Aerial surveys of Murchison Falls Protected Area, Uganda, March 2010

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Abstract

Murchison Falls Protected Area (MFPA)is the largest wildlife protected area in Uganda and forms one of the three sites that have been implementing the Monitoring the Illegal Killing of Elephants (MIKE) programme since 2002. A population survey of the MIKE site was conducted in March 2010 with the objective of establishing numbers of elephants and other medium and large mammals. The SRF method was used to determine wildlife distribution and numbers in MFPA. This method relies on counting within a systematically obtained sample (Norton-Griffiths 1978). The results of the survey indicate a general recovery and increase of major species, especially elephants, following a huge decline in numbers as a result of accelerated poaching that followed the breakdown of law and order in the 1970s and early 1980s.

Despite the fact that various methods were used in previous surveys, some in dry seasons and others in wet seasons, the results still show general species recovery and significant population increase of certain species. Most of the species—namely elephant, Uganda kob, giraffe, warthog, buffalo, hartebeest and waterbuck—are steadily increasing.

Résumé

L'aire protégée des chutes de Murchison (MFPA) est la plus grande aire protégée de la faune en Ouganda et forme l'un des trois sites qui mettent en œuvre le programme du Système de suivi du braconnage des éléphants (MIKE) depuis 2002. Un recensement de la population du site de MIKE a été effectué en mars 2010 avec l'objectif d'établir le nombre d'éléphants et d'autres mammifères de taille moyenne et grande. On a utilisé la méthode du Vol de Reconnaissance Systématique pour déterminer la distribution de la faune et leur nombre dans la MFPA. Cette méthode repose sur le dénombrement au sein d'un échantillon obtenu systématiquement (Norton-Griffiths 1978). Les résultats de l'étude indiquent un recouvrement général et une augmentation des espèces majeures, surtout les éléphants, suite à un déclin énorme du nombre causé par le braconnage accéléré qui a suivi l'effondrement de l'ordre public dans les années 1970 et au début des années 1980.

En dépit du fait qu'on a utilisé plusieurs méthodes dans les études antérieures, quelques-unes dans les saisons sèches et d'autres dans les saisons pluvieuses, les résultats montrent toujours un recouvrement général des espèces et une importante augmentation de la population de certaines espèces. La plupart des espèces à savoir, l'éléphant, le kob d'Ouganda, la girafe, le phacochère, le buffle, le bubale et le waterbuck augmentent régulièrement.

Introduction

In the 1960s wildlife population and diversity in Murchison Falls National Park, Karuma, and Bugungu Wildlife Reserves (now managed as Murchison Falls Protected Area) was high. Wild animals used to range freely inside and outside the MFPA. The 1970 s and early '80s were devastating times for wildlife in Murchison Falls Protected Area/MFPA, and the country as a whole due to heavy commercial poaching, mostly for meat and ivory as a result of the breakdown of rule and law at the time.

Population estimates of large mammal species in Murchison Falls Protected/MFPA Area are available from various counts conducted prior to 1973 and from aerial surveys conducted in 1980, 1995, 1999, 2005 and 2010 to determine animal population distribution and trends.

In 1980, the first SRF survey was conducted in MFPA to document estimates of smaller animal species such as kob and hartebeest; subsequent sample counts for MFPA were conducted during 1995/96, 1999/2000, in 2005 and 2010 (Sommerlatte and Williamson 1995; Lamprey and Michelmore 1996; Lamprey 2000, Rwetsiba et al. 2005; Rwetsiba et al. 2010).

In March 2010 a sample count (SRF) of medium to large mammals was carried out in MFPA to establish animal population size and distribution patterns. This survey was funded by the CITES-MIKE programme using funds provided by the European Union for the MIKE Phase Two for Africa.

The survey results generally suggest a recovery of wildlife populations in MFPA. This could be attributed to improved management and reactivation of anti-poaching patrols under strong and dedicated management of Uganda Wildlife Authority, who use significant funding support from government and donors such as CITES-MIKE to implement wildlife management programmes following the restoration of law and order in Uganda in the late 1980s.

