

Diversity and diel activity patterns of terrestrial mammals in the Nkuba Conservation Area, Democratic Republic of the Congo

YNTZE VAN DER HOEK, ESCOBAR BINYINYI, URBAIN NGOBOBO, TARA S. STOINSKI and DAMIEN CAILLAUD

SUPPLEMENTARY FIG. 1 Photographic evidence of the presence of 31 terrestrial mammals of all body sizes in the Nkuba Conservation Area, as obtained from camera traps.



MUSTELIDAE Spotted-necked otter *Hydrictis maculicollis*



HERPESTIDAE Marsh mongoose *Atilax paludinosus*



HERPESTIDAE Alexander's cusimanse *Crossarchus alexandri*



MANIDAE White-bellied pangolin *Phataginus tricuspis*



MUSTELIDAE Honey badger *Mellivora capensis*



HERPESTIDAE Long-nosed mongoose *Herpestes naso*



MANIDAE Giant ground pangolin *Smutsia gigantea*



ORYCTEROPODIDAE Aardvark *Orycteropus afer*



SUIDAE Red river hog *Potamochoerus porcus*



HOMINIDAE Grauer's gorilla *Gorilla beringei graueri*



CERCOPITHECIDAE Owl-faced monkey *Cercopithecus hamlyni*



BOVIDAE African forest buffalo *Synacerus caffer nanus*



TRAGULIDAE Water chevrotain *Hyemoschus aquaticus*



HOMINIDAE Eastern chimpanzee *Pan troglodytes schweinfurthii*



CERCOPITHECIDAE Red-tailed monkey *Cercopithecus ascanius*



BOVIDAE Black-fronted duiker *Cephalophus nigrifrons*



BOVIDAE Weyns's duiker *Cephalophus weynsi*



BOVIDAE Yellow-backed duiker *Cephalophus silvicultor*



BOVIDAE Sitatunga *Tragelaphus spekii*



BOVIDAE Bates' pygmy antelope *Neotragus batesi*



BOVIDAE Bay duiker *Cephalophus dorsalis*



BOVIDAE Blue duiker *Philantomba monticola*



BOVIDAE Bongo *Tragelaphus eurycerus*



SUPPLEMENTARY TABLE 1 Overview of other species (i.e. not mammals >1 kg) encountered in camera traps and along line transects in the Nkuba Conservation Area, plus details on trapping rates and/or sign counts. Blank cells refer to species not recorded and NA refers to species recorded but not counted.

| Family | Common name | Scientific name | IUCN status | Number of individuals (maximum number in one event) | Camera events by hour | Camera events by day | Cameras (out of 167) | Trapping rate / 100 days | Signs on transects (of which direct observation) |
|----------------------------------|------------------------------|-------------------------------|-------------|---|-----------------------|----------------------|----------------------|--------------------------|---|
| Small mammals (< 1 kg) | Fire-footed rope squirrel | <i>Funisciurus pyrropus</i> | LC | NA | NA | NA | NA | 0.08 | |
| | Checkered sengi | <i>Rhynchocyon cirnei</i> | LC | 16 (2) | 15 | 13 | 4 | | |
| Birds | African finfoot | <i>Podica senegalensis</i> | LC | 3 | 2 | 2 | 1 | 0.01 | |
| | African rail | <i>Rallus caerulescens</i> | LC | 4 (2) | 3 | 3 | 1 | 0.02 | |
| | Nkulengu rail | <i>Himantornis haematopus</i> | LC | 58 (4) | 48 | 45 | 31 | 0.27 | |
| | Spot-breasted ibis | <i>Bostrychia rara</i> | LC | 11 (2) | 6 | 3 | 2 | 0.02 | |
| | Black guineafowl | <i>Agelastes niger</i> | LC | 287 (8) | 116 | 104 | 35 | 0.63 | |
| | Plumed guineafowl | <i>Guttera plumifera</i> | LC | 348 (13) | 99 | 89 | 48 | 0.54 | |
| | Forest francolin | <i>Peliperdix lathami</i> | LC | 68 (2) | 58 | 52 | 22 | 0.32 | |
| | Blue-headed wood dove | <i>Turtur brehmeri</i> | LC | 152 (2) | 149 | 136 | 56 | | |
| | Black-throated coucal | <i>Centropus leucogaster</i> | LC | 1 | 1 | 1 | 1 | 0.01 | |
| | Eastern long-tailed hornbill | <i>Horizocerus cassini</i> | LC | 5 (1) | 5 | 5 | 5 | 0.03 | |
| | Great blue turaco | <i>Corythaeola cristata</i> | LC | 1 (1) | 1 | 1 | 1 | 0.01 | |
| | Red-tailed bristlebill | <i>Bleda syndactylus</i> | LC | NA | NA | NA | NA | | |
| | Yellow-eyed bristlebill | <i>Bleda ugandae</i> | LC | NA | NA | NA | NA | | |
| Reptiles | Unidentified crocodile | Crocodylidae | | | | | | X | |
| | Ornate monitor | <i>Varanus ornatus</i> | NE | 7 (1) | 7 | 7 | 7 | 0.04 | |

