ORIBI ANTELOPE

(*Ourebia ourebi*)

POPULATION AND HABITAT VIABILITY ASSESSMENT

19 – 22 June 2006
Hebron Haven, KwaZulu-Natal,
South Africa

Sponsored by: MALOTI DRAKENSBERG TRANSFRONTIER PROJECT
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CONSERVATION BREEDING SPECIALIST GROUP
SOUTHERN AFRICA

Endangered Wildlife Trust
oribi working group

ORIBI ANTELOPE
(*Ourebia ourebi*)

POPULATION AND HABITAT VIABILITY ASSESSMENT IN SOUTH AFRICA

19 – 22 June 2006

WORKSHOP REPORT

Convened by:

CONSERVATION BREEDING SPECIALIST GROUP SOUTHERN AFRICA
ENDANGERED WILDLIFE TRUST
ORIBI WORKING GROUP
EZEMVELO KWAZULU-NATAL WILDLIFE

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The CBSG, SSC and IUCN encourage workshops and other fora for the consideration and analysis of issues related to conservation and believe that reports of these meetings are most useful when broadly disseminated. The opinions and recommendations expressed in this report reflect the issues discussed and ideas expressed by the participants in the Oribi PHVA Workshop and do not necessarily reflect the opinion or position of the CBSG, SSC, or IUCN.

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Thank You!
August 2006

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ORIBI POPULATION AND HABITAT VIABILITY ASSESSMENT

19 – 22 June 2006

**Hebron Haven, KwaZulu-Natal,
South Africa**

WORKSHOP REPORT

SECTION 1

EXECUTIVE SUMMARY AND CBSG WORKSHOP PROCESS

EXECUTIVE SUMMARY

BACKGROUND

Even though Oribi have a wide distribution on the African continent, stretching from Senegal towards Ethiopia and southwards towards South Africa, it is patchily and discontinuously distributed within this area as a result of specific habitat requirements (Adamczak, 1999). In South Africa, Oribi are distributed within Mpumalanga, Gauteng, the North West, Free State, KwaZulu-Natal and the Eastern Cape (Friedmann and Daly, 2004).

Recent population estimates indicate that the total population of Oribi in South Africa is likely to be between 2500 and 4500 individuals. Census data from KwaZulu-Natal indicates that the population of Oribi is declining on private land and thought to be stable in KwaZulu-Natal protected areas, although better monitoring is needed. On the basis of the small, discontinuous population size and estimated rate of decline Oribi were recently classified as Endangered (Friedmann and Daly, 2004).

The main cause of the decline is loss of grassland habitat to agricultural practices such as afforestation, cropping and pastures. In addition, many remaining grassland fragments are in poor condition as a result of poor veld management and incorrect burning regimes. In addition to these threats, hunting with dogs has caused Oribi numbers and distribution within the remaining grassland fragments to decline considerably (Viljoen, 1982; Marchant, 1991).

Oribi are not adequately protected within the protected area network of South Africa and hence it is essential to develop conservation strategies to conserve Oribi on private land. The Conservation Breeding Specialist Group (CBSG), an IUCN (World Conservation Union) Species Survival Specialist Group, utilises a series of scientifically-based tools to undertake risk assessment and species management decision-making. These tools include the Population and Habitat Viability Assessment (PHVA) process, which uses population and conservation biology, human demography and the dynamics of social learning in intensive, problem-solving workshops, this process, was used to produce realistic and achievable recommendations for a national conservation strategy for Oribi.

THE CBSG PHVA WORKSHOP PROCESS

Thirty-six participants from across the country participated in the multi-stakeholder workshop, representing the conservation Non-government Organisation (NGO) community, academic institutions, Ezemvelo KZN Wildlife, Maloti Drakensberg Transfrontier Project (MDTP) and Mpumalanga Tourism and Parks Agency. Ross Game Capture, Mondi Business Paper South Africa, Mondi Shanduka Newsprint, SAPPI Forest (Pty) Ltd, Natal Cooperative Timber (Pty) Ltd (NCT Forestry), Msinsi Holdings and various private landowners were also represented. A Briefing Document was made available to all workshop participants a week prior to the workshop which afforded participants the opportunity to get up-to-date information on the biology, ecology, population dynamics and trends, distribution, threats and conservation status of Oribi in South Africa.

The workshop was conducted over three and a half days. The morning of the first day was dedicated to various presentations covering the history of the Oribi Working Group (OWG) of the Endangered Wildlife Trust (EWT), South Africa's Oribi population status and trends, preliminary results on the genetic study and an update on the captive breeding of Oribi as well as the OWG's policy on captive breeding. The remainder of the workshop progressed as outlined below.

The standard PHVA workshop process was followed which comprises a series of plenary and working group sessions in which working groups work through tasks designed to

facilitate free thinking, brainstorming, discussion and debate and finally, consensus building. After an initial group brainstorming session, a list of the key issues facing the survival of the Oribi in South Africa was identified. These were consolidated into five working groups:

1. Oribi Habitat and Management Working Group
2. Awareness and Extension Working Group
3. Law Enforcement Working Group
4. Research and Monitoring Working Group
5. Population Modelling and Dynamics Working Group

Working groups spent three days tackling issues specific to their group, and systematically worked through the tasks assigned which included, drafting a situation overview, compiling problem statements, developing and prioritising solutions and finally, working out detailed action plans and steps that will contribute to achieving the identified solutions.

Plenary discussion sessions enabled working groups to present the results of their discussions to the entire group and thus obtain the input of all participants, which resulted in additional debate and insight.

CONSERVATION OBJECTIVES

The following minimum conservation objectives were developed:

Each of the 13 subpopulations must have a 95% chance of survival over a 50 year period, must maintain 80% of their original genetic heterogeneity, and overall there must be a 0% chance of extinction of the metapopulation i.e. 100% chance of survival of the metapopulation.

SUMMARY OF KEY ISSUES AND PROPOSED INTERVENTIONS

Listed below are a summary of the issues and interventions proposed by the five working groups:

1. Oribi Habitat and Management Working Group

Priority problem statements and solutions identified by the working group included:

- Establishment of an Oribi Conservation Area Network per genetic management zone to ensure persistence of the species. This will be done by seeking commitment from landowners and formulating and implementing an informal Oribi habitat management plan in collaboration with the OWG;
- Providing incentives to landowners to conserve Oribi through formalised partnerships with provincial agencies (provincial stewardship programmes) and municipalities responsible for the creation of stewardship;
- Influencing development and activities within existing and potential Oribi habitat to minimise inappropriate land cover, land-use change;
- Developing an extension programme for the Oribi conservation area network; and
- Developing a conservation strategy and action plan for the species, per genetic management area and coordinating the translocation programmes of excess Oribi within the network areas to alternative suitable areas.

2. Awareness and Extension Working Group

Priority problem statements and solutions identified by the working group included:

- The lack of awareness amongst various stakeholders of Oribi and their natural habitat requirements and ineffective extension effort with regards to Oribi conservation. Suggested solutions included providing effective formal and informal education to learners through the development and implementation of a formal education programme and training of facilitators to present information to identified stakeholders. A focused extension programme was also proposed which will entail the development and implementation of an appropriate toolkit for use by extension officers throughout the Oribi range.
- Inappropriate consideration of Oribi conservation within current political land redistribution processes. To address this, it was suggested that Oribi and Oribi habitat conservation issues be investigated and addressed as appropriate, by decision makers and stakeholders.
- A lack of incentives for landowners to conserve the Oribi and its habitat. To mitigate this and ensure that the Oribi Conservation Plan has an increased status in national stewardship programmes, the OWG's Custodian Programme should be promoted and expanded throughout the Oribi range. In addition the awareness of the economic value of the sustainable utilisation of Oribi should be increased amongst landowners.
- Lack of communication between different provinces regarding Oribi conservation. Suggested solutions include ensuring the timeous distribution of information from the OWG national structure, maintain national conservation bodies, bioregional programmes and keep institutions informed.

3. Law Enforcement Working Group

Priority problem statements and solutions identified by the working group included:

- The illegal capture, translocation and hunting (over-utilisation) of Oribi and the negative impact on population numbers that such activities have and the potential for irreversible genetic contamination through illegal or misinformed translocation. The group suggested developing an awareness campaign addressing unlawful capture, introduction policies, import, export and hunting of Oribi and educating user groups on the impacts of over-utilization. This could be done through the production and dissemination of a "Z" fold brochure incorporating the legal requirements of these activities. In addition the number of patrols should be increased to address illegal hunting with dogs in Oribi areas. Provinces should coordinate efforts with respect to conservation and law enforcement.
- A lack of awareness of nature conservation efforts and related laws and regulations exists at all levels of society. This translates into a lack of support for nature conservation and for voluntary compliance by institutions and the public. Effective law enforcement processes are also hampered by inadequate skills. Target programmes that raise awareness and the development of materials for presentations.
- A lack of capacity is diluting efforts by law enforcement officers and decreasing service delivery, compounded by the frustration that wildlife crimes are not considered to be a priority. This results in increasing contempt by the public towards the criminal justice system and traditional authorities. To alleviate this problem, the group suggested that the number of competent officials be increased through training and the establishment of new law enforcement posts.

4. Research and Monitoring Working Group

The group identified the lack of sufficient information as a major problem. In addition to increased monitoring of all Oribi populations, further information is required on:

- Oribi demographics both within and outside of protected areas in South Africa.
- The genetics of the population and incidences of inbreeding.
- The amount of potential suitable and available Oribi habitat.
- The minimum size of Oribi habitat.
- The characteristics of effective corridors.
- The impacts of predation on the Oribi population.
- Inter-specific and intra-specific competition.

The group identified the following specific actions:
- A nationwide baseline census within and outside of protected areas.
- Employ a designated census coordinator to monitor the national Oribi population.
- Ongoing collection and analysis of as many genetic samples as possible.
- Model potential available habitat nationwide and prioritise areas for ground-truthing.
- Develop a research project to determine the parameters of an ideal corridor.
- Develop a research project to determine the levels of natural and unnatural Oribi mortality in selected areas.
- Use tracking technology in conjunction with observations to answer inter-specific competition questions.
- Develop husbandry and reintroduction protocols.
- Develop and implement a national Oribi database.
- Undertake a literature study on diseases affecting the species.

5. Population Modelling and Dynamics Working Group

The values chosen for the Oribi in the baseline model produced a deterministic growth rate (r_{det}) of 0.042 i.e. 4.2% per annum. The model predicts a decline in each of the 13 subpopulations, with a metapopulation decline of $r_{stoch} = -0.085$; and a range from $r_{stoch} = -0.101$ for the Underberg / East Griqualand subpopulation to $r_{stoch} = -0.061$ for the St. Lucia population. The model predicts that the Free State and Gauteng subpopulations have the greatest probability of extinction (P[extinction] = 0.944 each) due to their small size; the Coastal Eastern Cape subpopulation has the lowest probability of extinction of 0.014. As a metapopulation, however, the model shows that Oribi in South Africa have a zero probability of extinction over a 50 year period.

It was calculated that in order to achieve the conservation objectives i.e. 95% probability of survival with maintenance of 80% of the genetic diversity over 50 years, a population of approximately 90 individuals per sub-population is required in a safe environment.

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WORKSHOP REPORT

SECTION 2

BACKGROUND INFORMATION

1. Taxonomic Description

The type *Antilope ourebi* was first described by Zimmerman in 1783 from a specimen assumed to have originated from the then "Cape of Good Hope" (Sclater, 1900). Roberts (1954), fixed the area to be the Uitenhage district as this was the nearest location to the Cape where Oribi have been known to occur.

According to Groves (1993), the current classification of the Oribi is as follows:

Order:	Artiodactyla
Family:	Bovidae
Sub-family:	Antilopinae
Tribe:	Neotragini
Genus:	*Ourebia* Laurillard 1841
Species:	*Ourebia ourebi* (Zimmerman, 1783)

As many as 13 subspecies of Oribi have been proposed, to account for the considerable variation in body size and colouration across the species' range. Animals in East Africa appear larger and darker than western, northern, and southern conspecifics, but this trend, and the validity of many proposed sub-species / race distinctions, has not been tested using molecular techniques. DNA work in KwaZulu-Natal shows that there may be two to three genetically distinct populations, but the sample size is small, and the work is ongoing. Variation in body size and colouration among populations is sufficiently large to confound cursory efforts to identify suites of morphological traits specific to regions. Three of these subspecies occur in southern and central Africa (Ansell, 1972).

- *Ourebia ourebi ourebi* (Zimmerman, 1783), occurs from the Eastern Cape Province, southern and north-western KwaZulu-Natal, south-eastern Orange Free State, southern and eastern Transvaal[1] through to central and southern Mozambique.
- *Ourebi ourebi hastata* (Peters, 1852), is distributed from eastern and south-eastern Zimbabwe, northern Mozambique, Malawi, and eastern Zambia through to south-eastern Tanzania.
- *O. o. rutila* (Blaine, 1922), occurs from north-eastern Botswana, north-western Zimbabwe, north-eastern Namibia, western Zambia, Angola and perhaps south-eastern Democratic Republic of Congo (DRC) (Meester *et al.,* 1986).

The distributional boundaries and references to different sub-species are not always clear, yet the following constitute the other ten sub-species located across the African continent (Groves, 1993).

- *O. o. cottoni* (Thomas and Wroughton, 1908) – South-western Kenya to central Tanzania.
- *O. o. masakensis* (Lönnberg and Gyldenstolpe, 1925) - Southern Uganda, northern Ruanda and north-western Tanzania.
- *O. o. auquatoria* (Heller, 1912) - Northern Uganda and the southern Sudan. This is not a well-marked form and may integrate with *montana* to the north and *cottoni* to the east.
- *O. o. kenyae* (Meinhertzhagen, 1905) - Central Kenya.
- *O. o. haggardi* (Thomas, 1905) - Kenyan coast and perhaps southwards towards north-eastern Tanzania.
- *O. o. gallarum* (Blaine, 1913) - Central Abyssinia.
- *O. o. montana* (Cretzschmar, 1826) – South-eastern Sudan and western Abyssinia. Integrates with *aequatoria* in the south and with *gallarum* in the east.

[1] Refers to the political boundaries of South Africa pre-1994

- *O. o. goslingi* (Thomas and Wroughton, 1907) - Northern Congo.
- *O. o. dorcas* (Schwarz, 1914) - Chad and central African Republic.
- *O. o. quadriscopa* (Smith, 1827) - Nigeria and west to Senegal.

Description: Oribi are small neatly built antelope yet are the largest of the Neotragini. The males have a mean shoulder height of 580 mm and a mean mass of 14 kg (Reilly, 1989). Full-grown ewes, are on average larger and heavier (mean 2 kg) than the rams (Adamczak, 1999). This is confirmed by studies by Jongejan *et al.*, (1991), during a study conducted within the Serengeti National Park.

The upper parts of the body vary from russet to fawn appearance, which is in stark contrast to the pure white underparts. This white coat extends upwards over the rump to the base of the tail and high onto the front of the chest. The coat is fine and silky yet may appear longer along the back with a distinctive wavy appearance (Sclater, 1900; Keogh, 1983). White markings on either side of the nostrils and the white crescent shaped bands above each of the eyes are distinctive identification features. These features, combined with the black bushy upper parts of the tail, clearly distinguish the Oribi from the steenbok (*Rhapicerus campestris*), an antelope with which it is often confused (Marchant, *pers. comm.*).

Oribi ears are large, narrow and covered on the posterior side with short rufous hairs and anteriorly and within, with long white hairs. There is a conspicuous hairless patch of skin below each ear (Sclater, 1900). Preorbital glands open into a small depression in the front of each eye and are slightly larger amongst rams (Viljoen, 1982).

Only the rams have horns, with a mean horn length of 113 mm (Estes, 1991). The horns are straight except for a slightly forward curve towards the tips. The horns are well ridged at the base and can be used to estimate the age, in conjunction with horn height. However an adequate database regarding these two measurements is needed (Reilly, 1989; Jongejan *et al.,* 1991). According to Smith (1990), a record horn length of 190.5 mm has been measured.

Oribi limbs are slender with long hairs clothing the knees to form large tufts. This is a diagnostic feature along with the black spots beneath the ears. The false hoofs are small whilst the true hoofs are narrow and pointed (Sclater, 1900).

Oribi have six scent glands: the preorbital, subauricular, inguinal, hoof, carpal and metatarsal.

2. Distribution and Population Status

Distribution: Oribi have a wide distribution on the African continent, stretching from Senegal towards Ethiopia and southwards to the old “Cape Province” in South Africa. They are present in temperate montane and tropical Africa and are primarily grassland dwellers (Tinley, 1969; Pienaar, 1974). Adamczak (1999), states that the Oribi distribution south of the equator is discontinuous and patchy, due in part to their specialised habitat requirements. Marchant (1991), concludes that the main reasons for the decline in Oribi distribution in South Africa are habitat destruction and predation by dogs. Figure 1 below illustrates the distribution of Oribi across its range states. Historical distribution is likely to have been continuous across much of this range, whereas current distribution is highly fragmented.

Oribi occur from Senegal to western Ethiopia; in northern and south-eastern Uganda; in south-western and south-eastern Kenya and in southern Somalia. Oribi have been recorded along the Kenyan coast, yet recent observations by Adamczak (1999), could not verify these records. This may be as a result of the intensified land-use. Oribi occur throughout western and north-western Tanzania and their distribution stretches into the north-eastern sector of

Zambia. They are however restricted to National Parks and Game Reserves in the central and southern provinces of Malawi and Zimbabwe.

Within South Africa, Oribi are mainly found in the Mpumalanga and KwaZulu-Natal provinces, extending into the north Eastern Cape. Reilly (1989), states that the highest concentrations of Oribi within the Eastern Cape are found in the Bathhurst and Humansdorp districts. Despite the fact that the type specimen was described from the Uitenhage district, Bateman (1961), states that Oribi were probably extinct from this region by 1961 and that they have never been recorded as far as Swellendam.

Oribi within KwaZulu-Natal are mainly restricted to the interior of the province, occurring predominantly on privately owned land and within certain protected areas. Oribi were previously widespread in the eastern parts of the Free State, however Lynch (1983), states that their present distribution is scarce and is probably limited to a few isolated areas. A small number has been re-introduced into the Golden Gate National Park (Reilly, 1989). Viljoen (1982), states that the distribution of Oribi within the old Transvaal Province is concentrated around the Ermelo, Piet Retief and Carolina districts. However, Oribi are found as far north as the Blyde River Canyon (Mpumalanga) and westwards towards the south-west of Pretoria.

Population status: Various counting methods have estimated Oribi numbers. Obtaining accurate counts is however difficult, as Oribi tend to spend a large proportion of their day lying in long grass (Marchant, 1991). Due to the large proportion of Oribi populations occurring on privately owned land (and time constraints of researchers), questionnaires are a popular research tool for ascertaining Oribi numbers within a number of areas (Millar, 1970; Thompson, 1973; Howard and Marchant, 1984; and Marchant, *pers. comm*.). Extension officers, employed by several conservation agencies have also conducted surveys to determine Oribi numbers and distribution. Marchant (1991), recommends three possible methods for counting but emphasises that the accuracy, precision and replication of the counts may be biased because of the Oribi's behavioural traits:

- Known group count - This is fairly simple and inexpensive to apply and is best used for management rather than research purposes. It is however, unsuitable for large areas (such as nature reserves), but is appropriate for privately owned land i.e. farming areas.
- Modified strip transect - This is useful for a field worker (e.g. farmer) with limited research experience and is more appropriate for obtaining relative estimates rather than absolute estimates.
- Animal signs (faeces, spoor, etc.) - This should only be used as a last resort.

3. Life History

Little is known of the social behaviour of Oribi, however Viljoen (1982), estimates that a mere 1% of all the Oribi's activities are spent in direct social interactions. Oribi live predominantly in pairs (male and female) and together defend a small territory. While this territory is maintained and advertised by both the male and female through olfactory markings, the male is the more active marker. Dung middens are also utilised for territorial marking (Everett, 1991).

Group structure: Male – female pairs are observed, often with one (rarely two) young present; however uni-male, multi-female (0 - 82% of groups) or multi-male, multi-female groups (0 - 39% of groups) have also been observed (Arcese *et al.,* 1995). Sightings of lone animals are probably in most instances either males patrolling territory perimeter, young / old animals that have been chased out of the group by the dominant male, females in the vicinity of young lying out, or other animals temporarily out of sight of social groups. The mean size

of adult groups are calculated at between 1.8 (Burkina Faso) to 3.92 (Uganda). This variance is thought to relate positively to the rate of apparent polygyny across populations in Africa (r = 0.90, n = 9) and number of years (r = 0.88, n = 5), (in the Serengeti), (Arcese *et al.,* 1995). The apparent polygyny also relates positively to adult female:male ratios and population density (Arcese *et al.,* 1995). The group size which includes all ages in the Serengeti, is 3.1 – 4.3 whereby the mean = 3.6, n = 5 yrs (Arcese *et al.,* 1995). Oribi occasionally occur in groups of up to 12 adults and young (Roosevelt and Heller, 1914). Estimates of group size based on resightings of identified Oribi, averaged 33% larger than estimates of roadside counts of Oribi encountered at random (Arcese *et al.,* 1995). Oliver *et al.,* (1978), found the Oribi to have a mean group size of 1.89 and an overall typical group size of 2.22.

Everett (1991), estimates the mean group size of Oribi at 2.15, whilst Reilly (1989), found that the group never exceeded four individuals. Table 1 indicates the comparison of group size frequency across three 'habitat' types namely, montane grassland, tropical grassland and midlands habitat.

Table 1: Group size frequency of Oribi's as per cent occurrence across three different habitat types (Rowe-Rowe *et al*., 1992).

Group size	Montane grassland (n=932)	Midlands grassland (n=1175)	Tropical grassland (n=52)
1	35.1	31.2	13.5
2	45.4	39.1	26.9
3	16.2	19.0	26.9
4	2.1	7.0	25.0
5	0.8	1.9	5.8
6	0.4	1.3	0
7	0	0.4	0
8	0	0.1	1.9
Ā	1.89±0.85	2.15±1.13	2.92±1.34

Smaller groups and lone animals are more common in drier, cooler and / or less productive habitats, where concealing cover reduces detection of group members often resting or feeding at distances of up to *c*. 100 m (Rowe-Rowe *et al.,* 1992; Arcese *et al.,* 1995; and Brashares and Arcese, 2002). In Ghana, geographic variation in rainfall relates closely to quality and quantity of forage, with each of these variables also relating positively to group size (Brashares and Arcese, 2002). Median inter-individual distance of identified group members is estimated to be 7 m in north-west Serengeti during the 'dry-season' (*c.* Jul – Dec), when migratory grazers / intermittent fires reduce grass cover (Arcese *et al*., 1995). Large groups in less productive habitats likely represent aggregations of non-territorial groups at sites of local resource abundance, however groups of up to 11 (5 adult males, 6 females), are found to occupy strongly defended territories in productive habitats of north-western Serengeti (Brashares and Arcese, 1999a). Aggregations also form during border conflicts between territorial groups (Arcese *et al.,* 1995).

Oribi also display a tendency to form occasional temporary groups in the wild. Parties of up to 12 individuals have been recorded in short grassland. Such differences in group size are likely to be dependant on seasonal social dynamics (breeding or non-breeding) as well as on availability of suitable forage. Large groups of Oribi are often seen congregating together on recently burnt or mowed patches of grassland (Grey, *pers. comm*.).

Jarman (1974), indicated that Oribi form small harem herds consisting of a single male and between 2 - 5 females. Jarman referred to this social class as Class B. Other East African researchers have similarly recognised this classification (Rowe-Rowe *et al.,* 1992). After

analysis of data collected within KwaZulu-Natal, Rowe-Rowe (1982), placed the Oribi into Jarman's (1974) social Class A (antelope that live singly or in pairs and occasionally accompanied by offspring). Spinage (1986), supports this classification. This difference in classification could be attributed to the difference in habitat quality, where in East Africa a more suitable habitat for Oribi is found (Everett, 1991). Leuthold (1977), also describes the Oribi as a 'borderline' case between Class A and Class B and finds that adult males are often observed singly, with / without females, exhibiting territorial behaviour. These results concur with Jarman (1974), whereby Oribi are classed into social Class B as well as Rowe-Rowe (1982), who classified Oribi into Jarman's (1974), social Class A grouping.

Oribi tend not to exhibit any signs of a gregarious species and evidence suggests that groups of five to six may be resident families or individuals situated between territories. Oribi within the Serengeti group together on a one-year basis with only 20% of the male-female dyads remaining intact for longer than three years (Adamczak, 1999).

Research by Humphrey (2006) on Kasouga Farm, found the following:
Oribi occurred most often in mixed sex groups or as solitary males (Table 2; Table 3). The 'uni-male polygynous' groups (MFF), were most prevalent (21.1%), whereas the male and female pairs (MF) occurred less often (18.4% out of the 147 observed field sightings). Of all the Oribi pairs, 14.3% were MF pairs with young, while only 7.5% were of 'uni-male polygynous' groups (MFF) with one young however no polygynous groups had two young. Single sex groups (MM) were rare. Solitary males represented 13.6% of Oribi, while very few solitary females (F) were seen (0.7%). Male pairs (MM) occurred less often (3.4%). Oribi groups were also common (18.4%). The paired groups (2 M 2 F and 2 M 4 F), occurred most often (64%) during March and August. Groups (3 M 4 F) occurred 23% of the time in August (Table 2). Group size increased through the year as did the number of groups on Kasouga farm. In addition, field observations revealed the absence of juveniles together with polygynous groups (Table 3). Oribi maintained a close proximity to one another within groups, regardless of sex.

Table 2: Mean percentage of adult females and juveniles on Kasouga farm (n = total number of samples).

Sample	n=	% Adult females	% Juveniles	Total % of Juveniles, of Adult Females
March	8	8.4	2.5	30%
August	6	11.3	0.66	5.4%
August	4	18.75	3.5	18.6%

Table 3: Social structure of Oribi on Kasouga farm for March and August. M (Male), F (Female), J (Juvenile) (n = 147).

Social Structure	Percentage
M	13.6
F	0.7
MF	18.4
MM	3.4
MFF	21.1
MMF	0.68
MF + J	14.3
MFF + J	7.5
MFF + J + J	0
MMF + J	0.7
Groups (< 3 adults)	18.4
Calves	2

Home ranges, Territories and Ecological Densities: The home range of the Oribi varies considerably between 28 ha in the Transvaal (Viljoen, 1975), and 60 ha in Natal (Everett, 1991), with several other estimates falling within this range (Oliver *et al.,* 1978, Spinage, 1986 and Reilly, 1989). Oliver *et al*. (1978), found the mean home range size to be 49,2 ha within the Drakensberg. Within East Africa, Spinage (1986) estimated home ranges to be 25 ha in extent, whilst Reilly (1989), found the mean size to be 23.1 ha within the Golden Gate National Park. Everett (1991), concluded that the home ranges for Oribi are excessively large and included peripheral areas not utilised by the individual. The home range size of Oribi most likely depends on food availability as well as total population size of a given area.

Oribi are common in suitable habitats at densities of 2 - 10 animals / km^2 (Mduma and Sinclair, 1994, Arcese *et al.,* 1995), but have been observed at densities of 45 animals / km^2 in exceptionally productive tropical grasslands and treeless floodplains (Monfort and Monfort, 1974, Plewman and Dooley, 1995). The highest density recalled in South Africa, on an area that was mowed annually for hay, was one Oribi per 7 ha (Marchant, *pers. comm*.). Local densities are linked to abundance, rainfall regularity and quality and quantity of preferred grasses (Brashares and Arcese, 2002). Ecological densities range from one Oribi per 6 ha to 1/30 ha, depending on quality of the habitat and how it is managed (Everett, 1991; Oliver *et al*., 1978; Rowe-Rowe and Scotcher, 1986 and Rowe-Rowe, 1994).