Materials and method

Study area

The MFPA is composed of Murchison Falls National Park that covers an area of 3893 km^2, Bugungu Wildlife Reserve (473 km^2) and Karuma Wildlife Reserve (678 km^2) as shown in see Fig. 1.

Murchison Falls National Park (MFNP) was established in 1952 while Karuma and Bugungu Game Reserves on the southern edge of MFNP were established in the 1960s. Today, these areas are managed as part of the national park, the complex being referred to as the MFPA.

MFPA supports a wide range of ecosystems, ranging from medium altitude tropical forest, to *Combretum* woodlands, *Butyrospermum* savanna and papyrus wetlands. The area comprises a rolling *Combretum* savanna and tall grassland in the centre and north, and dense thickets in the higher and wetter areas in the south. The Protected Area supports a wide range of wildlife including elephant, buffalo, hippo, reedbuck, hartebeest, giraffe, crocodile, leopard and lion.
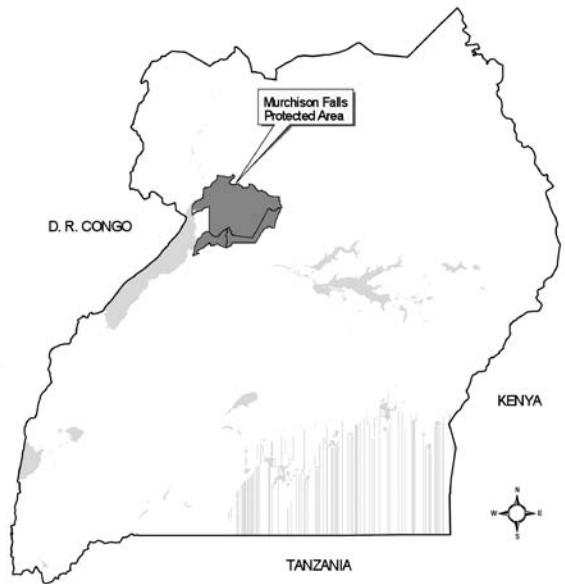

Figure 1. Map of Uganda showing location of MFPA.

Survey method

The SRF method was used to determine wildlife distributions and numbers in MFPA. This method relies on counting within a systematically obtained sample (Norton-Griffiths 1978). The method was used because the census area was large and it would be costly and difficult to count and estimate the population of species such as Uganda kob, waterbuck, topi, warthog and hartebeest, which are small, and more scattered than elephant or buffalo, and cannot easily be counted by the aerial total count method. Furthermore, methodology duplicates were used in the previous set of aerial surveys conducted in 1982/83 (Eltringham and Malpas 1983), and in the countrywide series of SRF surveys by Lamprey and Michelmore (1996), which therefore facilitated the analysis of trends.

A Cessna 182 aircraft equipped with a radar altimeter was used. The aircraft flew along parallel transects five-km apart (Fig. 4). Each transect was subdivided in sub-units of five-km lengths. A Front Seat Observer (FSO) was seated next to the pilot and continually recorded radar altimeter readings every half a minute while Rear Seat Observers (RSO), one on each of the rear seats, continually scanned the transect area demarcated by the rods attached to the wing struts on either side of the aircraft and tape-recorded the observations.
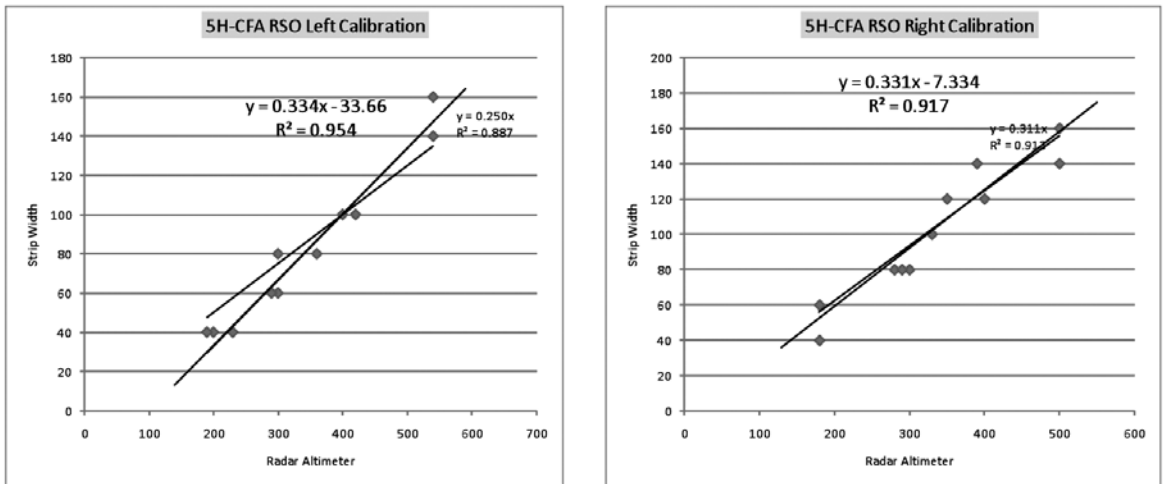
Figure 2. Calibration of results of the left and right Rear Seat Observers (RSO) that was used to calculate

