Conserving Grevy’s Zebra in the Samburu District

2011 FIELD REPORT

Background Information

Lead PI: Paul Muoria

Project scientists: Paul Muoria and Prof. Nicholas Oguge

Report completed by: Paul Muoria

Period Covered by this report: January 2011 to December 2011

Date report completed: 14th January 2012

Research site: Samburu Wamba Centre, Samburu District, Kenya
Dear volunteer,

On behalf of the Grevy's zebra (Equus grevyi) project team, I wish to take this opportunity to sincerely thank you for your support of the project and to update you on our progress. Your participation on our project has enabled us to continue gathering important information on the Grevy’s zebra numbers and that of its competitors, including other wild herbivores and livestock. Those of you who participated on the project in 2011 helped us gather baseline information on habitat quality, particularly in respect to soil erosion, invasive species and food availability. You helped us cover a total of 170 km enumerating and measuring erosion gullies; collecting data on food abundance and diversity; estimating diversity of invasive species; and counting Grevy's zebra, livestock and other wild animals. The Overall goal of our project is to contribute information that can help reverse the decline in Grevy’s zebra numbers. All the scientists on our project are members of the National Grevy's zebra Technical Committee which helps Kenya Wildlife Service (KWS) implement The National Grevy’s Zebra Conservation Strategy. We are therefore well positioned to ensure that the data you helped us collect will be used in the implementation of the national Grevy's zebra conservation strategy.

It is my belief that you enjoyed working with us. The challenge of reversing the decline in Grevy’s numbers is enormous and we need all the support we can get. Just remember, Wamba is your home and you, your family and friends are always welcome. Come again, and bring a friend, or family. If you have never been the Grevy’s zebra World, I am sure you will never regret signing up and coming over. What with scenic Mathews ranges, the beautiful Grevy’s zebra and other wild animals living in harmony with livestock and the Samburu pastoralists and the rich ‘unpolluted’ Samburu culture. A visit to Samburu and Buffalo National Reserves or the Namunyak Wildlife Conservancy is unforgettable.

Dr. Paul K. Muoria  
Principal Investigator  
Grevy's Zebra Project  
14 January 2012
SECTION ONE: Scientific research achievements

Top highlight from the past season
During the year 2011, we incorporated habitat monitoring in our Grevy's zebra monitoring activities. Our findings showed that habitat degradation, as evident from the large numbers of erosion gullies, is a serious problem particularly in Meibae conservancy. Efforts to contain the problem need to be intensified.

Reporting against research objectives
Objective 1: Monitoring Grevy's zebra population size, structure and distribution in relation to that of other wild animals and livestock. Data on the population size, status and the spatial and temporal distribution of Grevy's zebras is necessary for effective management and conservation of this endangered species. To achieve this objective, we continued gathering population size, status and distribution data in Southern Samburu. Specifically, we continued gathering detailed data on the Grevy's zebra population in West gate and Meibae conservancies (Figure 1). We also continued monitoring the densities of other wild animals and livestock in the area.

Figure 1: Study area in West gate and Meibae conservancies.
Figure 2: Comparison of the abundance of different wild and domestic animals in Wamba area (West gate and Meibae conservancies) in 2008, 2010 and 2011.
- **Methods**

Working with three teams of volunteers in July, August and September 2011, we monitored wildlife and livestock abundance by conducting surveys on all 28, four kilometre permanent transects distributed in West Gate and Meibae conservancies from July 2011 to September 2011. We ensured that the standard line transect protocols were adhered to. We have been using these transects since 2008. Each of the transects was surveyed at least once. For convenience of our data collection logistics, we divided Meibae conservancy into Ngaroni and Barsalinga areas. Ten (10), 11 and 7 transects were in West gate, Barsalinga and Ngaroni areas respectively. Distance 6.0 Software was used to analyses the resulting data.

