

Progress report

Title: Robust Wildlife Population Monitoring under Challenging Conditions

Research problem

Many local people in rural Central Africa rely on bushmeat for food and livelihoods. Yet, current levels of hunting are often unsustainable, a problem for both conservation and local people. Further, robust and cost-effective methods to gather information on species status, distribution and hunting rates are often lacking. This is especially a problem in forest environments or for shy or rare species. One proposed solution has been to integrate local knowledge of those who already live or work in an area, into population monitoring. However, the reliability and sustainability of this method has not been properly assessed.

We have been working with local communities around the Dja Faunal Reserve, Cameroon, to test a wildlife population monitoring method that encompasses local knowledge from those who rely on forest resources. Using an interdisciplinary approach, distribution data for 17 bushmeat species is collected through social surveys. It is then triangulated against data collected from more accepted, but expensive and technical camera trapping methods. In doing so, the team understands if the use of social surveys for monitoring is robust, reliable and how to design surveys of this kind in the future to reduce bias when using local ecological knowledge for wildlife population monitoring.

This research is of high social and economic value as it addresses the issue of unsustainable hunting, a major developmental and environmental issue in Central Africa. This research will facilitate the conservation of hunted species, beneficial for both conservation and future food security of those who depend upon them. This research develops a method to allow more robust and cost-effective monitoring of mammals in forest environments and at large spatial scales, something which is greatly lacking in conservation at present.

Update on progress in the field

I arrived in Cameroon at the end of January 2018 and returned home 3 weeks ago. We set out to collect the final data which will allow us to answer our research objectives:

1. Investigate how interview-based population monitoring is affected by different types of environmental or responder bias
2. Explore the trade-offs between cost, precision and accuracy when using interview-based population monitoring

3. Quantify the status of, and threats to, hunted species in the Dja region
Identify barriers to and the potential for the successful implementation of interview-based population monitoring in the Dja region and more broadly

Methods

In order to do this, we used mixed methods to collect and map presence/absence data on 17 mammal species and to track hunting offtake (including forest elephants, gorillas, chimpanzees, pangolins, duiker, antelope and porcupines).

We carried out participatory to capture the ways that people use or access their environment, and participatory calendars to understand seasonal changes in livelihood activities. Sociodemographic questionnaires were conducted within each household to collect key information on participants age, gender, ecological knowledge and livelihoods.

Identifying a subset of 10-15 highly knowledgeable and willing participants, key informants were trained in how to complete a daily icon based diary. This diary helped us to collect information on species sightings each day, where they were seen and how the respondent came to see it (i.e did they see it with their eyes, hear its call, kill it in a snare, or see tracks etc.) Hunter follows were undertaken at random with these key informants to ground-truth and ensure data recording was completed robustly.

Semi-structured interviews were scheduled each season to ask respondents to recall what species they have or have not seen over the season and estimate how many times sightings were made.

30 cameras were to placed in a 30km² grid over 60 days to obtain data to use as a comparison to the social data. An MSc student from the UK has been identified and will work closely with me to process and analyse the data as part of her MSc project.

Progress

Below is an update of the activities and progress we planned to complete on this trip:

