Darwin Initiative for the Survival of Species

Half Year Report (due 31 October each year)

Project Ref. No.	162/12/004
Project Title	Building capacity for conservation of a critically endangered flagship species
Country(ies)	Kenya
UK Organisation	Zoological Society of London
Collaborator(s)	IUCN African Rhino Specialist Group, Kenya Wildlife Service
Report date	31/10/05
Report No. (HYR 1/2/3/4)	HYR 3
Project website	http://www.zsl.org/field-conservation/deserts-and-rangelands/conserving-the-black-rhino,22,AR.html (ZSL) http://www.kws.org/darwin.html (KWS)

1. Outline progress over the last 6 months (April – September) against the agreed baseline timetable for the project (if your project has started less than 6 months ago, please report on the period since start up).

1) 1 field officer/ranger starts course in Wildlife Management (Certificate) at KWS Training Institute:

Twelve KWS staff were successfully trained together. Three students (2 from Tsavo West NP and 1 from Aberdare NP) were awarded Distinctions, the only ones in the Institute's academic year, and were also presented with the best student awards. Five students received Upper Credit and four students received Lower Credits. The original project plan was to train 4 staff including one person in the 3rd year. 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 to allow 2 extra officers to be trained. The project also used this as a leverage to obtain extra funding from USAID to enable 2 officers from each of the six key areas to undertake the training. The UK and Kenyan Darwin fellows taught the key module on Sanctuary Wildlife Management Techniques. The Darwin project team also set up the course field projects and provided supervision.

Subsequent to this training, the Darwin Fellows have supported the Rhino Scientist Ben Okita in continuing with the teaching of the main Sanctuary Wildlife Management modules.

2) 1 BSc in Wildlife Management at Moi University - Adhan Berhe, the KWS Rhino Warden, has started his third year of the course after successfully completing the second year.

3) 1 MSc in Wildlife Management at Moi University - Lekishon Kenana, the KWS Scientist, has been undertaking his field project at Tsavo West NP. He has completed the field habitat surveys and is now analysing the data. The project thesis will be submitted at the end of December.

4) Six monthly field assessment - Field assessment was carried out in September 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 have been trained in the detection and collection of rhino signs such as spoor, dung and browsed vegetation. Additional funds for fuel etc costs have been obtained from WWF to conduct a 3 month intensive survey. Dung samples are also being collected for DNA analysis by ZSL. The project team has also carried out training 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 Monitoring and Surveillance System for the whole park is now being considered.

Similarly, the collection of standardised data in Solio GR, a private reserve, has improved considerable over the last year.

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 home ranges following the introductions.

Field support by Kenyan field assistant is continuing on a regular basis.

5) Management outcomes from the population dynamic analysis and status reports (please see the annex for a summary – more details will be provided in the final report)

6) Education awareness programme

Claire Robinson, Head of Education at ZSL, accompanied the Darwin Project Leader in September to continue with the training. Claire also worked with the Education Wardens at Tsavo West and Lake Nakuru NPs, Elema Hapcha and Lucy Makosi, to develop further primary education material. Claire's flight and training material were funded by ZSL.

7) Habitat assessment and ECC model: The main work during this reporting period involved the following:

1. Completion of data capture and analysis of the black rhino browse availability information from field surveys.

2. Image processing and image classification to determine area sizes of vegetation types in each of 9 Kenyan black rhino areas. So far Ol Jogi, Lewa, Ngulia, Aberdares and Sweetwaters have been done, and Nakuru, Mara and Nairobi NP are in progress.

3. Digitising of rhino area features such as roads, buildings and drainage line courses.

4. Completion of final manuals for field Browse Availability Assessment.

5. Determining adult black rhino range locations and sizes in several rhino areas. Home range size is inversely log-correlated with black rhino carrying capacity.

