

Darwin Initiative for the Survival of Species

Annual Report

1. Darwin Project Information

STAFF / OFFICERS

Project Ref. Number	162/12/004
Project Title	Building capacity for conservation of a critically endangered flagship species
Country(ies)	Kenya
UK Contractor	Zoological Society of London
Partner Organisation(s)	IUCN SSC AfRSG, Kenya Wildlife Service
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2. Project Background

This project implements priorities listed in the Kenya 5-year Black Rhino Strategy (KBRS), which was produced jointly by Kenya Wildlife Service (KWS), ZSL, African Rhino Specialist Group (AfRSG) and other stake-holders/NGOs and endorsed at the highest level within KWS. The project was developed in collaboration with the KWS rhino programme co-ordinator and the KWS rhino scientist, alongside input from the IUCN SSC AfRSG. Kenya held, at the end of 2003, 86% of the estimated 500 remaining critically endangered eastern black rhino (*Diceros bicornis michaeli*). The 5-year KBRS has given the highest priority to their biological management to help achieve and maintain rapid meta-population growth to increase rhino numbers. Specific training and capacity-building in rhino monitoring (from field data collection to end-reporting) were identified as urgently required. Procedures to assess black rhino habitat carrying capacity have become a necessity to assist in developing new viable populations in Kenya and to manage existing rhino sanctuaries, most of which face loss of suitable habitat through high rhino- and competing browser- densities. Delivering these objectives meets the CBD and coincides with key objectives of the 1998 Kenyan National BAP, namely building technical capacity, improving access to resources and training, and strengthening of research and monitoring capacity.

3. Project Purpose and Outputs

This project's purpose is to develop a team of skilled Kenyan researchers and park field personnel capable of significantly contributing to the achievement of one of Kenya's key conservation goals: namely, increasing the numbers of the critically

endangered eastern black rhino (*Diceros bicornis michaeli*), and conserving its natural habitat. It aims to develop human capacity and procedural mechanisms within the Kenyan Rhino Conservation Programme to 1) train personnel in field rhino monitoring, data collection, analysis and reporting; 2) produce standardised annual rhino status reports which assess the numbers, performance and population dynamics of Kenya's black rhino populations to aid biological management decision making; and 3) assess black rhino habitat conditions and carrying capacities in fenced rhino sanctuaries, allowing the management of habitats by adjusting rhino and other browser population densities.

The project outputs are as follows.

i) 20 trained instructors (rhino officers) in rhino monitoring; ii) 20 trained officers undertaking data quality control, basic processing & reporting using the GIS based Rhino Information Management System; iii) 165 rangers trained in rhino monitoring (by local instructors with support and monitoring from Darwin fellows); iv) 1 KWS rhino programme coordinator, 1 KWS rhino scientist and 10 rhino officers/researchers trained in the synthesis and interpretation of annual park and national rhino status reports; v) Standardised annual rhino status reports at both park and national level; vi) A black rhino ecological carrying capacity model for Kenya with estimates for 11 rhino parks; trained staff and set procedures for rhino habitat assessments; vii) 2 KWS rhino scientists trained in the use of RHINO mark recapture population estimation tool; viii) Fully operational GIS based Rhino Information Management System in 11 parks and KWS headquarters; ix) Field staff trained in wildlife and sanctuary management (2 MSc, 1 BSc and 4 Certificates); x) 1000 rhino conservation education booklets published and distributed to schools; xi) 4 peer-reviewed papers published; xii) 2 radio broadcasts.

The project's progress and achievements are detailed in the following section.

4. Progress

Year – 1:

The project started in July 2003 with first developing 1) the material for the training of rhino monitoring instructors and field rangers, and 2) the field tools and procedures. The development of the GIS based Rhino Information Management System and user manual was completed in August 03. Some of the monitoring training and test material, field procedures (inc. sightings forms, protocols, monthly status reporting template, rhino ID master file template) were produced in September 03. Twenty-six park officers attended a 6-day monitoring training workshop held at Lake Nakuru National Park in the beginning of October and 18 officers successfully passed the course. The pass rate for trainers was set at 80% because they would be the ones to teach in the future. This was followed by an intensive 2-month on-site training of field rangers in parks/reserves by local instructors with support from Darwin fellows. This training by local instructors has continued on a regular basis by teaching one or two modules at a time.

During an 18 week training programme, Darwin fellows and trained KWS field assistants implemented the GIS based Information Management System in 9 reserves/parks. A minimum of 2 field officers in each area were trained in its use (total 24 staff trained). Existing rhino records were also checked and corrected. Field data quality control, processing and reporting procedures were implemented and staff trained in their use. This included rhino ID master files, sighting forms, standardised monthly reporting template, pocket patrol grid maps, protocols and guidance notes. 24 staff were also trained in basic computer skills, standard software packages and reporting. Manuals and tests to accompany this training were also produced.

Compilation of available environmental information for the development of black rhino Ecological Carrying Capacity (ECC) model was also undertaken in the first year.

Ben Okita, the KWS Rhino Scientist, started his MSc course in October 2004 at DICE, University of Canterbury, UK. Lekishon Kenana from Tsavo East NP also started his MSc at the same time at Moi University in Kenya. However a university lecturer's strike in Kenya soon after enrolment resulted in a delay of 2 months.

Year – 2:

Twelve KWS field staff successfully completed their 6-month Sanctuary Wildlife Management Certificate course in September 04 at KWS Training Institute. The original project plan was to train 4 staff (1 in years-1, 3 and 2 in year-2). However, during the first year's on-site training we identified the need to build this wildlife management capacity in each of the six KWS rhino sanctuaries / national parks. Following discussions with the principal of the KWS training institute, a reduction in the accommodation fees was agreed (from 800 Kenya shillings to 400 Kenya shillings per day) to allow 2 extra officers to be trained. The project also used this as a leverage to obtain additional funding from USAID to enable 2 officers from each of the six key areas to undertake the training. The course was also modified to meet some of the specific needs of the programme. The UK and Kenyan Darwin fellows (R Amin, M Mulama) taught the key module on Sanctuary Wildlife Management Techniques. The Darwin project team also set up the course field projects and provided supervision. All the students passed with good grades. Three students (2 from Tsavo West NP and 1 from Aberdare NP) were awarded Distinctions, the only ones in the Institute's 2003/04 academic year, and were also presented with the best student awards.