Territorial behaviour: Oribi are territorial and defend their territories against other Oribi. Male calves are excluded from groups at one year of age. Group densities are dependent on availability of suitable habitat, food quality and the quality of management. Oribi occupy territories of 0.1 to 60 ha in size both seasonally and throughout the year. Territories are found to be larger and defended less assiduously where annual rainfall < c. 800mm and / or mean minimum temperatures < 5 ^{o}C. In north-western Serengeti, Tanzania, territories defended year-round range from 10 – 90 ha in size (mean = 60; Brashares and Arcese, 1999a). This is similar to those in Akagera National Park, Rwanda which range from 8 - 61 ha (Monfort and Monfort, 1974). Territories appear to be seasonal in South Africa but are generally similar in size. For instance the following ranges are observed in different locations: 35 - 73 ha [Strathcona]; 28 ha [Transvaal]; 59.4 ha [Natal] (Adamczak, 1999); and 60.2 ha [Natal] (Everett, 1991). Oribi may abandon territoriality entirely in the driest, coolest or least productive parts of the range; e.g., high elevation sites in South Africa and low-rainfall sites in Ghana (Oliver *et al.,* 1978; Rowe-Rowe *et al.,* 1992; Adamczak, 1999; and Brashares and Arcese, 2002). At Kafue Flats (Zambia) Oribi defend territories seasonally in lowland flood plains (Clutton-Brock, *pers. comm*.), but important details of group membership, site fidelity and social behaviour during the wet season were unstudied.

Territorial behaviour also influences the density of Oribi. In suitable habitat, territory sizes appear small, allowing for a greater density of Oribi in that area. Oribi in KwaZulu-Natal therefore occur in naturally low numbers. Oribi rams exhibit a distinct attachment to their territories, especially during the rut. Creation of communal dung heaps is thought to serve as a social bonding within the species. Rams actively defend their territories by means of object horning (fighting movements directed towards the substrate i.e. vegetation on the ground). Dominant rams also chase would-be opponents in order to exclude them from their territory (Viljoen, 1982). The dominant ram may also maintain an erect posture with its head raised and neck nearly vertical in relation to its body. He will also invariably stare in the direction of the opponent (Reilly, 1989). Male Oribi can be extremely territorial and will aggressively defend their territories against other males. Yearling males are normally chased away by the territorial male, and accounts of adult males killing young males do exist both in captivity and in the wild.

Behaviour – predators: The male Oribi is more alert than the female. When a predator is sighted, the Oribi sinks to the ground and hides, lying undetected prone with its ears folded (Adamczak, 1999). They then flush from cover at the last moment and run at speeds in

excess of 40 km / hr. The Oribi call comprises short shrill blasts and they run in a 'rocking-horse' gait for approximately 200 m, after which they stop and look back (Leuthold, 1977). The Oribi may also stott when alarmed with their white rump and black tail clearly displayed (Adamczak, 1999).

Oribi seldom mix with other ungulates as a form of anti-predator behaviour. They appear however, to significantly prefer Springbuck (*Antidorcas marsupialis*) as their nearest neighbour, tending to associate with prey of a similar size to reduce the risk of predation. Mduma and Sinclair (1994), documented similar findings within the Serengeti.

Everett (1991), observes that Oribi also tend to lie up (rest) in long grass for lengthy periods to escape predation. Higher wind speed may also cause the Oribi to rest in the long grass for longer periods as increased noise may reduced their ability to locate the source of noises.

Reproduction: The Oribi exhibits an extended breeding season, however it usually has distinct peaks that coincide with the rainy season: in Zimbabwe this occurs between August and November (Thompson, 1973); in South Africa, in November and December (Mentis, 1972; Oliver *et al.,* 1978); Rwanda between May and July; and in Tanzania between March and June (Jongejan *et al*., 1991).

Females may conceive at 10 months, whilst rams become sexually active by 14 months (Cade, 1966; Adamczak, 1999). The Oribi gestation period ranges from 192 - 210 days (Rowe-Rowe, 1994), approximately 7 months. Oribi have been known to have inter-birth intervals of less than eight months which indicates that conception can occur shortly after giving birth. It is further noted that no relation exists between the sex of the calf and the subsequent birth interval. A single birth is the invariable rule.

Age at maturity: Various reports suggest age at maturity is 10 - 14 months in males, but ca. 3 months earlier in females (Cade, 1966; Kingdon, 1982; Estes, 1991; Jongejan *et al.,* 1989). The single estimate for males originates from a hand-reared Oribi that inseminated captive females at 14 months of age (Cade, 1966). This precedes slightly the typical age (15 - 17 months) at which males first defend territory (Jongejan *et al.,* 1989, Arcese, 1999). Females in the Serengeti typically elicited courtship interest of males after 7 months of age and occasionally stood to be mounted.

Age and sex ratio:
Age: Age is rarely reported. In the Serengeti, approximately half of all social groups contained a juvenile older than 7 months (range = 0.3 - 0.8) (Arcese *et al.,* 1995). Individual identification allows aging of males to ca. 2 yrs by horn length (Jongejan *et al.,* 1989), but no life tables are yet published. Longevity in captivity is approximately 14 years (Estes, 1991).

Sex ratio: Sex ratio is highly variable across species range at 0.83 - 2.13 females per male. This is positively related to the apparent rate of polygyny for populations in Africa and years of study in the Serengeti (Arcese *et al.,* 1995). Forage quality and quantity is however, a better predictor of adult sex ratio and apparent polygyny in Ghana (Brashares and Arcese, 2002).
Research by Humphrey (2006), revealed the following: The sex ratio of adult males and females was 50:50 in March, while for juveniles it was 39% males and 61% females (Table 4). In August (1st sample), the adult sex ratio was 46% males, 54% females, and for juveniles, 43% males and 57% females. Additional findings (August 2nd sample), revealed the adult sex ratio to be 50:50, with juvenile males occurring at 44% and juvenile females at 56%. The only significant difference was a 39:61 ratio of juvenile males and females, which is significant from 50:50 ratio (d.f 1; $p<0.05$).

Humphrey (2006), also found the sex ratio of adult females and juveniles to be 8.4:2.5 in March (Table 4). The sex ratio in August (1st sample) differed with 11.3% adult females and 0.66% juveniles (Table 4) as did the second sampling period in August which revealed that adult females were 18.75% and 3.5% juveniles. The percentage of juveniles to adult females was 30% in March, and 5.4% and 18.6% respectively during the month of August (Table 4). The adult female and juvenile ratio's were significant (d.f; $p<0.00$).

Table 4: Sex ratio of adults, juveniles and lambs expressed as a mean percentage on Kasouga farm. (n= no of observations).

Sample	n=	Adult ♂	Adult ♀	Juvenile ♂	Juvenile ♀	Lambs
March	51	50	50	39	61	2
August	44	46	54	43	57	0
August	52	50	50	44	56	0

Adamczak (1999), observes a lack of information on the birth and early development of Oribi, with captive individuals providing the only existing data. This is confirmed by Oliver *et al.,* (1978). Oribi fawns have a dark grey coat up to the first five weeks. The calf begins grazing within five days of birth and moults within five weeks. Calves are totally independent after six weeks. Ewe's have two pairs of inguinal mammae. For the first few weeks of life, the young Oribi is left by the female in long grass while she feeds during the day. The instinct not to move is strong, as many a farmer has accidentally found out while mowing. The lamb is weaned at two months of age and females become sexually mature at 12 months, males at 14 months.

Young Oribi grow rapidly, attaining near-adult size in ca. 7 months. In the Serengeti, the young reaches a size of ca. one-third of the shoulder height of an adult female at 2.2 months. At 3.6 months it grows to half the shoulder height; at 4.7 months it grows to two-thirds of the shoulder height; and at 7 months reaches three-quarters of the shoulder height of an adult female (Jongejan *et al.,* 1989). Horns appear in males at ca. 4.5 months of age and grow rapidly up to ca. 20 months of age. Horn length and number of annulations can be used to estimate age of males younger than 20 years, but the technique awaits validation for older males (Jongejan *et al.,* 1989).

4. Habitat Requirements

The Oribi is a highly specialised antelope inhabiting African temperate grasslands. It is known to occupy two major habitat types, namely open grasslands and wooded grasslands. Oribi occur within a wide range of climatic regimes, ranging from extreme sub-temperate climates within South Africa through to tropical climates in the vicinity of the equator i.e. Serengeti National Park (Mduma and Sinclair, 1994). Within each of these habitat types, preferred micro-habitats include well drained open pastures of short to medium grasses (10 - 100 cm) with good visibility and cover for hiding and shade. Highest densities (i.e. 45 animals / km^2) occur in moist tropical grasslands where annual rainfall is frequent and exceeds 1100 mm (e.g. *Loudetia simplex* grassland in Rwanda). High densities (i.e. >30 / km^2) are also

common on treeless floodplain habitat (e.g. Kafue Flats, Zambia; Plewman and Dooley 1995).

Oribi are water-independent, highly specialized antelopes. They favour moist grassland on flat to gently undulating terrain (usually less than 10º slope) with actively growing short grass for food adjacent to long grass which is required to provide cover from the elements and predators, as well as shelter for the young which are left to "lie out" for the first 8 to 10 weeks. Oribi seldom use agricultural lands, or pastures such as oats and rye grass as a source of supplementary winter food, as do common reedbuck. However, recent isolated records exist of Oribi feeding on young sugarcane and on rye grass under centre pivots. Oribi do favour both natural and planted (Eragrostis, K11, etc.) hayfields.

A number of characteristics are utilised by Oribi with regards to habitat selection and preference. These include:

- Aspect of slope: Rowe-Rowe (1983) and Everett (1991), found that Oribi favour the north and east facing slopes and show a negative selection towards the south and south-eastern facing slopes.
- Degree of slope: Oliver *et.al.* (1978), found that 90% of the Oribi within the Highmoor Nature Reserve occur on slopes less than 15°. Within the Giants Castle Nature Reserve, Oribi favour gentle slopes (5° or less) and gentle undulating plateaus and ridge tops with a slope of less than 10° (Rowe-Rowe, 1983). Within the Transvaal, Viljoen (1982), found Oribi to prefer plateaus and spurs of between 1° and 20°.
- Topography: Oribi tend to avoid lowland areas, preferring ridge terraces and avoiding flat land and steep slopes (Everett, 1991). Within the Serengeti, Mduma and Sinclair (1994), found that Oribi prefer rocky outcrops, suggesting that it provides hiding places during the dry season when the grass is short or alternatively providing green grass when other areas are dry.
- Vegetation: Oribi show a preference for open natural grassland dominated by *Themeda triandra*, veld hayfields and planted hayfields. They however, avoid planted pastures, croplands and plantations (Everett, 1991; Shackleton and Walker, 1995). A small group of Oribi (five individuals) were observed within a vlei adjacent to two *Eucalyptus* plantations within the Hlatikulu region of Kwazulu-Natal (pers. obs.). This despite the relative proximity to vast areas of open grassland. Oribi also have a high tendency to frequent recently burnt veld because of its high nutritional status (Oliver *et al.,* 1978; Everett *et al.,* 1991).

The Oribi favours open grasslands. Hofman (1973), suggests that the Oribi was perhaps the first of the East African ruminants to successfully adapt to a bulk roughage diet, with its poor digestible energy as characteristic of the open grasslands. The Oribi has both external and internal structures and behavioural features, which represent adaptations to its open grassland habitat. This is also as a result of its almost exclusive preference for grass and the minimal presence of forbs in its diet. In KwaZulu-Natal and Mpumalanga, Oribi prefer natural grasslands dominated by *Themeda triandra* (red grass), a grass species considered to be one of the most valuable veld grasses and an indicator of good quality veld. Most Oribi occur in the harsher climes of KwaZulu-Natal, such as the misbelt and highland sourveld areas, where winters are severe and the food quantity and quality is at its lowest.

Foraging and Food: A selective grazer, the Oribi relies on fresh green grasses but feeds also on forbs, legumes and tree foliage when fresh grass is unavailable. Oribi select not only for short grass, but also for certain species of grass and for certain parts of those grasses. This means that the growth form of plants is important in terms of its selective feeding. This is turn has implications for management with respect to burning and mowing (Reilly, 1989; Everett, 1991). When feeding, Oribi typically remove new leaves and seed heads of grasses and ignore older leaves and stems. Preferred grasses include *Themeda*, *Hyparrhenia*,

Loudetia, *Eulalia*, *Andropogon* and *Pennisetum* (Kingdon, 1982; Viljoen 1982 and Awad, 1985). Viljoen (1982); Shackleton and Walker (1985); Reilly *et al.* (1990) and Everett *et al.* (1992), have all recorded that Oribi show a preference for *Themeda triandra*; *Monocymbium ceresiiforme*; *Andropogon schirensis* and *Hyparrhenia hirta*. Although the Oribi select a variety of plants it is important to note that the decreaser category of grass species (grasses which decrease in abundance in the veld proportionally to the deterioration in condition of the veld) feature predominantly in the Oribi's diet (Marchant, 1991). Oribi regularly visit mineral licks and will travel across territory borders and gather in groups at preferred licks. Groups in the Serengeti were observed on three occasions to break apart termiteria with their hooves and horns and consume the sediment found within, presumably for its mineral content (Brashares, unpubl. obs.). Oribi avoid planted croplands and plantations, but will use planted hayfields and may occasionally feed on field crops such as wheat and oats (Kingdon, 1982 and Perrin and Everett, 1999), and sugar cane when there is fresh growth of a few centimetres. (Marchant, pers obs).

Oribi have a relatively high-energy requirement per unit body mass due to a higher metabolic rate in comparison to your larger antelopes (Marchant, 1991). They apparently supplement the grasses nutritional homogeneity by feeding selectively on certain annuals and geophytes, which including: *Hypoxis argentea*; *Helichrysum callicomum* and *Sporobolus centrifugus* (Reilly *et al.,* 1990). Everett (1991), also found that Oribi have a preference to various monocotyledonous forbs.

Oribi also display a marked seasonal variation in their use of certain plants. Reilly *et al.* (1990), found Oribi to feed on the leaves of *Watsonia densiflora* during the summer period, and the corms during early and late winter. *Eragrostis curvula* was utilised throughout the year, whilst *Sporobolus centrifugus* was only eaten during the summer period. This trend is also evident amongst forbs and geophytes. Species utilised in summer include *Helichrysum appendiculatum* and *H. callicomum,* whilst winter species include *Eulophia clavicornis* and *Gazonia krebsiona.*

During the winter months, food quantity and quality is at its lowest and it is at this time that there is a marked decline in the crude protein content of grass species (Mentis, 1978). There is also a corresponding increase in the crude fibre content of grass species. Digestibility and nutritional value of the food is therefore, very low and often results in a loss of condition of the Oribi during winter.

Oribi also favour burnt veld. Oliver *et al.* (1978), found that grass burnt during June contained almost double the amount of crude protein in August compared to unburnt areas at the same period. As a result, Oribi within the Highmoor Nature reserve have a marked preference for firebreaks burnt in June, during July and August and similarly for the spring burn areas during October to May. This trend is also prevalent in the Giants Castle Nature Reserve and in the Transvaal (Marchant, 1991; Viljoen, 1982). Shackleton and Walker (1985), propose a biennial winter burn so as to provide forage with a high nutrient content during the late winter, as well as promoting the growth of *T. triandra*, an Oribi preferred species.

The Oribi appear active throughout the day. A number of researchers (Oliver *et al*. 1978; Viljoen, 1982; Reilly, 1989; and Everett, 1991) all observed Oribi grazing in the early morning and late evenings. These are the peak periods, however the Oribi will graze throughout the day. Foraging is most common during cool hours of early morning and late afternoon to early evening, often continuing into nightfall. During mid-day, Oribi typically rest in tall grass or beneath a tree or shrub to escape the heat. Average time spent foraging varies between populations, ages, and sexes. In the Serengeti National Park, Tanzania, feeding comprised less than 10% of daytime activity for females and juveniles and less than 5% for adult males. Oribi generally do not feed in heavy winds and rain.

Water requirements:

Various opinions exist regarding the water requirements of Oribi. Viljoen (1982), is adamant that Oribi within the Transvaal never drink water, even when it is readily available but rather obtain moisture from succulent herbage such as *Eulolia villosa* or even from dew.

The water content of young grass can be as much as 70 - 80% in comparison to dead or dormant grass, where it is as low as 0 - 10% (Reilly, 1989). The moisture content of plants measured by Viljoen (1982), was at its highest at 06h00. This period corresponds with the peak feeding period of Oribi. Frost in winter and dew are also prevalent during this period and obviously contribute to the water intake of the Oribi. The possibility of Oribi obtaining water via grooming after precipitation (rain, frost or dew) cannot be ignored (Viljoen, 1982). Reilly (1989), notes that Oribi within the Golden Gate National Park spent time grooming during the early hours of the morning. The majority of research is however conclusive in that Oribi have never been observed consuming water (Marchant, *pers. comm*.).

Oribi depend on natural grasslands for their survival. This is a habitat that is currently one of South Africa's most threatened ecosystems, with only 2% being formally conserved and more than 80% already irreversibly transformed. Due to its grassland dependence, the Oribi acts as a flagship species for the conservation of these important grassland areas. The focus of conservation in South Africa has shifted towards ecosystems, habitats and flagship species and towards addressing the threats facing these species and habitats. Addressing the threats facing Oribi and grassland ecosystems in the eastern parts of South Africa will have significant benefits for conserving our remaining grassland areas, and their associated biodiversity components.

5. Threats

Key threats relevant to Oribi include:

- **Habitat destruction (loss and fragmentation) -** Grasslands are lost to commercial forestry activities, intensive commercial farming, grassland degradation due to overstocking, poor fire management, erosion and mining. The Oribi is a grassland specialist and cannot survive elsewhere. The loss of grasslands on flat to undulating terrain is thus a very real threat to the survival of the species.
- **Over-utilisation due to illegal hunting -** The hunting of Oribi with dogs is a serious threat to the survival of the species. This method of hunting has led to the demise of many localised Oribi populations in the KwaZulu-Natal midlands and the threat continues unabated. Much of the illegal hunting is done by hunting parties using dog packs. Trapping of animals with snares also poses a severe threat to the Oribi while some landowners allow the sport hunting of the Oribi at unsustainable levels.
- **Inappropriate management -** In many areas where Oribi populations are present, current farm management practices (e.g. fences, poor burning practices, poor veld management, domestic dogs) prevent co-existence with Oribi.
- **Limited government conservation efforts -** Although the Oribi is formally protected in the provinces in which it occurs, very little action is taken to halt the decline in numbers. Lack of capacity and resources in these organisations result in poor law enforcement and a lack of coordinated conservation effort and management.
- **Poor law enforcement -** South Africa currently has advanced environmental legislation. However, the enforcement of this legislation has been poor, and continues to affect grassland-dependent species.

- **Lack of Awareness -** The lack of awareness of the status of Oribi and the threats facing this antelope is currently a significant threat to this species.
- **Lack of coordination / cooperative management -** a coordinated national approach to Oribi conservation is required to avoid duplication of efforts and wasted funding.
- **Lack of understanding / appreciation of the value of grasslands -** grassland ecosystems are currently the most important and yet the most underrated and highly degraded ecosystems in South Africa. A far better understanding and appreciation of grasslands is required, which will benefit those grassland-dependent species.
- **Illegal capture and movement of Oribi -** The numbers of Oribi caught illegally unknown. However, due to the high price often paid for live Oribi (currently valued at R9.000 per animal), the threat of “fly-by-night” game capture operators trying to make a quick profit should not be underestimated.

ORIBI POPULATION AND HABITAT VIABILITY ASSESSMENT

19 – 22 June 2006

**Hebron Haven, KwaZulu-Natal,
South Africa**

WORKSHOP REPORT

SECTION 3

PRESENTATIONS

ORIBI WORKING GROUP – OVERVIEW / HISTORY

KEVIN McCANN, KWAZULU-NATAL BIODIVERSITY PROGRAMME

In 1981 a random postal questionnaire survey of antelope on private land in KwaZulu-Natal was conducted. The results showed that Oribi had disappeared from 23% of the farms where they had previously occurred, which, in addition to the now fragmented distribution of Oribi due to the considerable increase in land-use such as afforestation, was cause for concern. A follow-up survey in 1998 by Ezemvelo KZN Wildlife to assess the status of Oribi on the same 86 farms involved in the 1981 survey gave more alarming results. On 31% of the farms that had Oribi in 1981 Oribi numbers had decreased, and on 25% the Oribi had gone extinct. The follow-up survey showed an overall downward trend in Oribi numbers on private land, and the results suggested that it could now be one of South Africa's most threatened antelope species.

As a result of these survey findings an Oribi Working Group (OWG) was formed at a workshop in Ithala Game Reserve on 2 March 2000, consisting of a partnership of representatives from Ezemvelo KZN Wildlife staff, KwaZulu-Natal Wildlife Honorary Officers, influential farmers, NCT Forestry, Sappi, Mondi Business and Paper South Africa, SA Timber Growers Association, DWAF, KwaZulu-Natal Crane Foundation, Blue Swallow Working Group, Antelope Specialist Group of the IUCN, KwaZulu-Natal Conservancies Association, SA Sugar Association, Voermol, Wildlife and Environmental Society of Southern Africa (WESSA) and a hunting representative with Oribi experience. In November 2002 a smaller committee, the OWG Committee was formed consisting of members from Ezemvelo KZN Wildlife, the Endangered Wildlife Trust, landowners, Msinsi Holdings, and NCT Forestry. This group was formally adopted and become a working group of the Endangered Wildlife Trust during 2003.

<u>OWG Conservation Plan – Projects and Policies</u>

During 2005, the OWG completed the production of the Oribi Conservation Plan. This plan outlines the projects, policies and strategies of the OWG, as well as giving basic management guidelines for Oribi conservation.

Habitat Conservation Projects –
- Identifying properties with suitable habitat for Oribi;
- Identifying properties with significant populations of Oribi;
- Identifying properties with "doomed" Oribi populations;
- Facilitate the translocation of Oribi (where possible); and
- Management recommendations for landowners with Oribi.

Oribi Custodian Programme –
To promote the conservation of Oribi and their grassland habitat through public recognition of outstanding contributions in Oribi conservation and / or habitat management i.e. includes landowners and individuals / organizations making a contribution to Oribi conservation.

Education and Awareness –
The OWG partners with the Endangered Wildlife Trust / Ezemvelo KZN Wildlife BEEP Programme (Biodiversity Environmental Education Programme), using the Oribi poster and Brochure resources developed by the group.

Research and Monitoring –
- Oribi surveys carried out – 1981, 1998, 2001, 2003, 2005

- Oribi genetics project – samples analysed at the University of Stellenbosch from South Africa, Zimbabwe and Zambia.
- Oribi database – a spatial database has been developed by the OWG to store and provide analytical capabilities to all Oribi related data.
- Oribi research projects – recent and ongoing Oribi research projects include those of Rebecca Ross (MSc – University of KwaZulu-Natal), Glynis Humphrey (3rd year project – Rhodes University) and Andrew Hill (MSc – University of KwaZulu-Natal).

ORIBI POPULATION STATUS AND TRENDS

ATHOL MARCHANT, EZEMVELO KWAZULU-NATAL WILDLIFE

A 1981 antelope survey in KwaZulu-Natal showed that Oribi had, within living memory, disappeared from 20 of the 86 farms that mentioned they had (or used to have) Oribi. A re-survey of these 86 farms 17 years later (1998) showed that on 31% of the farms the Oribi had decreased and on 25% they had gone extinct within the 17-year period. The survey also showed that it was mainly populations of less than 10 Oribi that were at the greatest risk of extinction. At the same time Oribi were also assessed in the 16 Ezemvelo KZN Wildlife game reserves. Eight of these reserves had populations of less than 10 Oribi, placing these areas into the high risk of extinction category. The Ukhahlamba Drakensberg Park had about 300 Oribi (but in pockets due to the broken nature of the terrain), while Chelmsford Nature Reserve had over 150 animals in one continuous population, making it one of the most important Oribi areas in South Africa.

A survey in 2000, involved nearly 300 farms with Oribi in KwaZulu-Natal. The results were similar to the 1998 survey. In both surveys habitat loss and fragmentation due to afforestation and agriculture, and serious poaching with dogs, were the main causes of Oribi declines and extinctions. A KwaZulu-Natal Oribi census in 2003/04 gave a highly fragmented population of 1873 on 220 farms involved in the census. There were only 20 farms with more than 20 Oribi on each, while 102 farms had five or less Oribi. On 10 farms Oribi had gone extinct – this in addition to all earlier mentioned extinctions. This census also showed serious declines in populations once considered good and safe, and only two populations out of the 220 showed an increase. A few unsolicited responses from farmers in the Piet Retief area in Mpumalanga showed that the declines / extinctions were not limited to KwaZulu-Natal.

Table 5: A national census in 2005 had 239 responses:

Province	Number of Responses	Number of Oribi
Gauteng	3	21
Mpumalanga	27	166
Eastern Cape	1	185
KwaZulu-Natal	208	1550 (i.e. 81%)
TOTAL:	239	1922

The KwaZulu-Natal figure of 1550 is over 300 Oribi down from the 2003/04 figure of 1873. The status of Oribi in KwaZulu-Natal is disturbingly down from an estimated 2000 of a couple of years previously. Ezemvelo KZN Wildlife has about 600 Oribi in total on their reserves, thus showing that the future survival of Oribi is in the hands of the farmers. The Eastern Cape response to the survey has been poor and therefore under-represents the number of Oribi in this province.

All surveys have shown a serious decline in Oribi populations and Oribi numbers, and that the dramatic destruction of the moist grassland habitat required by Oribi has led to fragmentation of the remaining populations. Oribi require grassland on gently undulating terrain with a maximum slope of around 10° on north to east facing slopes. These areas are also favoured for afforestation and agriculture. Oribi feed very selectively on the best quality grasses, and these grasses are threatened by poor management practices such as overgrazing by livestock or game, over burning, no burning, and burning at the wrong time of year. Oribi also require a mosaic of both long grass (shelter from bad weather, from predators, and for their young) and short grass (for grazing) in the same year. This required mosaic is threatened by poor management practices.

A survey in the sheep farming areas of KwaZulu-Natal (where all reported sheep kills were analyzed) showed that over 80% of the sheep kills were caused by dogs, and often by the farmer's own house dogs. The effect of dogs on Oribi is thus of huge concern. The survey also showed that the larger the property the fewer dogs per unit area and the more Oribi present. The more subdivided the properties became, the more landowners present (each with their own dogs) the more farm workers present (with their dogs), resulting in significantly reduced Oribi numbers.

ORIBI GENETICS

IAN RUSHWORTH, EZEMVELO KWAZULU-NATAL WILDLIFE

Across Africa thirteen subspecies of Oribi have been described on the basis of morphological and behavioural differences (Ansell, 1972) (Figure 1). These subspecies have evolved as a result of isolation and local adaptation. However, the validity of these subspecies has not previously been corroborated by genetic research. At a more local level, within South Africa there are populations of Oribi that are likely to have been separated for extended periods by areas of unsuitable habitat. It is likely that these isolated populations, through mutations and genetic drift, have begun to develop locally adapted gene pools, which is the first step in the natural process of speciation. Large-scale movement of Oribi by man may break down these locally adapted gene pools and impact on the process of speciation, and ultimately even on the genetic fitness of the species.