Herds exceeding 20 animals were photographed to allow more accurate counting later. The flight transects were regularly spaced to provide a systematic coverage of the area, and thus indicate the distribution of species seen.

The sample strip width used was calibrated by flying back and forth over an airstrip on which white markers were placed at an interval of 20meters on the ground, for a distance of two km.

Data analysis

Jolly II Method was used for analysing the aerial survey data for unequal sized sampling units that were specifically designed to eliminate the effect of the difference in size between sampling units. Each transect was treated as a sample of the population. If species occur in 'clumps', either occupying part of the census zone, or by aggregating into a few large herds, there is a large difference in the numbers in each transects, and the standard error (SE) is high.

Results

Population estimates

Encounters of the recorded animals were spatially mapped using ArcView 3.3. Relative abundance of animals in the different areas of the protected area was represented using symbols of different sizes.

Discussion

Generally the animal population in MFPA is steadily increasing for the majority of species. Most of the species are steadily recovering where as others seem to be stable (see Table 2). In Murchison Falls National Park and its adjacent wildlife reserves of Bugungu and Karuma, population estimates of large mammal species are available from various counts conducted prior to 1973 and from SRFs conducted in 1980, 1995 (x2), 1999, 2005 and total aerial counts conducted in 2002 to determine the number of elephant, buffalo and giraffe only as it is not possible to count smaller species in large groups by the total aerial count method. These counts indicate trends over the last 30 years.

Wildlife in Murchison Falls Protected Area and other protected areas in Uganda suffered a great deal from the poaching trend that was exacerbated by the breakdown of law and order in the 1970s and early '80s. In the late 1980s, with improved management and the reactivation of anti-poaching patrols, a number of species in Murchison Falls Protected Area—primarily elephant, Uganda kob, giraffe, warthog, buffalo, hartebeest and waterbuck—have been steadily increasing. Most species are recovering following improved security in the region and strengthened protected area management.

Table 1. Wildlife estimates for all species observed during the survey

Estimates are shown where absolute number of individuals observed was greater than 20; when fewer than 20 individuals are sighted estimates are not considered reliable.

Species	Observed	Estimate	SE
Baboon	16	413	276
Buffalo	356	9192	3789
Elephant	35	904	333
Giraffe	36	930	357
Hartebeest	139	3589	812
Hippo	37	955	384
Oribi	35	904	366
Uganda kob	1419	36,640	8069
Warthog	76	1962	594
Waterbuck	249	6430	1280
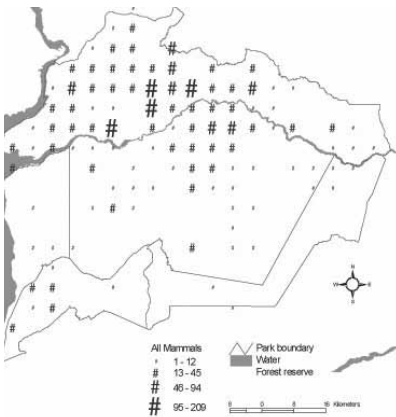
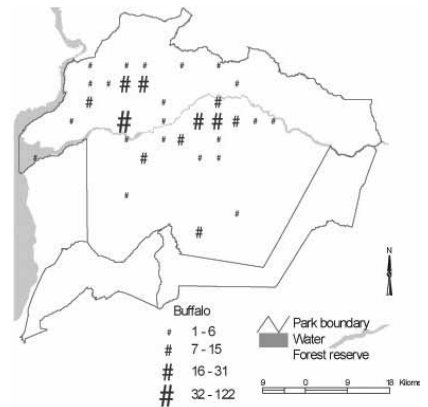Figure 3. Map showing abundance of all mammals encountered.