The rhino scientist Ben Okita was awarded a Distinction in his MSc in Conservation Biology from DICE, University of Kent. Ben's dissertation was based on the population dynamics and status reporting of six Kenyan black rhino populations. Ben achieved a mark of 81 percent. Ben's MSc analyses produced a number of very interesting findings and contributed to informing senior management of the need for specific urgent management actions in key areas.

The Tsavo field officer Lekishon Kenana also successfully completed his taught first year MSc course in Wildlife Management at Moi University and started his field work in Ngulia Rhino Sanctuary.

The Tsavo West NP Rhino Warden (Adhan Berhe) successfully completed his second year BSc degree course in Wildlife Management at Moi university.

The Kenyan rhino coordinator (M.Mulama) and KWS rhino scientist (B.Okita) were trained in producing population estimates using RHINO Bayesian Mark Recapture rhino population estimation software at a hands-on interactive course in May 2004. Two KWS rhino programme assistants (C.Kayale and A.Wandera) were also later trained in January 2005.

A further eight of the Certificate students were trained in July 04 as Rhino monitoring instructors by a Darwin fellow and four local instructors (from the initial training who were attending the Certificate course). The students were also formally tested and five students qualified as instructors.

On-site monitoring + support was primarily covered by incorporating support throughout the period into other Darwin activities and by 2 dedicated KWS field assistants. Comprehensive start-up training was also provided to rangers of the newly created sanctuary at Mugie ranch by the KWS field assistant and 2 park instructors from Tsavo East NP and Aberdare NP. ID master files, data quality control procedures including field sighting forms and reporting templates were also set-up. The Kenyan GIS based Rhino Information Management System was also implemented and training provided in its use.

Rhino annual national and park status reporting templates were produced in April 04 and further refined during the January 05 workshop. 26 field officers from 14 reserves and parks were trained in population data analysis and preparation of annual status

reports during a 6-day workshop undertaken at KWS Training Institute, Naivasha. The first set of annual status reports were produced.

ZSL's Head of Education, Claire Robinson, provided training to the Lake Nakuru and Tsavo West NP education wardens (Elema Hapicha and Lucy Makosi) during a field visit (ZSL paid for her costs). The training included techniques for teaching young children and approaches to activities suited to this age group ((based on learning through discovery). A 'treasure chest' of activities was also created to support the bus tours that regularly take place in the Park. Information panels and education posters were also developed. Plans were also put in place for Elema and Lucy to spend a period of 2 weeks in July at the ZSL education centre in June. Unfortunately visas were refused by the British Embassy despite letters from ZSL and the Darwin secretariat. The UK Darwin fellow had a meeting with John Virgoe at the Embassy and he was very surprised with this decision and suggested re-submitting.

Habitat assessment and ecological carrying capacity work was undertaken in September - February 2005. Nine key black rhino areas were successfully surveyed for black rhino browse availability and species composition. These were: Nairobi NP, Maasai Mara/ Trans-Mara, Lake Nakuru NP, Aberdares NP-Salient, Solio Ranch, Sweetwaters Ranch, Ngulia, Lewa and Ol Jogi. 100-150 detailed vegetation plots were assessed and photographed within each of the 9 rhino areas. Rhino feeding data was also compiled from observations made at each site. These plots sampled all the major vegetation types in each area, and catalogued amounts and composition of black rhino browse. The training manual for visual browse availability assessment was refined. Monitoring staff in each area assisted with field work and were thus able to improve their botanical and observational skills.

Analysis of the plot information also begun in 2005. Landsat 7 imagery of each rhino area was obtained to assist with vegetation mapping and extrapolation of results from surveyed plots. Auxiliary data on variables linked to black rhino carrying capacity were compiled into a database for Kenyan rhino areas (Game count data, soil and geology data, long-term rainfall records).

Year – 3 (reporting period)

1. Kenyan-based 2-year MSc in Wildlife Management, Moi University.
Lekishon Kenana successfully completed his field project. Lekishon has performed very well and in recognition of this achievement was promoted to Senior Scientist.
2. Training of 1 field officer in Wildlife Management (BSc course) at Moi university.
The Tsavo West NP Rhino Warden (Adhan Berhe) successfully completed the 3rd year of his BSc course. Adhan has started his final year and for his field project will be on community issues around Tsavo East NP.
3. Second annual park status reports and national status report produced. The end of 2005 park status reports and national status report were produced by the Park Rhino Wardens, monitoring staff and the KWS Rhino Scientist. Both the 2004 and 2005 national estimates show growth rates over the 5% for the first time since the 1970s. The 2005 national total was 539 animals. This is very encouraging as the strategy goal is to increase rhino numbers by at least 5% reaching 500 by 2005.
4. Training and support
The Kenyan field assistant continued to provide regular field support. Darwin fellows carried out 6 monthly field assessments in September and February with the Kenyan Rhino Scientist and Field Assistant. The Darwin team was very encouraged to see the significant progress made in the various elements of the monitoring and management process. These included i) regular training of field staff (including new recruits), ii) collection of good quality field data using the project forms, iii) keeping the Master ID files up-to-date and using these to check

and validate field data and iv) data analysis using the Rhino Information Management System.

In Aberdares NP where rhino monitoring is particularly difficult due to the thick vegetation and difficult terrain, rangers were trained in the detection and collection of rhino signs such as spoor, dung and browsed vegetation. Additional funds for fuel etc costs were obtained from WWF and a 2 month pilot survey was conducted by the Kenyan field scientist and Aberdare monitoring staff. Dung samples are also being collected for DNA analysis by ZSL. The project team also trained monitoring staff in the collection of indirect sightings in Chyulu NP. Camera traps are also being considered.

The sightings of rhinos in Tsavo East NP have greatly improved following training and support. The development of a Security and Monitoring System for the whole park is being considered.

Similarly, the collection of standardised data in Solio GR, a private reserve, has improved considerable over the last year. The revised population estimate has shown that the reserve is overstocked and 30 rhinos are to be moved to the extended Ol-Pajeta PS.

The monitoring staff at the newly established sanctuary, Mugie Ranch, are performing extremely well. They have been analysing their field data and have produced a report on rhino movement patterns and establishment home ranges following the introductions.

