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Further case-studies from around the globe

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The re-introduction of Lichtenstein's hartebeest to Malilangwe Wildlife Reserve, south-eastern Zimbabwe

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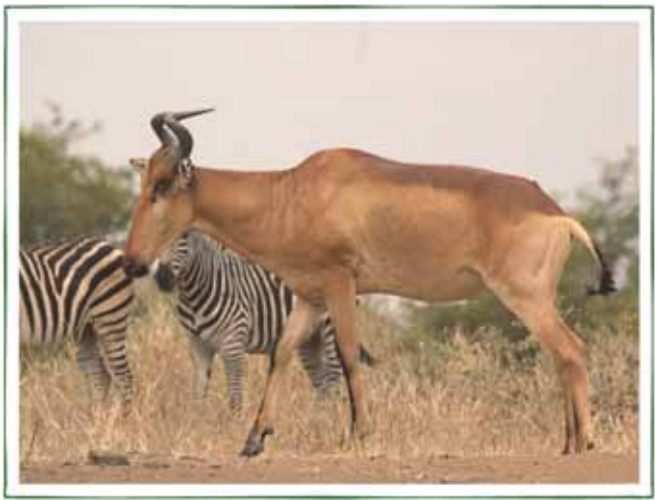
Introduction

Lichtenstein's hartebeest (*Alcelaphus buselaphus* ssp. *Lichtensteinii*) is an African savanna antelope inhabiting the ecotone between woodland and seasonally flooded grassland (Booth, 1980). Historically the species occurred from Tanzania southwards through central Africa to north-eastern South Africa. Although vulnerable to poaching, the species is labeled "of Least Concern" in the IUCN Red List of Threatened Species because key populations in Tanzania and Zambia are currently stable. At the end of the 19th century the species was widely distributed in what is now Zimbabwe (Selous, 1893). However, by the 1960's numbers had declined dramatically, with only a few herds remaining; these being confined to a few privately owned ranches in the south-east (Booth, 1980). Lone Star Ranch harboured the largest population, with approximately 38 animals recorded in 1976 (Booth, 1980). However, by 1993 drought-induced mortality had reduced this population to one known animal (Colin Wenham, pers. obs.).
In 1994, The Malilangwe Trust purchased Lone Star and Maranatha Ranches to form Malilangwe Wildlife Reserve (see Clegg & O'Connor, 2012 for a biophysical description of the reserve). A principal objective of the Trust is to restore the historic biodiversity of the reserve, and consequently re-introduction of Lichtenstein's hartebeest became an important management goal.



Lichtenstein's hartebeest © Bradley Fouche

Goals

- Goal 1: Determine whether suitable habitat

for Lichtenstein's hartebeest exists after the catastrophic droughts in 1983 and 1992.

- Goal 2: Establish a viable nucleus of breeding animals within a fenced enclosure.
- Goal 3: Establish a self-sustaining, free-ranging population by releasing animals from the breeding nucleus onto the reserve.

Success indicators

- Indicator 1: Number of animals in the fenced breeding enclosure is growing at or close to the maximum intrinsic rate of increase.
- Indicator 2: In the absence of catastrophic events, the established free ranging population is predicted to remain viable for 50 years.

Project Summary

Feasibility: On Lone Star, Booth (1980) showed that hartebeest selected for shallow, seasonally waterlogged, grassland depressions at the headward ends of drainage systems in dry woodland or bush vegetation. After Booth's study in 1976, these vegetation communities, which are known as dambos, underwent compositional and structural changes in response to severe droughts in 1983 and 1992. Consequently, in 1996 a study was conducted to determine whether suitable habitat for Lichtenstein's hartebeest still existed at Malilangwe (Clegg, 1999). Despite significant compositional changes to the herbaceous layer, and some bush encroachment by woody plants, the dambos at Malilangwe still provided suitable habitat, so it was decided to go ahead with the re-introduction.