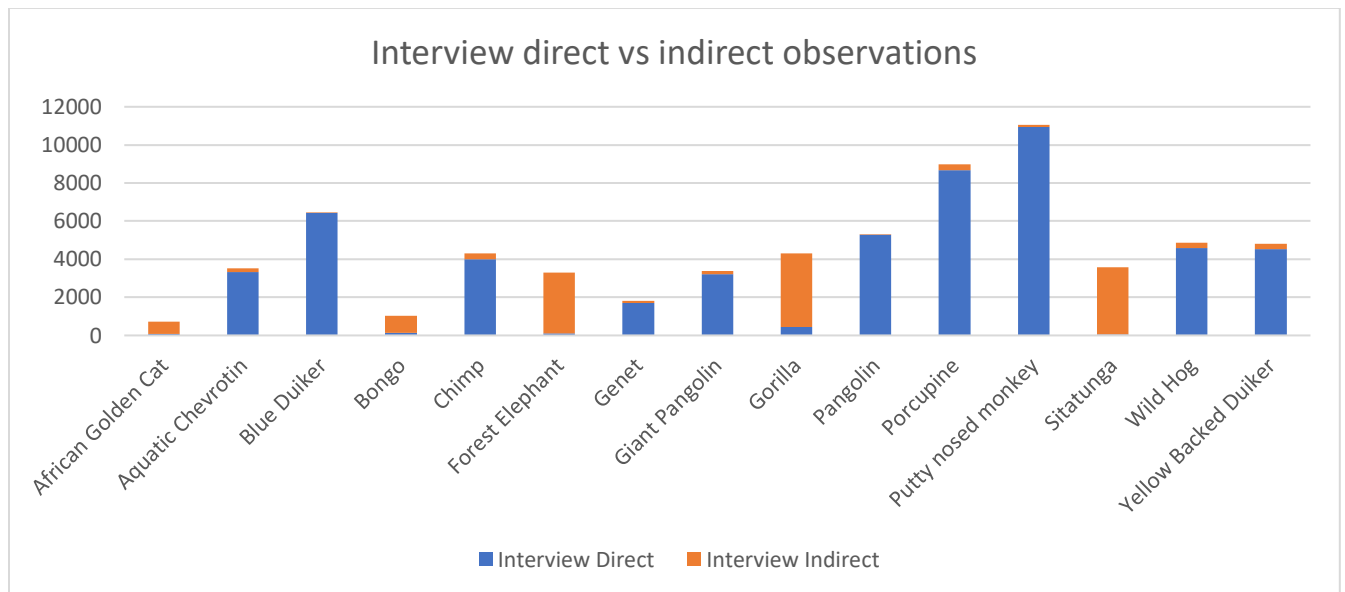
| Activity | Completed? | Notes |
|--|------------|---|
| Participatory mapping to capture the ways that | Yes | Participatory maps created in both villages, using a mix of focus groups and group proofing with GPS. Focus |

| | | |
|---|-------------|--|
| people use or access their environment. | | groups involved both men and women from all ages. Key landmarks, tracks, rivers and areas of importance were identified, then group-truthed during hunter follows |
| Calendars to understand seasonal changes in livelihood activities. | Yes | Calendars outlining the villages agricultural, fishing, hunting, and cultural activities throughout the year were created with groups of both men and women. |
| Sociodemographic questionnaires are conducted within each household | Yes | All willing adults in both villages have been interviewed. In total 149 different respondents in village 1 and 140 in village 2. |
| Daily diaries with 10 -15 hunters per village | Yes | 10 hunters completed daily hunter diaries for 6 months in village 1. Unfortunately, some hunters pulled out of the process in village 2, therefore we only have data from 7 hunters in village 2. However, we feel that the data is still informative and will be useful for analysis. |
| Seasonal semi-structured interviews with all households | Yes | <p>All willing adults in both villages have been interviewed. In total 149 different respondents in village 1 and 140 in village 2.</p> <p>Season 1: 62 + 106= 168 Season 2: 69 + 123 = 192 Season 3: 73 + 120 =193 Season 4: 67 +126 = 193</p> <p>TOTAL INTERVIEWS = 746</p> |
| 30 camera traps set in each village for 60 days | In progress | 30 cameras were set for 60 days in village one, and the data is being analyzed by the MSc student. The cameras are currently set in village 2 and will be collected in June 2018 |

Initial descriptive results

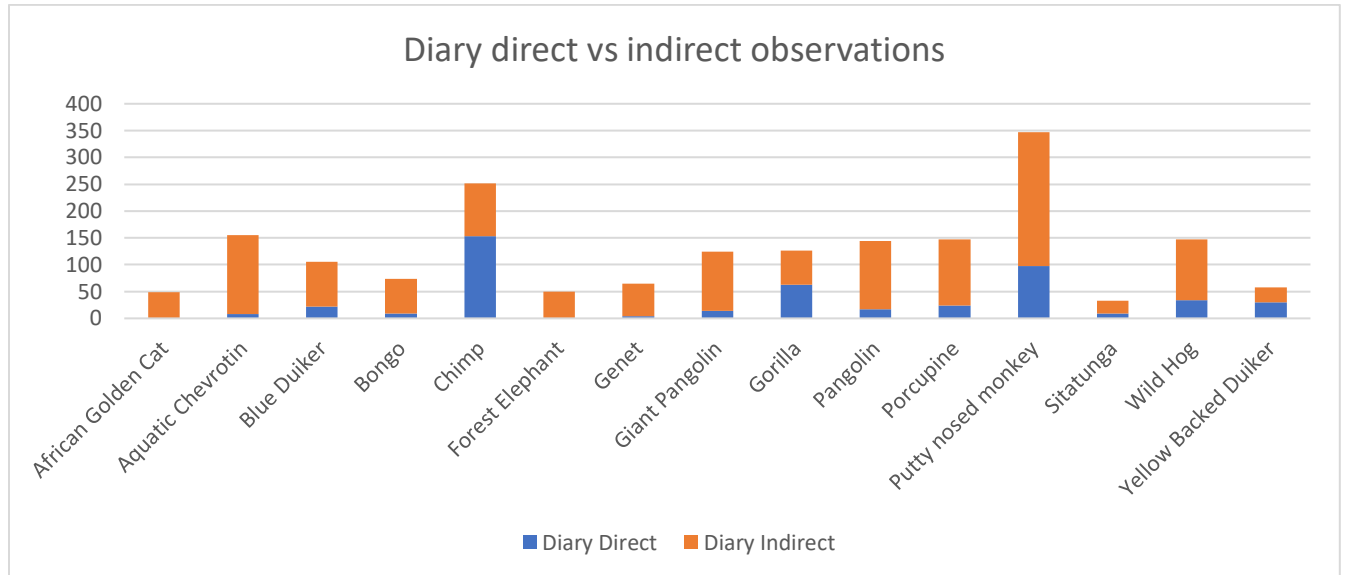
Below are some very preliminary descriptive results from the interview and diary data.