Comprehensive start-up training was provided to rangers of the newly created rhino population within Meru NP by the KWS field assistant and 2 park instructors. ID master files, data quality control procedures including field sighting forms and reporting templates were also set-up. The staff were also trained in tracking the radio horned animals. The Darwin fellows are very impressed by the standard of training conducted by the local trainers and the first progress reports have been produced by the Mugie ranch staff. The Kenyan GIS based Rhino Information Management System was also implemented and training provided in its use.

The Masai Mara rhino officer and Naikara/Laleta community officer were trained as instructors in rhino monitoring.

5. Management decisions and actions

A new population of 20 founders was created in Meru NP. Rhinos were translocated from Nairobi and Lake Nakuru NPs which were both overstocked (above the estimated MPCC - maximum productivity carrying capacity).

In Ngulia rhino sanctuary, other browsers (and especially elephant) have negatively impacted on rhino performance (and hence numbers) in the sanctuary (confirmed by status reports and Ben's MSc study), as well as altering habitat and reducing rhino carrying capacity in the area. Following a key meeting with management and security staff, management solutions were submitted for approval to the KWS board. These have been approved and include removal of at least 50 elephants from the reserve, extending the sanctuary and creating a free ranging population in the adjacent Ngulia / Rhino valley.

A meeting was also held with Kenyan Mara and Tanzanian Serengeti warden and scientist to discuss increased cooperation and sharing of information in view of the fact that many rhinos in the northern Serengeti-Mara area are cross-border animals. There is therefore a need for a small workshop bringing together relevant staff from both countries to ensure motoring protocols are standardised and to ensure information on all rhinos in the north of the Serengeti-Mara ecosystem is being shared and is captured in each other's rhino identification master files. Specific training and capacity-building in coordinated cross-border rhino monitoring (from organising periodic joint or parallel surveys, to field data

collection, record keeping and mutual reporting) would also be facilitated. Further discussions between KWS and TANAPA are currently in progress.

Aberdare - A pilot transect survey was undertaken to look for rhino indirect signs. The database system was also modified for storing and displaying this information on a GIS map.

Tsavo East NP - The MSc student Lekishon Kenana returned to Tsavo East NP and is analysing the wider security data and how best to implement the security and monitoring system in this vast area.

Tsavo West NP - An intensive sustainable, complete (from data capture to analysis) annual intensive four-night water-hole photographic survey programme is being developed for Ngulia Rhino sanctuary. This will provide important information on the population structure for the expansion programme.

Solio PS - Improved monitoring data has shown that the reserve is overstocked and therefore 30 rhinos are to be moved to the recently created Ol-Pajeta extension.

Some recommendations, actions and concept papers are provided in the supplementary item [Ref: 162/12/004-S1](#)

6. At least 5 trained staff in rhino habitat assessment (5-day workshop + field training).

Due to the number of reserves and level of interest, 18 park staff attended a 5-day training workshop held at Nairobi NP (please see supplementary item [Ref: 162/12/004-S2](#) for the training programme). On the first day, the staff trainees were introduced to the basics of browse availability assessment and carry capacity. They were then led through the contents of the manual. The trainees then practiced conversions between percentages and proportions. The browse availability cover field books were introduced and evening revision given. On day 2 the trainees set a test to see how well they understood the manual. This was followed by a revision of 3 methods of canopy cover assessment followed by a practical. Methods of average browse canopy depth assessment and calculating % vertical fill were then presented. The trainees then practised these methods in the field. This was followed by a revision with field practical of ranking and assessment of relative % of browse availability (BA) by species within layers. The trainees were then shown how to calculate overall BA and BA of components within a plot. On day 3, the trainees carried out assessments in 7 plots set up in the park. The results were then analysed back in the classroom and individual observer variability assessed. This was followed by a lesson on survey planning, calculating BA's per vegetation type and for an entire reserve. On day 4, the trainees carried out a field survey of 10 plots with supervision from the Darwin fellows. On the final day the trainees undertook data analysis with support from the Darwin fellows.

7. Vegetation manual: The revised manual for field Browse Availability Assessment was completed and each trainee was given a copy (please see supplementary item [Ref: 162/12/004-S3](#))
8. Vegetation monitoring databases were developed for each site which contain information on:
 - a) each monitoring plot including the UTM geographical position, size, vegetation type and labelled photographs with dates so can be compared over time;
 - b) different browse species, its growth form and suitability index;
 - c) detail tables of the vegetation components - i.e. the browse availabilities and proportional species compositions of the browse in each monitoring plot;

- d) tables giving the rhino-available area (km²) of the reserve/park and of each vegetation type in the available area;
- e) auxiliary data tables on variables linked to black rhino carrying capacity, i.e. herbivore count data, soil and geology data (tables of area of each type in the park and their fertility ratings), long-term rainfall records, temperature data.

9. Carrying capacity model

The main work during this reporting period involved the following:

- a. Completion of data capture and analysis of the black rhino browse availability information from field surveys.
 - b. Image processing and image classification to determine area sizes of vegetation types in each of 9 Kenyan black rhino areas (Ol Jogi, Lewa, Ngulia, Aberdares, Sweetwaters, Solio, Nakuru, Mara and Nairobi NP)
 - c. Digitising of rhino area features such as roads, buildings and drainage line courses.
 - d. Determining adult black rhino range locations and sizes in several rhino areas. Home range size is inversely log-correlated with black rhino carrying capacity (Please see supplementary Ref: 162/12/004-S4)
 - e. Developing the first Kenyan ECC model and report (Please see supplementary item Ref: 162/12/004-S5)
 - f. A paper is being written for publication
10. Further education training and support: Claire Robinson, ZSL Head of Education, provided further training and support during a 2 week visit to Lake Nakuru and Tsavo West NP education centres. ZSL paid for her flight costs.

Difficulties encountered during the year and steps taken to overcome them

Several difficulties arose during the development of vegetation maps from the available LANDSAT images, which led to delays in production of the black rhino Carrying Capacity model and final write-up. The available vegetation map information was in paper (not digital) form for all but Lewa and Nairobi NP. All vegetation maps were found to be deficient in demarcating units of relevance to black rhino browse. Thus relevant vegetation types first had to be determined from the field data, then mapped using the images (and maps where available/ applicable).