SUPPLEMENTARY TABLE 2 Diel activity periods as obtained from camera trap images of 26 mammal species in the Nkuba Conservation Area. Given are the 95% and 50% isopleths of activity, plus the activity period (range) and the percentage of time active (activity level) and its associated standard error and confidence interval. Species are grouped based on their 50% isopleth of core activity being predominantly nocturnal, diurnal, or cathemeral. No species were exclusively crepuscular, but those with a core activity that covered dawn or dusk were annotated with ^{CR}.

| Species | n | 95% isopleth | Range | 50% isopleth | Range | Activity level | SE | 95% CI |
|--------------------------------------|-----|-------------------------------------|-------|-------------------------------------|-------|----------------|------|--------|
| <i>Nocturnal</i> | | | | | | | | |
| Aardvark | 11 | 20:53-05:26 | 8.55 | 00:39-4:08 | 3.48 | 0.26 | 0.05 | 0.136 |
| African brush-tailed porcupine | 326 | 18:11-06:24 | 12.22 | 22:55-00:36; 2:24-4:40; 20:27-21:58 | 3:78 | 0.416 | 0.02 | 0.354 |
| African forest buffalo ^{CR} | 10 | 15:47-18:30; 19:46-22:30; 0:00-7:47 | 13.23 | 2:29-5:43 | 3:23 | 0.239 | 0.07 | 0.315 |
| Bay duiker | 238 | 15:59-7:01; 7:36-9:53 | 17.32 | 19:53-1:14 | 5.35 | 0.408 | 0.03 | 0.417 |
| Giant ground pangolin | 25 | 19:08-5:07 | 9.98 | 00:01-03:01 | 3.00 | 0.226 | 0.04 | 0.419 |
| Giant pouched rat | 615 | 17:48-7:32 | 13.73 | 1:56-4:56; 20:33-23:09 | 5.60 | 0.427 | 0.02 | 0.342 |
| Servaline genet ^{CR} | 70 | 17:29-9:06 | 15.62 | 2:46-5:51; 19:52-22:50 | 6.05 | 0.463 | 0.05 | 0.425 |
| Water chevrotain ^{CR} | 12 | 22:13-6:37 | 8.40 | 2:22-5:16 | 2.90 | 0.218 | 0.05 | 0.507 |
| White-bellied pangolin ^{CR} | 22 | 19:08-5:29 | 10.35 | 02:57-3:46; 20:10-23:21 | 4.00 | 0.293 | 0.05 | 0.323 |
| Yellow-backed duiker | 144 | 15:13-9:20; 13:23-14:30 | 19.23 | 02:58-06:33; 17:56-21:39 | 7.30 | 0.51 | 0.06 | 0.374 |
| <i>Diurnal</i> | | | | | | | | |
| Alexander's cusimanse | 4 | 6:27-9:46; 11:52-18:26 | 9.88 | 13:30-16:57 | 3.45 | 0.267 | 0.07 | 0.043 |
| Bates' pygmy antelope | 4 | 7:34-13:18; 14:11-17:25 | 8.97 | 8:52-11:40 | 2.80 | 0.209 | 0.07 | 0.282 |
| Black-fronted duiker ^{CR} | 11 | 22:24-0:59; 4:38-11:03; 13:04-19:35 | 15.52 | 5:49-9:26 | 3.62 | 0.235 | 0.07 | 0.047 |
| Blue duiker | 573 | 5:07-18:40 | 13.55 | 6:45-12:07 | 5.37 | 0.39 | 0.02 | 0.355 |
| Checkered sengi | 15 | 6:05-18:03 | 11.97 | 7:14-9:42; 10:34-12:42 | 4.60 | 0.337 | 0.06 | 0.405 |
| Eastern chimpanzee | 148 | 4:16-19:48 | 15.53 | 6:27-9:25; 14:43-17:09 | 5.40 | 0.373 | 0.04 | 0.436 |
| Grauer's gorilla | 56 | 5:23-11:45; 12:18-19:59 | 14.05 | 7:16-7:18; 14:10-19:06 | 4.97 | 0.354 | 0.05 | 0.253 |

| | | | | | | | | |
|--------------------------------------|------|---|-------|----------------------------|------|-------|-----------|----------------|
| Honey badger | 29 | 0:04-20:23 | 20.32 | 8:30-12:14; 13:36-16:37 | 6.75 | 0.382 | 0.10 5 | 0.242 - |
| Marsh mongoose | 35 | 00:53-13:33; 16:40-19:33; 20:02-22:55 | 18.43 | 6:34-11:19 | 4.75 | 0.325 | 0.06 9 | 0.214 - |
| Long-nosed mongoose ^{CR} | 15 | 3:14-12:02; 14:23-21:44 | 16.15 | 5:50-9:59 | 4.15 | 0.266 | 0.08 9 | 0.132 - |
| Owl-faced monkey | 1041 | 1:45-2:59; 5:01-20:02; 22:5-23:46 | 17.93 | 9:23-13:10; 14:17-16:23 | 5.88 | 0.463 | 0.01 9 | 0.399 - |
| Weyns's duiker | 7 | 7:25-13:47 | 6:22 | 8:28-10:52 | 2:24 | 0.176 | 0.04 8 | 0.055 -0.24 |