Figure 1: Direct vs indirect observations from interview data



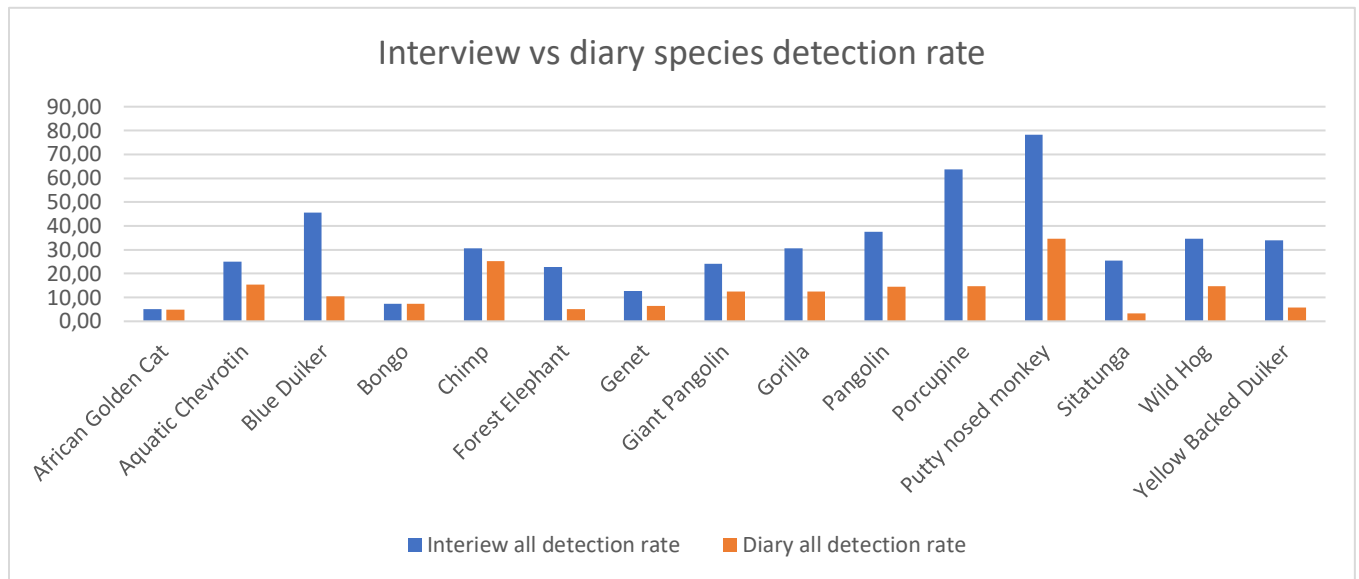
- Direct sightings are species that have been seen directly with the eye, either in passing, or hunted by gun or snare. Indirect sights include tracks, calls and nests
- Direct sightings account for the majority of species observations for all except African Golden Cat, Bongo, Forest elephant, Gorilla and Sitatunga (the rarer species at the site)

