Elephant Social Dynamics, Spatial Ecology and Human Elephant Conflict in the Makgadikgadi Salt Pans and Kalahari Ecosystems

August 2009

Submitted to: Department of Wildlife and National Parks, Botswana
Funded by: The San Diego Zoo and Elephants Without Borders

Michael Chase
Elephants Without Borders
Po Box 682
Kasane
Botswana
Tel/Fax: ++267 6250202
Email: er@info.bw

PROJECT NARRATIVE

Background

Conservation management plans for wildlife species require accurate and reliable longitudinal information about population size, distribution, demography, reproductive rate and habitat use. However, obtaining detailed data is often hampered due to financial and time constraints imposed on local governments and scientists. Our fundamental aim in this segment of our elephant ecology study in the Kavango Zambezi TFCA is to augment the elephant conservation efforts of the Botswana Government by conducting research on the ecology of elephants in the Makgadikgadi and Kalahari ecosystems to identify factors regulating the spatiotemporal distribution and habitat use of elephants. Our ultimate goal is to share this information with appropriate authorities, communities and the scientific community, in order to mitigate Human Elephant Conflict (HEC) while simultaneously promoting the conservation of African elephants and their natural habitats in Botswana.

Our study is unique and timely in that it monitors elephant range patterns in and out of national parks, across international boundaries and in habitats ranging from nearly desert to wetland/riverine environments. No other study has sought to conserve a "flagship" species by incorporating such a large and varied ecosystem. By adopting the most rigorous scientific methods and state-of- the- art techniques to derive estimates of elephant population size and distribution, as well as movement patterns across the region, we will greatly improve our understanding of the dynamic forces regulating elephant life histories, and their interactions with people thereby make significant contributions towards elephant conservation in Botswana.

Statement of Need

The elephant range in Botswana is not a static feature. As the elephant population continues to grow, the northern Botswana elephant range is expanding rapidly. Elephants are re-occupying areas from which they have been absent for many years. During the past 15 years the elephant range in Botswana has expanded by 43%, causing increasing concern about the impact of elephants on biodiversity, the viability of other species and the livelihoods and safety of people living within the elephant range (Chase, 2007).

The most striking expansion of elephant range has occurred south along the Boteti River towards the Makgadikgadi, and west of the Okavango Delta towards XaiXai along the Namibian border. Elephants are being seen as far south as the Central Kalahari Game Reserve, Ghanzi, Rakops and Khutse Game Reserve (Chase, 2009). The movements of elephants, their social dynamics and impacts on people around these periphery regions are currently limited. We aim to assess human-elephant conflict cases that are occurring on the periphery of the elephant range and suggest appropriate counter-measures.

In addition to affecting people, elephants might be impacting delicate habitats. In parts of Makgadikgadi Pans National Park the vegetation is unique and fragile (e.g. stands of *Hyphaene petersiana* palms). Chase (2008) recorded a large elephant concentration (n =

3000) in the east Caprivi Strip of Namibia, which is largely driven by the ripening of the trees fruit. In August satellite collared elephants in Chobe will move across the Chobe River to feed on these palm forests in the east Caprivi. The newly formed leaves, which are crisp at their base and have a pleasant coconut flavour, are eagerly consumed by elephants. Elephants probably also act as dispersal agents. It is suspected that the occurrence of palm trees in the Makgadikgadi Pan today is an indication of elephant presence in that area when permanent water was still available (Roodt, 1998).

In 2008, fifteen artificial water holes were installed to simulate water in the Boteti River, which is now flowing for the first time in 16 years. On the 12 August 2009 the water had passed 5 km south of the Khumaga DWNP entrance gate. Both artificial waterholes and the recent arrival of water in the river are likely to attract more elephants. Further, elephants are currently having severe impacts on the fence, which was built along the west and southern boundary of the Park. Elephants have only been recorded (in recent times) in this area since 1995 and the riparian area suitable for elephants is very limited (Ferrar, 1995). Water availability, in this previously dry and arid region will inevitably lead to high densities of bull elephants (and possibly cows). Increasing numbers of elephants will place pressure on the delicate riparian old growth *Acacia erioloba* stands along the Boteti River. In the southern part of Nxai Pan and Makgadikgadi National Parks the Baines and Greens Baobabs are important tourist attractions.

This is the first elephant satellite telemetry study in the Makgadikgadi and Kalahari ecosystems and aims to improve our understanding of the population dynamics, spatial ecology, habitat use and human elephant interaction of elephants on the periphery of their range.

PROJECT OBJECTIVES

1. How many elephants are there in the Makgadikgadi and Kalahari ecosystem?
2. The spatial distribution of elephants in relation to land cover and land use
3. Determine the demographic structure of elephant herds, including herd size, sex ratios, age/size composition, reproductive rate, and mortality rate
4. Conduct satellite telemetry studies of elephants to determine seasonal movements, and habitat use
5. Identify corridors and barriers to elephant movements
6. Conduct landscape-scale GIS analyses of the spatial and temporal factors affecting human elephant conflict.

METHODS AND PROJECT ACTIVITIES

Study Area

The western extent of the study area extends along the border of Namibia to approximately 20^0 E. The southern boundary extends from the Khuke Fence east and then south to the Boteti River. The southern extent of the study area follows the Makgadikgadi National Park boundary, which joins the Ngwasha Fence (near Odiakwe) and extends eastward to the Zimbabwe border. However, elephants do move through

damaged sections of the southern extreme of the Ngwasha Fence towards Gweta and Nata. As such, the southern boundary intersects with the Maun-Nata Road near Gweta, and continues east to the border with Zimbabwe near Sepako Village.