The Darwin Project Leader and the KWS Scientist also had a meeting with John Virgoe, First Secretary at the British High Commission and Deputy Permanent Representative to UNEP & Habitat to discuss the project including the possible project extension in the Tsavos. Ben Okita, the KWS scientist, has been invited to do a presentation on the project at the British High Commission in a few weeks time. We have also invited John Virgoe to the field to see the many elements of the project.

2. Give details of any notable problems or unexpected developments that the project has encountered over the last 6 months. Explain what impact these could have on the project and whether the changes will affect the budget and timetable of project activities.

Several difficulties arose during the development of vegetation maps from the available LANDSAT images, which have 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 two areas - 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 has also been difficult to classify the images in any automated way. It became necessary to demarcate broad subareas 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 have been experienced due to much more time required for the field surveys and the data processing.

Have any of these issues been discussed with the Darwin Secretariat and if so, have changes been made to the original agreement? These delays have been discussed with the Darwin Secretariat and changes to the project workplan approved.

Discussed with the DI Secretariat: Yes

Changes to the project schedule/workplan: The habitat assessment training workshop is being undertaken in November. The training requires the completed manuals for field Browse Availability Assessment and the carrying capacity model.

3. Are there any other issues you wish to raise relating to the project or to Darwin's management, monitoring, or financial procedures?

This project has identified some very important conservation needs.

The development of a Research, Monitoring and Surveillance Programme for the Tsavo ecosystem is much needed. The ecosystem is one of the largest in Africa and faces many challenges including human-wildlife conflict, poaching, bushmeat, effective community education and conservation. The ecosystem includes the Tsavo East and Tsavo West NPs covering over 50% of the protected areas in Kenya. The area has the largest population of elephant and rhino in Kenya and is home to over 60 mammal species and 400 bird species. There were over 7000 black rhinos in the Tsavos in the 1970 but, except for a few isolated individuals, all were lost through poaching. The area is one of the most suitable black rhino habitats in Africa and is essential for the long term establishment of a large free-ranging population and meeting the KWS's wildlife conservation and management mandate. The Tsavos have many other important populations of species including Hirola, elephant, lion (characteristic mane-less males), gerenuks etc.

A proposal is being developed by ZSL and KWS scientists for the establishment of a research and monitoring programme for the Tsavo ecosystem. A meeting was also held between the KWS and ZSL Directors and Scientists in September to discuss funding sources for this much needed programme. This work including an extension to the current project was briefly discussed during the UK Minister's project visit and a meeting with John Virgoe, First Secretary at the British High Commission and Deputy Permanent Representative to UNEP & Habitat.

The Aberdares NP has very difficult terrain making monitoring very challenging. Very little is known of the status of the species in the park. These include the highly endangered highland black rhino and the bongo. A similar specific research, monitoring and management programme is needed for this important area.

Please send your **completed form by 31 October each year per email** to Stefanie Halfmann, Darwin Initiative M&E Project Manager, Email: stefanie.halfmann@ed.ac.uk

Annex: Some recommendations and actions from the data analysis and status reporting

1) Impact of skewed sex ratios on population performance

i) Lake Nakuru National Park:

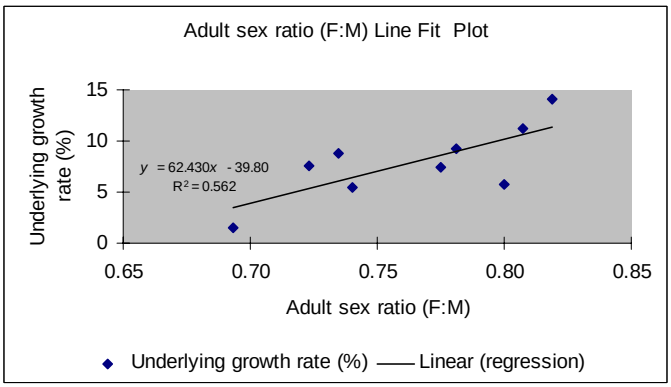


Fig.1: Linear relationship between sex ratio and underlying growth rate in Lake Nakuru National Park from 1992-2003, showing that 62.43 *x* sex ratio -39.80 significantly explained 56.2% of the variations in the underlying growth rate ($F_{1,7}$=8.97; P=0.020).