It was very difficult to classify the images in any purely automated way. It became necessary to demarcate broad sub-areas which had different geologies, topographies and vegetation structures (such as plant species/height/patchiness/density), and to classify within these. In many cases this involved extrapolating from each field browse availability plot, rather than relying on pure image classification. Bayesian classification (in IDRISI GIS) was used in all cases after extracting signatures from training sites. The Bayesian approach was excellent in that it gives the probability of each pixel belonging to each possible vegetation class. The probability of acceptance in a class could then be varied by sub-area to derive more accurate classifications per zone.

All drainage line vegetation had to be digitized by hand and classified using buffer zone around the lines. Drainage line vegetation is of vital importance to black rhino as the under-story vegetation is unique and palatable (and not picked up by satellite images).

None of these have affected the budget but delays were experienced due to much more time required for the field surveys and the data processing.

Digital cameras with sufficient optical zoom and resolution are much needed for developing top quality ID master files in some areas. However, some of the photographs taken by rhino officers with old equipment (with low resolution and with low optical zoom) are encouraging as they indicate that with better digital cameras they can significantly improve on this. With better cameras usable photographs could also be obtained from further away from the rhinos, both reducing the risk to the rhino officer concerned, but also reducing the disturbance to the rhinos themselves. A proposal to the EAZA rhino campaign for funding of seven digital cameras has been approved. EAZA provided initial funds for one digital camera, lens and flash to ZSL and a camera was bought and being used in the field. The Darwin project digital camera is now also being used for monitoring work. Both these cameras will also be used for this year's Ngulia night monitoring census. An additional camera is urgently required for the third water hole and a request is being made to Amneville Zoo, ZSL for this important work due to delays in EAZA funds.

Project material developed / setup

1. Newly established Meru rhino sanctuary
 - Rhino monitoring instructors training manual
 - Training posters
 - Trainee's guide in English and Swahili
 - Field pocket rhino monitoring cards
 - Black rhino Identification master files consisting of 2 ID files for males and females,
 - Kenya GIS based Rhino Information Management System with user manual
 - Data quality control procedures
 - Rhino monitoring and management protocol document
 - Standardised sanctuary monthly reporting template
 - Electronic GIS map produced as ESRI shape files.
2. Information panels for Lake Nakuru National Parks.
3. Field manual and forms for visual assessment of black rhino browse availability.
4. Vegetation database
5. Site vegetation assessment report
6. Primary school children education cards (nearly completed)

The timetable for the final year reporting period is as follows.

- Further training and support of at least 5 park scientists and monitoring staff in habitat assessment undertaken in a new area (July 06)
- Further training, support and development of park education programme for young children (ongoing)
- On-site support and assessment of training, data quality, entry and reporting procedures by rhino scientist, KWS field assistant and Darwin fellows (ongoing).
- At least 1 paper based on the habitat assessment and ECC work submitted to peer-reviewed scientific journals (Oct 06)
- 1 paper based on MSc field project submitted for publication in a peer-reviewed scientific journal (Oct 06)
- Third annual park status reports by park officers with support from rhino scientist and Darwin Fellows (Jan 07).

- Third annual national status report by rhino scientist with support from Darwin Fellows (Jan 07).
- Completion of BSc course in Wildlife Management by rhino warden at Moi university (Mar 07).

5. Actions taken in response to previous reviews (if applicable)

Comment:

To what extent do the rhino personnel receive training in social skills such as conflict resolution, community participation and communication to assist them in community interactions and reduce 'people and parks' types of tensions?

Some material and training has been provided to rhino wardens (Nakuru, Tsavo West Ngulia RS) for community education and awareness. Training has also been provided to the education officers of Lake Nakuru and Tsavo West NPs with the ultimate aim of promoting wildlife conservation and change of people's attitudes towards wildlife. The project also managed to get some funds for much needed water borehole for the surrounding Tsavo West NP local community and accommodation facilities for the Tsavo West Community Education Centre. The community aspect was only a very small element of the original project but will be developed further in the final year.

6. Partnerships

The project partners (Zoological Society of London, Kenya Wildlife Service and the IUCN SSC AfRSG) have worked very closely together in the implementation of this project. Three of the project Darwin fellows also played a significant role in the development the 5-year conservation strategy upon which this project is based.

Support has been fully provided by KWS and the private sanctuaries. This has included extensive use of the Rhino Programme vehicle, park accommodation at staff rates or less, availability of all relevant staff and equipment and logistic support.

The project has successfully managed to build close links with several international organisations and leveraged the following additional funds over the 3 years.

1. Save the Rhino International: (£4750) for living costs in the UK for the MSc studies.
2. Africa Wildlife foundation: (\$7000) for additional MSc costs (including laptop etc).
3. US Fish and Wildlife (\$20000) for MSc project field costs.
4. D' Amneville Zoo (44000 euros) for rhino field conservation support (20000 euros per annum).
5. Zoological Society of London (£4000) for the repair of field monitoring vehicle at Ngulia rhino sanctuary.
6. Zoological Society of London (£4000 per annum) for water system maintenance at Ngulia rhino sanctuary.
7. Zoological Society of London (£2400 per annum) for a new water pump at Ngulia rhino sanctuary.
8. Zoological Society of London (£1000) for travel costs for ZSL's head of education.
9. USAID: (1 million Kenya Shillings) for training of field officers in Sanctuary Wildlife Management (certificate course), Genetic faecal DNA study (56,000 Kenya Shillings).
10. Lord Parmoor for £25,000 for water and community related projects in Tsavo.

7. Impact and Sustainability

Kenya Wildlife Service is responsible for the conservation and management of wildlife in Kenya. It is charged with the implementation of the Wildlife Policy and the Wildlife Act. The rhino conservation programme is one of KWS's Flagship biodiversity programmes and a key contributor to both KWS's vision and mission. This Darwin project is seen as a key project within KWS as it addresses key priorities identified in the Kenyan Black Rhino Strategy.

There is extensive awareness of the project within the whole of the KWS organisation. The current and previous KWS Directors and park wardens/assistant directors have provided their full support to the project. Majority of these areas are designated rhino sanctuaries and therefore improved monitoring, status reporting, habitat assessment and management through adjustment of rhino and other browser population densities is seen to be vital for the conservation of many other species as well.

