

**The Secretary  
Game Products Trust Fund  
c/o Directorate Scientific Services  
Private Bag 13306  
Windhoek**

**Application for Funding for the provision of  
GPS/Satellite collars to monitor the movement patterns  
and elephants and extent of human-elephants conflict in  
the Kunene, Omusati and Erongo regions.**

## 1. Project details

<b>Title:</b>	<b>The use of GPS /Satellite collars to study the movement patterns of elephant in the Kunene Region in an integrated way to conserve elephants in a sustainable manner across a mosaic of landscapes.</b>
<b>Location:</b>	<b>The Kunene Region, from the Ugab river in the south to the Kunene river in the north, including western Etosha, all the Conservancies and the Concessions. Selected Conservancies in the Erongo (Tsiseb and Otjimboyo)and Omusati (Sheya Shuushona, Uukwaluudhi and Uukolokadi-Ruacana) regions are also included in the study site. This study area encompasses an area in excess of 100 000 km2.</b>
<b>Starting date:</b>	<b>August 2010</b>
<b>Proposed finishing time:</b>	<b>December 2012</b>
<b>Project Goal and Objective:</b>	<b>The application of GPS/satellite tools in providing long-term mitigation and solutions to Human-elephant conflict and conservation in north-western Namibia.</b>

## 2. Applicant details

<b>Name:</b>	<b>Kilian</b>
<b>Initials:</b>	<b>J.W</b>
<b>Organization/Institution (If applicable:)</b>	<b>Chief Conservation Scientist Elephant Coordinator Ministry of Environment and Tourism Directorate of Scientific Services Etosha Ecological Institute Etosha, Namibia</b>
<b>Address:</b>	<b>P.O Box 6, Okaukuejo via Outjo</b>
<b>Telephone:</b>	<b>+264-67-229854</b>
<b>Fax:</b>	<b>+264_67_228853/229866</b>
<b>e-mail:</b>	<b><a href="mailto:wernerkerk@mweb.com.na">wernerkerk@mweb.com.na</a></b>

## 3. Financial needs

<b>Estimated Total Project cost</b>	<b>N\$ 2,541,250</b>
<b>Amount requested from GPTF</b>	<b>N\$ 1,494,750</b>

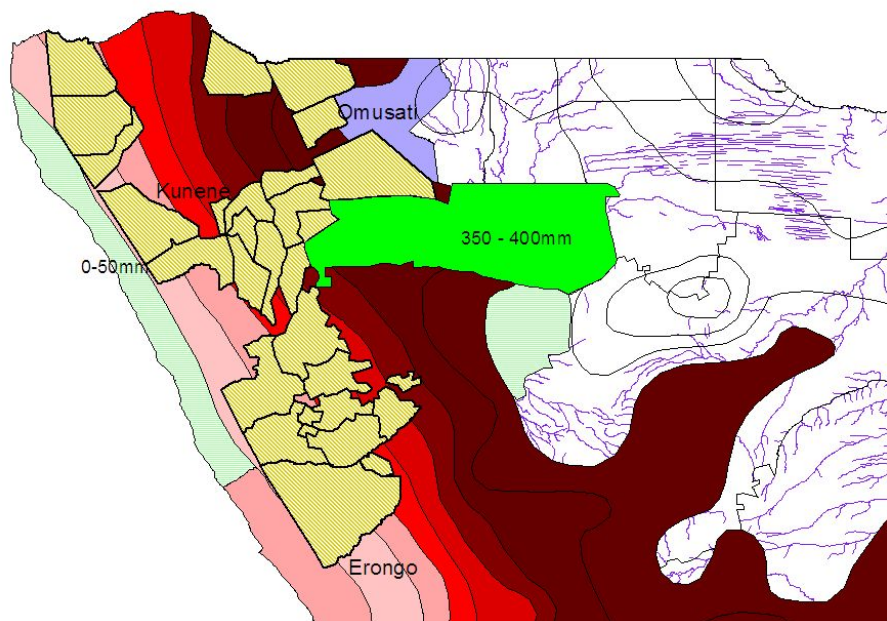
## ***Project Rationale***

The present elephant range in Namibia can broadly be divided into three clusters.