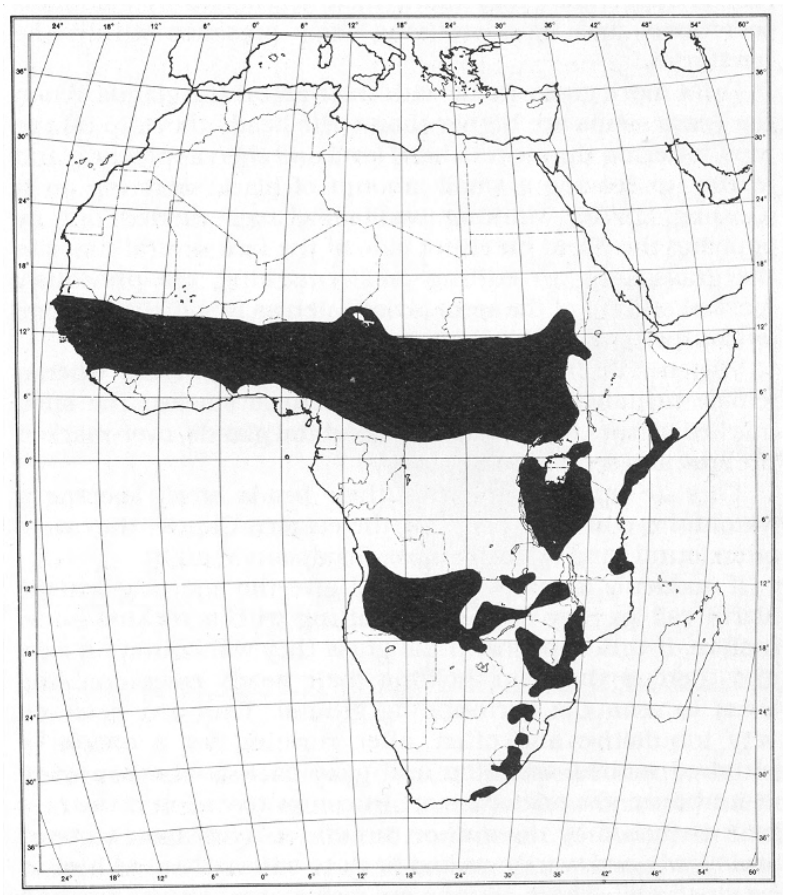


Figure 1: Distribution of Oribi in Africa (Skinner and Smithers, 1990).

A genetics study is underway (van Vuuren and Rushworth, unpublished data) to help understand any conservation issues around the movement of Oribi. While not complete at the time of publication of this report, preliminary results indicate that Zambian animals are significantly different to South African animals (thus supporting the differentiation of the subspecies), and that there are at least two distinct genetic groups within South Africa.

However, there is no clear relationship between genetic structuring and geographical pattern, with animals from different lineages being found in the same or similar areas. The reason for

this is not clear, but the most likely explanation is that there has been more extensive recent movement of Oribi by landowners than official records indicate.

Notwithstanding the above difficulty in the interpretation of the genetics data, it is recommended that the South African Oribi population be managed as three separate genetic management units (Figure 2), with free movement of Oribi within these units but not between the units. No Oribi should be exported from or imported into South Africa (other than from / to western Swaziland).

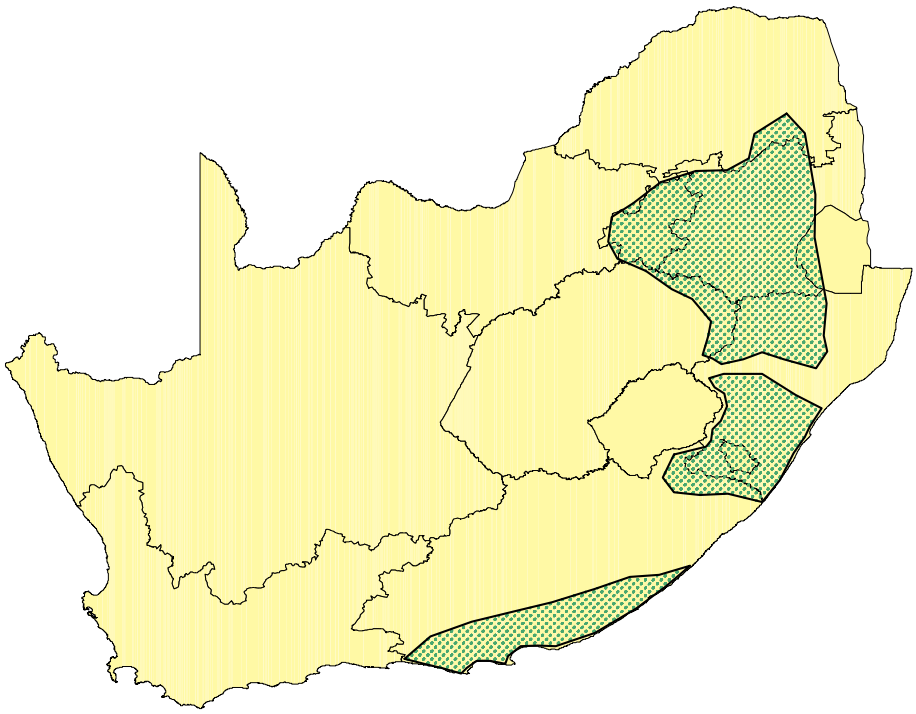


Figure 2: Oribi management areas for South Africa (van Vuuren and Rushworth, unpublished data).

AN UPDATE ON ORIBI CAPTIVE BREEDING AND THE ORIBI WORKING GROUP POLICY ON CAPTIVE BREEDING

REBECCA ROSS, ROSS GAME CAPTURE

Oribi are an endangered small antelope that require conservation strategies to prevent their population decline and extinction. Records from two zoological institutions show a poor history of keeping Oribi in captivity, however, with further research, captive breeding with a goal of reintroduction can be one potential strategy that can save this species.

A monitoring programme was implemented at a privately-owned captive breeding facility for Oribi in KwaZulu-Natal. As done in previous years, ten captive bred Oribi were released as part of a reintroduction program by the facility onto the surrounding agricultural / game farm. In the past, none of the released animals were monitored or seen again and it was hypothesised that the breeding / reintroduction methods were not adequate. For the first time, survivorship of the reintroduced Oribi was monitored using radio telemetry, so as to identify the factors involved in a successful or failed reintroduction attempt. Within months, eight of the ten Oribi were found dead, cause of mortality varied, but predation by natural predators and humans was an important factor. All are of concern and need to be addressed in future captive breeding, reintroduction and management of Oribi.

The use of translocation as a conservation tool for subpopulations facing extinction has also been proposed for antelope. Fifteen Oribi from threatened populations were translocated to a nearby large private game reserve in KwaZulu-Natal, South Africa. Radio telemetry was used to monitor the translocated Oribi for one year to assess the efficacy of translocation as a species conservation tool. Only a single mortality was recorded during the one year of observations and the Oribi settled into home ranges of a mean size of 90 hectares. Therefore translocation has been shown to be a viable option in preserving populations of Oribi that are considered to be doomed.

ORIBI POPULATION AND HABITAT VIABILITY ASSESSMENT

19 – 22 June 2006

**Hebron Haven, KwaZulu-Natal,
South Africa**

WORKSHOP REPORT

SECTION 4

WORKING GROUP REPORTS

List of Acronyms

BEEP	Biodiversity Environmental Education Programme
CAN	Conservation Area Network
CBSG SA	Conservation Breeding Specialist Group Southern Africa
CEO	Chief Executive Officer
DEAT	Department of Environmental Affairs and Tourism
DWAF	Department of Water Affairs and Forestry
EV	Environmental Variation
EWT	Endangered Wildlife Trust
IUCN	World Conservation Union
KwaNalu	KwaZulu-Natal Agricultural Union
KZN	KwaZulu-Natal
MDTP	Maloti Drakensberg Transfrontier Project
NCT Forestry	Natal Cooperative Timber (Pty) Ltd
NGO	Non-governmental Organisation
OWG	Oribi Working Group of the Endangered Wildlife Trust
PHVA	Population and Habitat Viability Assessment
SA	South Africa
SANBI	South African National Biodiversity Institute
SANParks	South African National Parks
SAPS	South African Police Service
WESSA	Wildlife Environment Society of Southern Africa

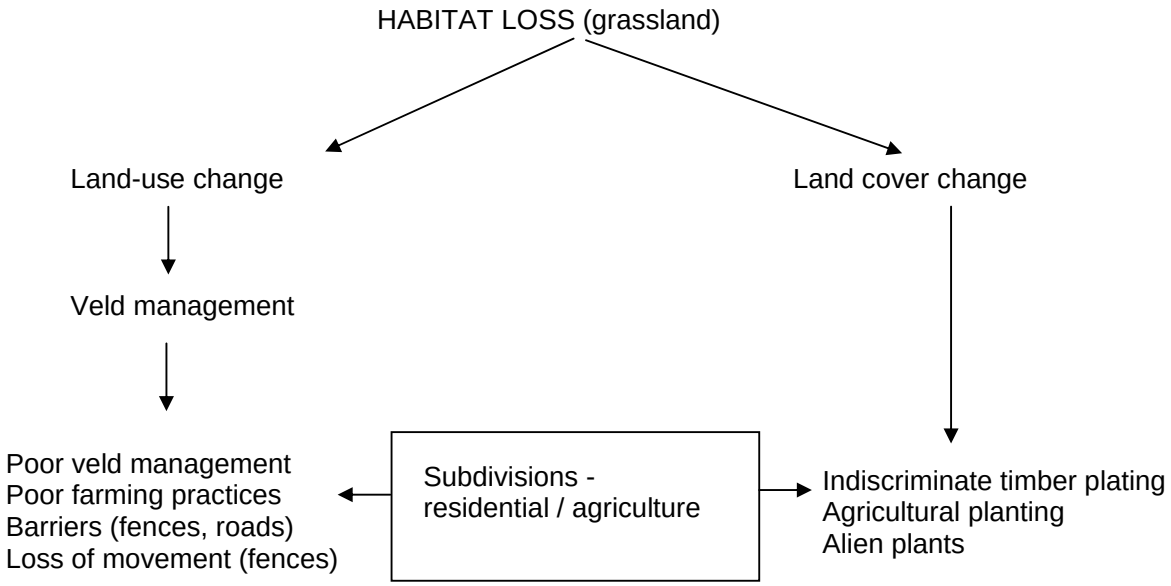
Oribi Habitat and Management Working Group

WORKING GROUP PARTICIPANTS

1.	Athol Marchant	Ezemvelo KZN Wildlife
2.	James Wakelin	Ezemvelo KZN Wildlife
3.	David Rowe-Rowe	Oribi specialist
4.	Gary Edwards	Landowner
5.	David Wardle	Landowner (Thomas River Conservancy)
6.	Mark Wardle	Landowner (Thomas River Conservancy)
7.	Mark Pettit	Sappi Forests
8.	John Crowson	Ezemvelo KZN Wildlife
9.	Cliff Walton	NCT Forestry
10.	Brent Coverdale	Mondi Business Paper South Africa
11.	Kevin McCann	Endangered Wildlife Trust

Introduction / Situation overview

All cards from the brainstorming session were used to develop an overall picture of habitat and habitat management issues affecting Oribi populations:



PROBLEM STATEMENTS

PROBLEM STATEMENT 1
LAND COVER CHANGE IS RESULTING IN LOSS AND FRAGMENTATION OF ORIBI HABITAT LEADING TO NON-VIABLE POPULATIONS.

Solution 1
Establishment of an Oribi Conservation Area Network (CAN) per genetic management zone (refer to figure 2, Oribi Genetics - Ian Rushworth) to ensure persistence of the species.

Definition for an Oribi CAN – areas that have formal land management specifically for the benefit of Oribi. This network of protected areas within each genetic management area should ensure, the conservation of Oribi by maintaining:

i. genetic heterozygosity;
ii. representivity; and
iii. persistence.

All these areas should have some form of legal protection status (e.g. proclamation or conservation servitudes), which will ensure for the continued conservation management of those areas and the species.

Action Step 1: Identify and map all existing Oribi populations across each genetic management zone.	
Responsibility:	Ezemvelo KZN Wildlife for their reserves and KZN, university students for remaining areas (Eastern Cape and Mpumalanga), supervised by Prof. Trevor Hill (University of KwaZulu-Natal).
Timeline:	▪ June 2007 for KwaZulu-Natal ▪ December 2007 for the remaining areas (Eastern Cape and Mpumalanga).
Resources needed:	Survey data (digital) and GIS facilities.
Collaborators:	OWG, Ezemvelo KZN Wildlife, University of KwaZulu-Natal and landowners.
Measurable outcomes:	Map and report.
Obstacles:	▪ Lack of reliable census data. ▪ Unwilling students.

Action Step 2: Identify and map the optimum (new and existing) areas for establishing conservation area networks within each genetic management zone.	
Responsibility:	▪ Andrew Hill (for KwaZulu-Natal). ▪ Andrew Hill to contact Prof. Trevor Hill (to co-ordinate for other areas).
Timeline:	▪ June 2007 (for KwaZulu-Natal). ▪ December 2007 for remaining areas.
Resources needed:	Suitable data for each genetic management zone, terms of reference for the project and Vortex Model.
Collaborators:	OWG, University of KwaZulu-Natal, Ezemvelo KZN Wildlife, Rhodes University, University of the Witwatersrand, Mpumalanga Tourism and Parks Agency and Eastern Cape Parks Board.
Measurable outcomes:	Working model and map.
Obstacles:	▪ Data not available. ▪ Students not identified.

Action Step 3: Seek commitment from landowners within each identified conservation area network.	
Responsibility:	OWG Chairman.
Timeline:	▪ KwaZulu-Natal – December 2007. ▪ Other areas – December 2008.
Resources needed:	An effective extension programme (e.g. District Conservation Officers), EWT KwaZulu-Natal Biodiversity Programme Field Worker and OWG.
Collaborators:	Ezemvelo KZN Wildlife, EWT, OWG, Mpumalanga Tourism and Parks Agency, Eastern Cape Parks Board and landowners.
Measurable outcomes:	Consolidated conservation area networks (increased landowner commitment), viable Oribi populations, farm visits and Oribi field days.
Obstacles:	▪ Unwilling landowners. ▪ Insufficient extension staff.

Action Step 4: Seek commitment from landowners within each identified conservation area network to formulate and implement an informal Oribi management plan in collaboration with the OWG (specific to each conservation area network).	
Responsibility:	EWT KwaZulu-Natal Biodiversity Programme Field Worker (André Rossouw – KwaZulu-Natal), OWG, Bill Howells and District Conservation Officers in KwaZulu-Natal. Other areas – OWG Manager.
Timeline:	June 2008 in KwaZulu-Natal and June 2009 for other areas.
Resources needed:	Oribi Management Guidelines and Oribi PHVA Workshop Report.
Collaborators:	Ezemvelo KZN Wildlife, OWG, Mpumalanga Tourism and Parks Agency, Eastern Cape Parks Board, EWT working groups.
Measurable outcomes:	Committed landowners with management plans for their properties.
Obstacles:	Change in staff.

Solution 2
Create incentives for landowners to conserve Oribi (link to Awareness and Extension Working Group).

Action Step 1: Formalise partnerships with provincial agencies / municipalities responsible for the creation of stewardship. NOTE: It is important to include in this section the conservation incentives provided by municipalities (under the Municipal Act) e.g. eThekweni Municipality.	
Responsibility:	OWG Chairman.
Timeline:	March 2007.
Resources needed:	Provincial Stewardship Programmes, time for liaison with stewardship programme managers.
Collaborators:	District and local municipalities, Botanical Society, landowners, provincial conservation agencies, EWT National Biodiversity Stewardship Programme Coordinator.
Measurable outcomes:	Formal protection and security of key Oribi properties in each conservation area network.
Obstacles:	▪ Inadequate incentives. ▪ Lack of buy-in from landowners and government. ▪ Lack of adequate staff for stewardship programmes.

Action Step 2: Encourage landowners to formalise protection of their conservation areas through the provincial conservation agencies.	
Responsibility:	Kevin McCann (KwaZulu-Natal), OWG Chairman / Manager for remaining areas.
Timeline:	March 2007.
Resources needed:	Provincial Stewardship Programmes and National Biodiversity Stewardship Programme.
Collaborators:	Ezemvelo KZN Wildlife, Eastern Cape Parks Board and Mpumalanga Tourism and Parks Agency.
Measurable outcomes:	Formal protection and security of key Oribi properties in each conservation area network.
Obstacles:	Lack of extension staff.

Solution 3
Promote training to improve capacity amongst all stakeholders (especially government departments) involved with land cover change decision making.

This solution was passed onto the Awareness and Extension Working Group, responsible for the actions required for the completion of this solution.

Solution 4
Identify and influence development and activities within existing and potential Oribi habitat to minimise inappropriate land cover change.

Action Step 1: Formulate an official request to the respective provincial authorities responsible for assessing the impacts of development activities on biodiversity, requesting that the OWG are consulted whenever any development may impact upon Oribi.	
Responsibility:	OWG Chairman.
Timeline:	January 2007.
Resources needed:	Information from this workshop to be included with letter.
Collaborators:	Eastern Cape Department of Economic Affairs, Environment and Tourism, KwaZulu-Natal Department of Agriculture and Environmental Affairs, Free State Department, Mpumalanga Tourism and Parks Agency and Gauteng Department of Agriculture, Conservation and Environment.
Measurable outcomes:	Letter.
Obstacles:	Extension capacity to react to development applications.

PROBLEM STATEMENT 2
THE QUALITY AND QUANTITY OF SUITABLE AND AVAILABLE ORIBI HABITAT IS NEGATIVELY AFFECTED BY INAPPROPRIATE MANAGEMENT PRACTICES.

Solution 1
Develop an extension programme for the Oribi conservation area network.

The Awareness and Extension Working Group has formulated an Extension Programme and thus was not developed further within this working group.

Solution 2
Develop and disseminate guidelines for the appropriate management of Oribi.

Action Step 1: Collate and distribute all relevant information pertaining to Oribi management, to all landowners within conservation area networks. This should be linked to a level of commitment by individuals receiving the information.	
Responsibility:	OWG Committee.
Timeline:	March 2007.
Resources needed:	Funding for printing.
Collaborators:	Ezemvelo KZN Wildlife, Eastern Cape Parks Board, Mpumalanga Tourism and Parks Agency, Farmers' Associations, EWT Working Groups, WESSA, corporate field staff, honorary officers and conservancies.
Measurable outcomes:	Development of an Oribi management guideline document.
Obstacles:	▪ Funding. ▪ Obtaining all relevant information in time. ▪ Identify capacity to collate information.

Solution 3
Partner with existing recognised conservation systems (e.g. Forestry Stewardship Council) to ensure appropriate management for Oribi.

Action Step 1: Arrange a meeting with the Environmental Managers within the Corporate Forestry Sector, to ensure that the Oribi management guidelines are included within the Open Area Management planning and Rare and Threatened species monitoring. Provide this information to the Forestry Stewardship Council auditors.	
Responsibility:	OWG Chairman.
Timeline:	March 2007.
Resources needed:	Management guidelines and Oribi Conservation Plan.
Collaborators:	▪ Mondi Business Paper South Africa and Siyaqhubheka: Chris Burchmore. SAPPI Forests: Douglas Macfarlane. ▪ NCT Forestry: Craig Norris. ▪ Global Forest Products, Masonite: Craig Houston-Macmillan. ▪ Mondi Shanduka Newsprint: Doug Burden. ▪ Hans Marensky: Stewart Christie. ▪ Nsingizi Forests: Stewart Christie. ▪ Komattieland Forests: Jan Huyser.
Measurable outcomes:	Oribi management is included in the Open Area Management and Rare and Threatened species monitoring programmes and effective certification programmes include management of Oribi.
Obstacles:	None.

PROBLEM STATEMENT 3
THE INCREASE IN HUMAN SETTLEMENT WITH ITS ASSOCIATED ACTIVITIES AND RESULTANT BARRIERS ARE REDUCING ORIBI HABITAT AND THEIR MOVEMENTS.

Solution 1
The OWG through the mandated provincial biodiversity authority – highlights the important Oribi areas to avoid or minimise the negative impact of human settlement and its associated activities.

This solution is very closely linked to the Awareness and Extension Working Group around

land claims (see Problem Statement 3, Solution 1).

Action Step 1: Ensure that all relevant provincial biodiversity authorities include the spatial CANs layer and guidelines into all spatial planning.	
Responsibility:	OWG Committee.
Timeline:	March 2008.
Resources needed:	Spatial CAN layer derived from Problem Statement 2, Solutions 2, Oribi management guidelines.
Collaborators:	▪ Provincial conservation authorities. ▪ Land Affairs. ▪ Provincial DEAT. ▪ Department of Agriculture.
Measurable outcomes:	Oribi spatial CAN layer is included and used in all provincial planning.
Obstacles:	Delay in the creation of the CANs.

PROBLEM STATEMENT 4
STOCK THEFT IS FORCING LAND-USE AND LAND COVER CHANGE.

Solution 1
Highlight the negative impact of stock theft on Oribi conservation.

Action Step 1: Formulate media releases for the following media sources – 50/50, Farmers Weekly, KwaZulu-Natal Agricultural Union (KwaNalu), SA Wild en Jag, Landbou Weekblad, provincial newspapers, Financial Newspapers, National Conservancies associations and The Guinea Fowl.	
Responsibility:	OWG Committee.
Timeline:	June 2007.
Resources needed:	The capacity to write media articles and contacts at various media sources.
Collaborators:	SAPS Borderline patrol unit, MDTP, affected Farmers Associations and Dale Hancock.
Measurable outcomes:	Successful media releases.
Obstacles:	Reluctance of media sources to place articles.

Solution 2
Support the lobby for more effective stock protection services.

Action Step 1: Develop formal relationships with organisations affected by stock theft.	
Responsibility:	OWG Committee.
Timeline:	June 2007.
Resources needed:	Letter of support and access to OWG letterhead.
Collaborators:	SAPS, farmers associations, KwaNalu and Forestry South Africa.
Measurable outcomes:	Letters sent to all stakeholders identified.
Obstacles:	Extent of the stock theft issue.

These solutions may impact on other species (other species may also benefit or could be added onto these activities).

PROBLEM STATEMENT 5
THERE IS A LACK OF SUITABLE AVAILABLE ORIBI HABITAT IN CERTAIN GENETIC MANAGEMENT AREAS. (NOTE – LINK THIS TO THE VORTEX TARGETS, VIABLE POPULATIONS SIZE).

If this statement is true, then the following solutions apply:

Solutions 1
Develop a conservation strategy and action plan for the species per genetic management area.

Action Step 1: Develop a conservation strategy and recovery plan for the species per genetic management area.	
Responsibility:	OWG Committee.
Timeline:	December 2008.
Resources needed:	PHVA document and formulated GIS layers.
Collaborators:	Ezemvelo KZN Wildlife, Mpumalanga Tourism and Parks Agency and Eastern Cape Parks Board.
Measurable outcomes:	Document and map.
Obstacles:	▪ Time and capacity to develop ▪ Capacity of OWG ▪ Variation in different geographic areas, languages.

Solutions 2
Coordinate the translocation programmes of excess Oribi within the network areas to alternative suitable areas.

Action Step 1: Coordinate the current translocation of threatened and excess Oribi populations. This is a reactive programme coordinated prior to the Conservation Strategy.	
Responsibility:	OWG Chairman.
Timeline:	Ongoing until the Conservation Strategy is developed.
Resources needed:	List of threatened populations and suitable recipients.
Collaborators:	Ezemvelo KZN Wildlife, Mpumalanga Tourism and Parks Agency, Eastern Cape Parks Board, game capture operators and willing landowners.
Measurable outcomes:	Improved security of threatened Oribi populations.
Obstacles:	▪ Financial backing and resulting delay in translocation. ▪ Incomplete database to map threatened populations. ▪ Genetic management of the Oribi populations. ▪ Availability of suitable game capture operators.

Action Step 2: Restock identified potential habitat with excess Oribi from viable CANs.	
Responsibility:	OWG Chairman.
Timeline:	Implement from January 2009.
Resources needed:	Tracking devices, list of excess populations and list of landowners with potential habitat (suitable recipients).
Collaborators:	All landowners in CANs, Ezemvelo KZN Wildlife, Mpumalanga Tourism and Parks Agency, Eastern Cape Parks Board and game capture operators.
Measurable outcomes:	Restocked additional areas, increased Oribi numbers country-wide.

Obstacles:	▪ Available excess Oribi. ▪ Knowledge on carrying capacity. ▪ Financial backing for translocations. ▪ Genetic management of the Oribi populations. ▪ CANs not functioning adequately.

PROBLEM STATEMENT *6*
UNNATURALLY HIGH PREDATOR NUMBERS MAY NEGATIVELY IMPACT ON ORIBI POPULATIONS.

Solutions 1
Investigate the impacts of natural predation on Oribi.

Refer to the research project (Problem Statement 7) under the Research and Monitoring Working Group.

Solutions 2
Respond immediately to any reported predation of Oribi (an extension function) and report back to OWG.

Action Step 1: Ensure information on Oribi predation is included in the awareness toolkit (Awareness and Extension Working Group, Statement 2, Solution 2).	
Responsibility:	OWG Chairman.
Timeline:	By end of 2007.
Resources needed:	Effective extension programme, developed resources on Oribi predation (specifically those developed by David Rowe-Rowe).
Collaborators:	All landowners, extension services, EWT fieldworkers and honorary officers.
Measurable outcomes:	Improved knowledge on Oribi predation and knowledge on problem species and areas.
Obstacles:	▪ An ineffective extension programme ▪ Cooperation from landowners.

Solutions 3
Maintain information in a database on all reported unnaturally high predator levels or Oribi predation incidents (link in to Human Wildlife Conflict Workshop – guidelines, Tim Snow, Hannes Stadler (CapeNature) and SANBI database).

Action Step 1: Ensure all reported information is stored in the OWG database and linked to the Human Wildlife Conflict database stored by SANBI.	
Responsibility:	OWG Committee.
Timeline:	Ongoing.
Resources needed:	Database expertise and capture clerk.
Collaborators:	Extension services, EWT Working Groups (specifically the Poison Working Group) and all landowners.
Measurable outcomes:	Up-to-date information, adequate feedback to all landowners and general public.
Obstacles:	▪ Finances ▪ Adequate capacity to deal with databases and data capture; spatially enabled to deal with other provinces, poor analysis and lack of dissemination.

Awareness and Extension Working Group

WORKING GROUP PARTICIPANTS

1. André Rossouw — EWT / KwaZulu-Natal Biodiversity Programme
2. Doug Burden — Mondi Shanduka Newsprint
3. Alex Wood — Ezemvelo KZN Wildlife, Vryheid
4. Frik Lemmer — Ezemvelo KZN Wildlife, Paulpietersburg / Pongola
5. Mandy McNamara — EWT / Blue Swallow Working Group, Mpumalanga
6. Samson Phakathi — EWT / Conservation Leadership Group
7. John Kennedy — Oribi Working Group

Introduction / Situation overview

There is a general lack of awareness and perceived reduction in extension capacity in South Africa which contributes to the continued decline in Oribi numbers throughout their range.

Definitions:

Landowners are defined as all communities and landowners including private commercial farmers, traditional authorities, municipalities, formal conservation and others.

Formal education will target teachers and learners.

Informal education will target farmers; municipalities; farm workers; honorary rangers; interest groups; SAPS; the judiciary; developers; consultants; hunting associations and seasonal labour.

PROBLEM STATEMENTS

PROBLEM STATEMENT 1
LACK OF AWARENESS AMONGST VARIOUS STAKEHOLDERS REGARDING ORIBI AND THEIR NATURAL HABITAT.

Solutions 1
Disseminate information through various public media channels.