Locating elephants to collar from the air

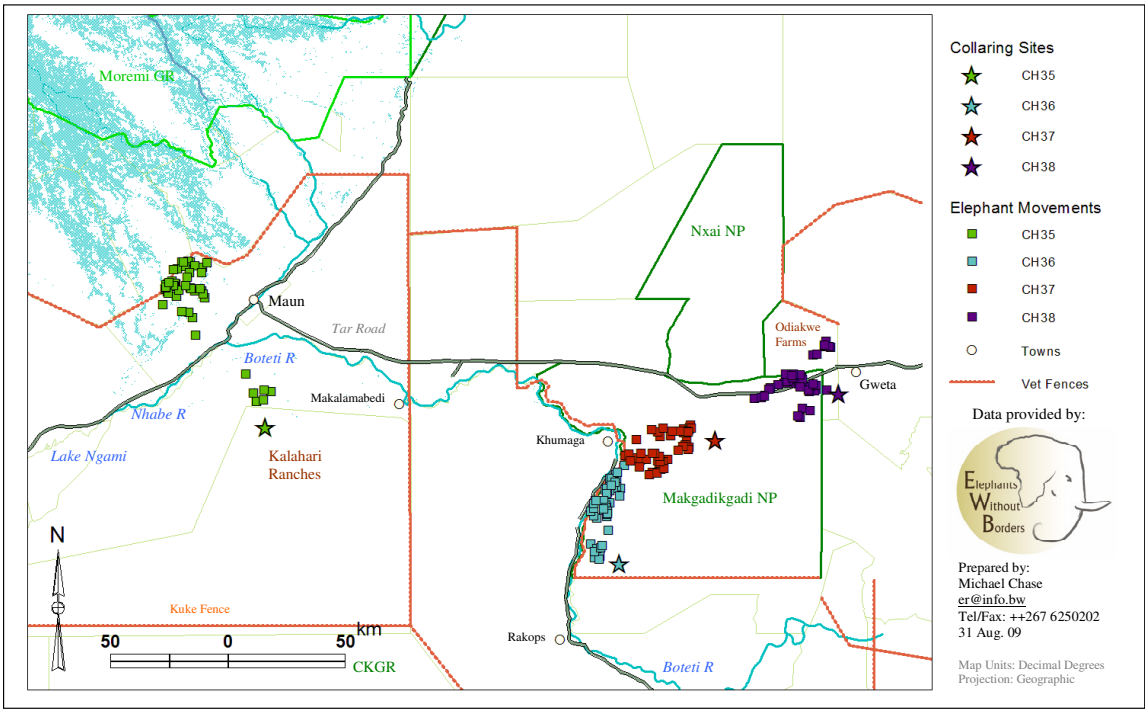
A small fixed wing plane was used to help locate and identify elephants to collar. A team of three aerial observers flew for nine hours between the Boteti River near Maun and the southern and eastern boundary of Makgadikgadi National Park, searching for elephants. A total of three elephant herds {1 family group (n = 16) and 2 bulls groups (n=1), n = 8)} were observed near Kwebe hills, 30km west of Samedupi. On the day of collaring we could not locate the family group to collar an adult elephant cow. In the Makgadikgadi NP numerous bachelor groups consisting of bulls of all ages were observed along the Boteti River. One bachelor group (n = 9) was observed 12.5km south east of Gweta.

We had anticipated collaring elephants near Toteng, but unfortunately no elephants were observed by our spotters in this region.

Capture and Collaring

A Bell Jet Ranger helicopter was used to dart the elephants from the air. From 11 to 13 August 2009, four elephant bulls were immobilized and fitted with satellite transmitters. Wildlife veterinarian, Dr. Larry Patterson with the help of Peter Pearlstein of Okavango Helicopters, immobilized the animals. Elephants Without Borders and San Diego Zoo researchers fitted the satellite collars to the elephants. Based upon the excellent performance of African Wildlife Tracking satellite collars during the Botswana segment of the elephant research project, we deployed the same collars on these four elephants. We distanced the collaring sites as far apart from each other as possible (Fig. 1). All the elephants appeared to be in good physiological condition.

Figure 1. Collaring sites of four elephants, and their movements from 15 - 30 August 2009, on southern periphery of the Botswana elephant range



Starting in August 2009, Elephants Without Borders will provide monthly updates on the movements of these collared elephants.

Acknowledgements

This collaring exercise was made possible with the generous financial support received from the San Diego Zoo, Rockefeller Family Foundation as well as Larry and Patty Malashock. Kelly Landen and Fred Bercovitch contributed to the logistical support of the collaring exercise. We extend our thanks to Dr. Cyril Taolo and Department of Wildlife and National Parks personnel for their support of this research project. The Department of Civil Aviation is acknowledged for providing the project with the necessary over flight and landing authorization to conduct this collaring exercise. Desert and Delta Safaris are acknowledged for allowing us to use their airstrip near Khumaga.

References

Chase, M.J. (2007a) Elephant collaring exercise in the West Caprivi, Namibia. Elephants Without Borders, Kasane.

Chase, M.J. (2007b) Home ranges, transboundary movements and harvest of elephants in northern Botswana, and factors affecting elephant distribution and abundance in the Lower Kwando River Basin. Phd, Dissertation. Dept. of Wildlife and Fisheries Conservation. University of Massachusetts, Amherst.

Ferrar, T. (1995). Makgadikgadi/Nxai Pan Management Plan. Ministry of Commerce and Industry. Department of Wildlife and National Parks. Gaborone. Botswana.

Roodt, V. (1998). Trees and Shrubs of the Okavango Delta, Medicinal Uses and Nutritional Value. The Shell Field Guide Series: Part 1. Shell Oil. Gaborone. Botswana,