
Collaring Report

Ecology of elephants in the Okavango Delta, Botswana

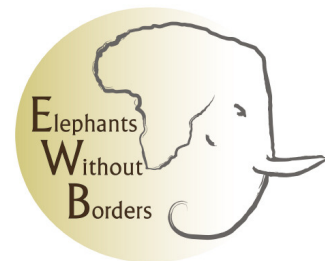
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Management of NG 26 Concession

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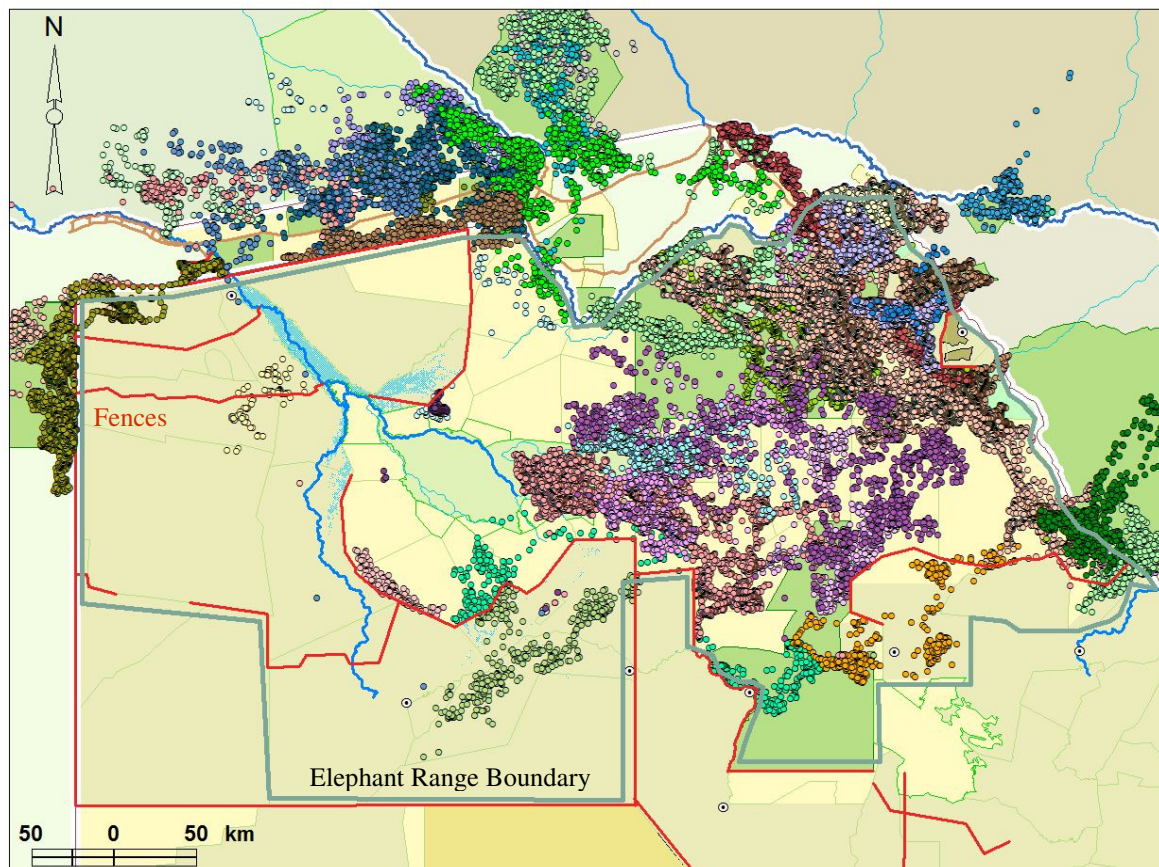
PROJECT NARRATIVE

Statement of Need

The elephant range in Botswana is not a static feature, it is expanding. This recent expansion can be attributed to two factors. The first is related to density dependent dispersal, increasing elephant densities have encouraged elephants to roam further in search of food and water. The second factor is the recent availability of surface water either through artificial waterholes or the recent flowing of rivers which have previously been dry for ~25 – 30 years. Additional surface water to previously dry areas has increased the density of elephants and expanded their spatial distribution (Chase *pers. obs.*).