The status reporting and habitat work has significantly improved knowledge for the management of enclosed reserves. The project has also expanded its activities by setting up important projects at Lake Nakuru NP and Tsavo West NP Education Centres. The planned implementation of the Tsavo East security system which involves training of over 60 general park security staff in monitoring and basic data collection techniques will help to improve knowledge of other species and to protect the wildlife in this vast area. Similarly, the pilot surveys and the indirect monitoring approaches being undertaken in Aberdare NP is providing valuable information. Further intensive surveys are being planned depending on funds. Faecal and blood DNA study is being undertaken and capacity built in the area of genetics which can also be applied to a range of species. The field tools (field maps, training material etc.) are also starting to be used by other park staff. The KWS programme staff have already confidently developed databases for the conservation of cheetah.

The excellent MSc thesis produced by KWS's Ben Okita and the annual park status reports produced by the field officers now means that Kenya has significant capacity built to undertake annual status report synthesis work in future. Ben Okita has been promoted to Senior Scientist Rhino and Lekishon Kenana promoted to Senior Scientist Savannah reflecting strong commitment by KWS.

The Darwin trained Kenya Wildlife Service rhino monitoring instructors (without any additional Darwin assistance or prompting) trained staff in rhino monitoring in two newly established rhino populations and were able to set up high quality ID master files. This is most encouraging. The role of the Darwin project here was simply to give encouragement by recognising the quality of this work and by awarding the reserve responsible with a framed certificate for the best newly set up master ID file.

It was extremely encouraging to see that there was so much interest for the vegetation workshop, All the delegates worked very hard throughout the 5-days in an attempt to learn as much as possible.

The park management and the KWS director of education are also fully supportive of the Darwin education initiative and the enthusiasm of the education wardens of Lake Nakuru and Tsavo West NPs is extremely encouraging.

The ZSL patron Lord Parmoor visited the project in the field and reviewed the many elements of the project during a 4-day visit to several rhino reserves and surrounding community areas. This is the first time a ZSL patron has visited a field project and he was most impressed with the commitment and knowledge of the KWS staff. Lord Parmoor donated £25000 to support the park community and Ngulia rhino sanctuary water needs (provision of a generator and water pump) and to help develop the Tsavo West national park community education centre (Please see supplementary item Ref: 162/12/004-S6).

Most Importantly, both the 2004 and 2005 national population estimates have shown rhino growth rates above the 5% (the national goal is at least 5%), the first time since the 1970s.

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

Not Applicable

9. Outputs, Outcomes and Dissemination

Several of the outputs are based on an on-going training programme. This includes 1) training of field rangers in rhino monitoring (by local field instructors), 2) training of field officers in data analysis and status reporting and 3) training in habitat assessment.

The following outputs were also achieved.

1. 18 field officers/rangers trained in browse assessments (project target was 5).
2. Site vegetation database, report, initial carrying capacity model and browse assessment manual.
3. Completion of a Kenyan based MSc building research and managerial capacity.
4. Aberdare and Chyulu Hills NP staff trained in indirect monitoring methods. Update of system to store and report on this information.
5. Staff at the newly established Meru NP rhino population trained in field monitoring. Field tools and procedures implemented and staff trained in their use.
6. A further 2 field staff successfully trained as monitoring instructors (26 instructors trained so far compared to the original target of 20)
7. Information panels: Three rhino and project information posters produced.
8. Support in developing education programmes including the training of 2 education wardens (ongoing activity).
9. Primary school children education cards for use by the KWS education centres and schools (almost completed)

The following extra activities are also being planned (proposals for additional funding have been submitted to USF&W and AWF).

1. Development of Tsavo East security and monitoring system. Rhinos in Tsavo East are difficult to individually monitor (e.g. very few routine visual sightings are obtained which can be used to identify rhinos). The ranging area for the rhinos is also assumed to be well over 4000km², and with the limited resources (human/equipment) it has proven difficult to effectively patrol and secure the area to its maximum security potential for rhinos. We are therefore planning to develop a system to assist the field managers to monitor patrol effort, illegal activities and abundance of rhinos across a distribution area, and use this information for tracking the performance of the population and allocating law enforcement effort adaptively to build effective protection around the rhino population conserved.

Some additional funds are required to implement the system which includes the training of approximately 60 security staff and procurement of monitoring equipment (binoculars) for security staff. We have submitted a proposal to US Fish and Wildlife.

2. Mara - Serengeti link. Some rhinos within the Mara-Serengeti ecosystem move between the borders so sharing of monitoring data would be very useful. The KWS senior management are now liaising with their counterparts

in the Tanzanian national parks board to setup a formal cross boundary link. The training and setup of field methods will then take place.

Project dissemination activities are being undertaken on an on-going basis. The project details have been placed on the KWS and ZSL website. Information panels have been developed for both the UK ZSL sites and Kenyan reserves/parks. A project leaflet has been produced and available to various stakeholders, donors and visitors. A 2-minute feature on the threats to rhinos was done by Darwin fellow for the forthcoming rhino documentary to be shown on Channel 5 and American network.

Presentations:

Rhino Mayday (UK) 9th May 05.

Articles and publicity material:

International Year Zoo Book. Special edition on rhinos. 2 articles have been accepted for publication 1) An overview of the conservation status of and threats to rhinoceros species in the wild; 2) An integrated management strategy for the conservation of Eastern black rhinoceros *Diceros bicornis michaeli* in Kenya

EAZA Rhino Campaign publicity material

ZSL Lifewatch articles

Rhino visitor displays at London Zoo and soon at Whipsnade Wildlife Park

Rhino rangers activity to take place at Whipsnade Wildlife Park in May 2006.

The Darwin logos have also extensively been used in 1) training notes/manuals, presentations, and accreditation tests, developed by the project; 2) GIS based Rhino Information Management system; 3) manuals and reports.