Action Step 1: Identify the target audience.	
Responsibility:	OWG.
Timeline:	June 2007.
Resources needed:	Personnel time and administrative costs.
Collaborators:	Provincial conservation authorities; PHVA participants (NGOs, landowners).
Measurable outcomes:	The form of media to be used will become clear once target audience is identified.
Obstacles:	▪ Budget constraints. ▪ Not seen as priority. ▪ Information not received from all parties. ▪ Lack of cooperation between relevant parties.

Action Step 2: Development / compilation of all media resources pertaining to Oribi conservation.	
Responsibility:	OWG.
Timeline:	July 2006 – ongoing.
Resources needed:	Personnel time, administrative and printing costs.
Collaborators:	Publishing houses; Ezemvelo KZN Wildlife media department; extension officers and researchers.
Measurable outcomes:	Developed and produced media resources on plight of the Oribi.
Obstacles:	Available man hours.

Solutions 2
Provide effective formal and informal education to learners.

Action Step 1: Development and implementation of a formal education programme with relevant resources conforming to Outcomes Based Education and the National Curriculum Statement.	
Responsibility:	BEEP.
Timeline:	Complete by August 2007.
Resources needed:	List of schools within the Oribi range; funding; dedicated field worker; personnel time and technology.
Collaborators:	Other organisations focusing on education activities regarding other threatened species (linked to activities in other PHVAs, e.g. Ground Hornbill, Wattled / Blue Cranes), WESSA; Ezemvelo KZN Wildlife; OWG; Corporations; Department of Education; other EWT Working Groups; Mondi and community facilitators.
Measurable outcomes:	Compilation of a formal education programme to enhance the basic understanding of Oribi conservation issues amongst learners.
Obstacles:	Buy-in from the Department of Education.

Action Step 2: Development and implementation of an informal education programme with relevant resources.	
Responsibility:	OWG.
Timeline:	Immediately and ongoing.
Resources needed:	List of target audience; funding and technology.
Collaborators:	WESSA; Ezemvelo KZN Wildlife extension officers; Department of Agriculture and Environmental Affairs extension officers; Corporations; other EWT Working Groups; Mondi; community facilitators and Community Conservation Officers.
Measurable outcomes:	Compilation of an informal education programme to enhance the basic understanding of Oribi conservation issues amongst learners. Including pamphlets; free standing mobile displays; z-folders and posters.
Obstacles:	Unknown.

Solutions 3
Distribute educational resources to learners.

Action Step 1: Refer to Action Steps 1 and 2, Solution 2 of Problem Statement 1.

Solutions 4
Ensure that the Oribi PHVA results are communicated to the identified stakeholders.

Action Step 1: Extract required information from the Oribi PHVA Workshop report and prepare for presentation in the informal education programme.	
Responsibility:	OWG.
Timeline:	One month after completion of Oribi PHVA Workshop report (January 2007).
Resources needed:	Personnel time.
Collaborators:	Chairpersons / relevant staff of related working groups around grassland management.
Measurable outcomes:	Concise tool for use in informal education programme developed.
Obstacles:	Time and man power constraints.

Action Step 2: Training of facilitators to present information to identified stakeholders. i. Public / private stakeholders ii. Governmental departments	
Responsibility:	OWG.
Timeline:	Two months after completion of Oribi PHVA Workshop report (February 2007).
Resources needed:	Funding.
Collaborators:	EWT KwaZulu-Natal Biodiversity Programme; WESSA; other grassland related working groups.
Measurable outcomes:	Trained facilitators able to effectively convey information.
Obstacles:	▪ Funding. ▪ Availability of trainers of the trainers.

Action Step 3: Setup and run workshops.	
Responsibility:	OWG by directing trained facilitators through a work programme and timetable and to be part of an ongoing extension network across the Oribi range.
Timeline:	January 2007 – April 2007.
Resources needed:	Funding for workshops (travel and catering).
Collaborators:	EWT KwaZulu-Natal Biodiversity Programme; Ezemvelo KZN Wildlife extension officers; EWT and grassland specialists.
Measurable outcomes:	Coordinated information dissemination.
Obstacles:	Personnel time.

PROBLEM STATEMENT 2
AN INEFFECTIVE EXTENSION EFFORT WITH REGARDS TO ORIBI CONSERVATION.

Solutions 1
Identify gaps in extension services across the Oribi distribution range in the entire country.

Action Step 1: Establish where extension officers are located throughout the Oribi range.	
Responsibility:	Ezemvelo KZN Wildlife district function (Frik Lemmer / Alex Wood) for KwaZulu-Natal and OWG for the rest of the range (Mpumalanga; Gauteng and the Eastern Cape).
Timeline:	June 2007.
Resources needed:	Telephone, email and time.
Collaborators:	Provincial nature conservation bodies.

Measurable outcomes:	Identification of extension officers in areas where this is unknown and making this information available to all interested groups.
Obstacles:	Time constraints.

Action Step 2: Encourage involvement of additional NGOs and corporate extension personnel to fill identified gaps.	
Responsibility:	OWG.
Timeline:	1 August – ongoing.
Resources needed:	Funding.
Collaborators:	EWT Working Groups; other working groups; WESSA; Corporate organisations and provincial conservation organisations.
Measurable outcomes:	Full compliment of extension officers throughout Oribi range.
Obstacles:	▪ Funding. ▪ Potential extent of the problem.

Solutions 2
Development of appropriate toolkit for use by extension officers throughout the Oribi range and ensure implementation using this toolkit.

Action Step 1: Locate existing extension manuals, identify gaps, fill gaps and collate information into a workable document for issue to extension officers.	
Responsibility:	Athol Marchant.
Timeline:	End 2007.
Resources needed:	Ezemvelo KZN Wildlife manuals, technical guidelines for farmers, WESSA / Sharenet literature.
Collaborators:	Bill Howells, Frik Lemmer, Eastern Cape officials, Free State officials, Gauteng officials, Johan Eksteen, John Kennedy, Doug Burden, Alex Wood.
Measurable outcomes:	Practical and implemental manual.
Obstacles:	None.

Solutions 3
Identify additional extension personnel (NGOs, corporate organisations and BEEP personnel).

Action Step 1: Refer to Problem Statement 2, Solution 1 and Action Step 2.

PROBLEM STATEMENT 3
THE UNPREPAREDNESS OF THE CURRENT POLITICAL LAND REDISTRIBUTION PROCESSES.

Solutions 1
Place Oribi and Oribi habitat conservation issues firmly on the agenda of stakeholders involved with the redistribution of land viz. the Land Claims Commission, District and Local Municipalities (target environmental officers), Land Affairs, Department of Agriculture and Environmental Affairs, corporate sector, DEAT, SANBI, provincial nature conservation departments and other large landowners to ensure that the protection of Oribi is dealt with prior to change of ownership.

Action Step 1: Access information and maps on verified land claims lodged on land within

the Oribi range.	
Responsibility:	EWT / OWG (André Rossouw).
Timeline:	July 2006 – until end of land claims process.
Resources needed:	LCC information and Resource.
Collaborators:	Five provincial land claims commissions, nature conservation organisations, other working groups and large landowners.
Measurable outcomes:	Map of affected areas.
Obstacles:	Incomplete claim information.

Action Step 2: Ensure claim information is distributed to extension service networks via OWG to capacitate extension officers to enable training to take place.	
Responsibility:	OWG (André Rossouw).
Timeline:	As information becomes available.
Resources needed:	Funding.
Collaborators:	Nature conservation departments.
Measurable outcomes:	Pre-settlement intervention on land redistribution.
Obstacles:	Dependant on previous actions re: staff availability and capacity.

Action Step 3: Ensure the inclusion of claimants / land redistribution benefactors in the consultation / extension process.	
Responsibility:	OWG (André Rossouw).
Timeline:	As soon as the information referred to above has been collated.
Resources needed:	Funding.
Collaborators:	Consultants, trained facilitators, community development officers and municipalities.
Measurable outcomes:	Recorded buy-in from the claimants / land redistribution benefactors.
Obstacles:	Dependant on previous actions re: staff availability and capacity.

PROBLEM STATEMENT 4
THERE IS A LACK OF INCENTIVES FOR LANDOWNERS TO CONSERVE THE ORIBI AND ITS HABITAT.

Solutions 1
To ensure that the Oribi Conservation Plan has a high status in national stewardship programmes.

Action Step 1: Distribution of the Oribi Conservation Plan and Oribi PHVA to agents of the various stewardship programmes. i. Ensure that the extension services network is made aware of the contents of the Oribi Conservation Plan / Oribi PHVA and communicates this to stakeholders.	
Responsibility:	OWG Chairman / Manager.
Timeline:	January 2007.
Resources needed:	Personnel time and administration costs.
Collaborators:	Conservancies associations, extension staff of provincial nature conservation departments and NGOs.
Measurable outcomes:	Recognition of Oribi conservation in stewardship programmes.
Obstacles:	Delay in the implementation of the stewardship programme throughout the Oribi range.

Solutions 2
Promote and expand the OWGs Custodian Programme throughout the Oribi range.

Action Step 1: Identify suitable and willing Oribi custodians throughout the Oribi range and explain their value in the Oribi conservation effort.	
Responsibility:	OWG extension officers.
Timeline:	Immediately and ongoing.
Resources needed:	Custodian boards, certificate and corporate funding.
Collaborators:	Nature conservation extension officers in provincial nature conservation departments.
Measurable outcomes:	Number of boards distributed.
Obstacles:	Change of landownership.

Solutions 3
Make Oribi landowners aware of the economic value of the sustainable utilisation of Oribi (trophy hunting, eco tourism, live capture and sale).

Action Step 1: Link the economic value of Oribi to the custodian programme described above.	
Responsibility:	OWG.
Timeline:	Immediately and ongoing.
Resources needed:	Auction brochures.
Collaborators:	Private capture operators and Professional Hunters Association of South Africa (PHASA).
Measurable outcomes:	Increased number of Oribi wisely utilised.
Obstacles:	Limited availability of Oribi for utilisation.

Action Step 2: Ensure the participation of the OWG in the Ezemvelo KZN Wildlife annual Animal Population Control Committee meeting to facilitate the wise distribution of Oribi to private landowners from Ezemvelo KZN Wildlife protected areas containing large populations (viz. Chelmsford).	
Responsibility:	OWG.
Timeline:	Next Animal Population Control Committee meeting (January 2007).
Resources needed:	Access to available Oribi in protected areas (census numbers etc.) and harvesting plan.
Collaborators:	Protected area managers and scientific personnel.
Measurable outcomes:	Establishment of viable populations on suitable land where no Oribi occurred previously.
Obstacles:	None envisaged.

PROBLEM STATEMENT 5
LACK OF COMMUNICATION BETWEEN DIFFERENT PROVINCES REGARDING ORIBI CONSERVATION

Solutions 1
Ensure timeous distribution of information from the OWG national structure to all Oribi conservation stakeholders nationally.

Action Step 1: Refer to Problem Statement 4, Solution 1, Action Step 1; Problem Statement 4, Solution 2, Action Step 1; Problem Statement 4, Solution 3, Action Step 1 and Problem

Statement 1, Solution 4, Action Step 3.

Solutions 2
Keep national conservation bodies, bioregional programmes and institutions informed (Game Rangers Association of Africa (GRAA), SANBI, WESSA, Grassland Society of South Africa, SANParks, Ekangala Grassland Trust, National Conservancies Association and universities).

Action Step 1: Refer to Problem Statement 5, Solution 1.

Solutions 3
Broaden the representation of the OWG in provinces where this is lacking.

Action Step 1: Canvas suitable candidates in provinces that are lacking representation.	
Responsibility:	OWG.
Timeline:	June 2007.
Resources needed:	Personnel time.
Collaborators:	Provincial extension officers, NGOs and other interest groups.
Measurable outcomes:	Broader representation in the provinces.
Obstacles:	Logistics.

Action Step 2: Equip identified candidates with toolkit to effect Oribi conservation.	
Responsibility:	OWG.
Timeline:	June 2007.
Resources needed:	Personnel time.
Collaborators:	Provincial extension officers, NGOs and other interest groups.
Measurable outcomes:	Broader representation in the provinces.
Obstacles:	Logistics.

PROBLEM STATEMENT 6
A LACK OF CAPACITY AMONG THE MAJORITY OF NATURE CONSERVATION FIELD PERSONNEL AND THE JUDICIARY CONCERNING MATTERS RELATING TO ORIBI CONSERVATION.

Solutions 1
Refer to Problem Statement 2, Solution 2.

Solutions 2
Workshop the toolkit content with members of the judiciary (SAPS, prosecutors / magistrates).

Refer to the Law Enforcement Working Group for more detail.

Solutions 3
Improve the interpersonal skills of extension officers.

Action Step 1: Arrange for an in service training courses where applicable.	
Responsibility:	OWG.
Timeline:	December 2006 – ongoing.

Resources needed:	Personnel time, training resources, facilitators and funding.
Collaborators:	Provincial conservation departments, NGOs and corporate funders.
Measurable outcomes:	Improvement in the inter-personal skills of extension officers.
Obstacles:	▪ Funding. ▪ Course material. ▪ Logistics.

PROBLEM STATEMENT 7
THERE IS A GENERAL LACK OF CONCERN WITH REGARDS TO THE PLIGHT OF ORIBI CONSERVATION (LANDOWNER APATHY).

Solutions 1
Highlight successes in Oribi conservation like convictions, or the acquisition of additional land for Oribi conservation etc.

Refer to Problem Statement 1, Solution 1 and Action Step 1 and 2.

Solutions 2

Refer Problem Statement 4, Solution 3.

Solutions 3
Impart knowledge of the long-term value of ecosystem services.

Action Step 1: Actively targeting municipalities re: the benefits of ecosystem services highlighting grassland management.	
Responsibility:	Ezemvelo KZN Wildlife extension officers with leadership from Des Archer and Bill Howells and relevant extension managers in other provinces.
Timeline:	Immediately and ongoing.
Resources needed:	Personnel time, funding and task lists.
Collaborators:	SANBI (mainstream biodiversity into land-use management forum), NGOs and corporate funders.
Measurable outcomes:	Inclusion of grassland conservation into all municipal Integrated Development Plans (IDPs) throughout the Oribi range.
Obstacles:	Limited capacity within municipalities.

Action Step 2: Refer to Problem Statement 1, Solution 2, Action Step 1 and 2.

Solutions 4
Gain an understanding of landowner problems like fear of reprisal.

Action Step 1: Sensitise landowners to the benefits of sharing management responsibility amongst various landowners in programmes like the Conservancy Movement.	
Responsibility:	Ezemvelo KZN Wildlife extension officers with leadership from Des Archer and Bill Howells and relevant extension managers in other provinces.
Timeline:	Immediately and ongoing.

Resources needed:	Personnel time, funding and task lists.
Collaborators:	NGOs and National Conservancies Association.
Measurable outcomes:	Reduced incidences of reprisal, more efficient conservancy functioning, reduced fear in farmers for taking responsibility for their Oribi populations.
Obstacles:	Lack of trust in the legal system.

Media matrix

	Farm workers	Land owners	Teachers & Learners	Estate agencies	Consultants & Developers	Seasonal Workers	Municipalities	Provincial Dept.	NGOs/ conservancies	Police services and Courts
Newspapers		✓		✓	✓		✓	✓	✓	
Magazines		✓		✓	✓				✓	✓
Television	✓	✓	✓	✓	✓	✓			✓	
Radio	✓	✓	✓	✓	✓	✓				✓
Extension / presentations	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Posters & pamphlets	✓	✓	✓			✓	✓	✓		✓
Field days	✓	✓				✓	✓	✓	✓	✓
Workshops		✓		✓	✓		✓	✓	✓	✓
8	**5**	**8**	**4**	**6**	**6**	**5**	**5**	**5**	**6**	**6**

Law Enforcement Working Group

WORKING GROUP PARTICIPANTS:

1. Rod Potter Ezemvelo KZN Wildlife
2. Bill Howells Ezemvelo KZN Wildlife
3. Pat Lowry Ezemvelo KZN Wildlife
4. Richard Schütte Ezemvelo KZN Wildlife

Introduction / Situation overview

Categories defined at the workshop:

Governance: Institutional capacity, government priorities, inconsistent management between provinces, lack of prioritisation, poor governance, tragedy of commons, lack of knowledge by SAPS / public participation / nature conservation officials of Oribi issues, increased social contempt for criminal justice system.

Unsustainable utilisation: Hunting with dogs (uncontrolled dogs), uncontrolled and / or illegal hunting, illegal game capture operations (pollution of Oribi genetic heterozygosity) and misinformed game capture translocation.

Awareness: Public ignorance of the law, public appreciation of the need for law enforcement, user group awareness and institutional awareness.

Practical law enforcement application: Lack of capable law enforcement officials for nature conservation issues.

PROBLEM STATEMENTS

PROBLEM STATEMENT 1
ILLEGAL CAPTURE, TRANSLOCATION AND HUNTING OF ORIBI IMPACT NEGATIVELY ON POPULATION NUMBERS AND THE GENE POOL.

Solution 1
Embark on an awareness campaign addressing unlawful capture, introduction, import, export and hunting of Oribi.

Action Step 1: Produce a "Z" fold brochure addressing the legal requirements of these activities (once the National Environmental Management: Biodiversity Act (2004) regulations are published) and provide contact numbers.	
Responsibility:	OWG.
Timeline:	End 2007.
Resources needed:	▪ Ezemvelo KZN Wildlife manuals / guides. ▪ WESSA and OWG material. ▪ Law books.
Collaborators:	Provincial nature conservation investigators; the Wildlife Translocation Association and SA Veterinary Council.
Measurable outcomes:	A law related brochure for distribution.
Obstacles:	▪ Individual workloads. ▪ Delays in new legislation.

	▪ Budget.

Action Step 2: Distribute the "Z" fold brochure with all related permit applications via all relevant permit offices.	
Responsibility:	OWG members and their institutions.
Timeline:	As soon as the brochure is produced.
Resources needed:	Relevant nature conservation officials and NGOs.
Collaborators:	Provincial nature conservation authorities and NGOs.
Measurable outcomes:	Distribute brochures to all interested and affected parties.
Obstacles:	None.

Solution 2
Increase the number of patrols in identified problem areas, to address illegal hunting with dogs throughout the Oribi range.

Action Step 1: Supervisors to reprioritise staff activities in order to increase the number of patrols.	
Responsibility:	Nature conservation agencies regional supervisors**.**
Timeline:	Winter 2006.
Resources needed:	Existing law enforcement resources.
Collaborators:	District Conservation Officers and other law enforcement officials.
Measurable outcomes:	Patrol statistics.
Obstacles:	Lack of staff and resources.

Action Step 2: Coordinate within and between provinces, reaching agreement among supervisors pertaining to a law enforcement focus on Oribi and illegal hunting with dogs.	
Responsibility:	Provincial nature conservation investigators.
Timeline:	June 2007.
Resources needed:	Effective communication channels between provinces.
Collaborators:	Nature conservation field managers.
Measurable outcomes:	Patrol statistics.
Obstacles:	▪ Lack of staff in the field. ▪ Different provincial approaches to law enforcement.

PROBLEM STATEMENT 2
THE POTENTIAL FOR IRREVERSIBLE GENETIC CONTAMINATION TO OCCUR THROUGH ILLEGAL OR MISINFORMED TRANSLOCATION IS SIGNIFICANT.

Solution 1
Improve knowledge regarding capture and introduction policies (Oribi PHVA).

Action Step 1: Train "authorising and permit issuing officers" about the relevant sections of the Oribi PHVA. The relevant sections are those that deal with the legal requirements for capture, introduction, export and import.	
Responsibility:	Provincial representatives on OWG Committee.
Timeline:	Mid 2007.
Resources needed:	Oribi PHVA final report and legal requirements of each province.
Collaborators:	OWG members.
Measurable outcomes:	All appropriate staff trained.
Obstacles:	Individual workloads.

PROBLEM STATEMENT 3
THE ILLEGAL OR OVER UTILISATION OF ORIBI LEADING TO REDUCED POPULATION SIZES, IS NOT ALWAYS A PRIORITY TO PRESENT USER GROUPS.

Solution 1
Educate user groups regarding over-utilisation leading to the extinction of the species and the impacts on every person's constitutional right.

Action Step 1: Refer to Problem Statement 1, Solution 1 and Action Step 1.

Action Step 2: Present talks to the user groups.	
Responsibility:	Extension staff and NGOs.
Timeline:	End 2007.
Resources needed:	Talk packs.
Collaborators:	Extension staff and NGOs.
Measurable outcomes:	All user groups addressed annually.
Obstacles:	Individual workloads.

Action Step 3: Support the accreditation process of members of user groups by OWG Committee representatives talking to users groups.	
Responsibility:	OWG Committee.
Timeline:	2007.
Resources needed:	Oribi PHVA.
Collaborators:	OWG Committee.
Measurable outcomes:	Accreditation process established within each user group.
Obstacles:	Individual workloads.

PROBLEM STATEMENT 4
A LACK OF NATURE CONSERVATION AWARENESS EXISTS AT ALL LEVELS OF SOCIETY, (INCLUDING THE PUBLIC, NATURE CONSERVATION OFFICIALS, SAPS, JUDICIARY). THIS MEANS THAT THE INSTITUTIONS AND THE PUBLIC CANNOT MAKE CALCULATED DECISIONS (BOTH IN AND OUT OF COURT) WHICH SUPPORT NATURE CONSERVATION.

Solution 1
Arrange and participate in targeted awareness raising programmes at all levels of society on threats facing the Oribi. Targeted programmes can include talks, "Z" fold brochures, open days, popular papers and the media.

Action Step 1: Develop a presentation pack for talks.	
Responsibility:	OWG.
Timeline:	End 2007.
Resources needed:	▪ Ezemvelo KZN Wildlife manuals / guides. ▪ WESSA and OWG material. ▪ Law books.
Collaborators:	Provincial nature conservation investigators; the Wildlife Translocation Association and SA Veterinary Council.
Measurable outcomes:	Talk pack produced.
Obstacles:	▪ Individual workloads. ▪ Delays in new legislation. ▪ Budget.

PROBLEM STATEMENT 5
VOLUNTARY COMPLIANCE IS HAMSTRUNG BY A LACK OF KNOWLEDGE (BY THE PUBLIC) ABOUT THE LAW. THIS LACK OF KNOWLEDGE RESULTS IN REDUCED SUPPORT BY THE PUBLIC AND POLITICIANS RE: CONSERVATION DECISIONS.

Solution 1
To use a "Z" fold brochure, posters, etc. to educate the public about the law relating to Oribi.

Action Step 1: Refer to Problem Statement 1, Solution 1 and Action Step 1.

Action Step 2: Develop a poster on "Oribi and the Law".	
Responsibility:	OWG.
Timeline:	End 2007.
Resources needed:	▪ Ezemvelo KZN Wildlife Publications Department. ▪ WESSA and OWG material. ▪ Law books.
Collaborators:	Provincial nature conservation investigators; the Wildlife Translocation Association and SA Veterinary Council.
Measurable outcomes:	Poster produced.
Obstacles:	▪ Individual workloads. ▪ Delays in new legislation. ▪ Budget.

PROBLEM STATEMENT 6
EFFECTIVE LAW ENFORCEMENT PROCESSES ARE BEING HAMPERED BY THE INADEQUATE SKILL LEVEL OF OFFICIALS. OFFICIALS INCLUDE NATURE CONSERVATION OFFICERS, SAPS, JUDICIARY AND ENVIRONMENTAL MANAGEMENT INSPECTORS.

Solution 1
Improve the Nature Conservation Officials law enforcement procedures skills.

Action Step 1: Provide a "basic law enforcement course" to nature conservation officials.	
Responsibility:	Conservation agency training centres.
Timeline:	Mid 2007.
Resources needed:	Training course.
Collaborators:	Theta.
Measurable outcomes:	Training course in place.
Obstacles:	Individual workloads.

Solution 2
Improve the knowledge of other officials about Oribi.

Action Step 1: Use the Oribi information pack to inform other officials.	
Responsibility:	Extension officers of nature conservation agencies.
Timeline:	Immediately after completion of the talk pack.
Resources needed:	Talk pack.
Collaborators:	Provincial nature conservation agencies.
Measurable outcomes:	Number of talks presented.
Obstacles:	Number of people to be addressed.

PROBLEM STATEMENT 7
THE RATIO OF CAPABLE PROFESSIONALS TO ILLEGAL INCIDENTS IS GREATER THAN EXISTING COMPETENT OFFICIALS ARE ABLE TO EFFECTIVELY DEAL WITH.

Solution 1
Increase the number of competent officials through training.

Action Step 1: Provide an advanced law enforcement course.	
Responsibility:	Conservation agency training centres.
Timeline:	Mid 2007.
Resources needed:	Training course.
Collaborators:	Theta.
Measurable outcomes:	Training course in place.
Obstacles:	Individual workloads.

Solution 2
Establish new law enforcement posts.

Action Step 1: Emphasise the relevant problems and suggested solutions discussed at the Oribi PHVA to senior management in order to request additional posts.	
Responsibility:	OWG Chairman.
Timeline:	June 2007.
Resources needed:	Oribi PHVA Report.
Collaborators:	Provincial nature conservation authorities.
Measurable outcomes:	Addressed the Executive Committees.
Obstacles:	Gain access to executive level meetings of nature conservation institutions.

PROBLEM STATEMENT 8
CERTAIN LAW ENFORCEMENT EFFORTS ARE DILUTED BY OFFICERS HAVING TO PERFORM NON LAW ENFORCEMENT DUTIES.

Solution 1
Establish new law enforcement posts.

Action Step 1: Refer to Problem Statement 7, Solution 2 and Action Step 1.

PROBLEM STATEMENT 9
WILDLIFE CRIMES ARE NOT CONSIDERED PRIORITY CRIMES BECAUSE OF THE PEOPLE-CENTRIC ORIENTATION OF THE GOVERNMENT.

Solution 1
Arrange and participate in targeted awareness raising programmes for the SAPS on the threats affecting Oribi.

Action Step 1: Use the Oribi information pack to inform the SAPS about Oribi related matters.	
Responsibility:	Extension staff.
Timeline:	Start when talk packs are complete.
Resources needed:	Talk packs.
Collaborators:	SAPS Provincial Offices.

Measurable outcomes:	Number of people addressed.
Obstacles:	The number of people to be addressed.

PROBLEM STATEMENT 10
THERE IS INCREASING CONTEMPT BY THE PUBLIC TOWARDS THE CRIMINAL JUSTICE SYSTEM AND TRADITIONAL AUTHORITY.

Solution 1
Increase public awareness of successful law enforcement actions through the media.

Action Step 1: The OWG to approach the appropriate institutions to request that the relevant decision maker instruct the various media liaison officers to publish information on successful Oribi-related law enforcement actions.	
Responsibility:	Representatives on the OWG Committee from relevant provincial nature conservation institution.
Timeline:	June 2007.
Resources needed:	Time.
Collaborators:	All media organisations.
Measurable outcomes:	All relevant decision makers (CEOs).
Obstacles:	Willingness of media organisations to publish the information.

Action Step 2: The OWG to approach the appropriate institutions to request that the relevant decision makers instruct the managers to instruct their staff to submit information to the media liaison officers on successful Oribi-related law enforcement actions.	
Responsibility:	Representatives on the OWG Committee from relevant provincial nature conservation institution.
Timeline:	June 2007.
Measurable outcomes:	All managers and field staff are informed.

PROBLEM STATEMENT 11
THE KNOWLEDGE BASE ON CRITICAL WILDLIFE ISSUES AT INSTITUTIONAL LEVEL HAS BEEN ERODED TO SUCH AN EXTENT THAT SOME DECISIONS ARE TAKEN WITHOUT FULL INSIGHT INTO THE PROBLEM AND THE ENVIRONMENTAL CONSEQUENCES OF POOR DECISION MAKING ARE NOT APPRECIATED BY THE PERSON MAKING THE DECISION.