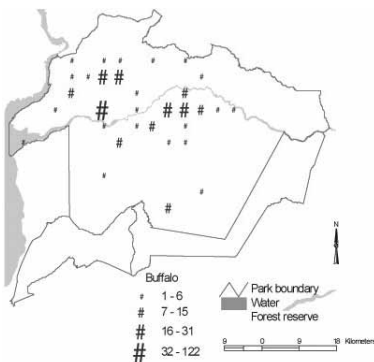Figure 4. Density distribution map of buffaloes.

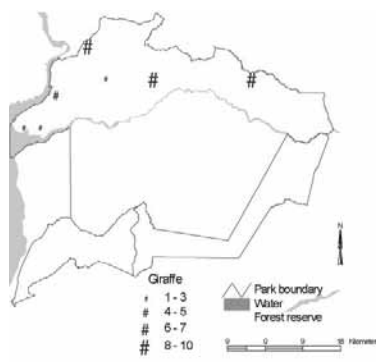Figure 5. Density distribution map of elephants.
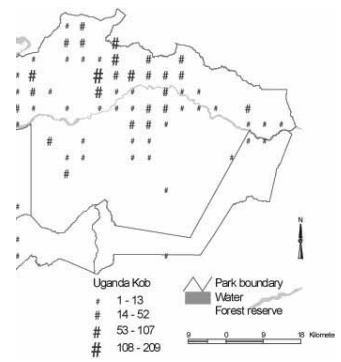

Figure 6. Density distribution map of giraffes.

Figure 7. Density distribution map of the Uganda kob.

Table 2. Animal population trends since 1973

	pre-1973[a]	1980[b]	1991[c]	April 1995[d]	Dec. 1995[e]	June 1999[f]	May 2002[g]	Jul-05	*Mar-10*
Buffalo	*30,000*	*15,250*	1610	*1087*	*2477*	*3889*	8200	*11,004*	*9192*
Giraffe	*150-200*	-	78	*100*	*153*	*347*	229	*245*	*904*
Hippo	*12,000*	*7565*	-	*1498*	*1238*	*1792*	-	*2104*	*955*
Uganda kob	*10,000*	*30,700*	-	*6355*	*4373*	*7458*	-	*9315*	*36,640*
Elephant	*12,000*	*1420*	308	*201*	*336*	*778*	692	*516*	*904*
Waterbuck	-	*5500*	-	*539*	*566*	*792*	-	*1441*	*6430*
Warthog	-	-	-	*411*	*856*	*1639*	-	*2298*	*1962*
Hartebeest	-	*14,000*	-	*3068*	*2431*	*2903*	-	*4101*	*3589*

Numbers in italics are from sample counts with standard errors omitted for clarity. Numbers in normal script are from aerial total counts. Sources: [a]UNP (1971), Laws et al (1976); [b]Malpas (1978), Douglas-Hamilton et al. (1980); [c]Olivier (1991); [d]Sommerlatte & Williamson (1995); [e]Lamprey and Michelmore (1996); [f]Lamprey (2000); [g]Rwetsiba et al. (2002).

Conclusion

Considering the various methods used by different survey teams in the separate surveys and the fact that some surveys were conducted in dry seasons and others in wet seasons, these results must be interpreted taking into account the above in mind. Despite the fact that various methods were used in the surveys, the results still show general species recovery and significant population increases among certain species. Most of the species, namely elephant, Uganda kob, giraffe, warthog, buffalo, hartebeest and waterbuck are steadily increasing. It may be true that where there is a decline due to natural factors such as diseases, predation, habitat changes as a result of climatic changes and natural fires.

Acknowledgements

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