1. Kunene/Etosha,
2. Kaudum/Nyae-Nyae
3. Caprivi.

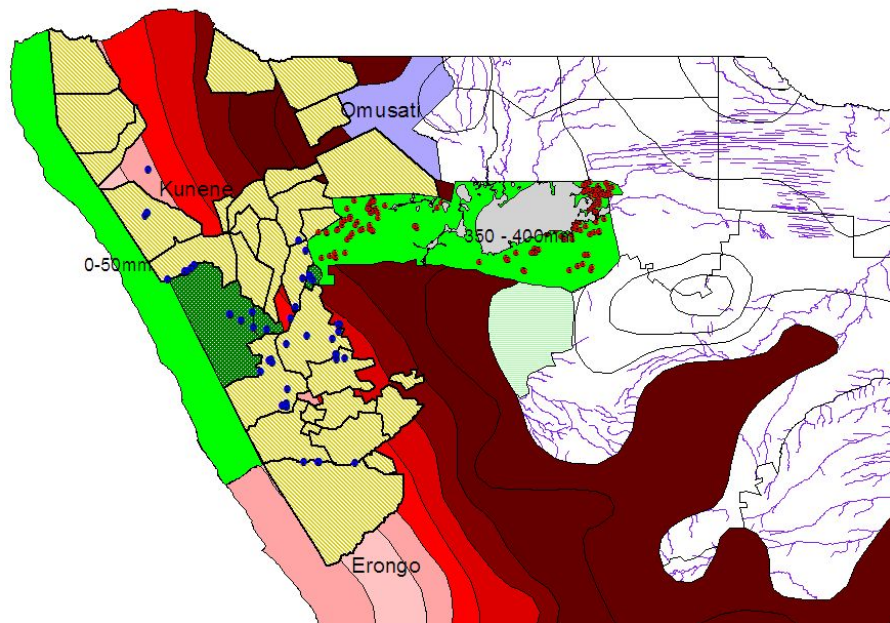
This proposed study focuses on the elephants of the Kunene/Etosha cluster. The elephants outside Etosha is still largely a free ranging population over much of a 100 000 km<sup>2</sup> range. For the purpose of this proposal the study area (Figure 1) encompasses the extreme western area of Etosha, Skeleton Coast Park, communal conservancies, concessions and the private farming land south of Etosha. The average rainfall ranges from <50mm to 300mm. Recently, human-elephant conflicts have received a lot of attention in this Region. The seriousness of mitigating conflicts and finding possible solutions, is expressed in a Cabinet Action Letter, which resolved:

1. ***“That Cabinet direct the Ministry of Environment and Tourism to urgently institute possible measures to mitigate human and wildlife conflict, particularly with elephants; and***
2. ***That Cabinet direct the Ministry of Environment and Tourism to undertake a pre-harvest assessment and use the results to effect ex gratia payments to the affected farmers, should elephants destroy their crop fields, in line with the Human-Wildlife Conflict Management Policy”***



**Figure 1. The study area illustrating the demarcated conservancies.**

The elephant population in this area is estimated to be approximately 400-800. The large size of the area, its variable topography and relatively low and scattered elephant population, are all factors that have to be taken into consideration when attempting to provide a reasonable accurate estimate for this population. In 2009, a helicopter count by the MET provided an estimate of 350 elephants. This survey was conducted from the Ugab river to the Hoarusib river. This estimate is lower than expected, but one has to consider that the elephant range north and west of the Hoarusib, as well as the entire Omusati Region was not surveyed, where elephants estimates are reported to be up to 300. This provides an additional motivation to include the entire region in this proposal. Figure 2 shows the distribution of all elephants counted by helicopter during the rhino block count for Etosha and the Kunene dedicated elephant count, during 2009.

