A comparison of line and camera trap point transect distance sampling in a central African tropical rainforest

Janika Wendefeuer[1], Hjalmar Kühl[2], Terence Fuh Neba[3]

[1] Biodiversity, Ecology and Evolution of Plants, Institute for Plant Sciences and Microbiology, University of Hamburg, Ohnhorststr. 18, 22609 Hamburg, Germany; [2]Max Planck Institute for Evolutionary Anthropology, Deutscher Platz 6, 04103 Leipzig, Germany [3]World Wide Fund for nature Central African Republic, Avenue de Martyrs, BP 1053 Bangui, Central African Republic

Mammal populations in Central Africa have dramatically declined in the past decades. Continuous monitoring of their state is therefore necessary to inform conservation management to ensure their protection. Traditional survey methods like line transect (LT) distance sampling require a high effort for precise estimates. They are limited regarding elusive species that are rarely detected by human observers, but also when conducting transect sign surveys (dung/nests). The identification and distinction of great ape nests as well as dung cannot be entirely certain. This can lead to misestimations or a grouping of species regarding dung size. Camera trap (CT) techniques have been developed to overcome those difficulties. Nevertheless, most studies focus on single species or don't calculate densities for multiple species. In this study we tested a new method applying distance sampling for CT to estimate mammal densities in the Dzanga-Sangha Protected Areas, Central African Republic. Simultaneously, we conducted a LT sign survey (dung/nest) applying distance sampling. The CT survey resulted in density estimates for nine mammal species (forest elephant, central chimpanzee, western gorilla, red river hog, five ungulates), whereas the LT survey obtained estimates for three mammals (forest elephant, central chimpanzee, western gorilla) and three species groups discriminated by dung size (small, medium-sized and large ungulates). For elephant and great apes, the accuracies of densities (coefficient of variation (CV)) could be compared directly, as they were surveyed by both techniques. For elephant, the density derived from LT data was more accurate (CV_{LT}=0.15) than from CT (CV_{CT}=0.28). For gorilla (CV_{LT}=0.38; CV_{CT}=0.23) and chimpanzee (CV_{LT}=0.56; CV_{CT}=0.47), densities from CT data were more accurate. The comparison indicates that distance sampling for CT can estimate densities for a broader spectrum of mammals than LT surveys. Furthermore, it provides a higher certainty of species identification, especially for great apes and ungulates.

- Camera Trap
- Distance Sampling
- Biomonitoring