# Capture of juvenile elephants from the Tuli Block, Botswana

Keith Lindsay
Oxford, UK
5 November 1998

## Introduction

Statements have been made in a variety of media, to the press, on radio and on websites, in support of the capture and removal from their natal family units of 30 elephants in the Tuli Reserve in south-eastern Botswana. A number of these statements have sought to justify the removals as a credible method of population control, given that there are "too many elephants" for the habitat to support. There are so many flaws in this line of argument, and so little logic, that they must be addressed one by one.

## Policy issues in the Tuli Block

As far as I am aware, there is no clear policy on elephant population size and habitat conservation in the Tuli Block, apart from an oft-stated belief that there are simply "too many", sometimes with numbers attached, such as "four times too many" or "ten times too many". One would think that the authors of such statements must have a clear idea of the "right number" of elephants, possibly backed up by sound scientific data and an unambiguous management plan for the area. It is true that, over the past decade, there have been studies of elephant interactions with woody vegetation in the Tuli reserve, and these have documented impact on certain tree species in specific areas. In at least one of the studies, a number of other factors were suggested as possible sources of stress on trees, which may act separately or in combination with elephant browsing. The drying-out of the area, due to climatic factors but also to large-scale extraction of water from the Limpopo and Shashe rivers has been suggested as a possible factor militating against the health of trees.

However, while these studies may have documented habitat change and suggested reasons for it, none have attempted a scientifically-based estimate of the "right number" of elephants for the Tuli Block. To date, such estimates that exist in the minds of managers of the "right number" are based on seat-of-the-pants guesses, or extrapolation from other areas. What they are essentially saying is that because trees are dying, we "know" there are too many now and so "a smaller number" must be right.

It is certainly possible, even likely, that elephant densities are excessive for the continued survival **in their current state** of certain of the plant species, some community or structural types and some animal species in the Tuli region. The most rational approach for managing elephants for habitat conservation in the Tuli Block would be to identify the plants and plant communities that are affected and to determine if these are genuinely of priority concern to people. An important part of such a determination exercise should be the recognition that in semi-arid savanna ecosystems, habitat change is the norm rather than the exception and that interventions to prevent change can often act to reduce biodiversity.

If there has been a thorough examination of the arguments that results in the identification of key habitat features of concern, a decision may then be made to reduce elephant density in the areas where they occur. There are a number of means by which this reduction could be achieved:
-increasing the size of the reserve
-manipulation of water supplies, i.e. closing or preventing access to water sources in the priority areas,

-manipulation of burning regimes to remove other attractive foods such as grasses which may attract elephants to the priority areas, or alternatively to encourage the same alternative foods so that elephants browse less in the priority areas,
-fencing of selected areas,
-disturbance shooting or pepper-spraying,
-translocation of adults or family units or
-culling.
Culling would be the most immediate, if least imaginative, option.

At the same time, there should be monitoring of the vegetation to see if the action taken has the desired effect on habitat conditions. Ideally, the management should be undertaken as an experiment, with some areas left as controls for comparative purposes.

All the above assumes that the appropriate management authority for the area has developed a rational, adaptive management plan for elephants, which is subject to regular review on the basis of the findings of scientific research. In this way, the “right number” of elephants for the Tuli Block could be estimated and then refined with some confidence. In the absence of a rational plan, then any such estimates can only be described as wild guesses; any management actions cannot be regarded as rational.

Whenever translocation or culling is undertaken in other protected areas, then whole family units, rather than a small number of juveniles, are removed. This is done for two very good reasons: 1. of minimising disturbance effects on the remaining animals and 2. for having a significant effect on consumption of vegetation and population size and growth.

In order to bring some numerical order to the debate, I include below some very basic calculations that show the likely impacts of removing small numbers of juvenile female elephants on habitats and population growth.

**Forage intake and habitat impact**

Although it has been stated that the elephants were 5-10 year olds, the ages 2-5 years appear more likely (reports by Poole). Removing juvenile elephants of 2-5 years will have minimal effect on the elephant population’s impact on habitats. Assuming they consume food in proportion to their metabolic requirements, female animals aged 2 to 5 years consume only 25% - 43% of the forage of a fully-grown adult. Even 10-year old females consume only some 67% of an adult’s daily forage intake.