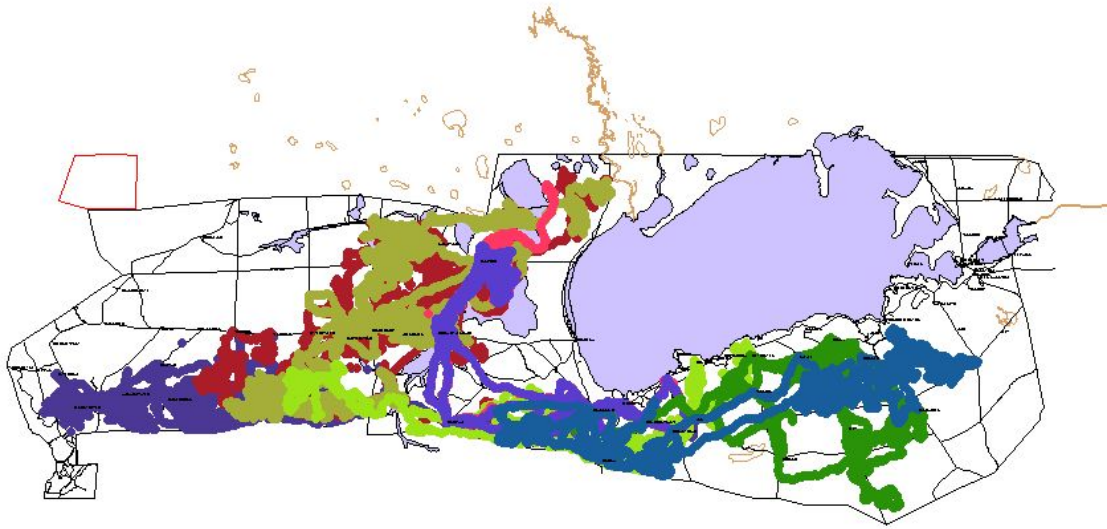


**Figure 2. The distribution of elephants in Etosha and Kunene during 2009.**

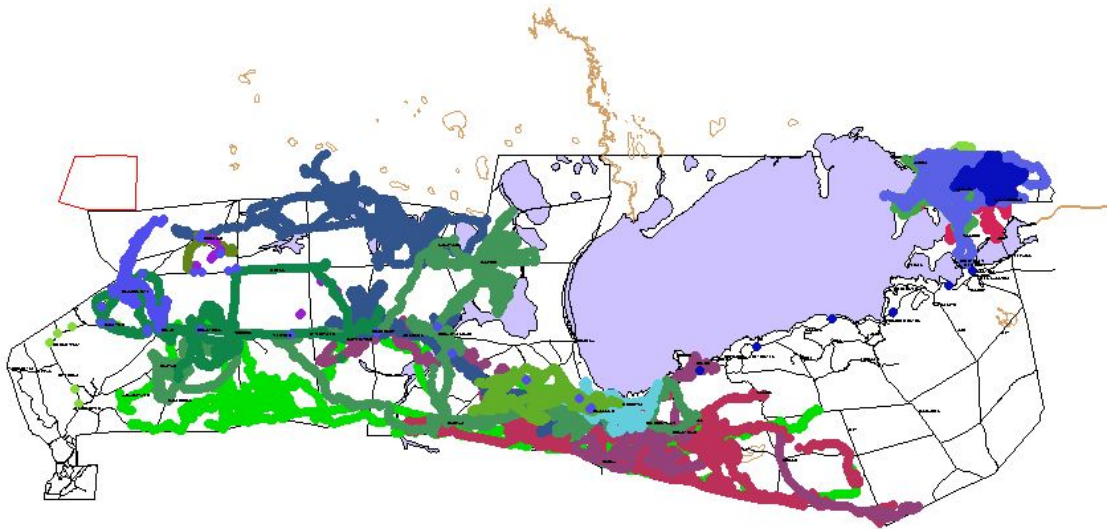
The distribution of elephants in this map is shown in relation to all the conservancies, including the concessions. This map shows the potential linkage between western Etosha and its surrounding areas. Determining the extent of elephant movements between western Etosha and its surroundings is a motivation for the inclusion of western Etosha in this proposal. The extent of movements across this western boundary is key to the options of proposed management actions and the sustainable utilization of elephants. Telemetry data obtained for elephants in central Etosha show that 17 collared females (Figure 3) have remained exclusively in Etosha and that 3 collared of a total of 8 males (Figure 4) have broken out of Etosha but always returned. Positional data for each collar was collected between 15 to 20 minute intervals.

The data in the figures below, are representative of the movement patterns of 15 elephants that were collared in 2008 and 10 in 2009. The multiple advantages of deploying collars with a high data resolution on a relatively high number of elephants are apparent in the Etosha data.

The motivation for showing this data is to illustrate the potential link between western Etosha and the Kunene Region and additionally to stress the variable movements between individual elephants, as well as differences between female and bull movement patterns. The latter points stress the importance of collaring a sufficient number of elephants whose movements are representative of the population at regional level.