Result: There were more males than females throughout the 10 year period. There was a positive relationship between increasing adult females to population growth rate.

Recommendations: Surplus males are translocated out of the park to correct the adult sex ratio to parity or above in order to improve growth rate.

Actions: 7 male and 3 female rhinos were translocated from L. Nakuru in 2004 in an attempt to correct the sex ratios in order to improve growth rates. A further 8 to 10 rhinos, with a higher proportion of males, will be translocated to re-stock Meru National Park in 2006.

ii Nairobi National Park:

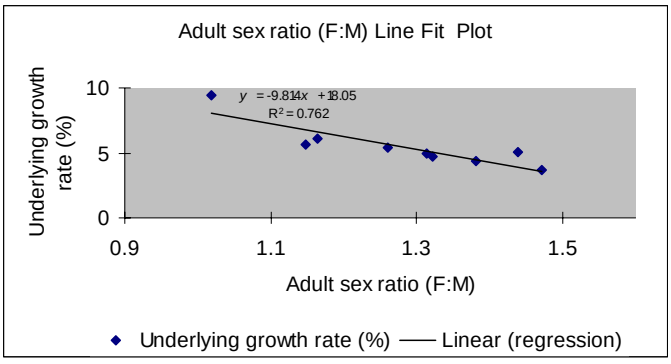


Fig.2: Linear relationships between sex ratio and underlying growth rate, in Nairobi National Park from 1992-2003 showing that -9.81 *x* sex ratio +18.05 significantly explained 76.2% of the variations in the underlying growth rate ($F_{1,7}$=22.45; P=0.002).

Result: Despite favourable sex ratio for optimum growth, underlying growth rate decreased. Previous translocations out of the park targeted sub-adults, inadvertently leaving behind relatively old-aged females (>25yrs) which were less productive.

Recommendations: Future translocations to consider translocating mother and calf >2yrs to balance sex ratios and age structure, whilst at the same time improve genetic variability.

Action: Ten rhinos were translocated out of Nairobi Park in 2005 to Laikipia ranches respectively. Decision on selection of translocation candidates was guided by this result.

2) Impact of rhino densities and competing browsers on population performance

i) Nairobi National Park:

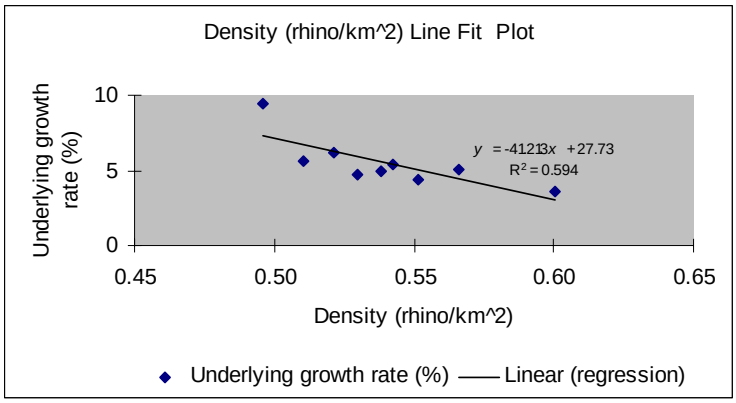


Fig.3 Linear relationships between density and underlying growth rate in Nairobi National Park from 1992-2003, showing that -41.21 *x* density +27.73 significantly explained 59.4% of the variations in the underlying growth rate ($F_{1,7}$=10.26; P=0.015).

Result: High rhino density negatively impacted rhino population growth rate.

Recommendation: The density of rhinos in Nairobi should be maintained between 0.48rhinos/km² and 0.54rhinos/km² for optimum growth.

