THE PHASA FOUNDATION

SINGATHA

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&
SINGATHA CONSERVATION RESEARCH FUND

PROGRESS REPORT

July 2020

Introduction:

PHASA Foundation and Singatha Conservation Research Fund (SingathaCRF) launched a collaborating project to "Determine leopard density on privately owned land in South Africa". Previous reports, based on scientific evidence, from the South African Biodiversity Institute (SANBI) and the Department of Environmental Affairs (DEA) indicated a declining in Leopard populations, yet more monitoring projects is needed to determine if the decline is continuing.

The PHASA Foundation project was launched in the Limpopo Province, being one of the highest contributing provinces in South Africa to suitable leopard habitat. A specific monitoring protocol has been set out by the Scientific Committee for the monitoring of Leopard population. Currently we have launched 6 projects within the Limpopo Province, 3 completed for the year 2020 and 3 projects already well in progress.

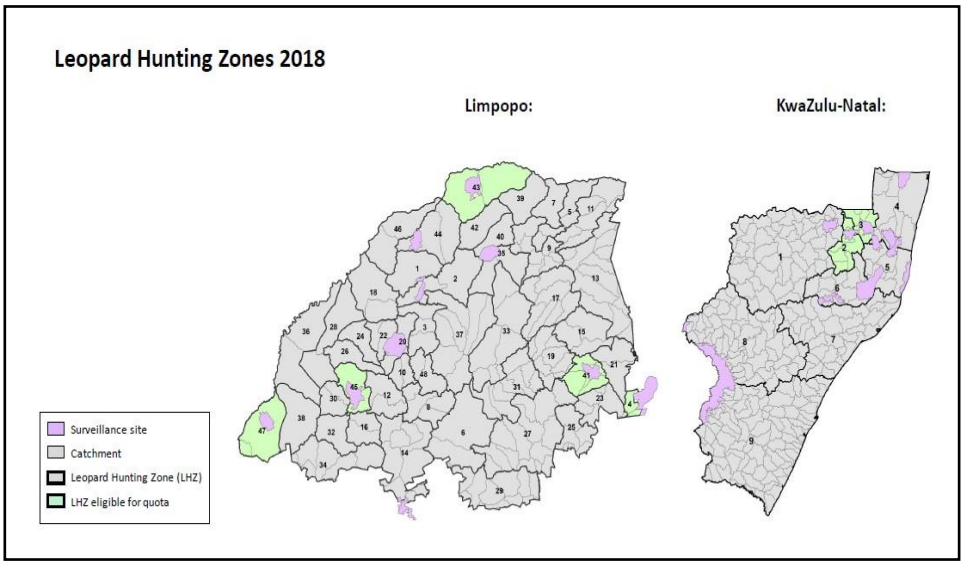


Figure 1: Previous 9 sites monitored in Limpopo Province for a three-year minimum period and data sets included in scientific reports. (DEA Leopard Quota Review)