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 53%. Using aerial survey and telemetry data from 55 collared elephants the current elephant range in northern Botswana is estimated to be 138 000 km² (Chase unpublished data, Fig. 1). The current size of the elephant range is unlikely to expand any further, although occasional streaks into remote areas will continue. The current distribution of elephants is 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).

Figure 1. The movements of collared elephants and northern Botswana's elephant range.



The most noticeable range expansion in Botswana has occurred south towards the Makgadikgadi and west of the Okavango Delta towards Xai Xai. In 2009, Elephants Without Borders (EWB) collared four elephants in the Makgadikgadi National Park (NP) to better understand the southern expansion of the elephant range along the Boteti River towards the Makgadikgadi salt pans (Chase 2009).

The western segment of the elephant range study commenced in October 2009 when an adult elephant bull was collared west of Gumare, and an adult cow was collared along the Southern Buffalo Fence in NG 24. In July 2010, EWB expanded this segment of our study and collared two elephant bulls in NG 26 on the western fringes of the Okavango Delta. This report details the collaring of these two elephant bulls as part of the second phase of monitoring elephant range expansion in Botswana.

Brief history of elephants in the Okavango Delta

During the 1970s it was rare to observe elephants in the Okavango Delta. Their occurrence west of Chiefs Island was seldom recorded (Larry Patterson *pers. comm.*). In the aerial census conducted by Department of Wildlife and National Parks (DWNP) between January 1987 and September 1989, elephants were scarce west of 23°E, and over most of the southern and western Okavango Delta (Calef 1988). Beginning in the early 1980s the occurrence of elephants within the Delta began to increase. In recent years, it also appears that elephants are frequenting the areas of the Okavango Delta that have more permanent waters. Historically, elephants were scarce in these areas and were primarily found around the periphery of the delta's floodplains (Moraka 1984; Calef 1988). In contrast, aerial surveys conducted by Conservation International (Burm and Griffin 2000), elephants were widely distributed throughout the southern portions of the delta, both in more permanently flooded areas and seasonal floodplains.

The colonization and growing presence of elephants in the Delta may have been driven by increasing elephant numbers, the need to search for new sources of food which coincided with the gradual drying of the Savuti and Linyanti Rivers. The lack of water in these rivers could have enticed elephants to move towards the eastern parts of the Delta.

Whether elephants occurred in the Delta before the 1970s is unclear, but around the 1800s the whole country appears to have carried more surface water (Campbell 1990). Wetter conditions and more surface water may have reduced the need for elephants to rely on the Delta's water and vegetation. Hence, it would appear that elephants may have never occurred at the current densities being recorded in the Okavango Delta.

C.A. Spinage in 1990 wrote:

A further increase in the present (elephant) population will lead to increasing conflict ...unless elephants disperse south and southwest of the Okavango Delta where presently the density is very low. It is not known why the delta is under-utilized by elephants: none has been recorded there nor were any shot during the tsetse control operations.

The ecological role of elephants in the Okavango Delta

A 2009 aerial survey of a concession in the Okavango Delta estimated elephant densities to be 3.7 elephants km². This density is high when compared to Kruger NP which has 0.63 elephants per km² and where conservation managers are concerned about the impact of elephants on biodiversity (Chase 2009). A massive build-up of elephant numbers in the Delta has been followed by a decline in woodland density due to a combination of tree destruction by elephants and the effects of fire. The most noticeable impact is being exerted on *Acacia nigrescens* and *mopane* woodland, *Ficus sycomorus*, Marula (*Sclerocarya birrea caffra*), and Baobab (*Adansonia digitata*), which are highly favoured by elephant. These trees were established during periods of low elephant (and herbivore) biomass.