Action: Sixteen black rhinos have been translocated from Nairobi National Park between 2004 and 2005. The current 2005 rhino density is 0.59rhinos/km². A further 13 rhinos will be translocated from the park in 2006 for re-introduction to Meru National Park. This will reduce the density to 0.49rhinos/km² (57 rhinos in 117km²). Rhinos will continue to be harvested from the population to maintain the population at the Maximum Productivity Carrying Capacity (MPCC) levels.

ii) Ngulia Rhino Sanctuary

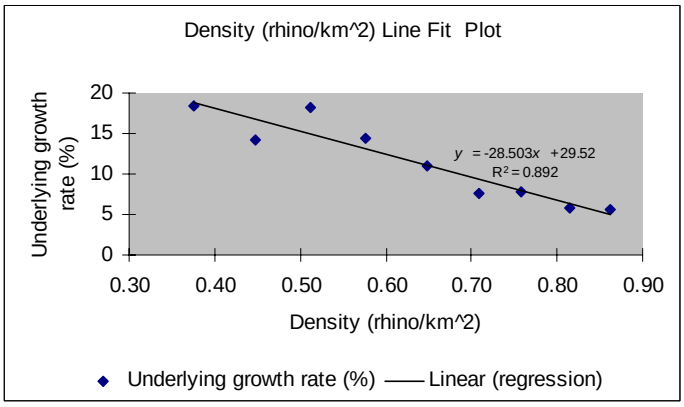


Fig.4 Linear relationship between density and underlying growth rate in Ngulia from 1992-2003. The graph shows that -28.50 x density +29.52 significantly explained 89.2% of the variations in the underlying growth rate ($F_{1,7}$=57.88; P=0.000).

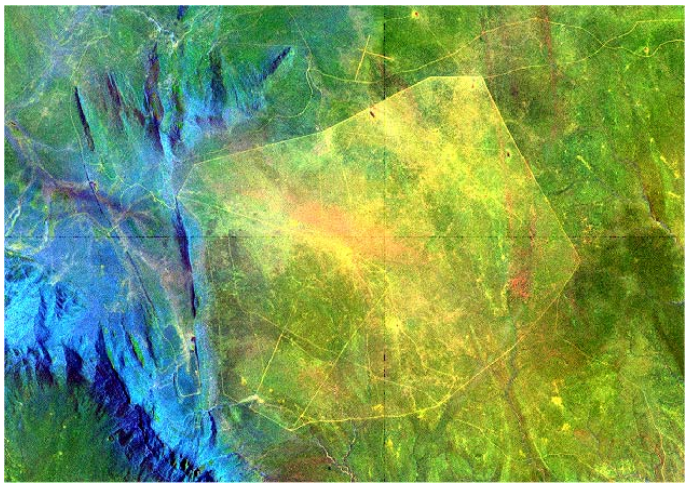


Fig.5 A satellite image of Ngulia rhino sanctuary showing the extent of vegetation degradation due to high density of browser species.