Figure 2: Direct vs indirect observations from diary data



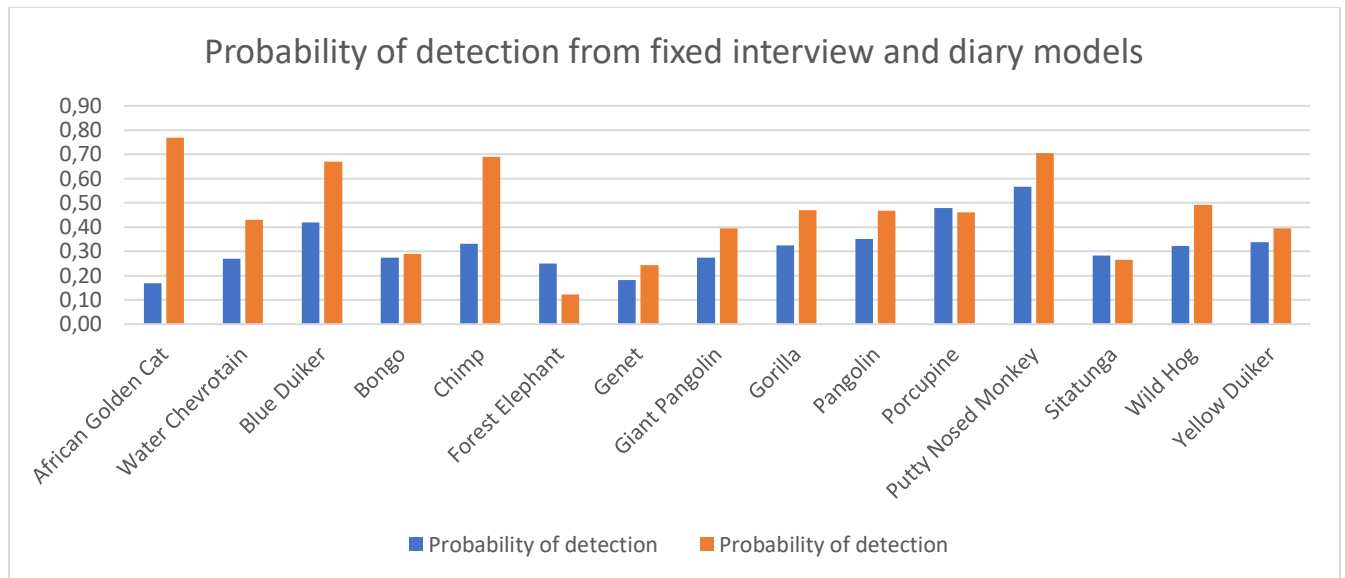
- Direct sightings are species that have been seen directly with the eye, either in passing, or hunted by gun or snare. Indirect sights include tracks, calls and nests
- Indirect sightings account for the majority of observations for all species except chimpanzees

Figure 3: Interview vs diary species detection rate



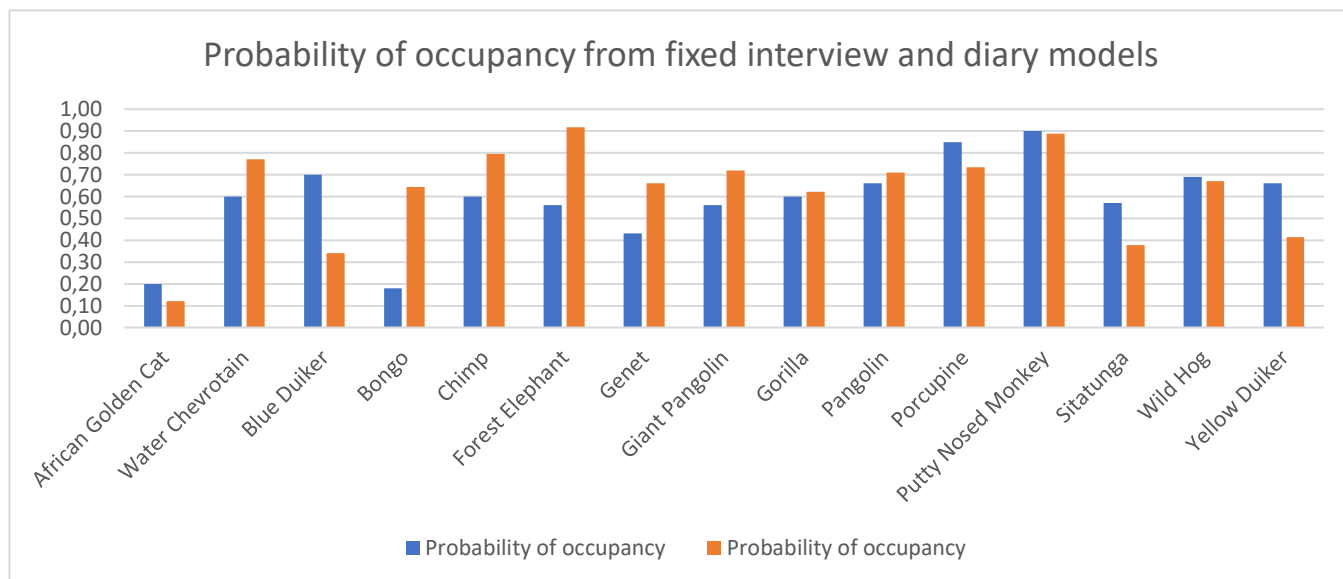
- Detection rate is higher for interviews than for daily diaries in all species except for bongo.
- Putty nosed monkeys are the most highly detected species for both interviews and diaries.
- Porcupines and blue duiker are highly detected in interviews, but have a lower detection rate with diaries.
- African Golden Cat has a low detection rate for both interviews and diaries
- Chimpanzee has the second highest detection rate from daily diaries
- My initial hypothesis that the diary detection rate will be greater than the interview detection rate can be rejected. However, upcoming comparison with the camera trap data may inform whether or not the interview detection rate includes many false positive detections.