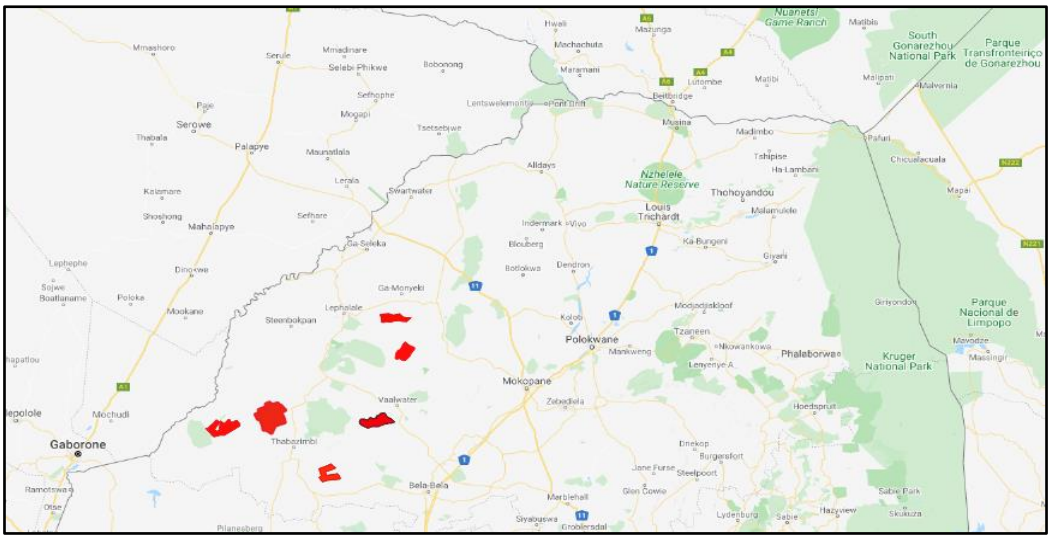


Figure 2: PHASA Foundation 6 monitoring sites for 2020.

Methodology:

1. Leopard Activity Mapping:

The set-up of a project consists of various role-players, equipment, and logistics. Projects are identified through suitable locations consisting of a minimum of 10 000Ha property, this can be one property or a few adjacent properties, and Leopard habitat preferences. At respective sites we engage with landowners, staff members from the communities and Professional hunters, through this we combine knowledge and expertise in hope to improve the monitoring. We also advise and educate members on the methodology during a workshop held at the respective monitoring locations before the projects starts. Citizen Science has been a big part of research for several years and have had some major successes, especially for wildlife monitoring. We use citizen science to not only gain benefit through added data, but also allow non-scientist to take part in important monitoring projects. Through the PHASA Foundation Leopard monitoring project we have trained staff members in taking theoretical methodology, applying it practically and setting up projects on their properties, doing data collection through leopard activity logging and setting up camera trap stations. This has allowed general members of the public to take part in science projects, without having a formal degree or qualification. By doing this we have noticed that members take responsibility for the project just as much as we do, they see the importance of obtaining data and sharing their knowledge with us. For the first phase of the project we require property staff members to log the activity of leopards, such as: tracks, drag marks, kills made by leopards, scat or real time sightings. An image is taken of the activity to be logged (tracks, kill, scat, or sighting), the GPS position is recorded, and the GPS record is loaded onto a Google map file. These GPS positions aids and verifies camera trap stations. This method engages working relationships between the monitoring team, landowners, and staff members. It saves a great deal of time when setting up each project and in return retains funds to be used for more projects around the province.

2. Camera trap surveys:

Using the methodology as prescribed by the Scientific Steering Committee, we have set-up 6 projects thus far. The methodology requires:

- Monitoring sites not less than 10 000Ha in size
- Camera trap station, consisting of 2 cameras opposite of each other, stations placed between 2 – 5km apart, covering a female home range
- Camera traps are placed along; roads, drainage lines, water sources and game trails where chances are maximized for capturing leopard movement.
- Camera traps is mounted on trees or steel droppers, about 45cm above ground, across from each other in attempt to capture both sides of the animal for better identification
- Camera trapping occasions are divided into 24hr cycles, monitoring will continue for 45 – 60 trap nights covering 10 000Ha

Camera trap stations are set-up by the monitoring team and property staff members. Every two weeks camera traps are serviced, changing SD cards, and replacing with empty cards, checking battery level, and ensuring camera station is still in the correct position. Every other week, staff members are requested to check up on stations, incidents occur where larger animals push camera traps into the wrong positions, and this affects the capturing of animals

Equipment:

PHASA Foundation purchased equipment to set-up 3 simultaneous projects. The project equipment consists of:

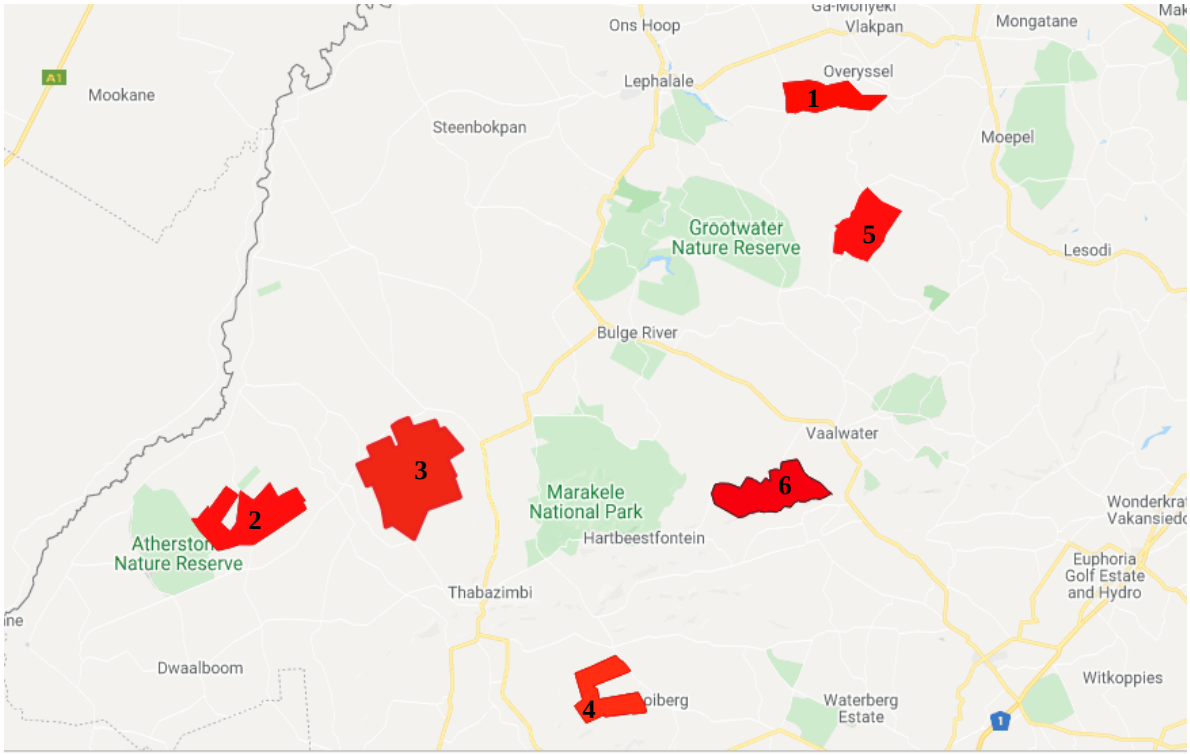
Equipment	Quantity
Trail cameras	120
Steel protective casings	120
12V Batteries	150
Connector cables	150
Voltage meters	2
32Gig SD Cards	240
External hard drives	5

We hope to purchase additional equipment to be able to cover more projects in the next year.

Project report:

This progress reports includes information on monitoring:

- Start and end date
- Property size
- Equipment used
- Service dates
- Relevant project information
- Data processing and indications of data



PHASA Foundation monitoring sites

Projects:

1. **Rhinoland**
2. **Dwaalboom**
3. **Thaba Tholo**
4. **Rooiberg**
5. **Nyati**
6. **Waterberg**

Project 1: Rhinoland

Monitoring date:
8 November 2019 – 7 January 2020

Property Size:
12000Ha

Equipment:

- 40 x Trail Cameras
- 40 x Steel protective casings
- 45 x 12V Batteries
- 40 x Connector Cables
- 40 x 32Gig SD cards

Project details:

The first project for the PHASA Foundation Leopard Monitoring project, we were able to set up by 8 November 2019.The Rhinoland Project is divided between two properties and collectively 12 000 ha in size, thus, 20 camera trap stations were strategically spread out across the two properties in order to cover the entire study area as to increase the probability of capturing leopard on the camera traps. During December 2019 we had over 600 images of leopards, this assisted us to identify individuals and place future data in their identity folder. By the end of the project we were able to identify a possible 8 females and 3 males.

After each service, the data is processed and filtered immediately. This process consists of sorting through the data and filing it, according to the station number and individual camera number. Any leopard footage is stored in a separate folder which is then later used during the identification process. The identification of leopards is done looking at their different coat patterns. All identification data compiled are peer-reviewed, this ensures that the project remains unbiased towards the objectives.

Cameras was retrieved from this property as the monitoring period for this block has reached the end. Monitoring team is currently busy analysing data. Final report will be submitted to PHASA Foundation and the South African National Biodiversity Institute.

