interact with the local community through conservation education initiative.	All local schools and villages targeted by CLO and theatre group.	
Database on hunting trophy quality compiled, manual on wildlife census and quota setting produced.	Project and DNPWLM staff enter data into designed database	Hunting trophy quality database available to DNPWLM	

Activities	Activity Milestones (Summary of Project Implementation Timetable)
Ecological research	Capture and collar study animals with GPS collars, Monitor effects of quota reduction, Analysis and reporting.
Tourism research	Finalise questionaire, complete surveys, analysis and reporting
Conservation education and impact survey	CLO begins work, further training workshops held for theatre group, all local schools and villages visited. Impact survey questionaire designed and survey undertaken by CLO and project staff. Analysis and reporting.
Workshops	Local stakeholder workshops held beginning and end of project period, final report presented to workshop. Regional lion conservation research workshops held yearly. Proceedings of regional workshops compiled.
Databases	Project assists DNPWLM to set and analyse trophy hunting data base. DNPWLM ecological staff receive training in database management and take responsibility for continued updates of database. Database on lion ID and home range in Hwange national park shared with DNPWLM.
Dissemination	Regional and local workshop reports distributed widely. Radio, Film and popular articles aired/ published throughout project. 3-4 scientific papers submitted to peer reviewed journals. Manual on quota setting completed and distributed.