**Figure 3. The movement patterns of 8 collared female elephant in Etosha.**



**Figure 4. The movement patterns of 17 collared elephant bulls in Etosha.**

Rowan Martin (2009) collated and summarized available data for the Kunene Region in an attempt to provide options for the management of elephants in Kunene and Etosha. In this report, the options for management were admittedly based on scant data relating to elephant population estimates and variability throughout the Region and uncertainties related to the link between western Etosha and its surroundings in the Kunene and Omusati. It is recognized that the conservation of elephant depends on the maintenance of large scale ecological processes governing that region. The application of GPS technology will provide scientific data to address and mitigate human-elephant conflict, options for sustainable utilization, and the identification of possible source-sink areas. This approach is one of adaptive management.

This study is designed to integrate and collaborate with other research and monitoring projects in the Region, including Hartmann zebra, lion and rhino. With the recent security concerns regarding rhino and elephant populations, the combined efforts of monitoring elephants and rhino in the region could pre-emptive illegal poaching of both species.

The main goal of this proposed study is to integrate the conservation of elephants as a key species with the present land use practices on different scales. This presents substantial challenges and the approach here is to supplement the existing data in the Kunene with advanced GPS satellite technology to fill critical gaps in our knowledge and thus improve our understanding.

The proposed study aims to achieve the following:

1. Determine the movement patterns movement of elephants in the Kunene Region with an emphasis on:
  - a. Human-elephant conflict,
  - b. Identifying the ecological needs of elephant on several spatial scales in the Region,
  - c. Assessing the importance and/or consequences of elephant dispersal between western Etosha and its surroundings.
2. Based on the acquired elephant movement data, options for the improvement of management plans, land use strategies and the sustainable utilization of elephants will be drafted.

The analyses and results of this study can readily be integrated to develop regional conservation priorities in the face of human and environmental induced factors and stress. The objectives elucidated below are inter-related, but underpins a multi-faceted approach with a strong scientific basis, crucial to base management actions and decisions on. The objectives aim to assist the Ministry of Environment and Tourism to further its Mission which states:

***“ To maintain and rehabilitate essential ecological processes and life support systems to conserve biological diversity and to ensure that the utilization of renewable resources is sustainable for the benefit of all Namibians, both present and future, as well as for the International Community”***

## *Objectives of the Project*

- 1. To deploy 30 GPS/Satellite collars on elephant in the Kunene, Omusati and Erongo regions.** The collars should be deployed in such a manner as to reflect the movement patterns of elephants at population level to include as much of the range of the elephants in north western Namibia. The total number of 30 satellite collars The number of 30 collars is considered the minimum number needed to reflect the movements across the Region for an estimated population size of 400-800. The collars will be deployed on a mixture of elephant bulls and breeding herds throughout the range. This deployment will largely depend on the distribution of the elephants throughout the range based on aerial surveillance and local knowledge.
- 2. To engage and collaborate with all stakeholders, including communities, conservancies, non-governmental organizations and tourist operators in the areas of concern.** The role of the MET should be to strengthen and facilitate the collaboration between all stakeholders. This collaboration is important and essential and the interactions and engagement between all stakeholders with different skills and expertise will contribute substantially to addressing all the issues at regional level. The MET will determine appropriate protocols for the acquisition, compilation and dissemination of data. These protocols need to take into account the possible sensitive nature of data which can potentially be a security risk to elephants.
- 3. To track the movement patterns of individual bulls and breeding herds at 30 minute intervals for a period of two years throughout this range.** The GPS satellite units give real time positions and are superior in areas where there is no cell phone cover. The resolution of 30 minute intervals is crucial to describe and interpret human-elephant conflict regarding water points and agricultural fields.
- 4. To assess the human-elephant conflict patterns through an analytical analysis of seasonal movement patterns by bull elephants and breeding herds.** The human-elephant conflict in Kunene and Erongo is expected to be largely related to infrastructural damage and competition for water resources. In Omusati, the human-elephant conflict is a mixture of infrastructural damage, competition for water resources and damage to agricultural fields.
- 5. To assess and interpret the elephant movements in relation to ecological and human-induced factors at various scales in the regions.** The ecological factors include landscape features such as vegetation type, vegetation cover, ephemeral river systems, vegetation productivity indices, soil type, water availability and topography. Human-induced factors include human density, distribution and settlements, artificial water points, livestock density and distribution, agricultural fields and infrastructure. The seasonal movement patterns of elephants to all



these factors will provide an indication of preferred and non-optimal habitats/landscapes.