Solution 1
The skills of existing competent officials are not being retained.

Action Step 1: Motivate for improved career prospects and competitive remuneration packages for existing officials.	
Responsibility:	OWG Chairman.
Timeline:	June 2007.
Resources needed:	Oribi PHVA.
Collaborators:	Provincial nature conservation authorities.
Measurable outcomes:	All CEOs / Provincial Ministers contacted.
Obstacles:	Ability of provincial organisations to increase remuneration packages and create posts.

Solution 2
Inform officials within each relevant institution about Oribi related matters.

Action Step 1: Use the Oribi information pack to inform officials in each institution.	
Responsibility:	Extension staff.
Timeline:	Start when the talk pack is completed.
Resources needed:	Talk packs.
Collaborators:	▪ SAPS. ▪ National Prosecuting Authority. ▪ DEAT and provincial departments. ▪ Department of Agriculture.
Measurable outcomes:	Number of people addressed.
Obstacles:	The number of people to be addressed.

Solution 3
Raise awareness amongst officials about the serious environmental consequences resulting from poor decisions.

Action Step 1: Use the Oribi talk pack to educate all officials.	
Responsibility:	Extension staff.
Timeline:	Start when the talk pack is completed.
Resources needed:	Talk packs.
Collaborators:	▪ SAPS. ▪ National prosecuting authority. ▪ DEAT and provincial departments. ▪ Department of Agriculture. ▪ Provincial nature conservation agencies.
Measurable outcomes:	Number of people addressed.
Obstacles:	The number of people to be addressed.

PROBLEM STATEMENT 12
POOR SERVICE DELIVERY BY INSTITUTIONS, E.G. LACK OF FOLLOW-UP ON REPORTED CRIMES, FRUSTRATES THE PUBLIC, ENCOURAGES CIRCUMVENTION OF THE ADMINISTRATIVE PROCEDURES AND FUELS CORRUPTION.

Solution 1
Officials should be held accountable through consistent application of the code of conduct.

Action Step 1: Request members of the OWG to report poor service delivery by officials to the relevant institution and request that action is taken.	
Responsibility:	OWG Chairman.
Timeline:	June 2007.
Collaborators:	All members of the OWG.
Measurable outcomes:	Request made by the Chairman.

Action Step 2: Request members to report poor service deliveries by institutions to the relevant decision-maker or Minster of Executive Council (MEC).	
Responsibility:	OWG Chairman.
Timeline:	June 2007.
Resources needed:	None.
Collaborators:	All members of the OWG.
Measurable outcomes:	Requests made by the Chairman.

Solution 2
Efficient administrative systems and procedures must be implemented by each institution.

Action Step 1: Problem Statement 12, Solution 1 and Action Step 2.

Solution 3
Formulate working groups between official bodies e.g. Ezemvelo KZN Wildlife Crime Working Group.

Action Step 1: Encourage and facilitate where possible the formation of Wildlife Crime Working Groups.	
Responsibility:	OWG Committee.
Timeline:	Mid 2007.
Collaborators:	Ezemvelo KZN Wildlife Crime Working Group.
Measurable outcomes:	Established Wildlife Crime Working Groups.
Obstacles:	Disinterested agencies.

PROBLEM STATEMENT 13
LAWS AND POLICY (WILDLIFE AND OTHER) ARE NOT FULLY ALIGNED AND SOMETIMES CONTRADICT OR UNDERMINE THE DESIRED END RESULT.

Solution 1
Encourage interested and effected parties to study new laws and contribute to public comment sessions in the drafting thereof.

Action Step 1: Make the draft laws available and inform interested and effected parties of public comment procedures.	
Responsibility:	Wildlife investigation staff.
Resources needed:	Drafts copies.
Measurable outcomes:	Drafts circulated.
Obstacles:	If time and budgets allow.

Solution 2
Encourage liaison forums between official bodies.

Action Step 1: Encourage and facilitate where possible the formation of Wildlife Crime Working Groups.	
Responsibility:	OWG Committee.
Timeline:	Mid 2007.
Resources needed:	None.
Collaborators:	Ezemvelo KZN Wildlife Crime Working Group.
Measurable outcomes:	Established Wildlife Crime Working Groups.
Obstacles:	Disinterested agencies.

PROBLEM STATEMENT 14
TOO MANY OFFICIAL BODIES DEAL WITH ENVIRONMENTAL ISSUES.

Solution 1
Increase the number of Environmental Management Inspectors employed by the various official bodies by uniformly enforcing National Environmental Management: Biodiversity Act (2004) and Specific Environmental Management Acts.

Action Step 1: Members to support the environmental management inspection process within their respective institutions.	
Responsibility:	OWG Chairman.
Timeline:	June 2007.
Collaborators:	All members of the working group representing their institutions.
Measurable outcomes:	All institutions contacted.

Research and Monitoring Working Group

WORKING GROUP PARTICIPANTS:

1. Rebecca Ross — Ross Game Capture / University of KwaZulu-Natal
2. Johan Eksteen — Mpumalanga Tourism and Parks Agency
3. Douglas van Zyl — Ezemvelo KZN Wildlife
4. Ruth Hannon — Wildlife and Environment Society of South Africa
5. Grant Burden — Ezemvelo KZN Wildlife
6. Sonja Krüger — Ezemvelo KZN Wildlife

PROBLEM STATEMENTS

PROBLEM STATEMENT 1
THERE IS INSUFFICIENT INFORMATION ON ORIBI DEMOGRAPHICS IN BOTH PROTECTED AREAS (INCLUDING CONSERVANICIES) AND OUTSIDE PROTECTED AREAS (PRIVATE AND COMMUNAL LAND) IN SOUTH AFRICA.

Solution 1
Undertake a nationwide baseline census both within and outside protected areas. The census should include population numbers, population age and sex structure and any historical mortality information.

Action Step 1: Develop a questionnaire* to be implemented through interviews with land managers and distributed widely using media (e.g. newspapers, radios, extension officers and other media).	
Responsibility:	OWG Chairman.
Timeline:	To be distributed by April 2007, counts to be done in June – September 2007, returned by 30 September 2007 or earlier (return within 2 weeks of counting).
Resources needed:	Individuals to undertake interviews, salary or research grant, vehicle, telephone, pamphlets. Individuals could be an honours student with several research assistants.
Collaborators:	Extension officers, OWG, University / Technikon, Farmers Associations, Conservancy Committees, Timber companies.
Measurable outcomes:	▪ A spatial indication of the target sample area. ▪ Questionnaires received that are representative of the sample area. ▪ An indication of the number of individuals and their spatial location, number of groups, age and sex structure and indication of mortality.
Obstacles:	▪ Land manager apathy. ▪ Student availability. ▪ Land managers unwilling to impart information.

*The questionnaire will consist of a two page document and include information on:

- census techniques;
- information on the genetics project; and
- sampling on the front page and the actual census questions on the reverse.

The questionnaire will be accompanied by the updated (for national relevance and use) Oribi brochure / pamphlet (reproduced in the cheapest way for mass mailing). Questionnaire and pamphlet will be made available electronically.

Action Step 2: Source (employ) designated census coordinator (student).	
Responsibility:	OWG (André Rossouw).
Timeline:	June 2007.
Resources needed:	Access to University / Technikon students.
Collaborators:	Universities and Technikons.
Measurable outcomes:	Coordinator in place (employed).
Obstacles:	▪ Lack of University / Technikon support. ▪ Lack of OWG funds to fund salary.

Action Step 3: Finalise the best counting method for mountainous areas.	
Responsibility:	Athol Marchant.
Timeline:	June 2007.
Resources needed:	Officer in Charge, field rangers and regional ecologists.
Collaborators:	Ezemvelo KZN Wildlife staff.
Measurable outcomes:	Method tested and implemented and included in the Oribi Conservation Plan.
Obstacles:	Staff availability.

PROBLEM STATEMENT 2
THERE IS INSUFFICIENT MONITORING OF ALL ORIBI POPULATIONS INCLUDING ANY CHANGES IN CURRENT POPULATIONS. REGULAR LONG-TERM MONITORING IS OFTEN ABSENT.

Solution 1
The national Oribi population must be monitored on an ongoing basis to obtain better information on trends and "known groups".

Action Step 1: Monitor a subset of the Oribi populations annually (e.g. 100 farms in KwaZulu-Natal as from 2007). The subset will include all protected areas, conservancies and translocated populations. Where possible the populations will be representative of the genetic areas throughout the country.	
Responsibility:	OWG Chairman.
Timeline:	After 2007 census (30 December 2007) for the 2008 monitoring season.
Resources needed:	Census data (captured spatially).
Collaborators:	▪ Land manager of translocated populations. ▪ Database administrator.
Measurable outcomes:	A subset of farms identified across the provinces, better information on population trend and known groups.
Obstacles:	▪ Poor or incomplete census returns. ▪ Data capture and processing problems.

Action Step 2: Implement regular nation wide census (biannually).	
Responsibility:	OWG Chairman.
Timeline:	Next one in 2009 and biannually thereafter.
Resources needed:	Individual to coordinate posting /emailing questionnaires and data capturer.

Collaborators:	Extension officers, OWG, farmers associations, conservancy committees and timber companies.
Measurable outcomes:	Census report.
Obstacles:	Lack of resources (the availability of a dedicated coordinator and time).

Solution 2
Intensively monitor specific translocated populations (i.e. large or doomed) over the short-term (<1 year).

Action Step 1: Track all translocated individuals using radio telemetry or GPS collars and tag all released Oribi.	
Responsibility:	OWG Chairman (Athol Marchant) to get a student / s.
Timeline:	Ongoing - as and when translocations take place.
Resources needed:	Telemetry equipment (with mortality sensor), tagging equipment, student and interested landowner.
Collaborators:	▪ Universities / Technikons. ▪ EWT Fieldworkers.
Measurable outcomes:	Documented success of translocated populations.
Obstacles:	▪ Funding for telemetry equipment. ▪ No suitable student found.

PROBLEM STATEMENT 3
THERE IS INSUFFICIENT INFORMATION ON THE GENETICS OF THE POPULATION AND INCIDENCE OF INBREEDING.

Solution 1
Collect and analyse as many genetic samples as possible nationwide on an ongoing basis.

Action Step 1: Analyse all remaining samples (approximately 60) stored at Stellenbosch so as to determine relatedness and coefficient of inbreeding depression.	
Responsibility:	Ian Rushworth.
Timeline:	30 December 2007 (if funding is available).
Resources needed:	Funding to speed up the action.
Collaborators:	University of Stellenbosch (Bettine van Vuuren).
Measurable outcomes:	Indication of the genetic viability of the population and relatedness.
Obstacles:	Lack of funding and collaborators time.

Action Step 2: Sample all captured individuals those in captivity and any individuals found dead.	
Responsibility:	Ian Rushworth.
Timeline:	Ongoing.
Resources needed:	Collection protocol.
Collaborators:	Game capture operators, zoos, land managers, professional hunters.
Measurable outcomes:	As above (Solution 1, Action Step 1).
Obstacles:	Lack of collaboration.

Action Step 3: Package and disseminate sample collection protocol to all game capture operators, zoos, land managers and professional hunters.	
Responsibility:	OWG Chairman.
Timeline:	Immediate (definitely by June 2007).
Resources needed:	▪ Database manager to email the sampling protocol to game capture operators, zoos, professional hunters and OWG stakeholders. ▪ Access to various forms of media.
Collaborators:	Extension officers, EWT field workers, farmers associations, timber companies, conservancy committees and media personnel from the various environmental organisations.
Measurable outcomes:	Sampling protocol is available and in Oribi Conservation Plan.
Obstacles:	None.

PROBLEM STATEMENT 4
THE AMOUNT OF POTENTIAL SUITABLE AND AVAILABLE ORIBI HABITAT IS NOT KNOWN.

Solution 1
Model potential available habitat nationwide and prioritise areas for ground-truthing.

Action Step 1: Model potential available Oribi habitat on a national scale.	
Responsibility:	OWG in a coordinating role (has been done for KwaZulu-Natal and Mpumalanga but not collated).
Timeline:	June 2007.
Resources needed:	Various provincial data layers (vegetation, Digital Terrain Model, land cover).
Collaborators:	Conservation planners within provinces.
Measurable outcomes:	National Oribi suitability map.
Obstacles:	▪ Data availability. ▪ Lack of capacity and coordination.

Action Step 2: Desktop-truthing of model by comparing census data to modelled distribution.	
Responsibility:	OWG.
Timeline:	30 June 2008.
Resources needed:	▪ Model outputs and census data. ▪ Skilled capacity (GIS skills).
Collaborators:	Conservation planners within provinces and census coordinator.
Measurable outcomes:	Prioritised list of areas for ground-truthing (next action step).
Obstacles:	Capacity and coordination.

Action Step 3: Ground-truthing of model outputs.	
Responsibility:	OWG.
Timeline:	30 December 2008.
Resources needed:	Desktop-truthing data and capacity.
Collaborators:	Extension officers, EWT field workers and conservancies.
Measurable outcomes:	Accurate suitability map and expanded database on Oribi distribution and numbers.
Obstacles:	▪ Capacity and coordination.

	▪ Time and mileage available for extension staff.

PROBLEM STATEMENT 5
THE MINIMUM SIZE OF ORIBI HABITAT IS NOT KNOWN.

Solution 1
Determine the minimum size area required for Oribi to survive.

Action Step 1: Undertake a research project using tracking to examine movement of animals within territories.	
Responsibility:	OWG to approach Universities / Technikons.
Timeline:	Project proposal by June 2007.
Resources needed:	Funds for project and equipment.
Collaborators:	Universities and Technikons.
Measurable outcomes:	Thesis / report.
Obstacles:	Lack of interest from tertiary institutions.

PROBLEM STATEMENT 6
THE CHARACTERISTICS OF AN EFFECTIVE CORRIDOR ARE NOT YET PROPERLY UNDERSTOOD.

Solution 1
Undertake a research project to determine the parameters of an ideal corridor. The outcomes would indicate whether transformed lands (e.g. sugar cane) are suitable corridors.

Action Step 1: Undertake a research project using tracking to examine movement of animals through various habitats such as plantations in selected scenarios.	
Responsibility:	OWG Manager to approach Universities / Technikons.
Timeline:	Project proposal by June 2007.
Resources needed:	Funds for project and equipment.
Collaborators:	Universities and Technikons.
Measurable outcomes:	Thesis / report.
Obstacles:	Lack of interest from tertiary institutions.

PROBLEM STATEMENT 7
PREDATION

Predation
- Planned changes in wildlife management could have major impacts on existing or introduced populations e.g. St. Lucia – Wild Dog introductions.
- What influence do predators have on mortality rates (primarily caracal and jackal)?

Solution 1
Research the impacts of predators (natural, domestic and human) on Oribi mortality. Undertake a research project to determine the levels of Oribi mortality in selected areas and the proportions taken by these three predator categories (snapshot – scat surveys).

Action Step 1: Undertake a research project in selected areas to determine mortality.	
Responsibility:	OWG to approach Universities / Technikons.
Timeline:	Project proposal by June 2007.
Resources needed:	Funds for project and equipment.
Collaborators:	Universities and Technikons.

Measurable outcomes:	Thesis / report.
Obstacles:	▪ Lack of interest from tertiary institutions. ▪ Sample size.

PROBLEM STATEMENT 8
INTER-SPECIFIC AND INTRA-SPECIFIC COMPETITION

- Little is known about how other species affect Oribi behaviour, breeding success, etc.
- Necessary territory size, basic habitat and social carrying capacity (young male mortality), requirements are unknown to allow for the safe dispersal of young.
- Competition with domestic stock.

Solution 1
Use tracking technology in conjunction with observations to answer:
- The impacts of other species on Oribi.
- Territory size, dispersal, home range size and young male interactions.
- Removal of bulk grazers such as cattle when areas are converted to game farms and their consequent impact on existing Oribi populations.

Action Step 1: Undertake a research project using tracking to look at territory size, dispersal, young male interactions and impacts of other species (cross-reference to demographics monitoring - Problem Statement 2, Solution 1, Action Step 1).	
Responsibility:	OWG to approach Universities / Technikons.
Timeline:	Project proposal by June 2007.
Resources needed:	Funds for project and equipment.
Collaborators:	Universities and Technikons.
Measurable outcomes:	Thesis / report.
Obstacles:	Lack of interest from tertiary institutions.

Solution 2
Look at impact of other species on Oribi (inter-specific competition).

Action Step 1: Undertake a desktop study using information from census where Oribi co-exist with other species.	
Responsibility:	OWG census coordinator.
Timeline:	30 December 2007.
Resources needed:	Census data.
Collaborators:	OWG.
Measurable outcomes:	Report on impact of inter-specific competition.
Obstacles:	Incomplete questionnaires / lack of information could prevent analysis.

PROBLEM STATEMENT 9
CAPTIVE BREEDING

Notes:
- There are no husbandry and reintroduction protocols.
- Captive breeding as currently carried out, is not a viable technique for reintroducing Oribi into the wild.

Solution 1
Develop husbandry and reintroduction protocols.

Action Step 1: Ongoing literature review of captive breeding and reintroduction.	
Responsibility:	Rebecca Ross.
Timeline:	June 2006 – indefinitely.
Resources needed:	Access to publications.
Collaborators:	Rebecca Ross and Pretoria Zoo.
Measurable outcomes:	Increase the knowledge base on captive breeding and reintroduction for Oribi by looking at examples and lessons from other species, especially similar antelope. Information to be collated into a summary document to be incorporated into five year review of Oribi Management Plan.
Obstacles:	None.

Solution 2
Allow National (Pretoria) Zoo captive breeding project to go ahead.

Action Step 1: Assist Pretoria Zoo with developing a project plan and access to Oribi.	
Responsibility:	Rebecca Ross.
Timeline:	June 2006 – 2009.
Resources needed:	Individual animals.
Collaborators:	Rebecca Ross and Pretoria Zoo.
Measurable outcomes:	▪ An assessment of the potential of captive breeding and reintroduction as a viable tool for Oribi conservation. ▪ A professional and scientific process through the National (Pretoria) Zoo. ▪ From the three year "test" period, gauge the efficacy of the tool under the most ideal circumstances and make decisions on any future captive breeding. ▪ A complete document on husbandry / reintroduction (if this process works and if not then the reasons why will also be documented).
Obstacles:	None.

PROBLEM STATEMENT 10
INFORMATION MANAGEMENT: THERE IS NO MANAGEMENT OF ORIBI DATA ON A NATIONAL SCALE AND NO NATIONAL COORDINATION OF ORIBI DATA.

Solution 1
Implement a standardised data form and national Oribi database.

Action Step 1: Develop and disseminate a standardised data form.	
Responsibility:	Census coordinator.
Timeline:	February 2007.
Resources needed:	None.
Collaborators:	OWG.
Measurable outcomes:	Standardised data form used by all provinces and available digitally on a website.
Obstacles:	No collaboration by provinces.

Action Step 2: Develop a national Oribi database.

Responsibility:	Employ a consultant to expand the database and employ a data capturer.
Timeline:	June 2007.
Resources needed:	Funds to employ a consultant and data capturer.
Collaborators:	OWG Manager.
Measurable outcomes:	An expanded national database, current and accessible information to all interested and affected parties.
Obstacles:	▪ Lack of funds and capacity. ▪ Lack of collaboration with provinces.

Action Step 3: House database at relevant institution i.e. SANBI.	
Responsibility:	OWG Manager.
Timeline:	June 2007.
Resources needed:	None.
Collaborators:	OWG and SANBI.
Measurable outcomes:	National Oribi database housed at SANBI.
Obstacles:	None.

Solution 2
National dissemination of information.

Action Step 1: Ensure that all Oribi related information is disseminated in the right format to a target audience at different levels (i.e. from executive staff to District Conservation Officers, farmers) using a web-based system.	
Responsibility:	OWG and SANBI.
Timeline:	June 2007.
Resources needed:	Budget for printed reports.
Collaborators:	OWG and provincial conservation authorities.
Measurable outcomes:	Preformatted reports available on demand.
Obstacles:	None.

PROBLEM STATEMENT 11
THERE IS NO OR LITTLE INFORMATION ON GENERAL PATHOLOGY IN THIS SPECIES.

GENERAL PATHOLOGY
- There is no or little information on diseases in this species (it is not known if Oribi are carriers or susceptible to disease e.g. foot and mouth and if or how they are affected).
- Internal parasites (massive problem if animal is stressed during game capture).
- Resistant to tick borne diseases – the viability of the translocation of Oribi from the midlands to the coast?

Solution 1
Undertake a literature study on diseases affecting the species.

Action Step 1: Undertake literature study on diseases affecting this species.	
Responsibility:	OWG Chairman to approach Onderstepoort.
Timeline:	June 2007.
Resources needed:	Time.
Collaborators:	Onderstepoort.
Measurable outcomes:	Report.

Obstacles:	Lack of interest from tertiary institutions.

Solution 2
Collect relevant samples for pathology from all Oribi during capture operations (and other opportunities - get guidance from wildlife veterinarians - what should be collected? e.g. blood, ticks etc.).

Action Step 1: Undertake a research project with sampling during all capture operations – (and trophy hunting where possible).	
Responsibility:	OWG to approach Onderstepoort.
Timeline:	June 2006 to December 2007.
Resources needed:	Funds for project and equipment.
Collaborators:	Universities and Technikons.
Measurable outcomes:	Thesis / report.
Obstacles:	Lack of interest from tertiary institutions and sample size.

Solution 3
Do post mortem on all carcasses that are fresh.

Action Step 1: Undertake a research project to determine cause of mortality.	
Responsibility:	OWG to approach Universities / Technikons.
Timeline:	Project proposal by June 2007.
Resources needed:	Funds for project and equipment.
Collaborators:	Universities and Technikons.
Measurable outcomes:	Thesis / report.
Obstacles:	Lack of interest from land managers, conservation officials, tertiary institutions and sample size.

Other potential research projects -

Reproduction
Determine the proportion of males and females in the populations that are breeding and how this varies in space and time.

Education and Awareness (Awareness and Extension Working Group)
Interested and affected parties (i.e. landowners, conservation organisation and children) are not well educated on Oribi conservation, threats or management.

This solution was passed onto the Awareness and Extension Working Group, responsible for the actions required for the completion of this solution.

Population Modelling and Dynamics Working Group

WORKING GROUP PARTICIPANTS:

1.	Kerryn Morrison	EWT
2.	Brenda Daly	CBSG SA
3.	Ian Rushworth	Ezemvelo KZN Wildlife
4.	Andrew Hill	University of KwaZulu-Natal

Introduction / Situation overview

Demographic modelling is a valuable and versatile tool for assessing risk of decline and extinction of wildlife populations. Complex and interacting factors that influence population persistence and health can be explored, including natural and anthropogenic causes. Models can also be used to evaluate the effects of alternative management strategies to identify the most effective conservation actions for a population or species and to identify research needs. Such an evaluation of population persistence under current and varying conditions is commonly referred to as a population viability analysis (PVA).

The simulation software programme Vortex (v9.58) was used to examine the viability of Oribi populations in South Africa. Vortex is a Monte Carlo simulation of the effects of deterministic forces as well as demographic, environmental, and genetic stochastic events on wild populations. Vortex models population dynamics as discrete sequential events that occur according to defined probabilities. The programme begins by creating individuals to form the starting population and stepping through life cycle events (*e.g*. births, deaths, dispersal, catastrophic events) typically on an annual basis. Events such as breeding success, litter size, sex at birth, and survival are determined based upon designated probabilities. Consequently, each run (iteration) of the model gives a different result. By running the model hundreds of times, it is possible to examine the probable outcome and range of possibilities. For a more detailed explanation of Vortex and its use in population viability analysis, see Lacy (1993, 2000) and Miller and Lacy (2003).

Vortex was used to evaluate the risk of population decline or extinction under alternative future scenarios. Once consensus was reached among workshop participants on the input parameters for the model i.e. that the baseline data best represented the status quo in South Africa, the model was then used to predict the outcome of different scenarios (anthropogenic-related mortality, natural catastrophes and conservation interventions).

Vortex Baseline Model Parameters

The Vortex project file with these input values is available at http://www.pdflibrary.ewt.org.za. Vortex version 9.58 was used.

Number of iterations: 500
500 independent iterations were run for each scenario.

Number of years: 50
Oribi have a relatively short generation time of 7.26 years for females and 7.89 years for males. At the risk of perpetuating errors due to the parameters for some of the variables not being based on reliable data, the number of years for which the model was run, was set at 50 years.

Extinction definition: *Only one sex remains*

The model developed at the workshop originally defined extinction as Total N < Critical Size = 444, a figure representing 10% of the estimated current total national population (see initial population size). This quasi-extinction value was based on the fact that Oribi occupy fragmented, discontinuous habitat and that there is a tendency for the population to decline dramatically once they reach low numbers.

However, due to a serious lack of mortality data and a baseline model that declined sharply, it was agreed that many of the scenarios run be compared using the probability of extinction / survival. With a quasi-extinction value in place, many of the scenarios then had a probability of extinction of 1.000 and hence an unrealistic outcome. For this reason, it was agreed that extinction be redefined to "only one sex remains".

Number of populations: *13 populations*

Although Oribi have a wide distribution on the African continent, stretching from Senegal towards Ethiopia and southwards to South Africa (Adamczak, 1999), it was agreed that only the South African Oribi population would be considered for the purposes of this workshop, due to practical management and conservation implications.

Workshop participants agreed to define 13 subpopulations (Figure 3). These were based on the three previously defined genetic management areas (van Vuuren and Rushworth, unpublished data) with further subdivision based on a very low to zero probability of Oribi interacting / moving between these subpopulations. The reason for the lack of, or minimal movement, was based on current gaps in distribution and the presence of unsuitable habitat through which Oribi were unlikely to move (Hill unpublished data).

Genetic management area 1:

Population 1: Northern Mpumalanga
Population 2: Eastern Mpumalanga
Population 3: Southern Mpumalanga
Population 4: Gauteng
Population 5: Free State
Population 6: Newcastle
Population 7: Vryheid

Genetic management area 2:

Population 8: Midlands
Population 9: Underberg / East Griqualand
Population 10: Ixopo
Population 11: South Coast
Population 12: St. Lucia

Genetic management area 3:

Population 13: Coastal Eastern Cape

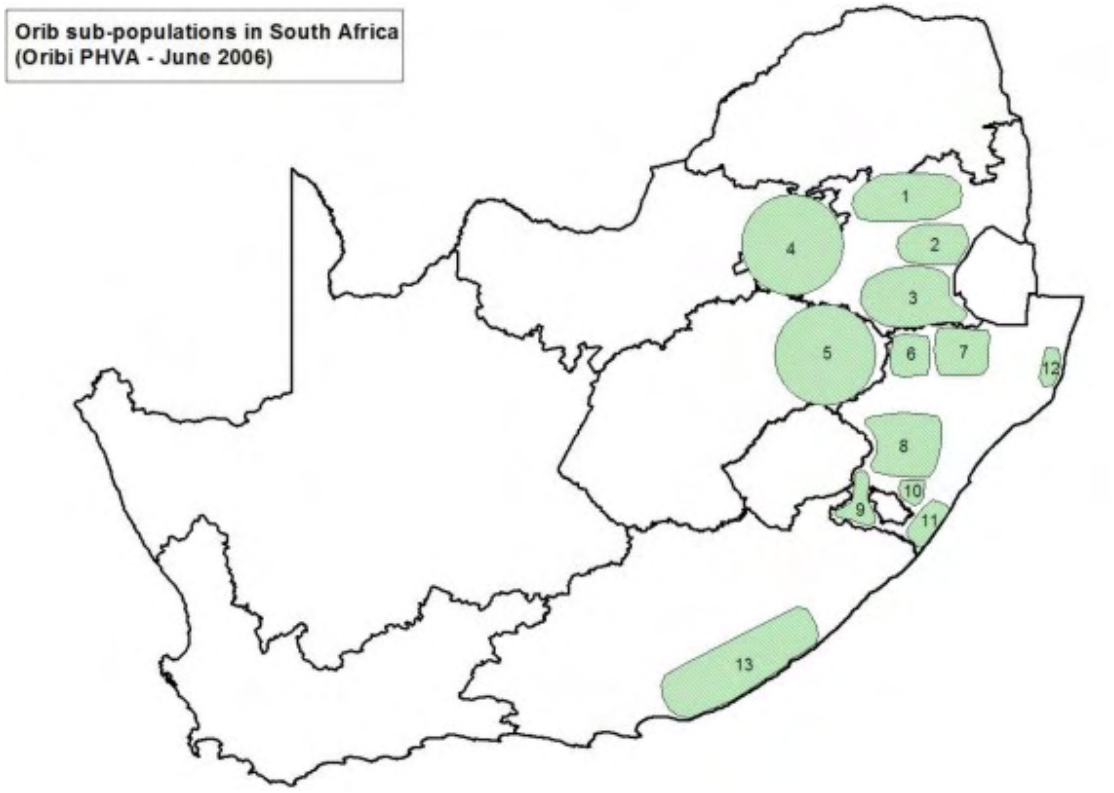


Figure 3: 13 Oribi populations in South Africa were used in the *Vortex* model.

