Monthly activity centres of african elephants in a small game reserve

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Introduction Due to habitat heterogeneity and environmental variation , the home range and habitat utilization of African elephants varies in different years and different seasons , not only in large protected areas but also in small reserves (Shannon et al ., 2006) . Although there are many studies on seasonal changes of elephant home ranges , no articles on finer temporal shifts within elephant home ranges are published . Monthly movement rhythms should provide more detail on elephant foraging and its impacts and help the conservation and management of both elephants and their habitats , especially in small reserves .

Materials and methods Radio and satellite collars on the elephants were fitted by a veterinary surgeon in a humane manner , and in accordance with laws governing animal anticruelty in South Africa . All elephant locations were projected into UTM 1983 (Zone 36) datum . Since the datasets are sampled differently , the analyses include only the first daily location and separated by sex . Using these data , monthly harmonic mean centres of elephants were determined using ArcView Animal Movement Analyst Extension (the number of divisions of the X axis : 100) .
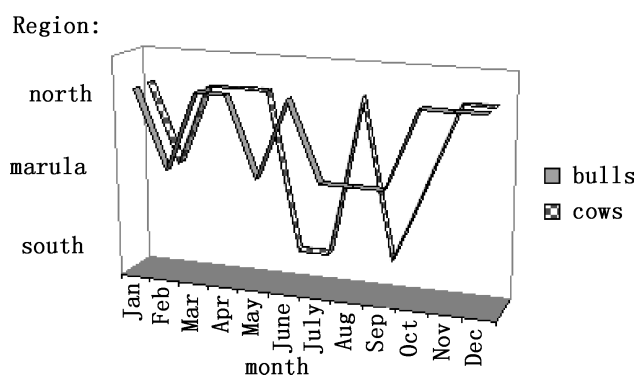

Figure 1 *Generalised cadence of elephant monthly harmonic mean centres of activity .*

Results For both bulls and cows the elephants are more active in the northern PGR , compared with oscillations to other regions in other months . These monthly regional preferences are generally consistent across years and a generalised cadence pattern is given in Figure 1 . For bulls the monthly cadence in activity is primarily between the northern PGR and the high marula densities area . The cow herd activity oscillates between the northern region and the southern PGR . These patterns of activity are partly disrupted in the dry months i .e . activity centres are more widely distributed . In February both bulls and cows are found in the central part of the PGR which appear to relate to the marula distribution area (Figure 1) . For the months adjoining months January and March they are in the north . From late April or May , elephant activity centres shifted from the north . From September or October when the first spring rains fell elephant activity centres shifted back to the north (Figure 1) . Bull and cow activity centres were only close together in the wet season from November to February (Figure 1) .

Conclusions Our results show that elephant activity over that period had similar month-by-month rhythms in different years , which appeared to be related to rainfall , vegetation , distribution of cow herd , marula (*Sclerocarya birrea*) fruiting and hunting . Food appears to play an influencing role in the elephant movements . Monthly activity centres of both bulls and cows were more widely distributed in the dry months than in the wet months . Bulls keep relatively close to the herd only in very wet months . There is a close association between fruiting of marula and the distribution of elephants in February . Rainfall appears to have an indirect but influencing impact on elephant ranging behaviour . Knowledge of elephant monthly movements is not only helpful for the design of suitable management strategies but could be used for the estimation of minimum size for a small reserve .