Project 2: Dwaalboom

Monitoring date:
28 January 2020 – 5 May 2020

Property Size:
11500Ha

Equipment:

- 40 x Trail Cameras
- 40 x Steel protective casings
- 45 x 12V Batteries
- 40 x Connector Cables
- 40 x 32Gig SD cards

Project detail:

At the end of January 2020, the leopard monitoring project continued on three adjacent properties, Haakdoorn, Elandskloof and Boelani, in Thabazimbi, towards Dwaalboom. The three properties are collectively just over 10 000 ha in size, thus, 20 camera trap stations had to be divided and strategically spread out across the three properties in order to cover the entire study area as to increase the probability of capturing leopard on the camera traps. On the 28th of Janauary 2020, the first number of cameras were active and the sampling period officially started for this block

The cameras were serviced the first time on 13 February 2020. The only major problem was the SD cards that filled up quite quickly. During the second service period on 17 March 2020, the problem was addressed and most of the 16GB SD cards were replaced with 32GB SD cards. The SD cards were used on a rotational basis, thus, as soon as the cards were retrieved from the field, the data on the SD cards were downloaded onto an external hard drive and the SD cards were cleared in order to have it ready for the next service period. By always having an extra set of SD cards clean it reduced the time spent in the field and further reducing the window for unforeseen technological problems. The camera stations on Boelani was removed during the second service period, since the property was sampled from November 2019, the cameras completed the full sampling period. These 4 stations were moved to Elandskloof and additional stations were added to Haakdoorn. Prior to moving the camera trap stations into the new area, five females and two male leopards were already identified on the three properties. The camera trap stations on Elandskloof and Haakdoorn continued to be sampled for another 45 days, counted from 17 March 2020, in order to complete the sampling period for the second batch of camera trap stations added to the above-mentioned properties.

After each service the data was processed and filtered immediately. This process consists of sorting through the data and filing it, according to the station number and individual camera number. Any leopard footage is stored in a separate folder which is then later used during the identification process.

Due to limitations of lockdown, property staff assisted with data collection and the project was able to continue successfully.

On the 1st of May the Monitoring team from PHASA Foundation was able to travel around with exemption permits. The cameras were retrieved from the properties on 5th of May 2020, as the monitoring period for this block has reached the end. Monitoring team is currently busy analysing data. Final report will be submitted to PHASA Foundation and the South African National Biodiversity Institute.

Project 3: Thaba Tholo

Monitoring date:
3 March 2020 – 15 June 2020

Property Size:
20 000Ha

Equipment:
- 40 x Trail Cameras
- 40 x Steel protective casings
- 45 x 12V Batteries
- 40 x Connector Cables
- 40 x 32Gig SD cards

Project detail:
Thaba Tholo comprise of 35 000 ha in size and thus it was decided to only sample 20 000Ha and to divide the property into two blocks for sampling. An area of approximately 10 000 ha was sampled as the first bloack and after 45 days, the camera stations were relocated to the next 10 000 ha block.

The first block in the North West corner of the property comprised of 20 camera trap stations strategically placed throughout this block, on the 3rd and 4th of March 2020, as prescribed by standards and recommendations.

The stations were serviced for the first time on the 16th of March 2020. Most of the 16 GB SD cards were then also replaced with 32 GB cards. With little damage to our camera traps, alternative deterrent methods had to be used to limit equipment damage.

After the first service the country went into a national lockdown with travel restrictions. Thaba Tholo placed their property under lockdown and our team was not allowed to enter. Due to these circumstances we made the necessary arrangements with management at Thaba Tholo and local monitoring assistants to assist with servicing the camera traps and collecting the data. We also provided Antonie (monitoring assistant) with the extra equipment and storage he would need to continue. The cameras were serviced a second and third time, 2

April 2020 and 15 April 2020 respectively. Unfortunately, elephants were more abundant resulting in three of the camera trap stations to be relocated to reduce interaction and further damage to the cameras. The repositioning of two of the stations took place on the 8th of April 2020 and the last one on 22 April 2020.