Initial population size (N): 4513
The following initial subpopulation sizes were used in the model:

Northern Mpumalanga	92
Eastern Mpumalanga	56
Southern Mpumalanga	382
Gauteng	30
Free State	35
Newcastle	338
Vryheid	113
Midlands	1456
Underberg / East Griqualand	449
Ixopo	537
South Coast	79
St. Lucia	24
Coastal Eastern Cape	922
Total	**4513**

Each of the three Mpumalanga subpopulations were derived from data collected by the Mpumalanga Tourism and Parks Agency C-Plan (unpublished reports). The subpopulations in Gauteng and Free State were estimated from the 2005 Oribi survey and the experiences of the people at the PHVA workshop for areas not included in the survey, but were known to have Oribi. The Coastal Eastern Cape subpopulation was taken from a survey conducted in the area from 1980 to 2002. Interestingly, this subpopulation has experienced a 7.8% growth over that time (Anonymous, 2002).

The St Lucia subpopulation was at 24 individuals at the time of the workshop and was known due to the Oribi having been reintroduced and regular monitoring occurring (Burden, *pers. comm.)*. The other six KwaZulu-Natal subpopulations were estimated from surveys

conducted in the Province in 2003 and 2005. Adjustments were made based on a realistic average of 20% of farmers with Oribi not taking part in the 2005 survey, and an estimated decline of 15% since the last estimate.

Carrying capacity (K): 9026
Due to a lack of knowledge on the carrying capacity of the species, plenary agreed that it could be modelled at double the initial population size for each subpopulation.

Northern Mpumalanga	184
Eastern Mpumalanga	112
Southern Mpumalanga	764
Gauteng	60
Free State	70
Newcastle	676
Vryheid	226
Midlands	2912
Underberg / East Griqualand	898
Ixopo	1074
South Coast	158
St. Lucia	48
Coastal Eastern Cape	1844
Total	**9026**

Inbreeding depression: No
The PHVA group felt that inbreeding was occurring and it was suggested that it could become a problem due to the large number of small, fragmented populations. However, due to the plenary having limited knowledge on its impact, it was agreed that inbreeding depression would not be taken into account in this model.

Concordance between environmental variation in reproduction and survival: Yes (0.25)
Environmental variation (EV) is concordant between variation in reproduction and survival relating to random variation in environmental conditions. EV for survival and reproduction were therefore linked in the model (*i.e.* good years for reproduction are also good years for survival).

Dispersal among populations: Limited
Limited dispersal of males, between one and four years of age, was included in the model (Please refer to Appendix 1). It was estimated by the plenary that only 10% of dispersers would survive due to the risk of being hit by motor vehicles, starvation and illegal hunting as they moved across unsuitable habitat.

Mating system: Long-term Monogamy
Oribi are considered to be polygynous across several populations in Africa both spatially and temporally (Arcese *et al.,* 1995). Even within South Africa, it was found that Oribi are occasionally polygynous (Adamczak, 1999). However, the plenary agreed that for the purposes of the model, Oribi would be considered to be monogamous due to the lack of understanding of polygynous behaviour and the majority of sightings of Oribi in Montane and Midlands grasslands being of groups between 1 and 3 in size (Rowe-Rowe, 1992). It was also agreed that a scenario for Oribi being polygynous would be run, but that the more conservative monogamous situation would form the baseline model.

In South Africa, Oribi are generally long-term monogamous and live mostly in pairs (male and female) and together retain a small territory. This territory is maintained and advertised by both the male and female through olfactory marking. The male however, is the more active marker (Everett *et al.,* 1991). After analysis of data collected within KwaZulu-Natal,

Rowe-Rowe (1982) placed the Oribi into Jarman's (1974) Class A social class (antelope that live singly or in pairs and occasionally accompanied by offspring).

Age of first offspring for females and males: Three years (females); 4 years (males)
Age at first parturition has not been accurately established, but it appears to be at around two years (Rowe-Rowe, 1982b). Various reports suggest age at maturity is 10 - 14 months in males, but ca. three months earlier in females (Cade, 1966; Kingdon, 1982; Estes, 1991; and Jongejan *et al*., 1991). Females may conceive at 10 months, whilst a ram will become sexually active by 14 months (Cade, 1966; Adamczak, 1999). The gestation period ranges from 192 - 210 days (Rowe-Rowe, 1994) or approximately 7 months. However, because Vortex models the average age of first birth and not first parturition or first birth, the plenary agreed that the ages needed to be older than these. Bill Howells noted that males tended to begin defending territories from four years of age and hence would probably have their first offspring when they were four. Females, maturing earlier and being able to produce young from 2 years (sexually active from 14 months + 7 months gestation = 21 months) it was agreed that an average age of first reproduction could be three years.

Maximum age of reproduction: 13 years
Vortex assumes that animals can reproduce throughout their adult life and does not model reproductive senescence. Individuals are removed from the model after they pass the maximum age of reproduction.

Females can be expected to produce one young per year, to a maximum age of 8 – 13 years (Mentis, 1972). Horn length and number of annulations can be used to estimate age of males < 20 years, but technique awaits validation for older males (Jongejan *et al.,* 1991). It was therefore agreed that both males and females could probably reproduce to 13 years.

Maximum number of progeny per year: One
Oribi have been known to have inter-birth intervals of less than eight months, which would indicate that conception could occur shortly after giving birth. It is further noted that there is no relation between the sex of the calf and the subsequent birth interval. A single birth per year is the invariable rule as mating takes place during April to June, and young are born mainly between November and January (Oliver *et al.,* 1978 and Rowe-Rowe, 1982b), after a gestation of 7 months (Mentis, 1972 and Viljoen, 1982) (Rowe-Rowe, 1994).

Sex ratio at birth – in % males: 50%
In a study of an Eastern Cape population (Humphrey, 2006), the following sex ratios were found: In August (1st sample), the adult sex ratio was 46% males, 54% females, and for juveniles, 43% males and 57% females. In August (2nd sample), the adult sex ratio was 50:50, with a juvenile ratio of 44% males and 56% females. These differences are not significantly different from parity and therefore the sex ratio was kept at 50%.

Density-dependent reproduction: No
No data were available on density dependence; reproduction was therefore assumed not to be density-dependent in the model. The plenary noted that reproduction did not seem to decrease when the population and density increased, but that increased fighting between males did occur when density increased and that subsequent reproduction would then decrease.

Percent adult females breeding: 75%
According to Oliver *et al*., (1978) and Rowe-Rowe (1982b), single males occurred more frequently (*ca* 25% of adults) than did single females (*ca* 10%). In addition, Humphrey (2006) found that 50% of first females and 25% of the second females bred in any group, based on a study of Oribi social structure on Kasouga farm. This then relates to around 75% of adult females breeding in any given year. An EV of 15% was used.

Percentage of adult males in the breeding pool: 75%
25% of the adults in a population are single males (Oliver *et al*., 1978 and Rowe-Rowe 1982), therefore 75% of the males are in the breeding pool.

Mortality rates: See below
No mortality data or information was available for Oribi. For this reason, it was agreed that the mortality rates be kept constant across each of the 13 subpopulations. The rates were adjusted until an intrinsic population growth rate of 4.2% was achieved, which the plenary agreed was acceptable and possible. Female, and particularly, male mortality was high in the 1 - 2 year period as it was suspected that mortality was higher due to dispersal factors as the individuals looked for a territory or a mate.

The mortality rates here did not include dog hunting and hunting, but included all natural mortality and those mortalities associated with dispersal.

Table 6: Mean annual mortality rates for male and female Oribi (EV = environmental variability estimated at 20% around the mean).

	Females		Males	
Life stage	**Mean annual mortality %**	**EV**	**Mean annual mortality %**	**EV**
0 – 1	25	5	25	5
1 – 2	40	8	55	11
2 – 3	-	-	20	4
3 – 4	-	-	30	6
Adult	5	1	5	1

Number of catastrophes: One
One catastrophe was included in the baseline model: snow combined with cold and windy conditions at the end of the winter season or early spring. Evidence of such a catastrophe was seen at Chelmsford in KwaZulu-Natal where 21 carcasses out of a total population of approximately 150 were found following a period of severe cold, snow and wind; i.e. a mortality of 14% (Rushworth and Howells, *pers. comm*.). For the purposes of the model, the severity of the catastrophe was estimated to have a 10% impact on survival rate and a 0% effect on reproduction. Breeding occurs in the summer months and would therefore not be affected by the weather conditions defined here as a catastrophe. However, it was noted that it should be borne in mind that long periods of cold wet weather in summer could result in increased competition between game and stock and potentially a lower birth rate.

Some members of the plenary also suggested that burning be considered a catastrophe at certain times and disease. However, both of these catastrophes would be based on speculation. In addition, it was generally felt that Oribi were well adapted to fire being a grassland species and that fires would probably have a minimal impact on them.

Harvest: No
No harvest was included in the baseline model.

Supplementation: No
No supplementation was included in the baseline model.

CONSERVATION OBJECTIVES

The conservation objectives for the Oribi in South Africa, as determined at the workshop, were to obtain a minimum viable population size which had a 95% chance of survival and a genetic heterogeneity of 80%, and a metapopulation size which had a 100% chance of survival.

BASELINE MODEL RESULTS

The demographic rates (reproduction and mortality) included in the baseline model can be used to calculate deterministic characteristics of the model population. These values reflect the biology of the population in the absence of stochastic fluctuations (both demographic and environmental variation), inbreeding depression, limitation of males, and immigration / emigration. It is valuable to examine these values to assess whether they appear realistic for the species and population being modelled.

The values chosen for the Oribi in the baseline model resulted in a deterministic growth rate (r_{det}) of 0.042. This represents an annual positive growth rate of 4.2%. Generation time for females was calculated to be 7.26 years and for males 7.89 years.

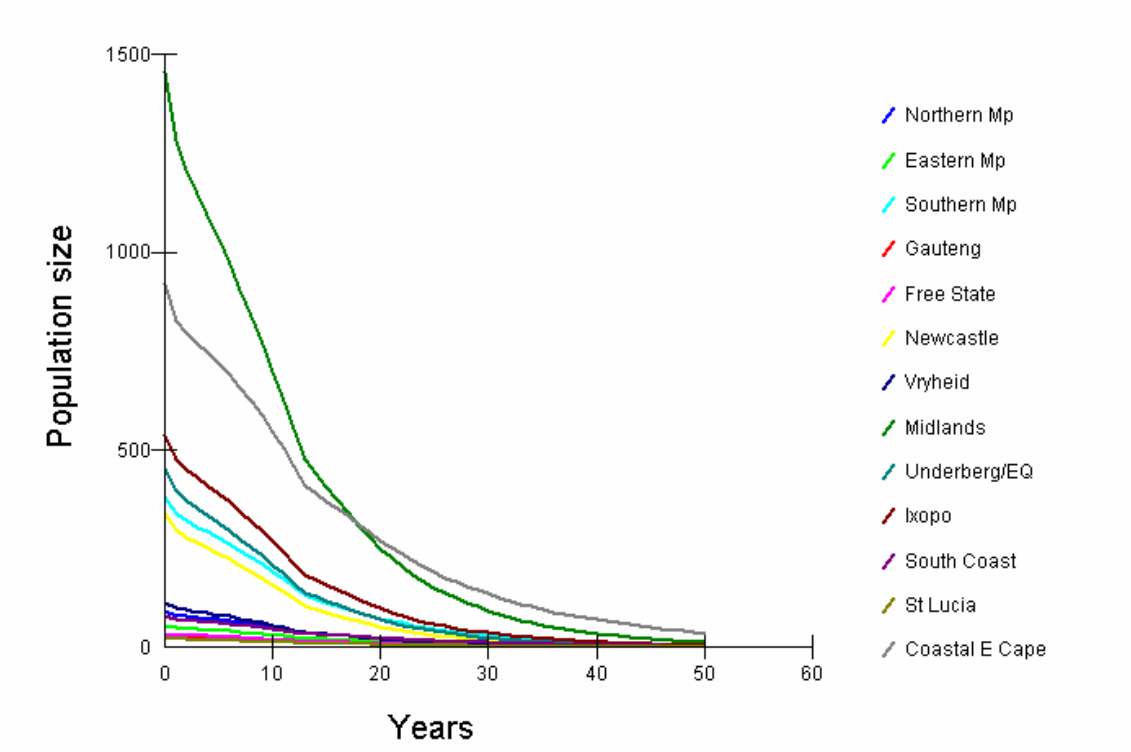


Figure 4: Baseline model for the 13 South African subpopulations of Oribi showing population size over time; Year 0 = 2006.

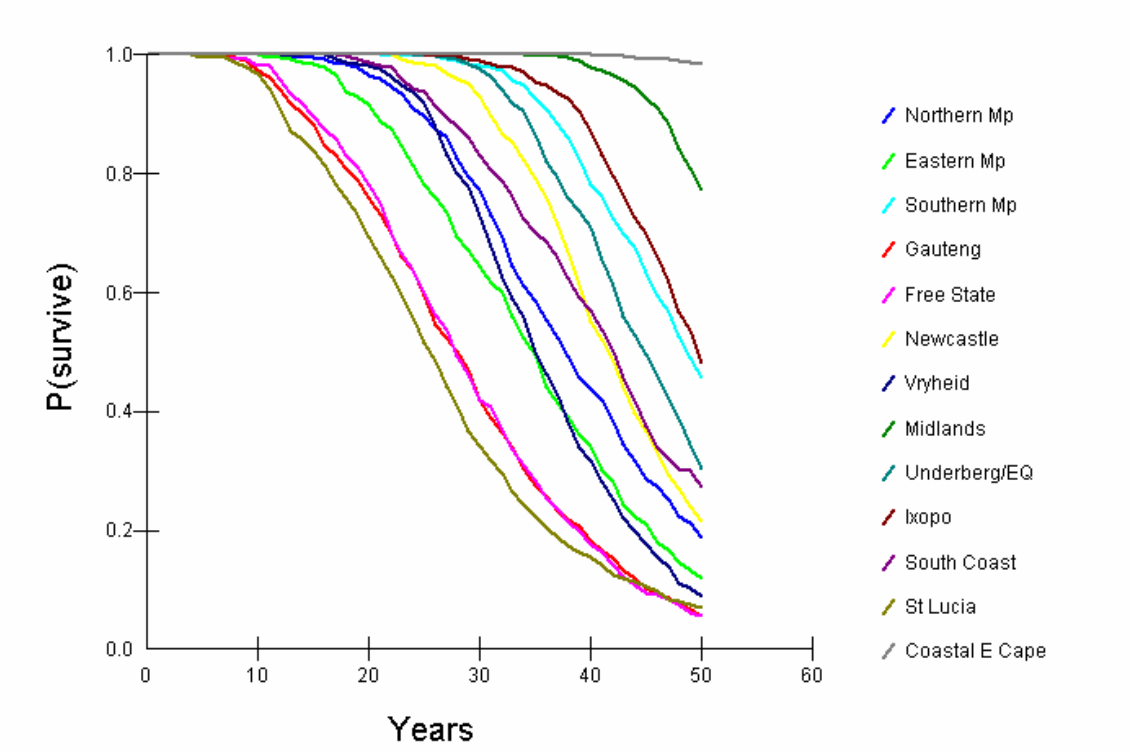


Figure 5: Baseline model for the 13 South African subpopulations of Oribi showing probability of survival; Year 0 = 2006.

The model predicts a decline in each of the 13 subpopulations, with a metapopulation decline of r_{stoch} = -0.085; and a range from r_{stoch} = -0.101 for the Underberg / East Griqualand subpopulation to r_{stoch} = -0.061 for the St. Lucia population. However, the Free State and Gauteng subpopulations have the greatest probability of extinction (P[extinction] = 0.944 each) due to their small size, whilst the Coastal Eastern Cape subpopulation has the lowest probability of extinction at 0.014. As a metapopulation, however, Oribi in South Africa have a 0 probability of extinction over the 50 year period for which the model was run. Interestingly, although the Midlands subpopulation had a high r_{stoch} = -0.099, it had a relatively low P[extinction] = 0.22. This is because its initial population size was by far the highest of all the subpopulations. Consideration must be given when interpreting these results, to the fact that most of the data used for the metapopulation was drawn from research and monitoring findings in KwaZulu-Natal.

The baseline model incorporates in its input parameters the best synthesis of current estimates of demographic rates and an understanding of the biology of the species and therefore the best projection of the future of this population. Caution should however, be used in interpreting the results, and model revision is encouraged as more current and accurate data becomes available or different modelling strategies are developed.

Although a number of the input variables for Oribi were based on published data or reliable information from personal experiences of people at the workshop, information on mortality was seriously lacking, with no personal experiences within natural populations. Mortality has a strong influence on the demography of a population and hence it is important that the actual population sizes or growth rates not be considered, but rather the differences between subpopulations and scenarios.

Sensitivity Testing
The baseline model was developed using the best available published data and expert opinion at the PHVA workshop. However, given the uncertainty surrounding many of these parameters, sensitivity testing was conducted on the demographic parameters and population estimates to determine the potential effect on model results. This then provides an indication of the demographic and population variables that have the largest influence on the future of the population and therefore where future research should be directed.

Except for the mortality data, all sensitivity scenarios were developed from the metapopulation data and compared to the baseline's metapopulation.

Age of first reproduction
In the baseline model, the age of first reproduction for females was set at 3 years and for males at 4 years. In order to test the sensitivity of the model to this variable, the age of first reproduction for females was changed to 2 and then 4 (Figure 6); and for males at 3 and 5 (Figure 7).

The three scenarios for the age of first reproduction in females had very little impact on the model (Figure 6). The three scenarios for males, however, had an impact, but this was dependent on the mortality rates used (Figure 7). For the male age of first reproduction = 3, the high mortality rate between ages 3 and 4 was lost and hence a much improved population growth rate can be expected. For age 5, the 4 – 5 age range was given a mortality rate of 5%, which is equivalent to the adult mortality rate used in the baseline model. One would therefore expect the two scenarios of 4 and 5 years to be similar.

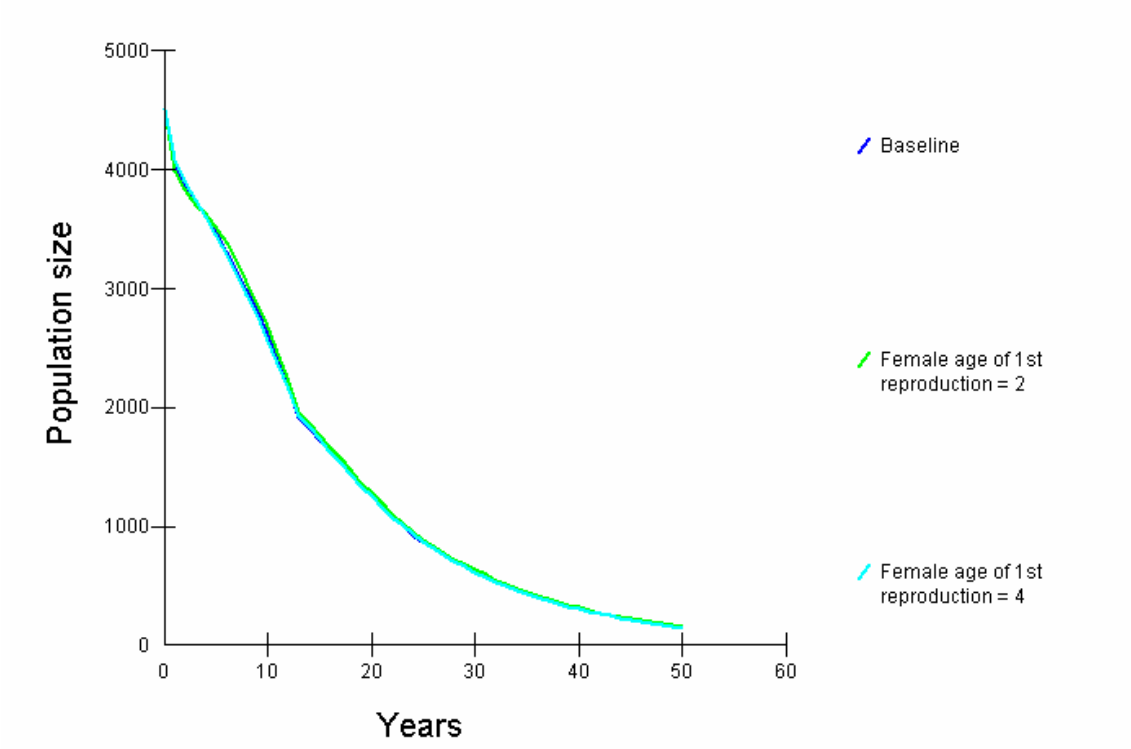


Figure 6: Female age of first reproduction at 2, 3 (baseline) and 4 years of age

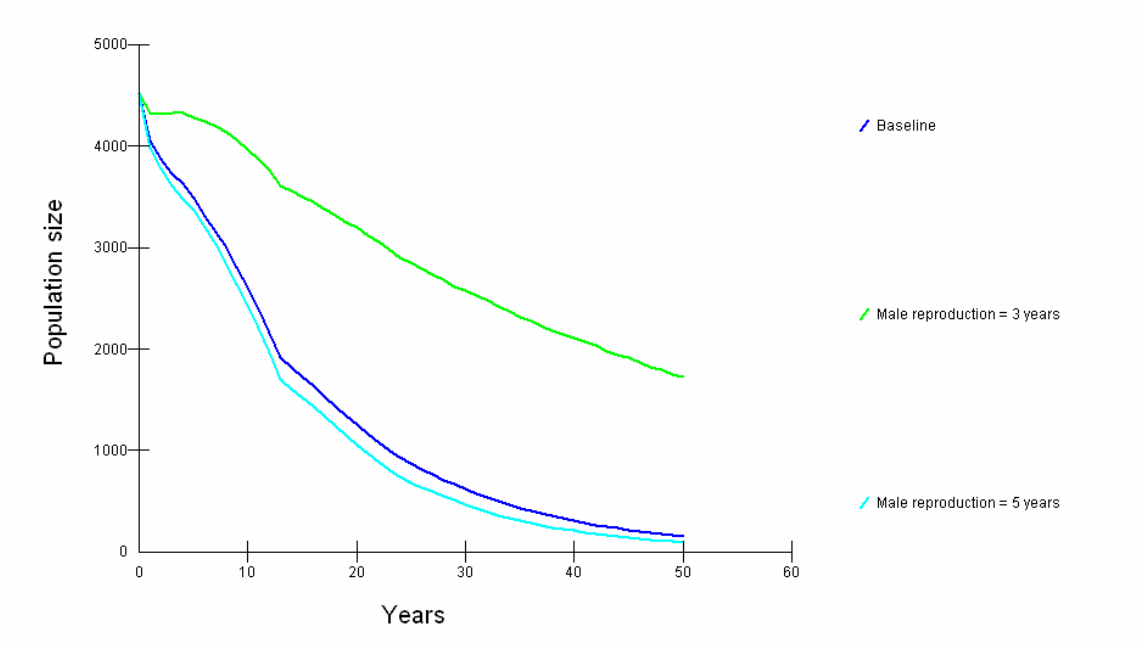


Figure 7: Male age of first reproduction at 3, 4 (baseline) and 5 years of age.

Percentage females breeding

With the baseline model using a percentage of females breeding of 75%, the two sensitivity scenarios run used 60% and 90% (Figure 8). The P[extinction] remained at 0 for all three scenarios, but the stochastic growth rate ranged from -0.057 (90% breeding) to -0.086 (60% breeding). Although there is a difference, it is relatively small.

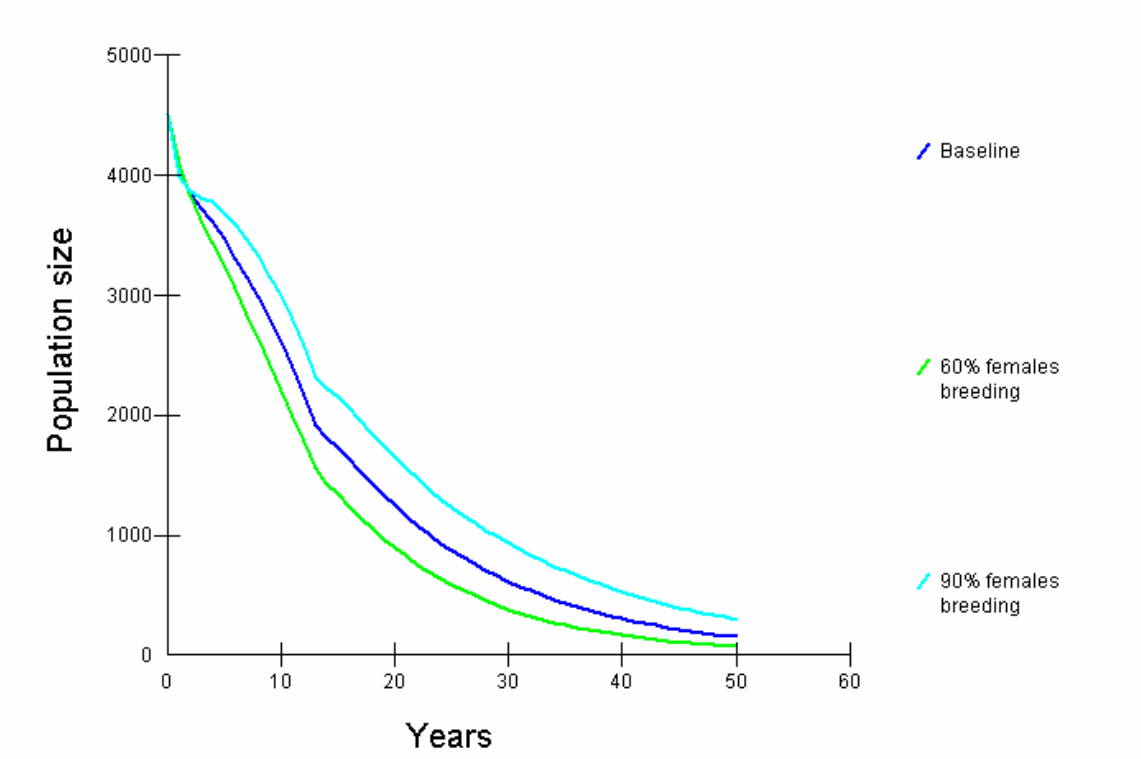


Figure 8: An increase and decrease in percentage of females breeding compared to the baseline.