2 page feature in the Darwin Initiative annual report on the field visit by the UK Minister for the Environment and Agri-environment

Table 1. Project Outputs (According to Standard Output Measures)

Code No.	Quantity	Description
6A, 6B	3	3 trained instructors (rhino officers) in rhino monitoring. The programme now has 26 trained instructors.
6A 6B	4 1	4 trained staff undertaking data quality control, basic data processing & reporting using the GIS based Rhino Information Management System and standard software packages (Meru National Park).
6A, 6B	10	10 trained rangers in rhino monitoring by local instructors (newly created Mugie rhino sanctuary).
12B 7B	1 1	Fully operational GIS based Rhino Information Management System with user manual and tutorials at Meru National Park.
6A	20	Aberdare and Chyulu NP monitoring staff training for collecting indirect sightings.
2	1	1 rhino scientist trained in Wildlife Management (MSc course at Moi University).
2	1	1 rhino officer currently undertaking training in Wildlife Management (BSc course at Moi University).
6A	18	18 park officers, scientists and rangers trained in habitat and browse assessment.
10	1	Procedural manual for habitat assessment.
12A	1	Template park database for habitat assessment.
11	1	Habitat assessment reports for rhino sanctuaries/parks.
11B	1	Initial ecological carrying capacity model
6A 6B	26 1	26 rhino officers/researchers provided further support in producing park annual status reports.
9	12	Standardised annual rhino status reports at park and national levels.
11B	2	Two papers accepted for publication in International Year Zoo book
11	1	Primary school children education cards (almost completed)
6A	2	2 education park wardens trained in techniques for teaching young children

10. Project Expenditure

Table 2: Project expenditure during the reporting period (Defra Financial Year 01 April to 31 March)

Item	Budget (please indicate which document you refer to if other than your project schedule)	Expenditure	Balance

11. Monitoring, Evaluation and Lessons

The project monitoring and evaluation is being done via 1) the use of in-built, outcomes-based skills accreditation tests within training courses; 2) field visits by Darwin fellow(s) and KWS project field support staff to evaluate progress and provide on-site training and support; 3) quality checks on monthly monitoring reports submitted by field staff; and 4) supervisory or advisory input into field monitoring, data analysis and reporting.

This project's purpose is to build local capacity to ensure that KWS has the human resources and information systems necessary to 1) achieve the targets for black rhino conservation mandated in its Kenya 5-year Black Rhino Strategy; and 2) meet CBD objectives. Monitoring and evaluation of the project outputs are summarised below. Important lessons learnt are also provided.

Output 1: A body of trained and accredited instructors for the AfRSG rhino monitoring course who are capable of continuing in-country training of field rangers.

Measurable Indicators: Minimum of 20 rhino officers from 11 parks trained and tested. Those that pass accredited.

Monitoring, evaluation and lessons: The programme now has 26 accredited instructors. The trainees had to obtain a pass rate of 80% in each of modules as they will be responsible for training the field staff on an on-going basis. The trainees were also tested on their ability to teach a selected module to a group of park staff.

The instructors are being supported and their training assessed by the Kenyan rhino scientist and the Darwin fellows. Trained KWS field assistants have also been regularly visiting each area in turn to provide support.

Output 2: A body of trained and accredited rhino monitoring field rangers.

Measurable Indicators: Minimum of 165 field rangers from 11 parks trained and tested. Those that pass accredited.

Monitoring, evaluation and lessons: Initial intensive training of field rangers by the locally trained instructors (supported by Darwin fellows) was completed in the first

year and subsequent training by local instructors is being undertaken on an on-going basis. Accreditation tests are also being implemented by the field staff. Progress is being checked through monthly reports and on-site visits by Darwin fellows and KWS field assistants. Each area provides information on the number of staff trained and modules taught as part of the standardised monthly report that the project has setup. This training process has boosted morale and significant improvements in monitoring and data quality are being seen through the monthly reports, status reports and visits.

One of the challenges has been ensuring training takes place on a periodic basis as a result of field wardens setting realistic timetables which fits into the normal reserve/park work. Guidance has been provided on this.

Output 3: 2 MSc studentships in Wildlife Management

Measurable Indicators: Students enrolled at university, examination and projects reports.

Monitoring, evaluation and lessons: The rhino scientist Ben Okita did extremely well in his MSc studies at DICE, University of Canterbury. Ben was awarded his MSc with Distinction and obtained 81% in his field project based on the study of population dynamics in six Kenyan reserves. This project has been extremely useful for building scientific and management capacity. Ben's MSc analyses and subsequent national status reports is helping KWS make informed metapopulation management decisions. This includes the need to translocate animals from a number of populations stocked at or near estimate longer term ecological carrying capacity and an increasing number of Kenyan rhino populations becoming donor populations. In addition the approximately 5% underlying growth in Nairobi National Park following a period with an average 5% annual removal of rhinos provided empirical support to the set percentage harvesting approach advocated by both the SADC Rhino Management Group and IUCN SSC's African Rhino Specialist Group.

Ben's MSc study undertaken in the UK has given him enormous confidence and is significantly contributing to the programme back in Kenya. The switching of the MSc from a local based to a UK based one at DICE, University of Canterbury has proved to be an excellent decision. The DICE course is very well suited to building capacity at this level. The project successfully leveraged extra funds from several organisations for converting Ben's MSc to a UK based one. Ben is now the Senior Scientist Rhino.

Lekihon Kenana's has also completed his 2-year MSc at Moi University and returned to KWS. Lekishon has also been promoted to a Senior Scientist position.

Output 4: 12 Certificate studentships in Sanctuary Wildlife Management (original project output was 4)

Measurable Indicators: Students enrolled at college, examination and projects reports.

Monitoring, evaluation and lessons: The project trained twelve promising field officers/rangers in Sanctuary Wildlife Management. Additional funds were obtained from USAID and reduction in accommodation costs were negotiated with the KWS Training Institute to enable 2 officers from each of the 6 KWS national parks to attend. The students all passed with 3 obtaining distinctions and best student awards, the only ones in the institute's academic year. The course tutor described the class as the best the institute has had. The Darwin fellows spent some time with the students teaching a one week module on Sanctuary Wildlife Management Techniques and were enormously impressed with the enthusiasm and hard work put in by the students. The students wanted to learn as much as possible, staying up late at night, and the lecture notes of many students were meticulously written. The KWS training institute has also been an excellent learning environment. The initial plan was for the students to arrange their own accommodation in the nearby town to

minimise costs but after discussing with the institute staff it was felt that staying within the campus would be much better and this has been the case. Having all 12 students trained together has allowed them to support and feed off each other and build real team spirit. The original certificate training programme was spread over the 3 years. The students have returned to their reserves/parks full of enthusiasm and very eager to contribute to the rhino programme. The Darwin team has now setup several field projects for the students to undertake and we are hoping to publish these results in journals.