- **Results**

Wild animals encountered included gerenuk (*Litocranius walleri*), Grevy’s zebra, Grants gazelles (*Nanger granti*) and Somali ostriches (*Struthio camelus molybdophanes*). These animals were encountered at densities of 1.45, 0.34, 0.33 and 0.17 individuals per kilometer squared, respectively. Other wild animals encountered less frequently included plains zebra (*Equus quagga*), elephants (*Loxodonta africana*), and lesser kudu. Wamba area (particularly Barasalinga and parts of Ngaroni) received some rains in July and August leading to high food abundance in the area during the reporting period. This was unlike other semi-arid parts of the country which were experiencing a severe drought. We recorded a very high abundance of cattle in Wamba area (Table 1 and Figure 2).

<table>
<thead>
<tr>
<th>Species</th>
<th>Sample size</th>
<th>Estimate</th>
<th>% CV</th>
<th>Df</th>
<th>95 % CI</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>31</td>
<td>65.482</td>
<td>47.55</td>
<td>62.15</td>
<td>26.559 – 161.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shoats (sheep</td>
<td>34.965</td>
<td>18.19</td>
<td>127.062</td>
<td></td>
<td>24.467 – 49.96</td>
<td></td>
<td></td>
</tr>
<tr>
<td>and goats)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Donkey</td>
<td>31</td>
<td>2.081</td>
<td>32.25</td>
<td>78.36</td>
<td>1.113 – 3.893</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Camels</td>
<td>32</td>
<td>2.053</td>
<td>35.78</td>
<td>78.74</td>
<td>1.029 – 4.097</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gerenuk</td>
<td>31</td>
<td>1.453</td>
<td>23.63</td>
<td>84.01</td>
<td>0.914 – 2.310</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Camels</td>
<td>30</td>
<td>0.340</td>
<td>39.62</td>
<td>58.02</td>
<td>0.158 – 0.730</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grevy’s zebra</td>
<td>17</td>
<td>0.32672</td>
<td>40.49</td>
<td>58.50</td>
<td>0.14981 – 0.71257</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plains zebra</td>
<td>1*</td>
<td>0.166</td>
<td>47.57</td>
<td>26.88</td>
<td>0.062 – 0.394</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elephants</td>
<td>2*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lesser Kudu</td>
<td>1*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Axtrix (*) means that sample size was too low for density estimation.

**Table 1:** The abundance of various wild and domestic animals encountered along the 28 transects surveyed during the reporting period.
This was occasioned by immigration of pastoralists and their cattle from Northern parts of Samburu County and parts of Marsabit County to North of the study area. The density of cattle was much higher than that recorded in preceding years (Figure 2). Other livestock species encountered included sheep and goats, donkeys and camels. As reported in the Grevy’s zebra annual report of 2010/2011, plains zebra seem to be disappearing from the area. During the reporting period, only one group of plains zebra was counted during the surveys of July to September 2011. We are still scrutinizing the data in order to investigate the trends in densities of other species.

**Objective 2 : Monitor the abundance of key Grevy’s zebra food plants and habitat degradation.** Rapid habitat degradation is evident in Wamba area as a result of overgrazing and possibly due to climate change. There are also evident vegetation changes with some areas being threatened by invasive species. Luckily, the local communities in the study area, who are primarily pastoralists, are setting up conservancies to generate income from ecotourism and also conserve Grevy’s zebras and other wild animals. We initiated an ecological monitoring program which will shed light whether the creation of conservancies is helping in habitat restoration.

- **Methods**
  During the reporting period, we incorporated soil erosion, abundance of invasive plants and herbaceous species cover and diversity monitoring to our activities in Wamba area (Meibae and West Gate conservancies). To monitor soil erosion, abundance of invasive species and the percent cover and herbaceous plant species diversity, a two kilometre segment of each of the 28 permanent transects were used. The layout of the transects and plots used in habitat monitoring is shown graphically in Figure 3.
We enumerated and categorized all the erosion gullies (defined as water channels with a depth of 30 cm or more) per km of transects. Gullies were categorized into four classes (1 = 0.3 to 1 metre, 2 = 1 to 2 metres, 3 = 2 to 3 metres, 4 = over 3 metres) depending on the gully depth where the transect intercepted the gully. In each of the 28, two kilometre transects used in habitat monitoring, four, 5 X 5 metre quadrats were laid out systematically such that they were 500 metres apart. Because all transects starting points were by a road or track, all the first quadrats were 400 m from the transect start point. This was to ensure that edge effects were minimized. In each of the quadrats, all the invasive species and those that are indicators of habitat degradation including *Acacia reficiens*, *Ipomea* spp., *Solanum* spp. and *Sansevieria* spp. were counted. To monitor herbaceous plant cover and species diversity, “point step method” was used. Four 100 metre segments in each of the 2 km transects were used as transects for this purpose (Figure 3). A observer walked along each 100 metre transect and dropped a pin just ahead of his right toe after every four paces (about 4 metres). The number of times that the pin touched a plant species was recorded. In addition, we recorded the number plant species touched, and whether it was green or dry. This information was latter used to calculate diversity index and herbaceous plant cover.