- 6. To assess and interpret differences in the movement patterns of bulls and breeding herds in relation to ecological and human-induced factors.** This distinction is important because literature reviews of human-elephant conflict indicate that bull elephants are more prone to induce human-elephant conflict than breeding herds, as illustrated in the Etosha elephant movement data sets. This pattern is expected to repeat itself in the surrounding areas of Etosha and elsewhere in Kunene, Erongo and Omusati.
- 7. To assess and interpret the movement patterns of bulls and breeding herds across the Etosha Park boundary onto surrounding land.** The Elephant Management plan for the north-west by Martin strongly indicated that dispersal and movements of elephants take place between Etosha and surrounding areas. These presumed movements across the Etosha boundary has led to the assumption that Etosha is a source and the cause for the presumed elephant increases in the north-west. The extent of these presumed movements have not been illustrated in any scientific way, and collaring of elephants across this boundary will improve our knowledge and enable decisions to be taken on definitive ecological data.
- 8. To determine the possibility of subpopulations of elephants in the three Regions under consideration.** This has huge implications for options for elephant management in the Regions. The present options for management do not take this point into consideration. Monitoring the movements of elephants across the entire range will provide the data for the existence of subpopulations.
- 9. To promote and propagate the development of a predicted framework in which to set long-term conservation and development priorities for the Region.** This long-term strategy will be developed in parallel with the most appropriate short-term measures.
- 10. To assess and put measures in place to regulate uncontrolled access of tourists into the perennial rivers of the Kunene Region.**

### *Beneficiaries*

1. The Ministry of Environment, benefiting directly through the acquisition of scientific data, which can be applied in an adaptive manner, and ultimately directing Management Policies,
2. Line Ministries, such as Ministry of Lands and Resettlement, Water affairs, Agriculture benefiting by aligning Regional development with ecological and human needs,
3. The communities, conservancies and the concessions benefiting through incorporating ecological data into their management plans to mitigate human-elephant conflict and ensure the sustainable utilization of elephants,

4. The communities, conservancies, and concessions, by evaluating the effectiveness of short-term measures for effective elephant population management.
5. Emerging conservancies, benefiting through incorporating ecological data into developing their management plans,

*Participants*

<b>Name</b>	<b>Rank</b>	<b>Directorate/ Organization</b>
<b>J.W. Kilian</b>	<b>Chief Conservation Scientist</b>	<b>DSS EEI</b>
<b>K. Uiseb</b>	<b>Deputy Director</b>	<b>DSS MRP</b>
<b>P. du Preez</b>	<b>Chief Conservation Scientist</b>	<b>DSS R&amp; P</b>
<b>W. Versfeld</b>	<b>Chief Control Warden</b>	<b>DSS EEI</b>
<b>J.Kapner</b>	<b>Ranger</b>	<b>DSS EEI</b>
<b>E. Tjikua</b>	<b>Chief Control Warden</b>	<b>DPWM Outjo</b>
<b>C. Maketu</b>	<b>Chief Control warden</b>	<b>DPWM Swakopmund</b>
<b>Several</b>	<b>Chief Control Warden/Chief Wardens</b>	<b>DPWM Oshakati/Opuwa</b>
<b>S. Kaseba</b>	<b>Chief warden</b>	<b>Etosha west</b>
<b>O. Aschenborn</b>	<b>Veterinarian</b>	<b>DSS EEI</b>
<b>H. Kolberg</b>	<b>Principal Conservation Scientist</b>	<b>DSS Survey and Monitoring</b>
<b>R. Loutit</b>	<b>Directors</b>	<b>SRT</b>
<b>G. Owen- Smith/J. Kasaona</b>	<b>Directors</b>	<b>IRDNC</b>
<b>C. Brown</b>	<b>Directors</b>	<b>NNF</b>
<b>G. Stuart-Hill</b>		<b>WWF-Namibia</b>
<b>Several</b>	<b>Staff/students</b>	<b>UNAM</b>

The Project executant is J.W. Kilian. All other participants will be involved at various levels and as required. The list reflects the major participants, and is designed to use them to engage in their respective areas with representatives at **communal, conservancy and concession level**. The list is not set in stone and additional participants will be included as needed or as the project develops.