Monogamy / polygamy

Although it was agreed that a monogamous breeding system was used in the baseline model (explained above), it was agreed that the model be run with polygamous to establish the effect on the model (Figure 9). The difference in the model is highly significant, emphasising the need for an improved understanding of the actual situation. It should be noted that one of the reasons for the declining monogamous population is due to the limitation of mates, and because only pairs breed, breeding productivity will be reduced if one or other sex declines, resulting in a further decline in the population.

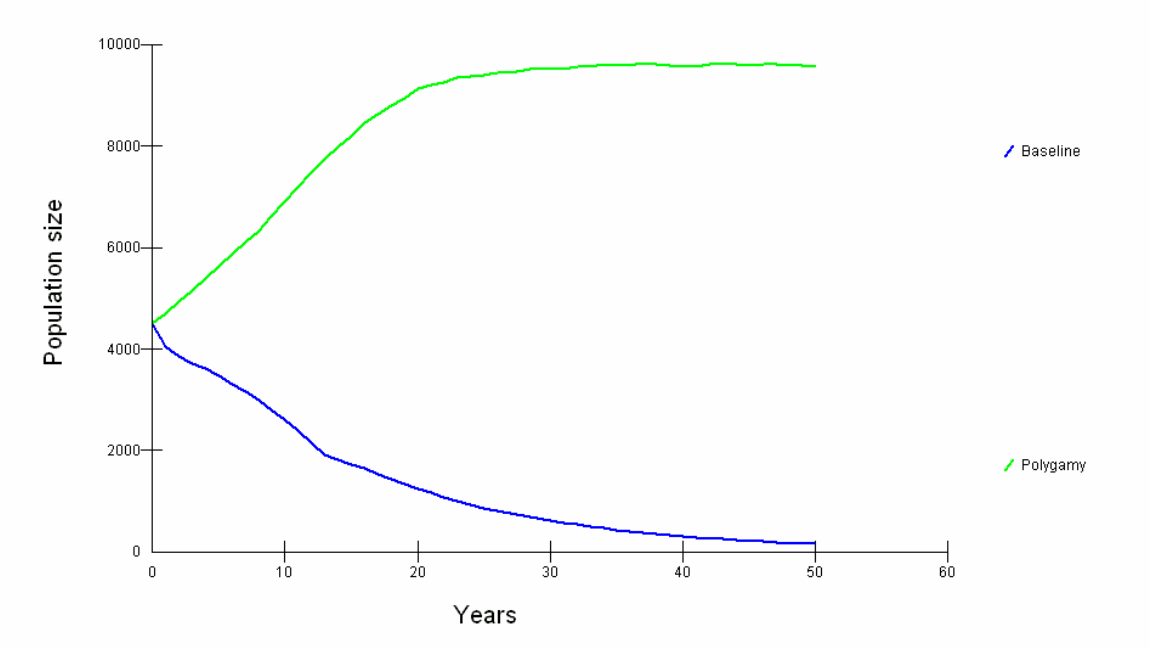


Figure 9: Monogamous (baseline) compared to polygamous.

Catastrophe

The baseline model was run with catastrophes and a scenario without catastrophes was also run to establish the effect that catastrophes are having on the population. According to Figure 10, the catastrophe modelled had a minimal effect on the population.

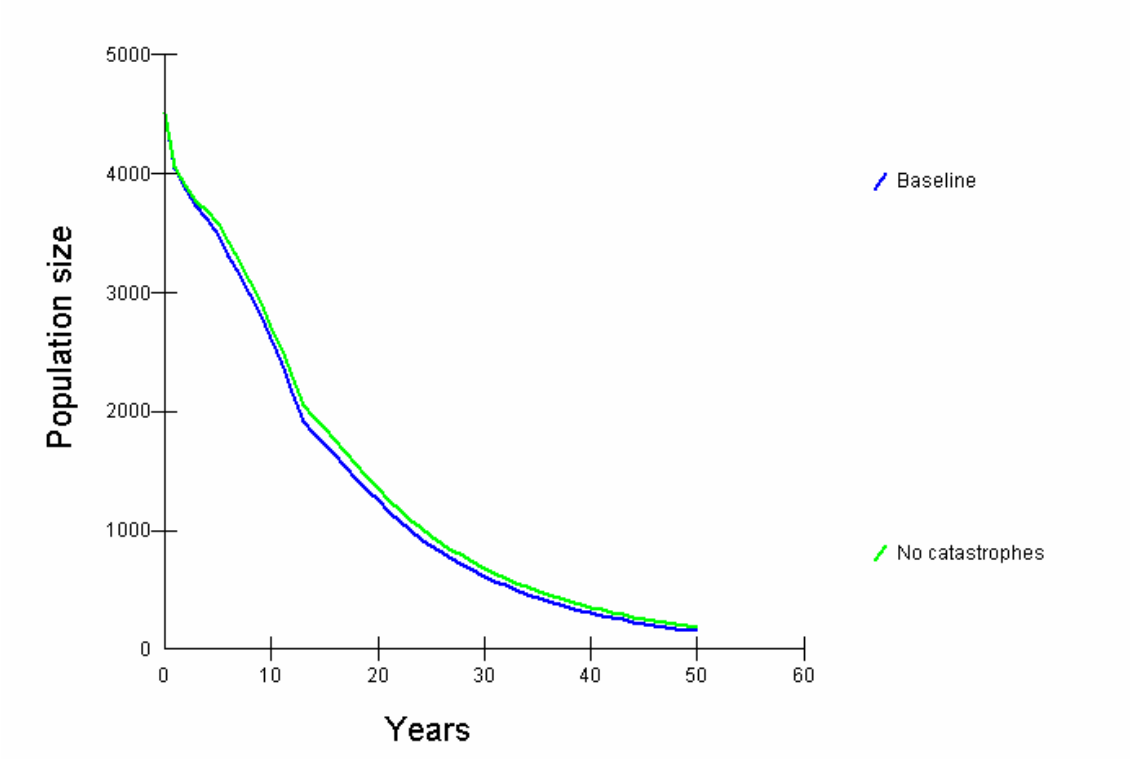


Figure 10: Baseline with catastrophes compared to a model with no catastrophes.

Mortality rates

In order to determine the effect that mortality is having on the population, both male and female juvenile mortality rates, were decreased by 10% and 20% and run separately. In addition, adult mortality was decreased by 10%.

Figure 11 shows clearly that a decrease in male juvenile mortality affects the demographics most significantly. The importance of gaining a better understanding of the mortality is therefore vital to better understand the population dynamics.

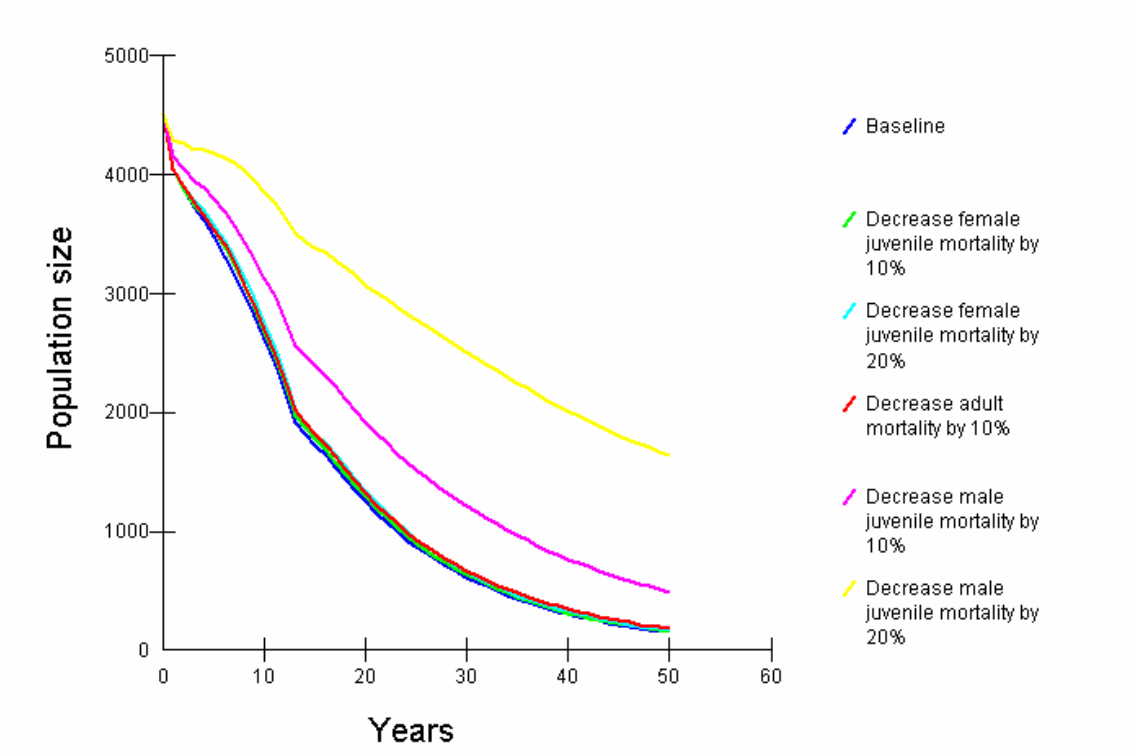


Figure 11: The baseline model compared to a 10% increase and decrease in male and female juvenile mortality and adult mortality.

Harvest through dog hunting and hunting

The effects of dog hunting, persecution and hunting were included in the model as harvests. Although exact numbers of Oribi harvested from each of the subpopulations were unknown, experience within the plenary was used to estimate numbers. The plenary agreed that 100 individuals harvested annually from the metapopulation was a good estimate for the purposes of the model, with the majority being apportioned to KwaZulu-Natal due to the higher occurrence of hunting with dogs in this area. Of the 100, 16 were distributed amongst the three Mpumalanga subpopulations based on a basic knowledge of legal and illegal hunting in the province, an arbitrary 5 individuals each were harvested annually from Gauteng, Free State and Coastal Eastern Cape subpopulations and a known 6 were harvested from the South Coast population annually (Potter, 1994). The remaining 63 were apportioned between the last 5 subpopulations in KwaZulu-Natal based on population size. (Table 7). No individuals were harvested from the St Lucia population as this population was within a nature reserve and no hunting occurs in the area.

Table 7: Annual harvest modelled in each subpopulation due to dog and permit hunting in South Africa.

Population Area	Number of individuals harvested
Northern Mpumalanga	3
Eastern Mpumalanga	6
Southern Mpumalanga	7
Gauteng	5
Mpumalanga	5
Coastal Eastern Cape	5
Free State	5
Newcastle	7
Vryheid	2
Midlands	33
Underberg	10
Ixopo	12
St Lucia	0

The effect of various mortality scenarios on several subpopulations was tested. Although results are available for all subpopulations, only some were shown in the report due to particular reasons. The Midlands subpopulation (Figure 12) was a big subpopulation with the highest mortality and harvest, the Coastal Eastern Cape (Figure 13) was a large population with low mortality rates and harvest, the St Lucia subpopulation (Figure 14) was one whose exact population size and mortality was known and had no harvesting, and the South Coast population (Figure 15) was the one subpopulation for which harvest figures were known. Data for the other subpopulations were minimal and would probably show a result between what is shown below. Note that the scenarios where mortality has been decreased have no harvesting, and those scenarios for which harvesting is included, use the mortality rates from the baseline model.

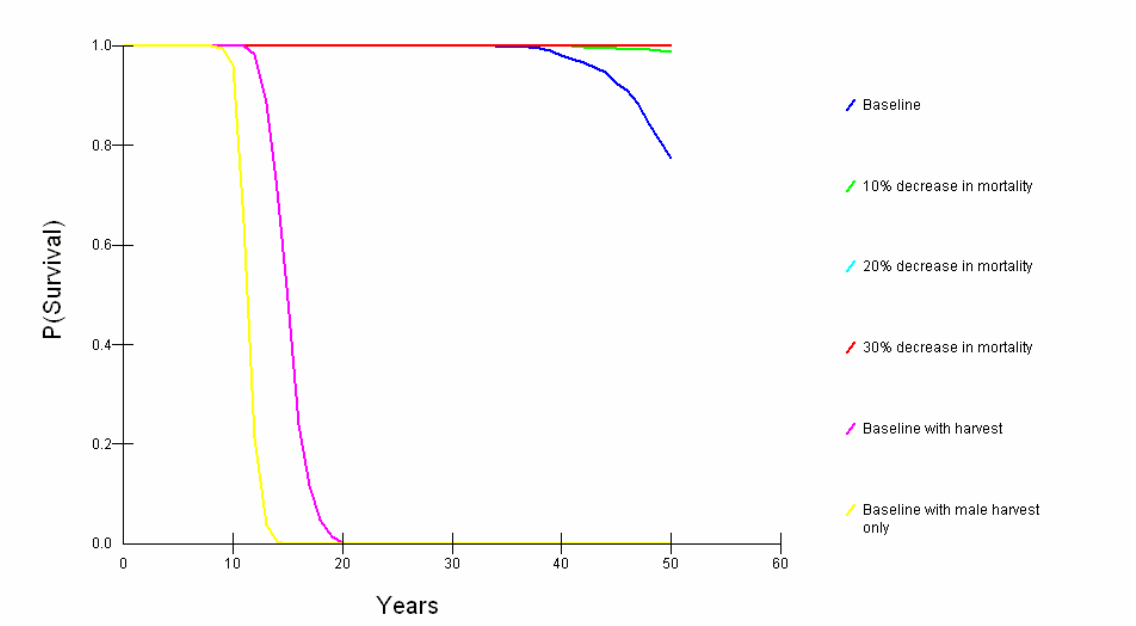


Figure 12: Probability of survival of the Midlands subpopulation under various mortality scenarios.

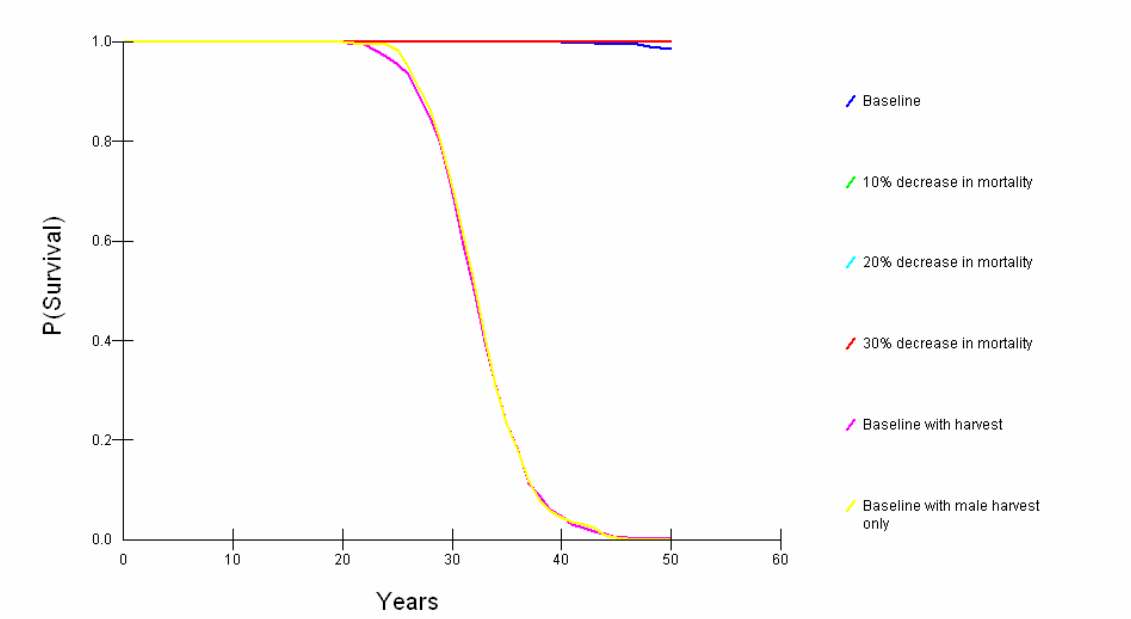


Figure 13: Probability of survival of the Coastal Eastern Cape subpopulation under various mortality scenarios.

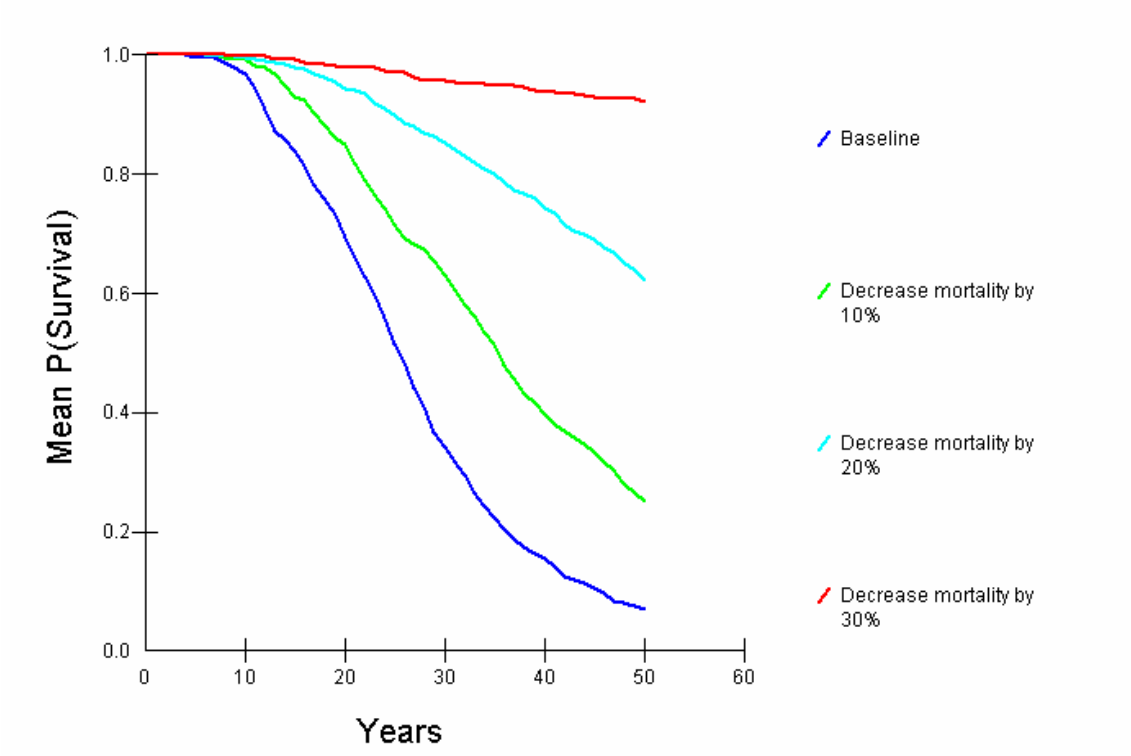


Figure 14: Probability of survival of the St Lucia subpopulation under various mortality scenarios.

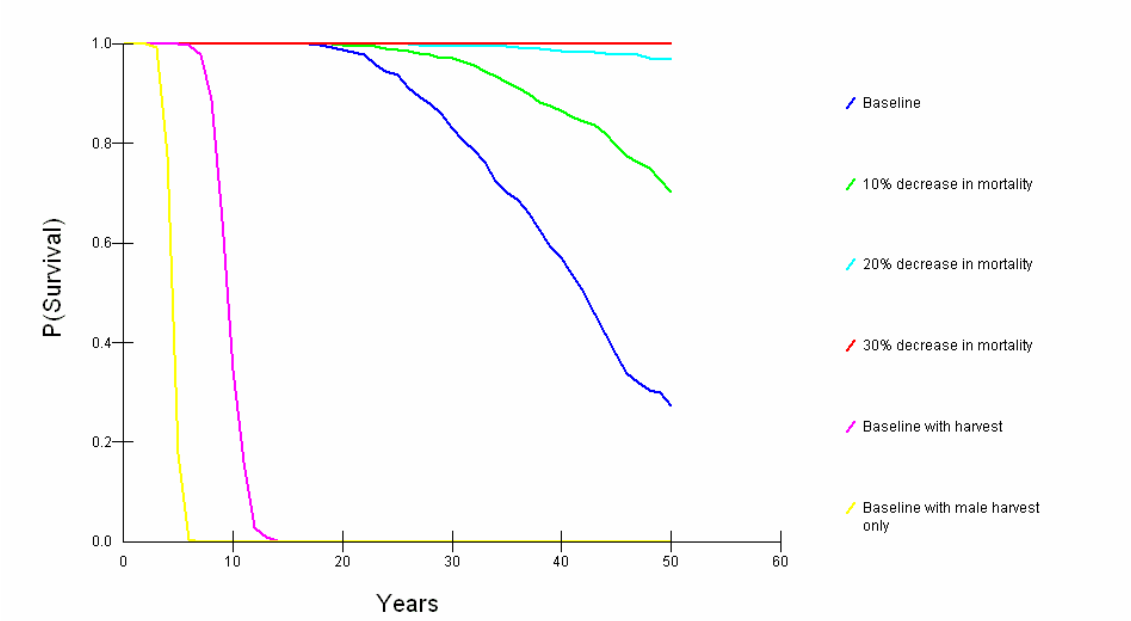


Figure 15: Probability of survival of the South Coast subpopulation under various mortality scenarios.

In all of the scenarios in which harvest was included, the P(Survival) decreased significantly from the baseline. Although having little impact on the Coastal Eastern Cape subpopulation due to the low harvest numbers, a male only harvest decreased the P(Survival) even further. This is to be expected as males will become even more limiting in the population.

Decreasing mortality improved the situation for all subpopulations. The trajectory for small populations, e.g. South Coast (Figure 15) and St Lucia (Figure 14), was significantly improved from a P (Survival) = 27% and 7% respectively, to a P (Survival) = 95% and 62% for a 20% decrease in mortality.

To test for the relationship between mortality factors and those that had the greatest significance, each age and sex specific mortality rate was modelled against a number of adult mortality rate scenarios. The juvenile mortality rates were chosen based on the baseline model so that a fair representation on either side of the baseline rate was tested. Adult mortality rates of 1, 2, 3, 4 and 5% were used. Female juvenile mortality rate had little impact on the population compared to male juvenile mortality rate (Figures 16 – 21). The juvenile 0 - 1 year male mortality rate had the biggest influence on the stochastic growth rate (Figure 18). This showed a positive growth rate when male 1 - 2 mortality was less than 30% and adult mortality less than 2% and when male 1 - 2 mortality was less than 25% an adult mortality less than 3% or when male 1 - 2 mortality was less than 20% and adult mortality was less than 4%.