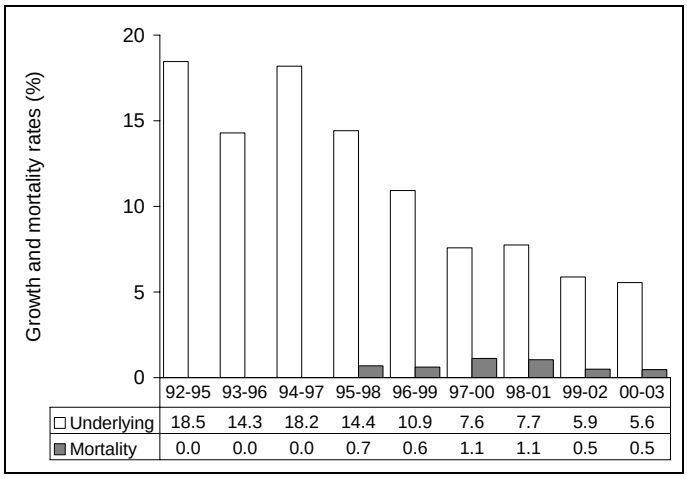


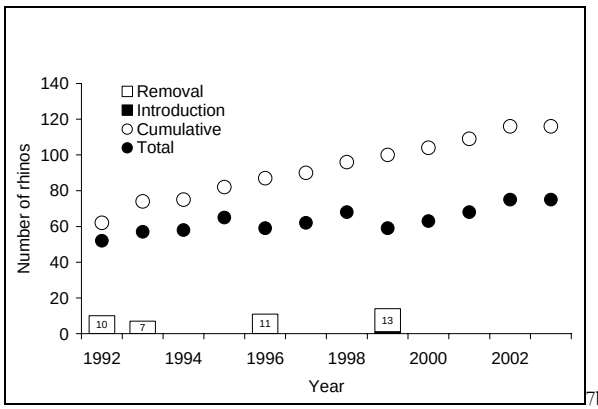
Fig.6 3-year moving average growth and mortality rates in Ngulia from 1992-2003 showing a steady decline in the underlying growth rate.

Result: The high density of competing browsers severely impacted the habitat (Fig. 5) and resulted in a significant reduction in ecological carrying capacity from 1-1.5 to 0.6 rhinos/km^2. The high rhino density also negatively impacted on underlying growth rate (Fig.6). A growth rate of 2.4% was projected for the next period.

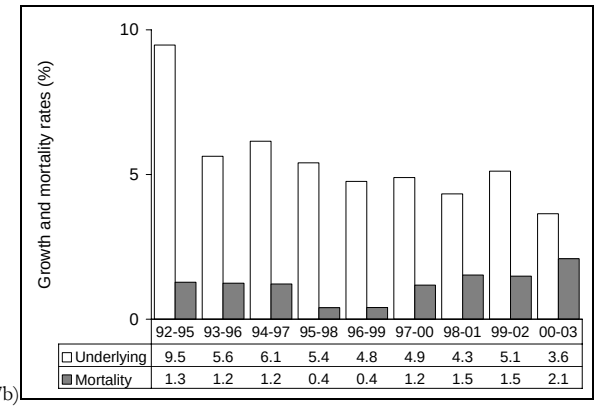
Recommendation: An urgent management intervention is required to reduce both rhino and competing browsers in the sanctuary.

Action: Reduction of competing browsers particularly the elephants is scheduled for October 2005. At the time of compiling this report, an attempt is being made to move elephants out of the sanctuary. A proposal is being developed to translocate some rhinos from the sanctuary into the adjacent area within Tsavo West National Park.

3) Implementation of rhino harvesting strategy



7a)



7b)

Fig. 7a shows a total of 41 rhinos translocated from Nairobi Park. This translated to 4.9% annual off-take, while Fig. 7b shows the resultant average growth rate of 5.5% over the ten years.

Result: Translocating a 5% set proportion annually resulted in approximately 5% annual growth rate. Fig. 7a and 7b above supported KWS's policy on removals and highlighted the need to continue at 5% off-take to maintain at least 5%+ annual growth rate.

Recommendation: All populations as outlined in the Kenya Black Rhino Conservation Strategy should be maintained at or below maximum sustained yield by harvesting a set proportion of the population annually to maintain at least 5% annual growth rate as seen in Nairobi N.P.

Action: This is an on-going exercise through translocations. These results were used at the 2004 Bangkok CITES meeting as a classic example of a set percentage harvesting strategy to attain equivalent growth rate.

4) Obtaining accurate rhino population estimates

Result: Maintaining densities and removing set percentages to optimise growth, is a strategy that would require accurate estimates of population numbers and carrying capacities.

Recommendation: Population estimates need to be improved for Lake Nakuru NP, Nairobi NP and Ngulia RS, which have an increasing proportion of "clean" (unidentifiable) animals, through the implementation of ear notching exercises and the use of Rhino population estimation tool.