- **Results**

Abundance and depth of gullies: In all the three areas, most of the gullies were between 0.3 to 1 metre in depth (Figure 4).
Figure 4: The abundance and depth of gullies in Meibae and West gate Conservancies
Gullies were most abundant in Ngaroni area and least abundant in West Gate Conservancy. We also recorded gullies with a depth of more than 3 metres in Ngaroni. Such gullies were not recorded in either Barsalinga and West Gate. Table 2 shows the density of some of the plant species we classified as invasive. Some of the problematic plant species in the area include *Acacia reficiens* and *Sansevieria* spp. Our method was sensitive enough on *Sansevelia* but it seems not good enough for *Acacia reficiens* probably because of its patch distribution and other factors we are yet to pinpoint.

![Table 2](image)

<table>
<thead>
<tr>
<th>Species</th>
<th>Barsalinga</th>
<th>Ngaroni</th>
<th>West Gate</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Acacia reficiens</em></td>
<td>0.00</td>
<td>0.00</td>
<td>10.00</td>
<td>3.57</td>
</tr>
<tr>
<td><em>Ipomea spp.</em></td>
<td>9.09</td>
<td>200.00</td>
<td>40.00</td>
<td>67.86</td>
</tr>
<tr>
<td><em>Sansevieria spp.</em></td>
<td>2572.73</td>
<td>157.14</td>
<td>0.00</td>
<td>1050.00</td>
</tr>
<tr>
<td><em>Solanum spp.</em></td>
<td>5927.27</td>
<td>4600.00</td>
<td>750.00</td>
<td>3389.29</td>
</tr>
</tbody>
</table>

**Table 2:** Abundance of invasive species in Wamba area (July 2011 to September 2011).

Monitoring herbaceous plant cover and diversity: We recorded the highest diversity of plants in Barsalinga area of Meibae Conservancy and the lowest in West gate Conservancy (Figure 5). The highest percent cover was also recorded in Barsalinga area of Meibae Conservancy. However, unlike diversity, cover was lowest in Ndaroni area.
Figure 5: The Shannon diversity index and percent cover for the herbaceous layer in Meibae and West gate Conservancies.
Objective 3: Disease surveillance for the conservation of Grevy's zebras. The rapid decline in Grevy's zebra population has been attributed to competition for resources with expanding human and livestock populations and the resultant habitat degradation. Other factors thought to be limiting Grevy's zebra population include reduced water supply and poaching. Disease outbreaks can cause sudden and unexpected local declines in abundance of endangered animals. In their extensive review of disease concerns of wild equids, Radcliffe & Osofsky (2002) only found scanty information on diseases affecting Grevy’s zebras. However, disease outbreaks could have been the silent cause of the documented Grevy's zebras decline. For example, at least 53 Grevy's zebras died during an anthrax outbreak in southern Samburu. It is therefore crucial that the risk of zoonotic diseases on Grevy's zebras be addressed comprehensively in order to formulate conservation and management policies which might lower this risk. During the year 2011, we continued working with partners including community scouts and National reserve rangers in disease surveillance but there were no disease outbreaks reported during this period.

Objective 4. Explore Grevy's zebra movements the impacts of climate change their population ecology. Since 2003, we have been collecting long-term daily rainfall and temperature data in three "weather stations" in Wamba area. We also have data that can be used to calculate Grevy's zebra and other wild animal and livestock density, distribution and movement patterns. We collared 5 Grevy's zebras in 2010 using GPS-GSM technology. This enables us to monitor how these equids use their habitat more closely enabling us to collect data which will help in modeling various climate change scenarios. We will work with AWF science team to write a scientific publication on this topic.