Monitoring assistant shared leopard data with us via WhatsApp or WeTransfer which enabled us to continue with the identification of the leopard. The sampling period for this block came to an end and the cameras were moved to the next block on Friday, 1st May 2020. Three of the camera stations were already relocated as previously mentioned, those three stations remained at their current location for a full sampling period of 45 days. Thus, only 17 stations were moved to the next block. The cameras were serviced a second and third time, 12 May 2020 and 23 May 2020 respectively.

After each service the data was processed and filtered immediately. This process consists of sorting through the data and filing it, according to the station number and individual camera number. Any leopard footage is stored in a separate folder which is then later used during the identification process.

On the 1st of May the Monitoring team from PHASA Foundation was able to travel with exemption permits. Due to the health risk, the team was still unable to gain access to Thaba Tholo, Antonie was able to retrieve and share the data. During the final service on the 15th of June, cameras were retrieved, and the monitoring period came to an end. A total of 7 females and 5 males were identified. Monitoring team is busy with data analyses. Final report will be submitted to PHASA Foundation and the South African National Biodiversity Institute.

Project 4: Rooiberg

Monitoring date:
19 May 2020

Property Size:
11 500Ha

Equipment:

- 40 x Trail Cameras
- 40 x Steel protective casings
- 45 x 12V Batteries
- 40 x Connector Cables
- 40 x 32Gig SD cards

Project detail:
The Rooiberg Project consist of 4 adjacent properties of 11 500Ha in total. First set of 20 Stations was set-up on Monate, Yzerfontein and Paardekraal. Previous leopard monitoring data on Monate was used to place stations in high possibility capture areas. Logging of leopard activity and camera trap set-up was done simultaneously. The first service took place on 4 June 2020, and second service on the 19th of June. During the first service 5 stations, was successful in capturing leopards. During the third service camera stations were moved to next part of the project to complete monitoring area. No problems occurred during monitoring and the data already indicated 4 females and 5 males. The first service for the 2nd phase of this project was on 20 July and data will be sorted for further identification and analyses.

After each service the data was processed and filtered immediately. This process consists of sorting through the data and filing it, according to the station number and individual camera number. Any leopard footage is stored in a separate folder which is then later used during the identification process

Monitoring team is busy with leopard identification which will then be sent for peer-review. Final report will be submitted to PHASA Foundation and the South African National Biodiversity Institute.

Project 5: Nyati

Monitoring date:
4 June 2020

Property Size:
12 000Ha

Equipment:
- 40 x Trail Cameras
- 40 x Steel protective casings
- 45 x 12V Batteries
- 40 x Connector Cables
- 40 x 32Gig SD cards

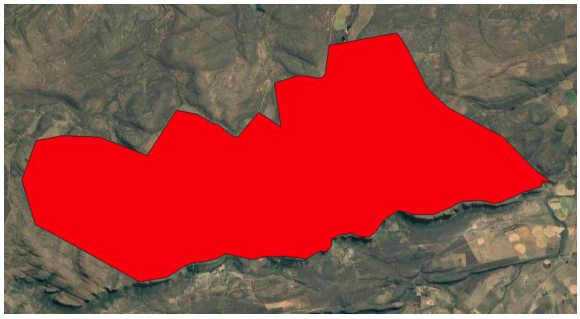
Project detail:
The Nyati project consist of three adjacent properties, Nyati Wilderness, Goudrivier and Izintaba. This project already presented itself successful in the first week with over 45 GPS points of leopard activity in one week. 20 Camera trap stations was set-up on Nyati and Goudrivier on the 1st and 2nd of June 2020. First service took place on the 17h of June 2020 with indications of leopard activity after the first round of service at 7 stations, during the second service on 2 July there was an increase in leopard activity at 10 camera trap stations. Camera trap stations were serviced for a final round on the 14th of July and moved

to cover the next phase of the project. During the first and second service, data indicated 4 females (incl 2 cubs) and 5 males.

After each service the data was processed and filtered immediately. This process consists of sorting through the data and filing it, according to the station number and individual camera number. Any leopard footage is stored in a separate folder which is then later used during the identification process

Monitoring team is busy with leopard identification which will then be sent for peer-review. Final report will be submitted to PHASA Foundation and the South African National Biodiversity Institute.