Implementation: A breeding nucleus of 30 animals (1 adult male and 29 adult females), that had been sourced from Choma, Zambia (10 in 1996 and 20 in 1998) were kept in quarantine pens at Triangle for 21 days before being released into a 500 ha enclosure that had been constructed in prime hartebeest habitat at Malilangwe. By 2002, the number of animals had increased to 72, but mortality of 20 (18 from exposure) dropped the number to 61 in 2003. To spread the risk of further catastrophic mortality, a group of 6 animals was moved in 2004 to a second 500 ha enclosure that had been constructed in the north-east of the reserve. Animals in the enclosures were monitored daily by scouts on foot who recorded the age and sex of each individual and the cause of any mortality. The population in the first enclosure increased at an average rate of 30 % per annum, which is close to the maximum rate of increase for an antelope of this size. In June 2004, 24 animals (1 adult male, 12 adult females, 4 sub-adult males, 3 subadult female, and 4 juveniles) were released from the first enclosure; the remaining 26 being retained.

By October 2006, the free-ranging population had increased to an estimate of 51, with a captive population of 43 (33 in the first enclosure and 10 in the second). In 2007, the remaining 33 animals (3 adult males, 11 adult females, 4 subadult males, 6 subadult females, and 9 juveniles) in the first enclosure were released onto the reserve, and the enclosure dismantled. The captive animals in the second enclosure had increased to 12, and were retained as an insurance policy. This population has grown at an average rate of 17 % per annum, and only in the

Attaching a radio-collar on hartebeest

last few years has it entered the exponential phase of a logistic growth curve (the population stood at 26 in 2012).

Post-release monitoring: Since 1999, an annual census of the large mammal species has been conducted at Malilangwe using a helicopter and distance sampling techniques. In this way, estimates of the free-ranging hartebeest population have been derived annually from 2004 to 2012. After an initial increase from 24 animals in 2004 to 81 in 2007 (the population was boosted by a second release of 33 animals in 2007), the free-ranging population has shown a steady decline to an estimate of 60 animals in 2012. The main cause for this decline appears to be unsustainable levels of predation of adult females. Small populations are highly sensitive to loss of the adult female age class, and mortality of as few as 4 adult females per year can put a population of <100 into decline (Capon, 2011).

Although numbers increased rapidly in the enclosures, current levels of predation by lion and other large carnivores will result in extinction of the free-ranging population in the next 6 years, if it is not supplemented by further releases from the captive population.

Major difficulties faced

- Elephant damage to the fences of the enclosures was a constant problem.
- In the enclosures, juvenile hartebeest were killed by leopards, which had to be caught and relocated.
- Lions were a serious threat because if they managed to access the enclosures they invariably killed adult hartebeest, which had a greater impact on growth of the population than the loss of juveniles. In the process of trying to remove a lioness from the first enclosure, Malilangwe's Wildlife Manager was mauled.
- Exposure during cold, wet periods in the dry season, when the hartebeests' reserves were at their lowest, was an infrequent but significant cause of mortality.
- Adult bulls are very aggressive, and will fight and kill subadult bulls (>I year) if these are not removed from the enclosure.
- Balancing the requirements of a photographic tourist operation that relies heavily on frequent sightings of the large carnivores, and the needs of a small re-introduced antelope population that is highly sensitive to predation, is a particularly difficult management problem. Capon (2011) showed that a lion

density in excess of 0.05/km^2 appeared to be unsustainable for a population of sable antelope at Malilangwe. This may also be true for the hartebeest population. The current lion density at Malilangwe is 0.07/km^2, but it has been as high as 0.1/km^2 in the past.

Major lessons learned

- Successful re-introduction of a low density antelope is only possible under conditions of low predation. To establish a self-sustaining, free-ranging population of hartebeest at Malilangwe the lion density should possibly be <0.05 km^2.
- To achieve rapid growth of the breeding nucleus there should be sufficient breeding animals (>30) to ensure that the population is positioned within the exponential phase of the logistic growth curve. With an initial nucleus of only 6 animals, it took the population in the second enclosure five years to enter an exponential growth phase.
- A massive outbreak of anthrax occurred at Malilangwe in 2004. Despite mortality of several species in the enclosures, no hartebeest succumbed to the disease. Hartebeest appear to be particularly resistant to anthrax.

Success of project

Highly Successful	Successful	**Partially Successful**	Failure
		√	

Reason(s) for success/failure:

- The re-introduction can only be considered partially successful because the established free-ranging population is currently not self-sustaining, with extirpation being prevented only by periodic supplementation from the captive population.

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