

Final Project Evaluation Report

Your Details	
Full Name	Monique Shanahan
Project Title	Piloting the development of indicators to assess and monitor bat populations
Application ID	23603-1
Grant Amount	£4986
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Date of this Report	October 2018

1. Indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
Comparing different monitoring methods used at Meletse and The Cradle of Humankind (CoH).				Due to restrictions to The Cradle of Humankind (CoH) site and the late arrival of the bat detectors, we could only compare multiple monitoring methods corresponding to the same timescale for the Meletse site. All data (bat captures and echolocation recordings) was collected for both Meletse and CoH.
Bat detector station deployment for long term monitoring in The Cradle of Humankind (CoH)				Due to import logistics we only obtained the bat detectors at a later stage of the project. The long term bat detector station was successfully installed at CoH on the 11th April 2018.
Public awareness				Project details were presented at the Meletse symposium in both 2017 and 2018, in addition to at the Eugène Marais Chair of Wildlife Management international symposia in 2018. Locals (managers, workers and guests) at the study sites were welcomed to engage in the events and were educated on the ecology and conservation of bat species in the area. I was also involved in educating children during the national science week (2017) presented at the Ditsong National Museum of Natural History.

2. Please explain any unforeseen difficulties that arose during the project and how these were tackled.

Obtaining clearance for animal ethics postponed the project which resulted in the fieldwork component to only start in June 2017. As a result the duration of the fieldwork was scaled down to 9 months rather than the proposed 12 months (June 2017-February 2018).

Due to access restrictions to CoH site we could only obtain capture data for 3 months. The late arrival of the bat detectors resulted in no temporal overlap of the different monitoring methods that were utilised, thus no comparisons could be made for the CoH site. We did however have 9 months' worth of data to compare overlapping monitoring methods for the Meletse site. Data was obtained (bat captures and echolocation recordings) for both Meletse and CoH.

When we did winter bat captures we noticed lower bat activity and that the decrease in temperatures caused the bats to struggle to fly. To account for this we adjusted our protocol to immediately identify and measure the captured bats to limit the exposure time of the animal to the cold. We also did not exceed captures for more than an hour after sunset. This proved effective as the bats flew away just after being processed. During summer we could revert back to the old protocol of identifying and measuring the bats after the capture event. This protocol was effective in summer as we had an increase in temperature and bat activity which meant that the mist nets had to be monitored more extensively.

Costs for certain equipment were subjected to availability of stock at suppliers and varying import costs based on international exchange rates. As a result in some cases we had to buy different brands of equipment but made sure to still uphold similarities in the quality of the original budgeted equipment.

3. Briefly describe the three most important outcomes of your project.

- a) We recorded a difference between the monitoring techniques that were utilised. This indicated that the use of only a single method to monitor bat populations might give underestimates of not only abundance but also underrepresent all the possible species within the region. It is also vital to record release calls of bats caught in the region to build quality call libraries that will allow the identification of bat species when utilising bat detectors for monitoring.
- b) During the winter periods we had a drastic decrease in overall bat activity and temperatures. This suggests that utilising active monitoring methods (mist net and harp trap captures) would be less effective when attempting to monitor which species occupying a certain region, especially when doing short term surveys. In this case passive monitoring (echolocation recordings) would be most effective during colder periods, but only if a good quality call library is available. It is important to utilise both active and passive monitoring when doing long term studies as we recorded variations in not only activity but also body condition of certain bat species over a temporal scale. There was an overall increase in bat activity and temperatures during the summer periods. During the warmer period we could utilise the active monitoring methods to full extent as we caught more species at increased rates as compared to the colder period. The bat detectors used for passive monitoring could not record all the bat species present due to technical limitations. In particular it was problematic to detect bats echo locating at higher frequencies (*Hipposideros caffer* at 140 KHz). The increase in bat activity also caused the "masking" of other bat calls as we caught species

that were not recorded on the bat detectors. It would therefore be beneficial to utilise active monitoring methods during hotter periods. We also recorded a difference in species that were captured in mist nets and harp traps. The higher frequency bats and clutter feeders (*Cloeotis percivali*, *Hipposideros caffer*, *Nycteris thebaica*) were mostly caught in harp traps but not in the mist nets, but the rest of the bat community were equally caught with both capturing methods. It is therefore important to consider what method of monitoring to utilise not only for certain bat species but also on a temporal scale.

- c) We successfully started a bat monitoring system within CoH. This will aid future studies by establishing a baseline of monitoring within the region and hopefully become a long term project.

4. Briefly describe the involvement of local communities and how they have benefitted from the project.

We spoke to local communities on site during the fieldwork period about monitoring bats and the conservation of these animals. Not only did we focus on the animals but also the conservation of the ecosystem as a whole. We attempted to inspire the young and old alike to become involved in the local conservation efforts and educate people when and where ever possible.

5. Are there any plans to continue this work?

Yes further monitoring of the bat communities will be undertaken by AfricanBats NPC. For this reason, the bat detector station was donated to AfricanBats NPC so that it could be permanently deployed in The Cradle of Humankind. During the course of this project I have also actively been involved in training other students as a mentor for AfricanBats NPC. This will allow trained individuals to continue this type of work at both Meletse and The Cradle of Humankind upon project completion.