Project 6: Waterberg



Monitoring date:
15 June 2020

Property Size:
12 000Ha

Equipment:

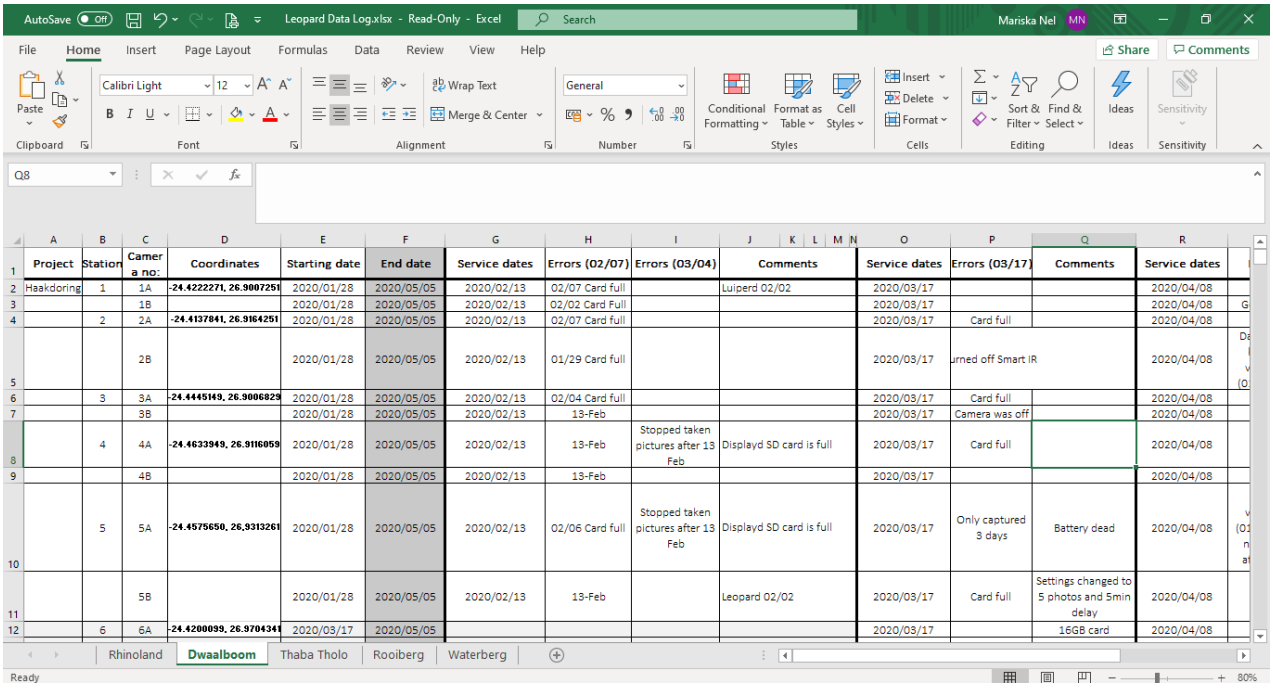
- 40 x Trail Cameras
- 40 x Steel protective casings
- 45 x 12V Batteries
- 40 x Connector Cables
- 40 x 32Gig SD cards

Project details:
The Waterberg project consist of three adjacent properties, Nooitgedacht, Kizingiti and Elandsfontein. 12 Camera trap stations was set-up on Elandsfontein and Kizingiti on the 15th and 16th of June 2020. First service took place on the 30h of June 2020 with indications of leopard activity after the first round of service at 6 stations with special footage indicating presence of a female strawberry leopard. A young male leopard was also captured eating a young calf. The second service took place on 17 July 2020. During the second service, the remaining camera trap stations were placed on Elandsfontein to cover the total monitoring area.

After each service the data was processed and filtered immediately. This process consists of sorting through the data and filing it, according to the station number and individual camera number. Any leopard footage is stored in a separate folder which is then later used during the identification process

Monitoring team is busy with leopard identification which will then be sent for peer-review. Final report will be submitted to PHASA Foundation and the South African National Biodiversity Institute.