Output 5: GIS based Rhino Information Management System, user manual, tutorials & training

Measurable Indicators: Fully working system in 11 parks.

Monitoring, evaluation and lessons: The Kenyan GIS based rhino information management system with user manual has been developed and is operational in 11 reserves/parks. Selected officers have been trained and formally tested in its use. Chuyulu Hills NP does not have a computer system nor electricity supply hence data is recorded in sighting and patrol log books. This data is then sent at the end of each month to KWS headquarters for entry into the system.

Field data is now being entered on a regular basis (in most cases daily) and many areas are already doing basic data analysis. Data entry and analysis is being monitored through monthly reports generated by the system and on-site visits.

Output 6: Field tools implemented, rhino officers trained in rhino monitoring data quality control, entry, basic processing & reporting.

Measurable Indicators: Minimum of 20 rhino officers from 11 parks trained and tested. Those that pass accredited.

Monitoring, evaluation and lessons: The rhino sighting data quality control process has been implemented in the rhino reserves/parks. 24 field staff have been trained and tested. Further support is being provided through field visits by Darwin fellows and trained KWS field assistants. This regular field support by the KWS field assistants has been very important as it has boosted field staff morale and enabled problems to be quickly identified.

Output 7: Rhino scientists trained in the use of Rhino 2.0 Bayesian Mark Recapture Population Estimation tool.

Measurable Indicators: At least two scientists trained. RHINO population estimation tool used in parks with unidentifiable rhino.

Monitoring, evaluation and lessons:

The Kenyan rhino coordinator (M.Mulama) and KWS's rhino scientist (B.Okita) were trained at a hands-on interactive course. Two KWS rhino programme assistants (C.Kayale and A.Wandera) were also later trained to give them an improved understanding of how field sighting data can be used and the importance of data and master ID file quality control. This new knowledge has assisted them in support work to rhino monitoring programmes in the field.

The students each had access to a computer on which the software and a suite of test datasets had been loaded. Students were therefore able to learn by doing – reinforcing the lessons. This also had the advantage of allowing the instructor to determine whether or not the students had fully understood and were able to use each component of the software. Many sample analyses were undertaken to expose students to all aspects of the software. Although there were no formal exams, the students demonstrated they were able to import data and correctly analyse it using the software's various features.

Output 8: [i] Rhino programme coordinator, and scientist, trained in detailed field data analysis, interpretation of population dynamics and effective status reporting for decision-making [ii] Rhino officers / researchers from parks trained to produce basic

annual park reports for KWS headquarter staff to use in national status reporting [iii]
First set of park and national annual status reports.

Measurable Indicators: [i] Rhino programme coordinator and support scientist from KWS headquarters trained. [ii] At least 11 rhino officer/researchers trained (1 from each population) [iii] Reports produced.

Monitoring, evaluation and lessons:

The approach taken to first train the KWS rhino scientist through his MSc field project (study of the population dynamics of Kenya's rhino populations) and then training the rhino park officers has been extremely effective. The 6-month project has allowed Ben Okita to build the necessary skills to take the Kenyan reporting process forward. His findings and recommendations have been very important to inform KWS senior management. The fact that this has come from a KWS scientist has given this added significance.

24 field officers (at least 2 from most areas) were trained to build sufficient capacity in status reporting at the local park level. The majority of these officers were also those who had undergone previous training in computers inc. software packages (Word, Excel), use of field tools, basic data analysis and wildlife management (Certificate course). These staff also help to produce monthly field reports so were familiar with the Rhino Information Management System. The Darwin project team were very impressed with the commitment and the enthusiasm shown by all staff. They were able to quickly learn to perform calculations to obtain population performance measures. Many also stayed late in the evening to learn more. There was also excellent team spirit and were able to learn from each other. The officers managed to complete the main sections of the status reports by the end of the workshop. The completed reports were submitted to the KWS programme office soon afterwards.

Further support was also provided to produce the second park status reports.

Output 9: A black rhino ecological carrying capacity model with procedures and training for habitat assessments, habitat monitoring and updating the model.

Measurable Indicators: Data established on various variables / determinants of rhino ecological carrying capacities for each park, model developed, carrying capacities estimated, monitoring system established.

Monitoring, evaluation and lessons:

Detailed habitat assessments were carried out in nine key black rhino areas. Environmental information and adult rhino home range data were also compiled. An initial ECC model was subsequently developed. Browse assessment manual was revised and park scientists and monitoring staff were trained in undertaking assessments. Site based vegetation database was produced. Further training will be provided in the final year and newly established rhino areas assessed.

Output 10: Publications and publicity

Measurable Indicators: Rhino conservation education booklet (1000 copies distributed to schools), 4 peer-reviewed papers, 2 radio broadcasts.

Monitoring, evaluation and lessons:

The development of rhino education cards as part of a wider primary education project (near completion).

Two papers have been accepted for publication in the International Year Zoo Book.

12. OPTIONAL: Outstanding achievements of your project during the reporting period (300-400 words maximum)

Important management actions are now being made on the basis of biological data (on rhinos and habitats). New populations are being initiated with rhinos from areas

which are approaching or reached carrying capacity. Two have already been created (Mugie and in Meru NP) and plans are in place for others (OI-Pajeta extension, Tsavo West NP). The national rhino population has increased by more than 5% per annum over the last two years. This is the first time since the 1970s and is most encouraging. The goal of the national 5 year rhino strategy is to increase rhino numbers by at least 5% p.a.

KWS has recently developed a new 5-year strategic plan. The project capacity building and management aspects (on-going training, monitoring, standardised data collection, analysis, status reporting, habitat assessment and informed decision making) are seen by KWS senior management as key elements that need to be adopted by other appropriate species programmes.

The KWS board has approved the initiation of an East African Community Rhino Management Group (EAC-RMG) (see submitted concept paper – supplementary item Ref: 162/12/004-S1). The overall objective of the group would be to promote the establishment and maintenance of a viable and well distributed meta-population of eastern black rhino taxa as flagship species for biodiversity conservation within the east African region.