Figure 4: Probability of detection from the null occupancy models: Interview vs diary



- Probability of detection is higher with diaries for all species, except forest elephant and porcupine
- Diary detection probability is significantly higher for African Golden Cat, Chimpanzee and Blue Duiker.
- Results between diary and interviews are comparable for Sitatunga, Bongo, Porcupine

Figure 5: Probability of occupancy from the null occupancy models: Interview vs diary



- Probability of occupancy is higher with diaries for all species except African Golden Cat, Blue Duiker, Porcupine, Sitatunga and Yellow Duiker.
- Results are comparable for African Golden Cat, Gorilla and Pangolin.

Figure 6: Seasonal calendar showing seasons and key agricultural and NTFP activities in Alat Makay

| Event/ Month | Jan | Fev | Mars | Avril | Mai | Juin | Juillet | Aout | Sept | Oct | Nov | Dec |
|------------------|--|---|------------------------------------|---------------------------|-----|---|---------|------|------|----------------------------------|-----|-----|
| Saison | Big dry season (15 Dec-15 Mars) Petit saison pluit | | Small rain season (15 Mars-15 Mai) | | | Small dry season (15 Mai-15 Sept) | | | | Big rain season (15 Sept-15 Dec) | | |
| Agriculture | Preperation (men & Women) | Planting Cacao, plantain, manyoc, arachide, maize, concombres, macabo, pattat - Women | | | | Harvest (Women) | | | | Recolte Cacao (Men & Women) | | |
| PFNL en fruits | | | | | | Mango, moabi, ginseng, irendels | | | | | | |
| Peche | Pirogue fishing (Men and Women) | Barrage fishing (Women) | | | | Pirogue fishing (Men and Women) | | | | Barrage fishing (Women) | | |
| Animal movements | Hard to see animals. Hurts their feet on the hard ground so they don't walk around a lot | | | Average animal encounters | | See animals a lot eating fruit and mating | | | | Average animal encounters | | |

The seasonal mapping exercise was conducted with the village chief and two village elders, plus a further twelve village participants (six men and six women). I found a close link between agricultural activities in the village and season, which is to be expected given the very distinct seasons experienced in this region. Cacao farming is a major cash crop for the village and they travel large distances to sell their crops at market (although a new road to their village completed this year will facilitate movement from now on).

Fishing was identified as an important secondary livelihood all year, although pirogue fishing was said to produce more fish, important especially during the dry seasons where agricultural productivity is lower. Men and women collect NTFP's all year for subsistence, but sellers come to the village for certain NTFP's such as wild mangoes, and moabi, during the summer months. This motivates many families to go to the forest to collect them for weeks on end to sell for additional income before the return to school in September. Animal encounters are also reported to increase in the forest during this period, because they are also looking for the same fruits.

Many villages reported that they don't see many animals in January-February, as the ground is too dry. Noticing tracks or signs during these months may well be harder. Further, animals are reported to stay much closer to the rivers and streams, and not venture too close to the village during this time.

Next steps

- Participatory map of the study villages will be digitized
- Descriptive sociodemographic results from both villages

- All the diary, interview and camera trap data will have been analyzed using occupancy analysis. I will then be able to present the findings of our comparison study, in terms of precision, accuracy and effort required for a satisfactory result.