6. How do you plan to share the results of your work with others?

I have already presented this work as part of the Meletse annual symposium (September 2017 and August 2018), the Eugène Marais Chair of Wildlife Management international symposia (September 2018) and plan to do so at future events. I plan to incorporate this data as part of my Master's thesis which will ultimately be published in scientific peer-reviewed journals.

7. Timescale: Over what period was the grant used? How does this compare to the anticipated or actual length of the project?

The grant was mostly utilised over the fieldwork period which spanned from June 2017-February 2018. However the grant was only obtained in November 2017 but still allowed for the funds to be allocated towards the necessary equipment and gave major aid until February 2018. It did cause monitoring to start later than expected but all necessary data was obtained to allow this project to be successful. All the

equipment that was obtained via grant funding can and will be used in future studies in an attempt to understand bat ecology and aid in population monitoring. The logo was also utilised during national science week in 2017 at the Ditsong National Museum of Natural History.

8. Budget: Provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used. It is important that you retain the management accounts and all paid invoices relating to the project for at least 2 years as these may be required for inspection at our discretion.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Total Vehicle (Fuel costs)	203	218	-15	Fuel prices were unpredictable and amounted to more than originally estimated. This was due to increased fuel prices over the course of the project.
Total Equipment	4580	4621	-41	Different brands of equipment had to be bought due to price inflation of imported equipment. Similar specifications to the original requested equipment were ensured. Excess money was used to buy additional equipment upon request of funder. Budget amount calculation error amount to £4580 not £4570.
Anabat Swift Detectors	2598	1877	721	Difference in brands caused varied prices. The original budgeted bat detectors doubled in prices and would have been too expensive.
Anabat power cable	122	33	89	Brand difference
Anabat 5m microphone cable	0	37	-37	Previous brand had microphone cable as bundle price with microphones. Had to adjust cost according to new brand equipment availability.
Anabat microphones	356	282	74	Brand difference
Shipping costs	0	137	-137	New supplier had different shipping costs
62GB micro SD cards	29	180	-151	Only one external power cable was bought and additional SD card was added to have two functioning bat detectors.
Dial calliper	43	39	4	Shipping costs differ due to exchange

				rates.
Digital scale	119	122	-3	Shipping costs differ due to exchange rates.
Calibration weights	69	69	0	
Portable radios	156	143	13	Different brand was bought at cheaper price but similar specifications to original.
Laptop	938	1122	-184	Different brand was bought at higher price due to supplier stock, but similar specifications to original.
6m mist nets	67	85	-18	Shipping costs differ due to exchange rates.
9m mist nets	83	107	-24	Shipping costs differ due to exchange rates.
Battery charger	0	85	-85	At request of funder to use additional costs
Microsoft office	0	193	-193	At request of funder to use additional costs
4TB hard drive	0	110	-110	At request of funder to use additional costs
Total Monitoring station	203	132	71	Material for the station was locally bought at reduced prices. Budget amount calculation error amount to £203 not £213.
Solar pane	18	15	3	Local prices varied marginally.
Protective casing and Extension pole	94	37	57	Due to smaller bat detectors smaller protective casings could be bought at reduced prices.
12v battery	75	50	25	Bought as a bundle with solar panel at reduced prices.
Peripherals	16	30	-14	Power converted had to be bought at elevated priced due to exchange rates.
Grand Total	4986	4971	15	Due to the exchange rate at the time of grant payment, more money could be utilised towards the project while adhering to the original budget.

Exchange rate £1=ZAR 18.2. Average exchange rate at date of payment (19-31 October 2017)

9. Looking ahead, what do you feel are the important next steps?

It is important to increase efforts in training people (local communities) to continue this type of work in addition to elevating the importance of monitoring efforts and techniques that allow quality surveying of bat populations. It would be ideal if long term projects could be established to help monitor and ultimately conserve bat species across South Africa, and to help expand our knowledge on the ecology of

these animals. It would be beneficial if this data could be used for future monitoring and reporting to government departments on both national and international scale.

10. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the Foundation receive any publicity during the course of your work?

Yes it was utilised in all presentations given relating to this project (Meletse symposium 2017-2018, the Eugène Marais Chair of Wildlife Management international symposia 2018. The logo was also used during fieldwork (T-shirts via AfricanBats NPC) so that locals could acknowledge that the project was supported by The Rufford Foundation.

11. Please provide a full list of all the members of your team and briefly what was their role in the project.

Mr Tlaishego Tedson Nkoana - assisted with fieldwork and was instrumental to finishing this project and collecting high quality data.

Dr Mark Keith - supervised the project and assisted in deploying the bat monitoring station in The Cradle of Humankind.

Ernest C. J. Seamark - co-supervised the project and assisted in deploying the bat monitoring station in The Cradle of Humankind.



Left: Entrance to the Gatkop cave in Meletse. This cave serves as a maternity roost for multiple cave dwelling bats in the area. ©M. Shanahan. Right: Late night visit of a *Nycteris thebaica* that used the roof of our facility as a night roost. ©M. Shanahan.



Left: M. Shanahan and T. Nkoana setting up temporary bat detectors across the Cradle of Humankind landscape. ©E. C. J Seamark. Right: Bat being taken out of a mist net by Monique Shanahan. ©T. Nkoana.