Objective 5. Work with other stakeholders to implement the National Grevy's zebra conservation strategy. The reversal of the decline in Grevy's zebra population requires the implementation of coordinated strategies among all stakeholders. This realization led to the development of the National Grevy’s zebra Conservation and Management Strategy. Launched in 2008, this strategy has nine objectives which forms the framework for conservation actions. Our project goals and activities have been revised to ensure that we contribute to the strategy implementation. To ensure effective participation of the project in the implementation of the strategy we:

a. continued participating in the strategy implementation by refocusing our activities to ensure relevance to the strategy and by our active participation in the National Grevy’s zebra Technical committee.

b. Shared our findings in the annual Grevy's zebra researchers conference held at Kenya Wildlife Service Headquarters in Nairobi Kenya in October 2011.
c. Contributed thousands of Grevy's zebra photographs to the National Grevy's zebra identification database.

SECTION TWO: Impacts

Partnerships

- **African Wildlife Foundation (AWF)**
  AWF is still committed to Grevy's zebra conservation and will continue partnering with the Author (Paul Muoria) in some of the field components of this project. Dr. Philip Muruthi (Senior Director of Conservation at AWF) will continue to serve as the scientific advisor on this project.

- **Local communities**
  Strong partnerships have been developed with the local communities, specifically West Gate and Meibae communities of Wamba area. Through their interaction with researchers, they have come to appreciate the importance of conservation, particularly of Grevy's zebras. They have also appreciated the fact that their area is crucial for the conservation of this endangered equid. In addition, they provide researchers with field guides and information on Grevy's zebras. Local community conservancies earn $23 per day for each volunteer who works in their area. These funds are used for community development projects and to pay for education of the children from the local community.

- **Local schools and conservation bodies**
  The project has three working “weather stations” where rainfall and temperature data is collected. Rain gauges and max-min thermometers were donated to Samburu National Reserve, and two schools (Nkaroni and Ngutu El Munget). In addition to getting weather data, these partnerships have enabled us to interact more closely with the local schools, conservation bodies and generally the local community. During the year 2010, we negotiated a deal with Samburu national Reserve in which the reserve allows volunteers to work in the reserve without paying reserve entry fees. In exchange, project staff will continue offering the reserve management technical and equipment support. Towards this end, the project bought and delivered a laptop computer, printer and digital camera for use by rangers while monitoring wildlife in the reserve. In addition, the research team was able to purchase more equipment including GPS units and batteries and to train the rangers in wildlife monitoring. In 2011, we helped the researve management to develop and implement a user-friendly
Microsoft Access data management system. This system will help the reserve management in data management, analysis and reporting.

- **Kenyatta University**
  We are working with three MSc students from Kenyatta University. Working with university students enriches the volunteer experience while at the same time, it helps in capacity building. The students help answer specific questions which might not be among the main project’s objectives.

- **Kenya Wildlife Service (KWS).**
  KWS is the Government agency responsible for all wildlife related matters in Kenya. It is the agency that we are working with in the implementation of the National Grevy’s zebra conservation strategy. In addition, it’s Veterinary department has been very supportive.

### Contributions to conventions, agendas, policies, management plans

#### National or regional

Data from the project are being used in the implementation of the National Grevy’s zebra Conservation Strategy.

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### Developing Environmental Leaders

1. Hannah Vazquez, a student from Princeton University was an Intern with Grevy’s Zebra Project from July - August 2011.
2. The project hosted three teams of international volunteers including teenagers.
3. During the reporting period, Paul Muoria continued working (as an external supervisor) with three Master of Science Students from Kenyatta university on different aspects:

   - Mr. Matano S. Mwatenga. (Msc. Student from Kenyatta University): working with Mr. Matano we are investigating the influence of age and sex on the Gastro Intestinal Parasite loads in Grevy’s zebra. Mr. Matano completed his field and laboratory work and is currently busy with thesis write-up.
   - Mr. Ocholla Odhiambo Gordon (Msc. Student from Kenyatta University): The student is examining “The roles of the indigenous knowledge-systems among the Samburu
pastoral community in conservation of wildlife animals in the Samburu landscape, Kenya. We worked with the student to conduct 50% of the planned interviews.