The impact elephants are having on the Delta's vegetation appears to be a recent disturbance. Mature mopane and acacia woodlands which would have been destroyed during the 1800s (had there been large elephant densities) are now being heavily browsed. The acacia trees in the Okavango Delta (and other tree species) are characterized by being uniformly mature, evidently having grown up in response to high water levels and low elephant densities. However, many of these mature woodlands are now being drowned by the high flood waters and together with heavy elephant browsing, this has resulted in increased pressure on mopane and acacia woodlands (Chase *pers. obs.*). The estimated 27900 elephants which currently occur within the Delta (DWNP 2004), are hastening the trees' destruction by ring-barking, resulting in patches of dead acacia and mopane forest. Like that created by the *A. tortilis* woodland flooded by Lake Manyara in the sixties, dead trees in the Delta can only be partially attributable to elephants. Regeneration of the acacia trees, it seems, would take place only in a much wetter phase and reduced elephant densities.

The recent flow of the Boteti, Linyanti, Selinda and Savuti Rivers could temporarily relieve elephant densities in the Okavango Delta.

This is the first satellite telemetry study to monitor the ranging behavior of wild elephants on the western periphery of the Okavango Delta. This segment of EWB's elephant movement study aims to improve our understanding of the spatial ecology, and habitat use of elephants on the western periphery of their range.

PROJECT OBJECTIVES

1. What is the current population status of elephants in the Okavango Delta?
2. Map the spatial distribution of elephants in relation to land cover and land use
3. Conduct satellite telemetry studies of elephants to determine seasonal movements, and habitat use
4. Identify corridors and barriers to elephant movements
5. Conserve mature tree species, through protection and establish seedlings

METHODS AND PROJECT ACTIVITIES

Study Area

The western extent of the study area extends along the border of Namibia to approximately 20° E. The northern boundary is defined by the Caprivi Border Fence to point where it joins the Okavango River near Shakawe. The northern runs along the Okavango River, and joins the Moremi Game Reserve's northern boundary. The eastern boundary joins the Makalamabedi Fence which extends south to the junction of the Khuke Fence. The southern boundary extends west along the Khuke Fence to the Namibian border.

Locating elephants to collar from the air

A small fixed wing plane, flown by Mr. Mike Holding, was used to help locate and identify elephants to collar. A team of two aerial observers flew for two hours over NG 26 looking for elephants. We observed numerous elephant herds throughout the western portions of concession.