### ***Activities***

1. To deploy 30 GPS/Satellite collars on elephants in selected areas of the Kunene Region. The collars will be divided between bulls and females to reflect differential movement patterns in the dry and wet seasons.
2. The deployment will take place in phases, commencing in August 2010 and expected to be completed in December 2010
3. Community engagement prior to collar deployment will be ensured.
4. A fixed-wing aircraft will be used as a spotter plane to identify elephants suitable for collaring. This will aid in minimizing helicopter costs.
5. The actual collaring will be done by helicopter, supported by a ground team where feasible.
6. The team from the EEI will participate in and supervise all aspects of the collaring of elephant. The immobilizations will be under the direct supervision of the veterinarian from the EEI.
7. The collected data will be housed at the EEI and disseminated to all stakeholders according to institutionalized protocols.
8. All stakeholders have to be informed of developments on a regular basis to ensure continuity.

### ***Products***

1. The locational GPS data on the elephants in the Region will include and be presented as:
  - 1.1. Movement patterns of collared bull and female elephants in relation to human habitation and infrastructure,
  - 1.2. Movement patterns of collared bull and female elephants in relation to artificial and natural water sources,
  - 1.3. Movement patterns of collared bull and female elephants in relation to characteristic features of the landscape,
  - 1.4. Movement patterns of collared bull and female elephants in relation to the western boundary of Etosha National Park,
  - 1.5. Movement patterns of collared bull and female elephants in relation to the major ephemeral river systems,
  - 1.6. Movement patterns of collared bull and female elephants in relation to specific management zones in conservancies.
2. The Project results will be presented in several formats to targeted stakeholders:
  - 2.1. Maps depicting movement data at scales from 1.1 to 1.6.
  - 2.2. Reports including the scientific interpretation of conflict, water and habitat use at various scales
  - 2.3. Reports to Top Management
  - 2.4. Peer-reviewed scientific articles
  - 2.5. Update the information on Kunene-elephant project at the EEI to inform a greater audience of CBNRM in Namibia

***Budget***

The requested funds from the GPTF are for a period of two years.

***Budget administration***

Allocated funds will be administered by the GPTF.

<b>Budget item</b>	<b>Number of Units</b>	<b>Cost per Unit</b>	<b>Total cost (2 years)</b>	<b>Matched funding</b>	<b>MET contribution</b>	<b>Total requested</b>
GPS/ Satellite collars for elephants.	30	21,950	628,500			658,500
Software, satellite downloading and service fees.	30	500 per month per unit.	360,000			360,000
Veterinary drugs for immobilization.	30	2,500	75,000			75,000
Helicopter four seater Turbo	50 hours	7,425	371,250			371,250
AVGAS for fixed-wing aircraft	12	2,500	30,000			30,000
<b>TOTAL</b>						<b>1,494,750</b>
=====	=====	=====	=====	=====	=====	=====
# Staff salaries	6 staff @ 90 days for 2 years	540 days	168,500		168,500	
# Staff S&T	6 staff@ 90 days for 2 years	540 days	54,000		54,000	
# Staff Overtime	6 staff@ 200 hoursx45	1200	54,000		54,000	
# GRN Transport	150 000 km	30,000 liters	240,000		240,000	
Helicopter MET					200,000	
# USFW collar Units for Etosha				330,000		
<b>TOTAL</b>				<b>330,000</b>	<b>716,500</b>	<b>1,046,500</b>
<b>TOTAL Project</b>						<b>2,541,250</b>

# Staff salaries, S&T, Overtime and Transport, were calculated as accurately as possible, but remain difficult to quantify.

# USFW collar units reflect the 15 units funded for Etosha in 2008/2009. These units provide back ground data of Etosha which can be linked to the proposal particularly with regards to establishing the link between western Etosha and its surroundings.

## *Sustainability*

The sustainability of the project will be ensured if the results of the study can be institutionalized into the:

1. Human-Elephant Conflict Management Policy, and
2. Long-term policies for the management and conservation of elephant in a sustainable manner in the Regions,
3. Long-term policies for regarding land-use planning to ensure the maintenance of Biodiversity.