I agree for ECTF and the Darwin Secretariat to publish the content of this section

Annex 1 Report of progress and achievements against Logical Framework for Financial Year: 2005/2006

Project summary	Measurable Indicators	Progress and Achievements April 2005-Mar 2006	Actions required/planned for next period
<p>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</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 build local capacity to ensure that Kenya Wildlife Service has the human resources and information systems necessary to 1) achieve the targets for black rhino conservation mandated in it's Kenya 5-year Black Rhino Strategy; and 2) meet CBD objectives.</p>	<p>Improved information on rhino population sizes and dynamics, and rhino habitat carrying capacities and conditions, to be used for effective management and implementation of the Kenyan 5 year Black Rhino Strategy.</p>	<p>Annual national and park rhino status reports, -providing indicators of population performances, and recommendations for rhino meta-population and habitat management across 11 Kenyan parks.</p> <p>Regular reviews & feedback reports from Kenyan Rhino Management and Technical Committees (RMC & RTC) and the IUCN AfRSG.</p>	<p>High level support within the Kenya Wildlife Service for the aims of the Kenya rhino management strategy.</p> <p>Adequate KWS funds and staffing to protect and manage rhino areas.</p> <p>Continuing successful grants to implement annually reviewed conservation strategies.</p>
<p>Outputs</p>			
<p>a-i) A body of trained and accredited instructors for the AfRSG rhino monitoring course who are capable of continuing in-country training of field rangers. ii) A body of trained and accredited rhino monitoring field rangers. iii) Rhino officers trained in rhino</p>	<p>Minimum of 20 rhino officers from 11 parks trained and tested . Those that pass accredited.</p> <p>Minimum of 165 field rangers from 11 parks trained and tested. Those that pass accredited.</p>	<p>3 staff were trained and passed bringing the number of accredited Kenyan instructors up to 26 (in years 1 and 2, the instructor's training course and certificate course trained 30 staff and accredited 23)</p>	<p>It was particularly encouraging that trained KWS instructors trained staff in rhino monitoring techniques at a newly established private custodianship black rhino sanctuary and Meru NP. They also set up excellent ID master files – all without any input from Darwin</p>

<p>monitoring, data quality control, entry and basic processing and reporting.</p>		<p>The instructors are training field staff on regular basis. They are being supported and their training assessed by the Kenyan rhino scientist and the Darwin fellows. Trained KWS field assistants have also been visiting rhino areas to provide support.</p> <p>Follow up work in the field has helped with quality control checking as well as assisting rhino officers improve areas where shortcomings were apparent (e.g. organisation and quality control of ID master files).</p>	<p>Fellows.</p> <p>Follow up work to continue to ensure accredited instructors continue training on site and that data quality control and maintenance of ID master files continues to improve.</p>
<p>c-i) Rhino programme coordinator and scientist trained in detailed field data analysis, interpretation of population dynamics and effective status reporting for decision-making ii) rhino officers/researchers from parks trained to produce basic annual park reports for KWS staff to use in national status reporting.</p>	<p>Rhino coordinator, support scientist and at least 11 rhino officers/researchers trained (1 from each population).</p>	<p>Following on from the excellent MSc dissertation by the KWS rhino scientist and the training of 26 park staff in the production of status reports, the second annual park and national status reports were produced with minimal support from Darwin fellow. The first annual status reports was produced in Year 2.</p>	<p>The end of 2005 national estimates have shown an increase of over 5% per annum (the national strategy target is at least 5% p.a.). The 2004 estimates also showed similar increases which is the first time since the 1970s.</p>
<p>d) A black rhino ecological carrying capacity model with procedures and training for habitat assessments, habitat monitoring and updating the model.</p>	<p>Data established on various variables / determinants of rhino ecological carrying capacities for each park, model developed, carrying capacities estimated, monitoring system established.</p>	<p>Detailed surveys of 9 well-established Kenyan black rhino sanctuaries for browse availability and proportional browse species composition completed. 100-150 monitoring plots established in each</p>	<p>Adjustments were made to planned vegetation sampling layouts (from along transects to stratified random plots, accessible (within 2km) by road or track). This was to facilitate logistical needs of repeat surveys</p>

		<p>area. Auxiliary data on herbivore densities, soil/geology, rainfall and temperature collected. Adult home ranges calculated for areas with sufficient data.</p> <p>Initial ECC model developed, Procedural manual for browse assessment completed, 18 staff trained in habitat assessment. Vegetation database developed and detailed report produced.</p>	<p>and to better sample all vegetation types.</p> <p>Valuable improvements were made to field and training procedures, to account for specific vegetation forms accounted in Kenyan rhino sanctuaries.</p> <p>Darwin fellows were particularly encouraged to see the very high level of interest and the hard work put in by the field staff during the training. A core field team will be further supervised / supported during assessments of newly created rhino areas.</p> <p>Additional survey data will be used to finalise ECC model and completion of at least 1 publication on Kenyan rhino habitat.</p>
<p>e) 2 MSc, 1 BSc and 4 Certificate studentships, and 1 BSc projects completed</p>	<p>Students enrolled at university/college, examination and projects reports.</p>	<p>In Year 2: Ben Okita was awarded his MSc with Distinction, University of Canterbury; 12 Rhino staff were awarded their certificates in Sanctuary Wildlife Management at KWS Training Institute. 3 students received Distinctions and best student awards; the only ones for the college academic year. 5 received upper credit and 4 received lower credit. Their course tutor commended them as the best</p>	

		<p>class the institute has had.</p> <p>In reporting year: Lekishon Kenana successfully completed his 2-year MSc at Moi University.</p> <p>Both Ben and Lekishon have been promoted to senior positions.</p> <p>Adhan Berhe, the Tsavo West NP rhino sanctuary rhino warden, successfully completed the third year of his BSc course in Wildlife Management.</p>	
f) Publications and publicity.	Rhino conservation education booklet (1000 copies distributed to schools), 4 peer-reviewed papers, 2 radio broadcasts.	<p>The rhino education booklet has been produced as part of the wider education training.</p> <p>Two papers have been accepted for publication in the International Year Zoo book. ZSL Lifewatch magazine article has been written, Information posters have been produced both for ZSL and Kenyan sites.</p>	One paper on habitat work is being written. A publication from Lekishon Kenana's MSc project is also being considered.