| Age | Shoulder ht (cm) | Weight (kg) | Active MR in MJ/day | AMR as % of 59yr old |
|---|---|---|---|---|
| 0 | 92.4 | 140 | 23.8 | 13.3 |
| 1 | 109.1 | 227 | 34.3 | 19.2 |
| 2 | 123.8 | 328 | 45.2 | 25.3 |
| 3 | 136.8 | 439 | 56.2 | 31.5 |
| 4 | 148.2 | 555 | 67.0 | 37.5 |
| 5 | 158.2 | 672 | 77.3 | 43.3 |
| 6 | 167.1 | 787 | 87.1 | 48.8 |
| 7 | 174.9 | 899 | 96.2 | 53.9 |
| 8 | 181.7 | 1005 | 104.6 | 58.6 |
| 9 | 187.7 | 1105 | 112.3 | 63.0 |
| 10 | 193.0 | 1199 | 119.4 | 66.9 |

Shoulder heights at age are derived from data collected in Amboseli NP in Kenya (Lee pers comm), but the figures are comparable to data for Luangwa in Zambia published by Hanks (1972). Shoulder height to weight relationship is taken from Laws et al (1975, p188). Active MR is 2 x Basal MR, taken as $0.293 \times W^{.75}$.

If there is concern over habitat impact, it makes much more sense to reduce the density of adult animals, or adults and juveniles in family units.

**Population dynamics**

I employ a very simple spreadsheet age-structured model of the female population for two reasons: 1. it was mostly females that were taken, 2. most simple models of mammal populations consider only females, as they are the ones producing the offspring.

With the following parameters (average figures across drought and good years from a variety of studies):
Starting population = 500 females (= half of the 1000 animals reported for Tuli)
Age at first calf = 12 years
Calf interval = 4 years
Mortality in 1st year = 10%
Mortality in 2nd year = 5%
Mortality > 2 years = 1%,
the population grows at 4.3 % per annum.

Removing 25 juvenile female calves, of estimated age 2-5 years, from a population of 500 females results in a reduction of population size to 497 in the year of the removal, but numbers increase to 520 in the immediately following year and continue to increase thereafter.

The population growth rate in the year of removal drops to –0.7%, but increases to 4.6% in the immediately following year because of age structure effects. This rate is sustained for 5 years and the rate of 4.3% is returned to after some 10 years. When the effect of the removal reaches the reproductive age classes, after 7-10 years, the population growth rate drops only to 4.2%, but this effect is felt for only 3 years. If, for the sake of argument, the animals are removed from the 5-9 year classes, the same scenario is found, but the rise, dip and levelling of growth rate occurs a few years earlier.

The model may be run with different parameters for reproduction and mortality rates but it will produce results which are, while slightly different in numerical terms, essentially the same in significance: removing small numbers of juvenile animals will have little sustained impact on population processes.

**Conclusions**

As can be seen from the discussion above, the argument that the removal of 30 juvenile elephants, 25 of them female, from their families can be justified on ecological grounds is mistaken. Such removal can have little ecological effect, either on the grounds of habitat impact or population size and growth. Other more imaginative and/or effective methods should be employed if the managers are serious about wishing to control elephant densities and at the same time to refine their estimates of optimal numbers.

The suggestion that the juveniles were likely to die anyway during the current dry period, and therefore were better off being taken into captivity, runs counter to the argument that the removals were a form of population reduction. As well, elephant mortality during droughts is **normal** in wild populations and the Tuli Block is **normally** subject to periodic droughts. The suggestion that elephant calves should be taken away from their families and into captivity

during droughts “for their own good” is losing sight of what nature conservation is supposed to be about. It is unlikely that in July and August (mid-dry season) the elephants were in malnourished condition; indeed if they were so, the capture would have risked their survival.

There has been some justification of the removal on financial grounds, in that the animal dealer was willing to pay a fairly large sum for each animal and this money could be used for supporting the management activities of the reserve. If this is the real reason for the exercise, then it should be stated honestly, rather than from behind a smokescreen of supposed habitat benefits. However, the market for live elephants will never be significant on a sustained basis, and such efforts can only be seen as marginal, periodic exercises.

Given the very limited benefits and substantial costs in terms of disturbance to the remaining animals (and certainly to those removed), the removal cannot be seen as a worthwhile undertaking.

Keith Lindsay is an Oxford-based wildlife ecologist with 25 years experience in field and analytical studies in North America and Africa. He studied elephant feeding ecology and population dynamics in Amboseli, Kenya in 1977-84 and retains an involvement with its ongoing long-term research programme. During 1988-92 he worked as a range/ wildlife ecologist with the Botswana Department of National Parks.