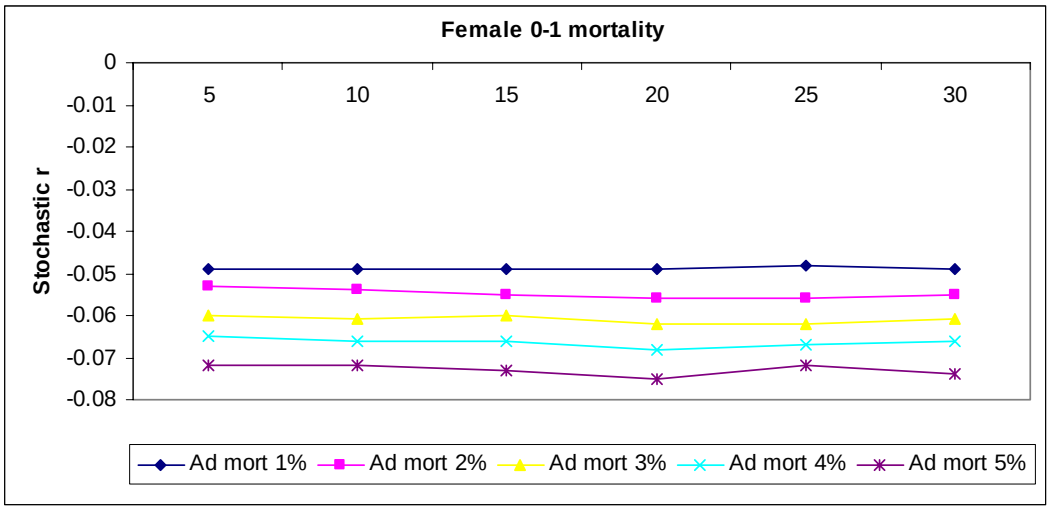


Figure 16

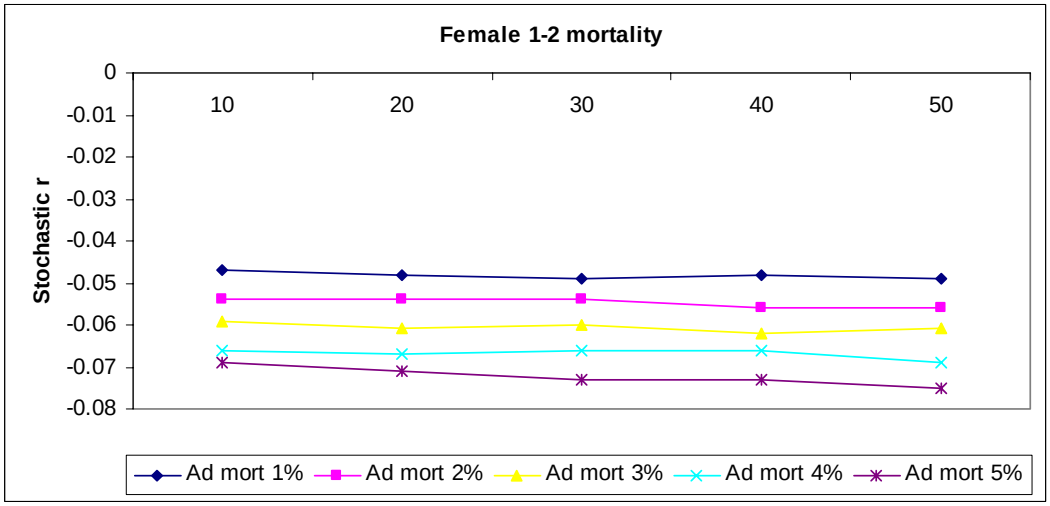


Figure 17

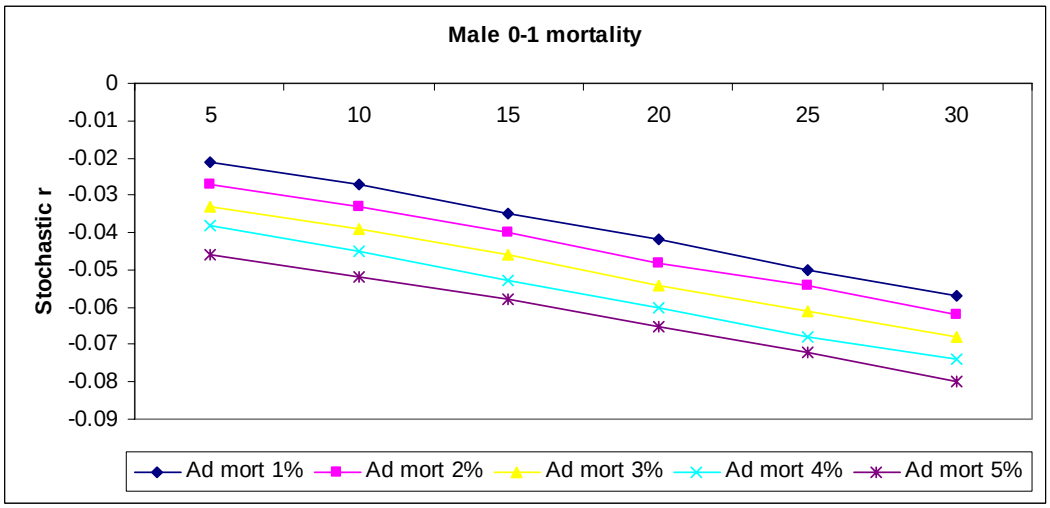


Figure 18

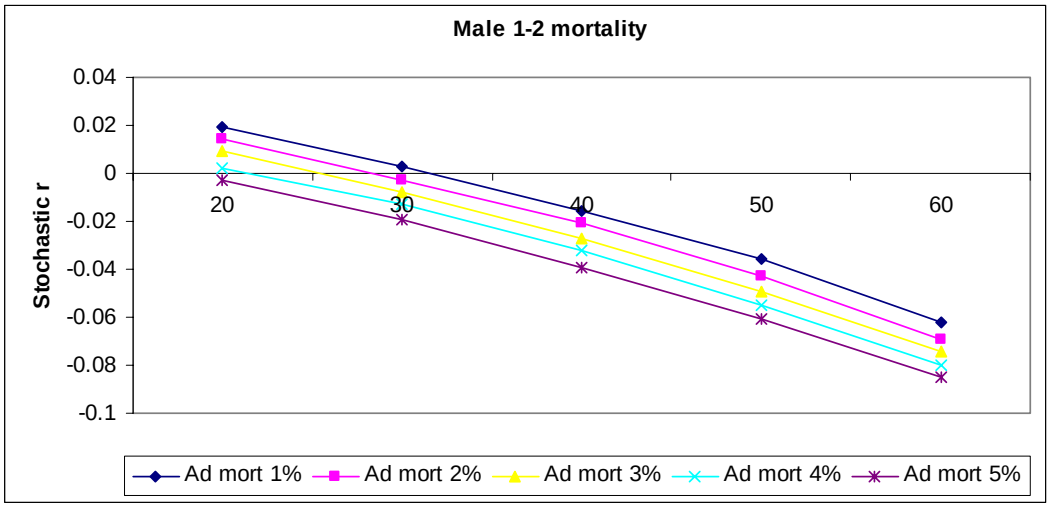


Figure 19

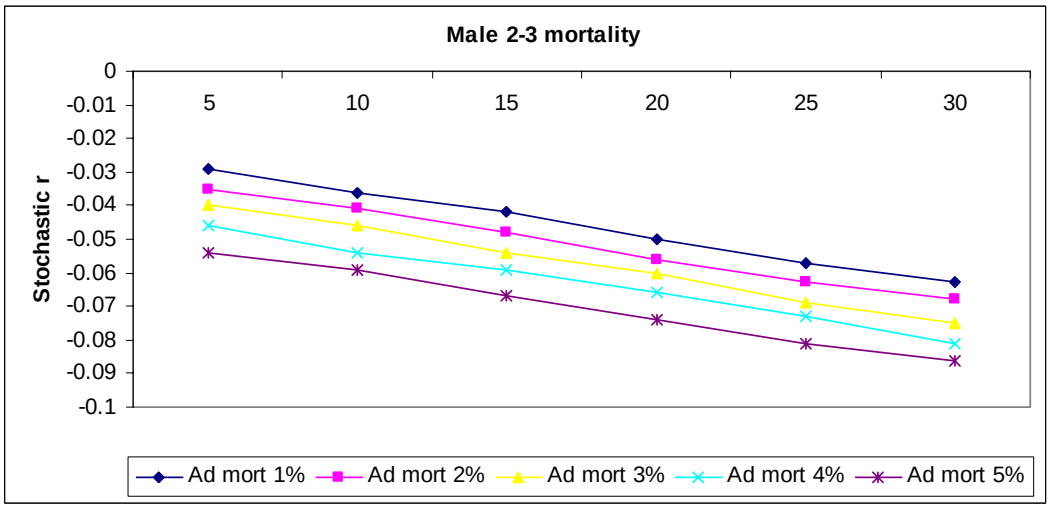


Figure 20

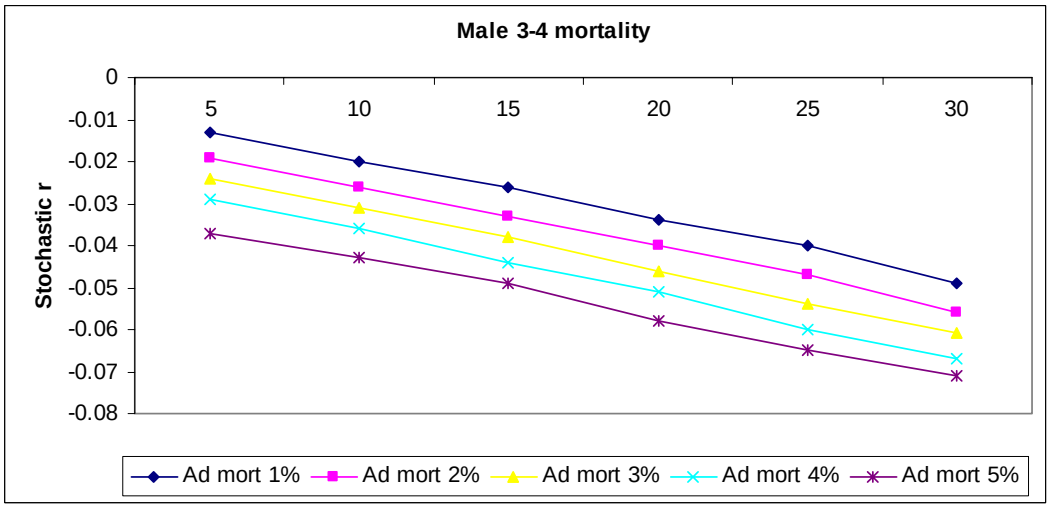


Figure 21

Summary

Based on the limited mortality and harvest data for the model, it is clear that mortality, both natural and hunting, plays a significant role in projecting trajectories of the population into the future. Male juvenile mortality between 1 and 2 years is probably the most important age specific mortality to research. It is therefore important that mortality is better understood to be able to more accurately test various conservation and management scenarios for the species.

The breeding system of the Oribi also needs to be researched further as this has a highly significant impact on the population dynamics.

Minimum viable population

Oribi are generally found in small groups or pairs, often with one (rarely two) young; uni-male, uni-female or multi-male or multi-female groups (Arcese *et al.,* 1995). However, a number of these groups are required, within dispersing distance of each, in order to ensure the subpopulation survives and maintains its genetic heterogeneity over a period of time. In order to manage the population to ensure its future, it is important that a minimum viable population size be known. With this, any relocations and movements of Oribi will be based on a sound foundation.

In order to determine the minimum viable population size (based on a 95% probability of survival and a genetic heterogeneity of 80% over a 50 year period), the model was run using the baseline data, for a number of initial population sizes. However, due to the absence of data on mortalities, the same initial population sizes were run for a 10 and 20% decrease in mortality as well.

A population of 90 individuals will meet the conservation objectives if the mortality is decreased by 20% from the baseline (Figure 22). This size will increase significantly as mortality increases. The real minimum viable population will therefore be dependent on the mortality rates and hence once again reiterates the importance of gaining a better understanding of mortality in order to refine any conservation action taken.

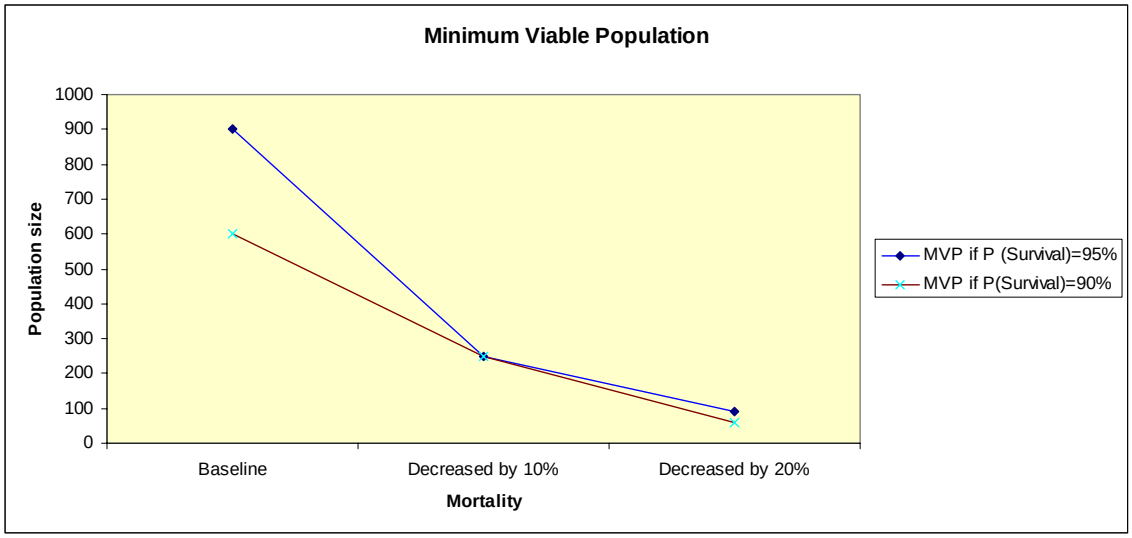


Figure 22: Minimum viable populations for a genetic heterogeneity of 80% and a probability of survival of both 90 and 95% over a period of 50 years.

Interestingly, for genetic diversity alone, a minimum viable population of 20 individuals is needed if Oribi are polygamous, but require a population of between 300 and 400 if they are monogamous (Table 8).

Table 8: Comparison of Monogamous vs Polygamous in terms of % genetic diversity at 50 years.

Population Size	**% Genetic Diversity**	
	Monogamous	Polygamous
10	0.578	0.218
20	0.511	0.862
30	0.610	0.984
50	0.662	0.996
100	0.729	1
200	0.796	1
300	0.834	1
400	0.867	1
500	0.892	1

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Group Prioritisation of Solutions

Each working group brought their top five solutions, chosen by means of paired ranking of their group's total list of solutions, to a plenary session where they were combined into a list of twenty (20) solutions for the whole group. Each person then went back and pair-ranked this list of twenty solutions in order to arrive at a prioritised list of solutions for effective Oribi conservation which the whole group had contributed towards and agreed upon. The results were as follows:

1. Develop an appropriate toolkit for use by extension officers throughout the Oribi range and ensure implementation of same.
2. Create incentives for landowners to conserve Oribi (link to Awareness Group).
3. Place Oribi and Oribi habitat conservation issues around redistribution of land firmly on the agenda of stakeholders viz. the Land Claims Commission, District and Local Municipalities (target environmental officers), Land affairs, Department of Agriculture and Environmental Affairs, Corporate sector, DEAT, SANBI, provincial nature conservation departments and other large landowners to ensure protection of Oribi are dealt with prior to change of ownership.
4. Undertake a nationwide baseline census both within and outside protected areas. The census must include population numbers as well as population age and sex structure and any historical mortality information.
5. Ensure the establishment of an Oribi conservation area network per genetic management zone that ensures persistence of the species.
6. Ensure that the Oribi Conservation Plan has high status in National Stewardship programmes.
7. Model potential available habitat nationwide and prioritise areas for ground-truthing.
8. Develop a conservation strategy and action plan for the species per genetic management area.
9. Develop an extension programme for the Oribi conservation area network.
10. The OWG, through the mandated provincial biodiversity authority, highlights the important Oribi areas to avoid or minimise the negative impact of human settlement and its associated activities.
11. Increase the number of patrols in identified problem areas to address the illegal hunting with dogs throughout the Oribi range.
12. Broaden the representation on the OWG in provinces where this is lacking.
13. Effective formal and informal education.
14. Increase the number of competent officials through training.

15. Educate the user groups about the implications of over utilization leading to the extinction of the species and impacting on every person's constitutional right.
16. Increase public awareness through the media of successful law enforcement actions.
17. Monitor specific (i.e. large or doomed) translocated populations intensively over the short-term (<1 year).
18. Develop a national Oribi database.
19. Encourage the formulation of working groups between official bodies e.g. Ezemvelo KZN Wildlife Crime Working Group.
20. Collect and analyse as many genetic samples as possible nationwide on an ongoing basis.

ORIBI POPULATION AND HABITAT VIABILITY ASSESSMENT

19 – 22 June 2006

**Hebron Haven, KwaZulu-Natal,
South Africa**

WORKSHOP REPORT

SECTION 5

APPENDICES

Appendix 1: Dispersal Rates

Annual probabilities (as percentages) of dispersal from source populations (rows) to recipient populations (columns)

	N Mp	E Mp	S Mp	GP	FS	Newcastle	Vryheid	Midlands	Underberg / EG	Ixopo	South Coast	St. Lucia	Coastal Eastern Cape
Northern Mp	99	0.5	0.5	-	-	-	-	-	-	-	-	-	-
Eastern Mp	0.5	99	0.5	-	-	-	-	-	-	-	-	-	-
Southern Mp	0.5	.05	99	-	-	-	1	-	-	-	-	-	-
Gauteng	-	-	-	100	-	-	-	-	-	-	-	-	-
Free State	-	-	-	-	99.5	0.5	-	-	-	-	-	-	-
Newcastle	-	-	-	-	1	97	2	-	-	-	-	-	-
Vryheid	-	-	1	-	-	2	97	-	-	-	-	-	-
Midlands	-	-	-	-	-	-	-	97.5	1	1.5	-	-	-
Underberg / East Griqualand	-	-	-	-	-	-	-	2	96.5	1.5	-	-	-
Ixopo	-	-	-	-	-	-	-	2	1.5	96.5	-	-	-
South Coast	-	-	-	-	-	-	-	-	-	-	100	-	-
St. Lucia	-	-	-	-	-	-	-	-	-	-	-	100	-
Coastal Eastern Cape	-	-	-	-	-	-	-	-	-	-	-	-	100

The South Coast, St. Lucia and Coastal Eastern Cape subpopulations were isolated.

Appendix 2: Oribi Workshop Participants List

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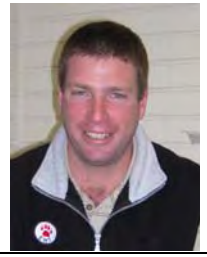
McCann, Kevin	EWT / KwaZulu-Natal Biodiversity Programme	kevinm@ewt.org.za	P.O. Box 1047, Mooi River, 3300	033 3306982	033 3306982	083 4470657	
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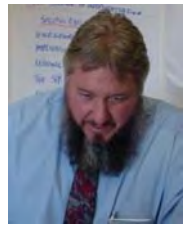
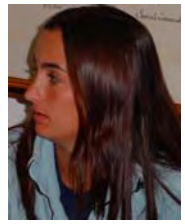
Potter, Rod	Ezemvelo KwaZulu-Natal Wildlife	rpotter@kznwildlife.com	P.O. Box 243, Merrivale, 3291		033 3302108	082 7728343	
Ross, Rebecca	Ross Game Capture	mikeross@iafrica.com	Box 735, Hilton, 3245			082 3690763	
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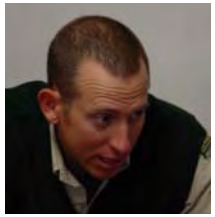
Wakelin, James	Ezemvelo KwaZulu-Natal Wildlife	james@kznwildlife.com	P.O. Box 13053, Cascades, 3202	033 8451465	033 8451499		
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Appendix 3: Workshop Programme

ORIBI POPULATION AND HABITAT VIABILITY ASSESSMENT

19 – 22 June 2006

Hebron Haven, KwaZulu-Natal, South Africa

SUNDAY 18TH	**JUNE 2006**
18h30 -	Delegates arrive, registration and icebreaker
19:00 – 20:00	**DINNER**

Ice Breaker sponsored by the Maloti Drakensberg Transfronteir Project

MONDAY 19TH	**JUNE 2006 - DAY 1**
	BREAKFAST
08:30 – 09:00	Welcome by Kevin McCann, Chairman of the Oribi Working Group of the Endangered Wildlife Trust.
09:00 – 10:30	Presentations ▪ The Oribi Working Group, the Conservation Plan and Policies. (**Kevin McCann, KwaZulu-Natal Biodiversity Programme**) ▪ Oribi Population Status and Trends. (**Athol Marchant, Ezemvelo KwaZulu-Natal Wildlife**) ▪ Oribi Genetics. (**Ian Rushworth, Ezemvelo KwaZulu-Natal Wildlife**) ▪ An update on Oribi captive breeding and the Oribi Working Group policy on captive breeding. (**Rebecca Ross, Ross Game Capture**) (15 min each)
10:30 – 11:00	**TEA BREAK**
11:00 – 11:30	Introduction to the CBSG, CBSG Southern Africa and the workshop process
11:30 – 12:00	Introduction to Vortex
12:00 – 13:00	Plenary Session: Identify key issues
13:00 – 14:00	**LUNCH BREAK**
14:00 – 14:30	Formation of Working Groups and overview of task one
14:30 – 15:30	Working groups convene and begin on first task
15:30 – 16:00	TEA BREAK (future breaks self-regulated)
16:00 – 16:30	Working Group sessions
16:30 – 17:30	Plenary – First Working Group Reports
19:00 – 20:00	**DINNER**

TUESDAY 20TH	**JUNE 2006 - DAY 2**
07:30 – 08:30	**BREAKFAST**
08:30 – 09:30	Working groups convene to make changes to first reports
09:30 – 10:30	Plenary on goals / solutions and filters
10:30 – 11:00	**TEA BREAK and group photos taken**

11:00 – 13:00	Working groups convene and begin second task
13:00 – 14: 00	**LUNCH BREAK**
14:00 – 15:00	Plenary session to present and discuss goals / solutions
15:00 – 15:30	Working Groups convene to continue with second task
15:30 – 16:00	**TEA BREAK**
16:00 – 17:30	Working Groups convene and finalise second task
19:00 – 20:00	**DINNER**
WEDNESDAY 21ST	**JUNE 2006 - DAY 3**
07:30 – 08:30	**BREAKFAST**
08:30 – 09:30	Plenary session to complete task two
09:30 – 10:30	Discussion of third task: Strategies and Action plans
10:30 – 11:00	**TEA BREAK**
11:00 – 13:00	Working Groups reconvene to carry on with task three
13:00 – 14:00	**LUNCH BREAK**
14:00 – 15:00	Plenary Session to report back on task three
15:00 – 15:30	**TEA BREAK**
15:30 – 17:30	Working Groups reconvene to carry on with task three Plenary session to finalise task three
19:00 – 20:00	**DINNER**
THURSDAY 22ND	**MARCH 2006 - DAY 4**
07:00 – 08:00	**BREAKFAST**
08:00 – 10:30	Working Groups reconvene to finalise reports Group integration: Prioritise all solutions
10:30 – 11:00	**TEA BREAK**
11:00 – 12:30	Plenary session to present working group reports, discuss management recommendations and report completion
	Workshop closure and survey
13:00 – 14:00	**LUNCH BREAK**
	Departure by delegates

Appendix 4: Participants Goals and Hopes

Workshop participants were asked to write down the answers to the following two questions:

1. What do you want to accomplish at this workshop?
2. What do you think you can contribute to this workshop?

I wish to accomplish	I wish to contribute
A way forward will be developed that outlines appropriate conservation action plans, which will result in the wise management of Oribi.	Strategic regional landscape conservation experience.
A comprehensive and practical Oribi conservation plan that will enable the decline of Oribi to be halted and eventually see populations stabilise and then increase to match suitable habitat.	As a generalist I hope to be able to contribute in any way possible, legal, ecological, behavioural and practical facets in the development of the Oribi conservation plan.
Develop a clear way forward for the conservation activities of the EWT's OWG. Getting everybody working towards a common good for Oribi, with buy-in from all stakeholders.	A very basic understanding of the needs and requirements of Oribi. Knowledge of the structure and functioning of the OWG.
Work towards the establishment of the workable and realistic goal of conserving and improving Oribi numbers and habitat. Develop a plan which is achievable to attain this goal. In my work I deal with a lot of development in Oribi habitat and hopefully the outcome of this workshop will assist me to better comment on development that destroy Oribi habitat.	Use my experience and knowledge to help develop this plan.
Highlight what the solutions will be to turn Oribi numbers around. Understand exactly what the root causes are regarding the threats that Oribi face.	Share my experience to-date on working towards improving the status of Oribi.
Personally obtain information on: Oribi population trends, threats and proposed Oribi management recommendation. Bigger picture: agreement with regard to Oribi threats and proposed solutions and coordinated plans with regard to Oribi management involving the private sector.	Inputs with regard to wildlife management generally, Oribi situation in Mpumalanga and involvement of private sector.
Develop an implementable conservation strategy for Oribi in South Africa and develop / come up with a coordinated national approach to Oribi conservation in South Africa.	Learn more abut Oribi and threats in general and hopefully give input into discussions regarding awareness and issues in Mpumalanga.
Crystalisation of management strategy Best management practice – nitty gritty of management / detail / quantification of habitat.	Some detail and practicalities of management.
I would like to see a model (Vortex) that will show the long-term future of the Oribi and indicate the best ways to manage for their long-term sustainability.	I would like to contribute towards identifying and encouraging sound management of suitable habitats for Oribi and conservation significant areas protecting Oribi.
Identify problems re: Oribi conservation and come up with sustainable and practical solutions to address solutions to address these	To help identify problems re: Oribi and hopefully contribute to the conservation of Oribi. Contribute in any way to accomplish this

problems. To come up with a strategy to secure the long-term survival of Oribi in their natural habitat.	strategy.
That a clear directive is formulated for securing the future of Oribi in South Africa.	I wish to contribute my knowledge about Oribi, as I have managed a reserve with an Oribi population on the reserve, as well as having worked with farmers, landowners and reserve managers who have Oribi populations on their farms and reserves.
Time bound action plan that is practical to implement.	Knowledge of the protected areas in the Drakensberg and Midlands and experience in working outside protected areas (communities) on land-use change applications.
A practical prioritised way forward for the long-term benefit of Oribi and their conservation.	Many years of practical experience with Oribi conservation and management.
Consensus on the way forward – practical achievable message for all landowners who accept land within the Oribi range.	Experience in dealing with a wide range of Oribi stakeholders (present and potential).
The importance of habitat conservation as well as Oribi itself is recognised. To educate and allow people throughout the previously vast suitable habitat areas for the Oribi a chance to get involved in Oribi conservation. There may be large tracts of land available for Oribi conservation that with a little incentive may become available.	Be an important link in Oribi conservation in the Greater St Lucia Wetland Park. There are large areas that if properly managed may be suitable for this cause.
Establish guidelines which can translate into policy for law enforcement and public awareness of the reasons for such laws.	Bring to the group experience in investigating wildlife related crimes and can share this with the members as well as benefit from networking with persons who can assist in various aspects of such investigations.
Implementation of stricter enforcement of laws regarding: developments threatening Oribi habitat, dog hunting and illegal capture / movement of Oribi.	Anything from my research and any assistance needed with regards to fieldwork, more research needed.
Confirm and adapt existing work and plans. Identify priorities. Improve contact and communication with landowners. Practical and realistic ideas that will benefit Oribi.	Contact with Timber Industry. The landowner perspective. The realisation that see potatoes into the future are a bigger threat than trees to Oribi habitat.
Develop and implement a management strategy for the province (KwaZulu-Natal). This should serve as a prototype for the other provinces in South Africa.	My particular contribution will be primarily in data management and collation of available information.
Maintain and promote the mission statement prescribed by the OWG. Update any gaps in the “system”.	An understanding into a GIS related habitat suitability analysis in KwaZulu-Natal and promote the benefits of such a tool in Oribi conservation.
I hope that a practical working solution will be agreed on, for the very important task of saving the South African Oribi population.	I would like to contribute – ideas around relocation of Oribi and also to offer habitat and protection for the release of doomed Oribi populations.
Plans - which can be practicably implemented,	Whatever knowledge or practical information

to ensure the future existence of Oribi in South Africa?	that I can impart, based on what I have learnt from my experience as a wildlife researcher and consultant (over 40 years experience).
A prioritised conservation plan, with good buy-in for Oribi. Good sharing of knowledge and input of expertise into the workshop.	Assist with the development of a population model that can be used as a basis for the development of management and research needs within the PHVA workshop and improved as more information is acquired.
The formulation of an implementable action plan for Oribi. Identification of key areas (focus) to drive Oribi conservation. Support for grassland conservation in the province. Support to ensure areas of habitat are secured for conservation, in perpetuity.	An understanding of the dynamics of dealing with private landowners, on whose properties, most Oribi occur. Experience in grassland conservation and importance of securing suitable habitat. Input into an action plan for Oribi.
Come out with a clear set of actions (time-bound) which, if implemented, will result in a stabilisation of the current population decline and ultimately an increase in the population in South Africa.	Some knowledge of Oribi ecology, conservation biology principles and experience in developing conservation strategies.
Agreement on methods to increase the ranges of Oribi within South Africa. Consensus on restrictions / permits for the movement to other areas (relocation).	Ideas on relocation and protection of Oribi. Offers of habitat for conservation of historically inhabited areas.
Clear direction on future processes for Oribi movement and introduction. Private landowner involvement on the forefront. Clear direction on captive breeding.	Guidance with regard to legislation and "security" of current populations. Identification and suitability assessment of possible properties for introduction.
Decisions for permitting Oribi capture from Chelmsford for reintroduction to suitable "safe" habitat on private properties i.e. KwaZulu-Natal. Direction for better Oribi management. Understanding the dynamics for Oribi conservation.	Whatever possible?

Appendix 5: The Endangered Wildlife Trust and CBSG Southern Africa

The Endangered Wildlife Trust (EWT) is one of the largest non-governmental conservation organisations in southern Africa and was established in 1973. Widely recognised by its prominent red cheetah spoor logo, the EWT conserves biodiversity through the hands-on conservation of threatened species and their habitats, in a sustainable and responsible manner. Coordinating more than 100 field-based conservation projects and with 18 specialist Working Groups operating throughout southern Africa, Endangered Wildlife Trust programmes cover a wide variety of species and ecosystems and play a pivotal role in conserving southern African biodiversity and natural resources.

Vision Statement:

A healthy planet and an equitable world that values and sustains the diversity of all life.

Mission:

The Endangered Wildlife Trust is dedicated to conserving threatened species and ecosystems in southern Africa to the benefit of all people.

The Endangered Wildlife Trust with its access to a rich and diverse range of conservation expertise established CBSG Southern Africa in partnership with the CBSG, SSC / IUCN in 2000. Nine CBSG regional networks exist worldwide, including CBSG Indonesia, India, Japan, Mesoamerica, Mexico, Sri Lanka, Europe and South Asia. Regional CBSG networks are developed in regions requiring intensive conservation action and each network operates in a manner best suited to the region and local species. CBSG tools are adapted according to the needs and requirements of regional stakeholders and species and local expertise is utilised to best effect.

CBSG Southern Africa's mission is: *To catalyse conservation action in southern Africa by assisting in the development of integrated and scientifically sound conservation programmes for species and ecosystems, building capacity in the regional conservation community and incorporating practical and globally endorsed tools and processes into current and future conservation programmes*.

CBSG Southern Africa, operating under the banner of the Endangered Wildlife Trust is a non-profit, non-governmental organisation, serving the needs of the *in-situ* and *ex-situ* conservation community in southern Africa through the provision of capacity building courses, species and organisational Action Planning, Population and Habitat Viability Assessment (PHVA) and Conservation Assessment and Management Planning (CAMP) workshops, communication networks, species assessments and a host of other CBSG processes for species and ecosystem conservation. CBSG Southern Africa works with all stakeholders in the pursuit of effective biodiversity conservation throughout southern Africa.

Contact CBSG Southern Africa on:
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