

Conservation status of felids in Mole National Park, Ghana

Cole Burton*, Cletus Balangtaa#, Moses Sam# and Justin Brashares*

* Dept. of Environmental Science, Policy & Management, University of California-Berkeley, USA, and # Wildlife Division of the Forestry Commission of Ghana



Figure 1. Elephants in Mole National Park's woodland savanna habitat.



Figure 2. Village adjacent to Mole National Park.

Context & Study Area

- Wild felid populations in West Africa are poorly known but suspected to have significantly declined. The lion (*Panthera leo*) is listed as Regionally Endangered, with isolated remnant populations facing an increasing threat of regional extirpation.¹
- In Ghana, high levels of bushmeat hunting and habitat loss have led to severe wildlife declines.² Despite the ecological and cultural significance of wild felids in Ghana, little is known about the status or viability of current populations.
- Mole National Park (MNP) covers 4,840 km² of woodland savanna habitat in northern Ghana (Figs. 1, 3). It represents the country's best chance of protecting regionally significant felid populations.
- 29 rural communities live adjacent to the park and depend directly on natural resources, including wildlife, for livelihood (Fig. 2).

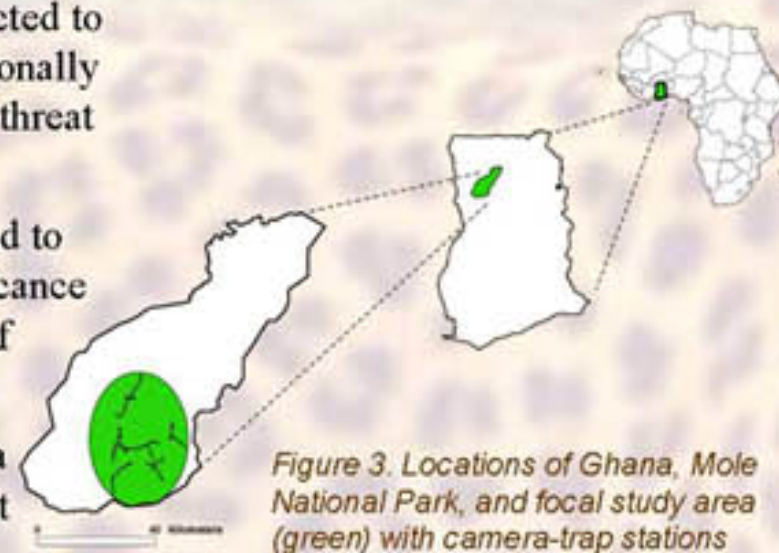


Figure 3. Locations of Ghana, Mole National Park, and focal study area (green) with camera-trap stations (black dots).

Methods

- Between 17 October 2006 and 5 April 2007, 118 camera-trap stations were set at ~1 km intervals along animal pathways in southeastern MNP (Figs. 3, 4). Total survey effort was 2,158 camera trap-days.
- An index of relative abundance was calculated as no. photos/100 trap-days.
- Probability of detection and occupancy were estimated for felids using program PRESENCE³.
- Individual leopards were identified by rosette patterns, and program CAPTURE was used to estimate density from a sub-sample of left-side photos (using model M_h).⁴
- Other sources of information included spoor transects, call-in surveys, village questionnaires, market surveys, and anti-poaching patrol records.



Figure 4. Team members setting a camera trap.

Results

- We obtained 1,936 photographs of 47 species, including 31 mammals.
- Two felid species were photographed – leopard and caracal – as well as seven other carnivores (Fig. 5).
- Leopard activity was highly nocturnal (97% of detections between 18:00 and 6:00) while caracal activity was more mixed (61%).
- In one sampling area (29 camera stations), the proportion of area occupied was estimated as 0.57 (± 0.08 SE) for leopard and 0.24 (± 0.13) for caracal.
- The probability of detecting leopards was estimated to reach 0.50 after 8 days of camera-trapping and 0.95 after 25 days. For caracal, detectability reached 0.50 after 11 days and 0.80 after 25 days.
- The preliminary estimate of leopard density was 2.3 (± 0.6 SE) leopards per 100 km².



Figure 5. The two felids (top) and 4 of 7 other carnivores (bottom) captured by the camera traps, along with their respective relative abundance.



- 21 potential prey species were photographed, ranging from African buffalo (*Syncerus caffer*) to marsh cane-rat (*Thryonomys swinderianus*).
- Evidence of illegal hunting in the park included 12 photos of poachers (Fig. 6) and the presence of skins in nearby markets (Fig. 7).
- Local villagers reported rare livestock conflicts with lion and leopard, as well as traditional uses of felid species.
- Historical and recent records from MNP foot patrols contain many observations of lion and leopard.



Figure 6. Camera-trap photograph of hunter in Mole National Park.

Conclusions & Continuing Effort

- Camera traps yielded new and significant data on felids and other wildlife in MNP – the park appears to support low-density populations of leopard and caracal.
- The status of two other felids – lion and serval (*Leptailurus serval*) – remains uncertain. While they were not detected by systematic surveys, patrol records and villager observations suggest that they still occur.
- There appear to be sufficient prey to support predator populations, but pressure from hunters is high and the long-term viability of felids in the region may not be secure.
- We are expanding the spatial and temporal coverage of felid surveys in northern Ghana. Human-felid conflict will be further investigated, as will the ecological correlates and consequences of predator declines.



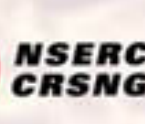
Figure 7. Leopard skin for sale in tourist market near Mole National Park.

Literature Cited

- ¹ Bauer, H., H.H. De Iongh, F.P.G. Princee and D. Ngintou. 2003. Research needs for lion conservation in West and Central Africa. *Complex Rendus Biologies* 326: S112-S118.
- ² Brashares, J.S., P. Arcese, M.K. Sam, P.B. Coppolillo, A.R.E. Sinclair and A. Balmford. 2004. Bushmeat hunting, wildlife declines, and fish supply in West Africa. *Science* 306: 1180-1183.
- ³ MacKenzie, D.L., J.D. Nichols, J.A. Royle et al. 2006. *Occupancy estimation and modeling: inferring patterns and dynamics of species occurrence*. Elsevier Academic Press, London, UK. [PRESENCE: www.mbr-pwrc.usgs.gov/software/presence.html]
- ⁴ Karanth, K.U. and J.D. Nichols. 1998. Estimation of tiger densities in India using photographic captures and recaptures. *Ecology* 79:2852-2862.

Acknowledgements

Many individuals assisted with this study. We particularly thank M. Adu-Nsiah, D. Farouk, E. Buedi, D. Bosu, E. Bani, J. Tahiru, P. Elsen, R. Dave, the Brashares Lab, and the Panthera/Wildlife Conservation Society Kaplan Awards Program. We also thank the following organizations for funding and logistical support:



For further information please contact cburton@nature.berkeley.edu