**Conservation of Taxa**

1. Scientific Name: *Equus grevyi*; common Name: Grevy’s zebra
2. Significance of the species: endangered
3. IUCN Red List status ([http://www.iucnredlist.org/apps/redlist/details/7950/0](http://www.iucnredlist.org/apps/redlist/details/7950/0)): Endangered A2ac; C2a(i), only found in Northern Kenya and isolated patches in Ethiopia.
4. Baseline information regarding previous status of the population: The previous population decline in Kenya between 1980 to 2007 was 68%. However, at least 2,407 individuals were counted during an aerial survey conducted in November 2008. The data from 2008 indicate a potential increase in the population in Kenya. The Ethiopian population is estimated at about 100, down from about 2,000 in early 1980s.
5. Impact on the Species. The project has already had a positive impact on Grevy’s zebra conservation. Firstly, awareness of the conservation issues relative to Grevy’s zebra has been enhanced at the local community, national and international levels. At the local level, interaction of members of the local community with researchers, volunteers and other visitors have helped the local people appreciate that Grevy’s zebra is unique by different community owned and managed conservancies. At the national level, Grevy’s zebra conservation status is being reviewed - we are working with the government through Kenya Wildlife Services to ensure that it is listed as a protected animal. Internationally, volunteers, tourists and other visitors help spread awareness in the global arena.

**Conservation of Habitats**

We documented baseline situation on:

1. Abundance of invasive plant species
2. Soil erosion
3. Herbaceous plant species cover and diversity indices

We intend to continue monitoring the situation.

**Impacting Local Livelihoods**

Conservation Fees (Land Use Fees): For each day each volunteer worked in Meibae or
West Gate conservancies, the conservancy earned $23. These funds were mainly used to pay for the education of the children of the members of the conservancies and also for community development projects. Part of the project funding was used to pay the salaries of the research assistant/field team leader, camp manager, 3 watchmen (guards for research camp), field guides, two cooks, drivers, and a house keeper.

Local community activities
Our working relationship with the local community is very good. The community conservancies provide field guides for our field work. The managers of West gate Conservancy and Namunyak wildlife Trust and many primary school teachers from the area were past volunteers on our project. They therefore know the importance of Earthwatch participation in the area. In addition, they appreciate the financial implications (through payment of conservation/land use fees) of Earthwatch involvement in their conservancies. Grevy's zebra is the flagship species that the local community use to market their conservancies to tourists and donors. Hosting volunteers from all over the world has greatly helped towards this effort - a fact that the local community is aware of. To keep the local community abreast with our project we engage them at different levels. Firstly, we participate in public presentations organized by Earthwatch, Kenya Office. During such meetings, the local community members are able to provide feedback to our work.

Dissemination of research results
Scientific peer-reviewed publications

Grey literature and other dissemination
1. Database of Grevy’s zebra, and other wild animals sighted during total counts and along line transects.
2. Grevy’s zebra photographs
3. We are developing a user-friendly Microsoft Access database to help the Samburu National Reserve management with managing, analyzing and reporting ecological monitoring data collected by the reserve rangers.
Acknowledgements

We acknowledge the contribution of the local community for allowing this work to be conducted on their land. The managers of the local community conservancies were very cooperative and provided their scouts to work as field guides and security. We acknowledge the financial support from Earthwatch Institute and the dedication shown by all the volunteers during the year 2011. During the year, we also enjoyed the support of the African Wildlife Foundation (AWF). The dedication of the field team led by Paul Gacheru ensured that logistics for field operations and data collection worked. Wamba camp manager and her staff made our stay at the Wamba Research camp very comfortable. My colleagues on the project including Prof Nick Oguge (Co-PI), Dr. Philip Muruthi (scientific advisor) and Paul Gacheru (Field team leader) all worked hard to ensure that the project succeeded. I would also like appreciate the contribution of Hannah Vazquez of Princeton University who was an Intern on Grevy’s Zebra Project from July - August 2011.