Capture and Collaring

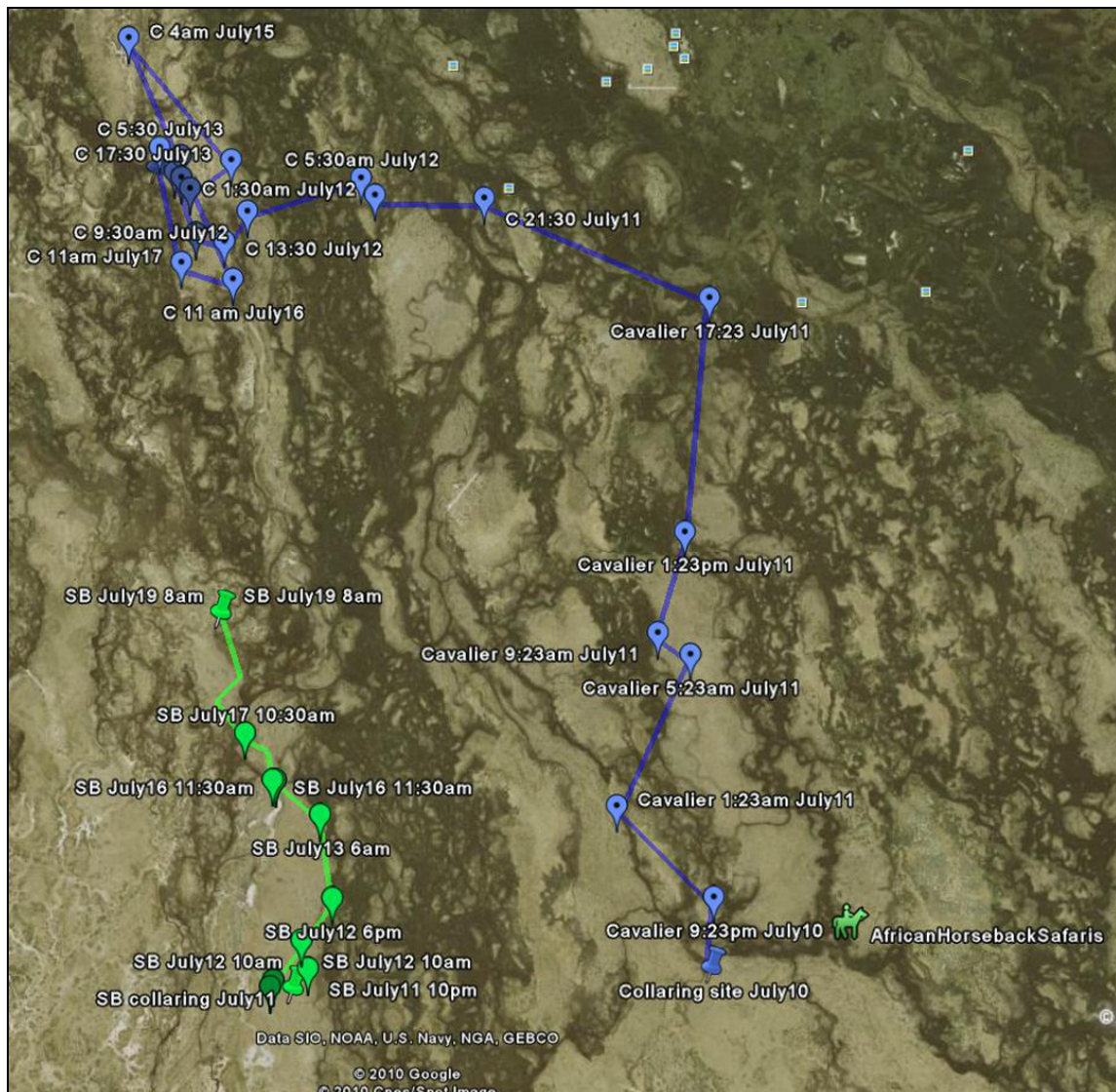
A Bell Jet Ranger helicopter flown by Mr. Peter Pearlstein was used to dart the elephants from the air. We darted two bull elephants. The first was collared on the July 10, 2010 while the second bull was collared on the 11 July, 2010. The elephant bulls were immobilized by wildlife veterinarian, Dr. Larry Patterson. EWB 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 two elephants. We distanced the collaring sites as far apart from each other as possible to avoid collaring elephants from the same clan thereby minimizing the probability of collecting movement data that would be similar. The elephants appeared to be in good physiological condition.

The collars deployed are new models capable of recording a GPS location *fix* every hour. The life span of the collar has also increased from 2 – 4 years due to stronger lithium batteries within the transmitter units. Researchers are now able to monitor elephant's movements for longer periods and a finer temporal resolution. This will undoubtedly provide us with new and seminal information of the ranging behavior of these elephants not previously recorded.

Table 1. Collared elephant statistics

Elephant CH 44	
ID	Cav.
VHF Freq.	150.
Sex	Bull
Age	30-35
Date Collared	10July2010
Herd Comp.	Lone Bull
Herd size	1
Shoulder Height (cm)	325cm
Right Tusk circum.	13.5 inches
Tusk Length (outer)	25 inches
Elephant CH 45	
ID	SB
VHF Freq.	150.
Sex	Bull
Age	40-45
Date Collared	11July2010
Herd Comp.	Lone Bull
Herd size	1
Shoulder Height (cm)	345cm
Right Tusk circum.	16 inches
Tusk Length	34.5 inches

Figure 1. Collaring sites of two elephant bulls, and subsequent movements, 10-19 July, 2010, western periphery of the Okavango Delta.



EWB has a total of 16 collared elephants with satellite transmitters. These two elephants will be added to the existing database, and monthly updates on the movements of all collared elephants will be sent to project collaborators.

Acknowledgements

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and the staff of African Horse Back Safaris are acknowledged for allowing us to use their airstrip and for hosting project personnel at their camp. We thank Mr. Mike Lorentz and the management of NG 26 for their support of this project and for allowing us to collar elephants in their concession.

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