Service data sheet:



Project	Station	Camera no:	Coordinates	Starting date	End date	Service dates	Errors (02/07)	Errors (03/04)	Comments	Service dates	Errors (03/17)	Comments	Service dates
Haakdoring	1	1A	-24.4222271, 26.9007251	2020/01/28	2020/05/05	2020/02/13	02/07 Card full		Luiperd 02/02	2020/03/17			2020/04/08
		1B		2020/01/28	2020/05/05	2020/02/13	02/02 Card Full			2020/03/17			2020/04/08
	2	2A	-24.4137841, 26.9164251	2020/01/28	2020/05/05	2020/02/13	02/07 Card full			2020/03/17	Card full		2020/04/08
		2B		2020/01/28	2020/05/05	2020/02/13	01/29 Card full			2020/03/17	urned off Smart IR		2020/04/08
	3	3A	-24.4445149, 26.9006829	2020/01/28	2020/05/05	2020/02/13	02/04 Card full			2020/03/17	Card full		2020/04/08
		3B		2020/01/28	2020/05/05	2020/02/13	13-Feb			2020/03/17	Camera was off		2020/04/08
	4	4A	-24.4633949, 26.9116059	2020/01/28	2020/05/05	2020/02/13	13-Feb	Stopped taken pictures after 13 Feb	Displayd SD card is full	2020/03/17	Card full		2020/04/08
		4B		2020/01/28	2020/05/05	2020/02/13	13-Feb			2020/03/17			2020/04/08
	5	5A	-24.4575650, 26.9313261	2020/01/28	2020/05/05	2020/02/13	02/06 Card full	Stopped taken pictures after 13 Feb	Displayd SD card is full	2020/03/17	Only captured 3 days	Battery dead	2020/04/08
		5B		2020/01/28	2020/05/05	2020/02/13	13-Feb		Leopard 02/02	2020/03/17	Card full	Settings changed to 5 photos and 5min delay	2020/04/08
	6	6A	-24.4200099, 26.9704341	2020/03/17	2020/05/05					2020/03/17		16GB card	2020/04/08

Detailing notes of services are important, when working through data, this ensures the team has a full picture when sorting through data, it also assists to address errors and to avoid losing data unnecessarily.

Data Analyses:

Currently we use a Bayesian spatially explicit hierarchical model to analyse spatial capture-recapture data (such as photographic captures), including sex as a covariate in the models to account for sex-specific capture heterogeneity. This gives us an indication of population size and density. Although the presence of leopards may be high on a property, it is important to indicate re-captures of male and female individuals.
The first three projects, Rhinoland, Dwaalboom and Thaba Tholo leopard ID'ing is complete and peer-reviewed by field specialist and experts, data is currently being analysed. The remaining three projects Rooiberg, Nyati and Waterberg data collection is still in process, data being sorted and leopard ID'ing is underway.

Conclusions:

We are in process setting up new projects across Limpopo Province and filling the information gap.

The opinion of "what is said on paper is not necessarily what happens in the field" rings true to any scientist. We can have the best plan, yet we work with nature and an unpredictable variable. We aim at doing the project to the best of our abilities, giving feedback on what happens in the field. We have the support of those on the ground, making the task easier and more knowledgeable. Where science has been perceived as the obstruction the last few

years. It has now stirred interest in parties who would never have been part of projects as such. Applying a basic skill set, to an already functioning method.

Cooperation between the wildlife services and wildlife users is crucial to management and visa versa. The technical capability of wildlife monitoring services depends on their budgets. It is therefore vitally important to develop mechanisms to provide additional funding, channeling at least part of the funds into wildlife management monitoring. This has been done by PHASA Foundation through promoting voluntary contributions by wildlife users such as hunters, private landowners, and wildlife product processing industries; together with international financial support, particularly for research, protection of endangered species and species of great social value.

The current data received presents promising, and we look forward sharing final conclusions with all involved. This information is vital to the future of leopards in South Africa. Together we can assist in obtaining this information, filling the gaps, and adding to the National database.

A special thank you to all the funders and team members on this project. Going alone, we can go fast, but going together we can go further.

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