Cathemeral

| | | | | | | | | |
|----------------------------------|----|---|-------|---|------|-------|-----------|----------------|
| African golden cat ^{CR} | 37 | 20:27-18:07 | 21.67 | 1:14-2:44; 3:46-6:57; 08:24-12:14; 21:41-22:31 | 9.35 | 0.572 | 0.10 8 | 0.374 - |
| Bongo ^{CR} | 8 | 1:19-8:25; 11:07-14:52; 16:31-20:48 | 15.13 | 4:17-4:46; 12:00-13:58; 17:18-20:00 | 5.15 | 0.289 | 0.1 | 0.092 -0.48 |
| Leopard ^{CR} | 26 | 14:11-11:02 | 20.85 | 4:04-9:21; 16:38-19:33 | 8.20 | 0.564 | 0.10 4 | 0.307 - |
| Red river hog ^{CR} | 85 | 22:37-2:31; 4:09-22:05 | 21.83 | 7:07-9:01; 10:30-13:23; 16:41-20:50 | 8.93 | 0.576 | 0.09 5 | 0.408 - |

SUPPLEMENTARY TABLE 3 Coefficient of overlap in diurnal activity patterns between a selected set of sympatric mammals in the Nkuba Conservation Area. Given are the overlap of the 95% isopleths and the 50% isopleths (in parentheses). *Species with <100 observations for which estimates of activity level and overlap may not have reached asymptotes in accuracy and precision (see Methods).

| | Leopard* | African golden cat* | Long-nosed mongoose * | Marsh mongoose * | Honey badger | Blue duiker | Yellow-backed duiker | Eastern chimpanzee |
|----------------------|-----------------|---------------------|-----------------------|------------------|-----------------|-----------------|----------------------|--------------------|
| African golden cat* | 0.75 (0.41) | - | - | - | - | - | - | - |
| Long-nosed mongoose* | 0.65 (0.31) | 0.58 (0.27) | - | - | - | - | - | - |
| Marsh mongoose* | 0.59 (0.36) | 0.64 (0.34) | 0.73 (0.69) | - | - | - | - | - |
| Honey badger* | 0.57 (0.09) | 0.68 (0.39) | 0.62 (0.23) | 0.68 (0.47) | - | - | - | - |
| Servaline genet* | 0.65 (0.21) | 0.57 (0.34) | 0.35 (<0.01) | 0.39 (<0.01) | 0.32 (<0.01) | - | - | - |
| Bay duiker | 0.58 (<0.01) | 0.49 (0.08) | - | - | - | 0.13 (<0.01) | 0.74 (0.24) | - |
| Blue duiker | 0.47 (0.33) | 0.57 (0.41) | - | - | - | - | - | - |
| Yellow-backed duiker | 0.78 (0.48) | 0.68 (0.34) | - | - | - | 0.27 (<0.01) | - | - |
| Grauer's gorilla* | 0.54 (0.28) | 0.5 (<0.01) | - | - | - | - | - | 0.82 (0.42) |
| Eastern chimpanzee | 0.55 (0.43) | 0.56 (0.14) | - | - | - | - | - | - |

SUPPLEMENTARY TABLE 4 Records of infants and juveniles of apparent pre-weaning age in camera trap imagery from the Nkuba Conservation Area.

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| <i>Juveniles walking independently</i> | | | | | | | | | | | | |
| Forest buffalo | | | | | | | 1 | | | | | |
| Black-fronted duiker | | | 1 | | | | | | | | | |
| Bay duiker | | | | | | | | | 1 | | | |
| Blue duiker | | | | | | | 1 | | | | | |
| Owl-faced monkey | 2 | | 5 | 2 | 2 | 1 | | 1 | 2 | 1 | 2 | |
| Red river hog | 1 | | | | | | 1 | | 1 | | 2 | |
| <i>Infants being carried</i> | | | | | | | | | | | | |
| Giant pouched rat | | | | | | | | | | | 1 | |
| Eastern chimpanzee | | | 3 | 5 | 1 | 1 | | 1 | | | 1 | |
| Grauer's gorilla | | | 1 | 2 | | 1 | | | | 3 | 1 | |
| Owl-faced monkey | 2 | 1 | | 2 | 1 | 1 | 1 | | 2 | 1 | 3 | |