Action: Rhino population estimation tool uses the principles of mark-recapture (sighting; re-sighting data). The Nairobi NP and Ngulia RS sighting re-sighting data were analysed (see Fig. 8a and b). Seven rhinos were ear-notched in Ngulia in August 2005. Funding has been obtained for ear-notching of another 20 rhinos (10 each in Nairobi and L. Nakuru NPs).

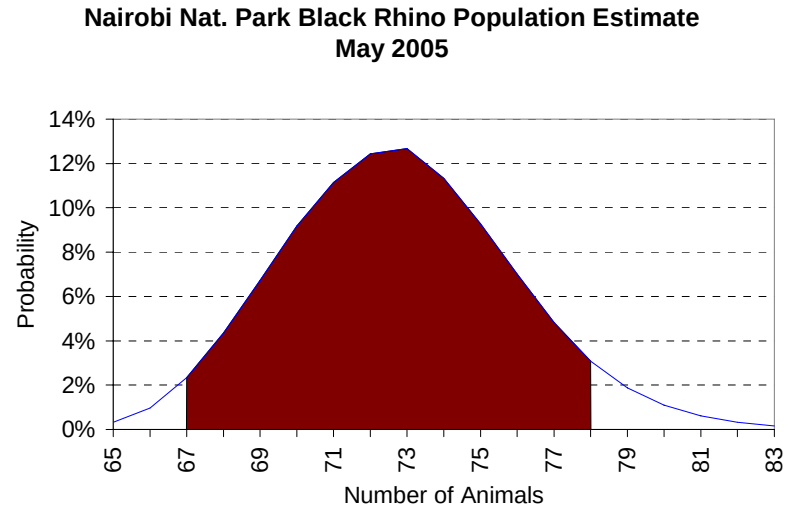


Fig. 8a: Probability distribution of Nairobi Nat. Park black rhino total population based on sighting re-sighting data between Nov 2004 and Apr. 2005. *90%* Posterior Credible Interval = *67 to 78* Skewness = *1.52*; Peakedness = *0.01*

The "claimed" population size in May 2005 was 75, but based on sighting re-sighting data the population was estimated at 72 with 95% confidence interval of 67 – 78 animals.

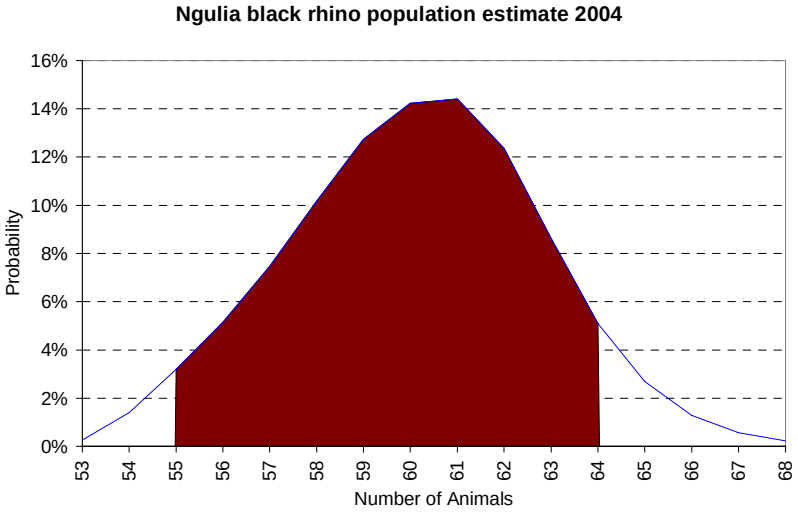


Fig. 8b: Probability distribution of Ngulia black rhino total population based on sighting re-sighting data of 2004. 90% Posterior Credible Interval = 55 to 64; Skewness = 1.20; Peakedness = 0.02

The "claimed" population size in 2004 was 64, but based on sighting re-sighting data the population was estimated at 60 with confidence interval of 55 – 64 animals.