



SPECIALIST RIVERINE RABBIT SURVEY

Monitoring for the presence/absence of Riverine Rabbits and the collection of data of other wildlife present on the Square Kilometer Array (SKA) site in the Karoo.

Reporting on observations and recommendations for further long-term monitoring and research programme on the SKA site.

Principal Client: DEA

Subcontracted Services: CSIR

Subcontracted Supplier: **The Endangered Wildlife Trust - Drylands Conservation Programme**

REPORT COMPILED BY:

| | | |
|--|--|--|
| Bonnie Schumann | Esté Matthew | Cobus Theron |
| Senior Field Officer | Intern Field Officer | Programme Manager |
| bonnies@ewt.org.za | estherm@ewt.org.za | cobus@ewt.org.za |
| Cell: 072 122 4232 | 072 4626543 | Cell: 079 508 2156 |

CONTENTS

| | |
|--|------|
| 1. Background | P.2 |
| 2. Expertise of specialist | P.3 |
| 3. Rationale: Riverine Rabbit conservation status and threats | P.3 |
| 4. Camera trap methodology | P.4 |
| 4.1 Methodology applied within Groot-Paardekloof | P.4 |
| 5. Results | P.6 |
| 5.1 Absence of Riverine Rabbits | P.6 |
| 5.2 Other Wildlife Present | P.6 |
| 5.3 Habitat suitability | P.7 |
| 6. Conservation recommendations for further long-term monitoring and research on the SKA sites | P.7 |
| 7. Conservation recommendations in Riverine Rabbit distribution areas | P.8 |
| 7.1 Recommendations for baseline- and during- and post-construction monitoring in any areas should Riverine Rabbits be discovered in the future. Specific monitoring would include, but not be limited to: | P.9 |
| 8. Conclusion | P.10 |
| 9. Selected photos taken during the survey | p.11 |
| 10. Dataset outline clarification | p.12 |
| 11. Appendices (attachments) | |
| Appendix 1- Complete photo dataset- 6 weeks | |
| Appendix 2- Mammal and bird species list | |
| Appendix 3- Plant species list | |
| Appendix 4- Google Earth map with polygons and placements | |
| Appendix 5- Camera placement photos | |
| Appendix 6- All original photos | |

1. Background

The CSIR (Council for Scientific and Industrial Research) was contracted by the Department of Environmental Affairs (DEA) to conduct the Strategic Environmental Assessment for the Square Kilometre Array (SKA) development in the Karoo (Phase 1). Part of this process includes biodiversity assessments. The Endangered Wildlife Trust was then sub-contracted by the CSIR in June 2016 to carry out the survey for the presence/absence of Riverine Rabbits (*Bunolagus monticularis*), and in addition to collect data on other wildlife present.

The Critically Endangered Riverine Rabbit occurs along seasonal rivers in the Nama Karoo. While much is known about Riverine Rabbit distribution in the Nama Karoo, there are still areas where they may occur, but which have not been surveyed yet. The Endangered Wildlife Trust's Drylands Conservation Programme surveyed the farm Groot-Paardekloof (on the SKA site) for a six-week period using camera traps (Figure1).

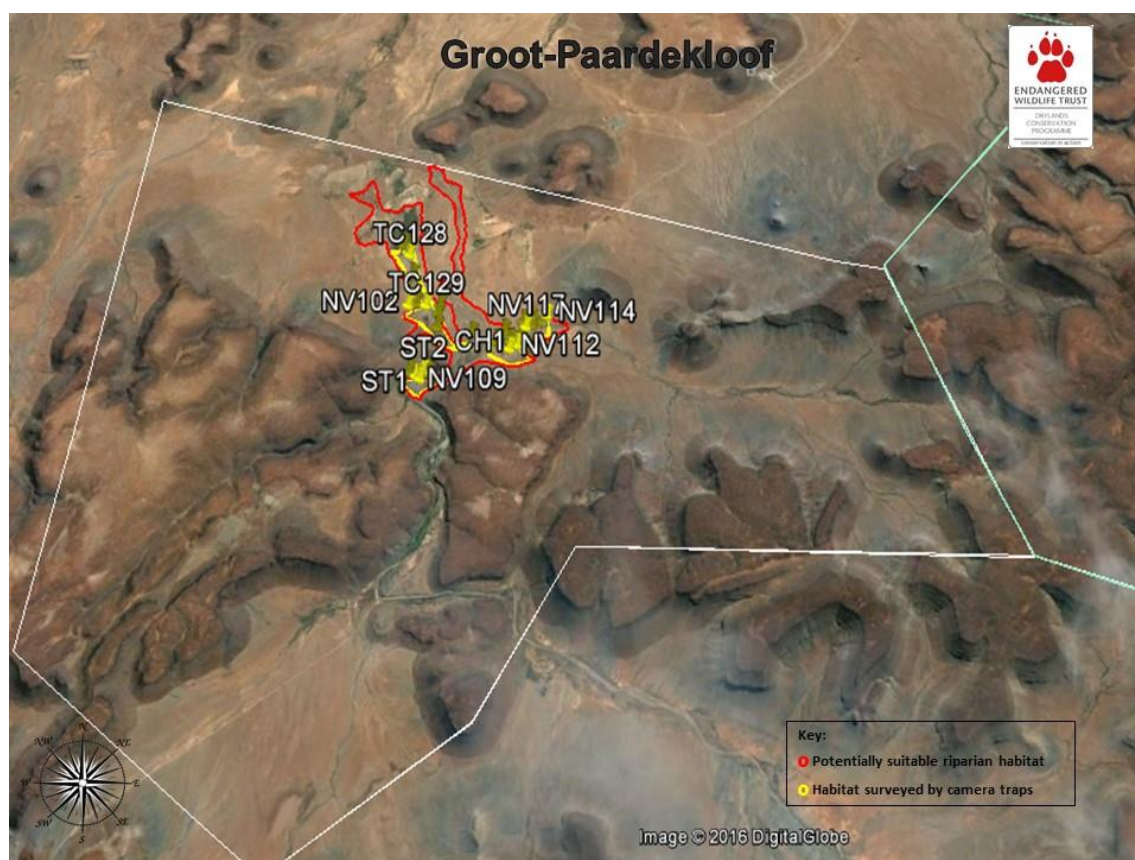


Figure1: Overview of the Groot-Paardekloof farm and area surveyed with the cameras traps in the riparian zone.

2. Expertise of specialist

The Endangered Wildlife Trust's Drylands Conservation Programme has extensive experience in Riverine Rabbit habitat identification and surveys, having worked on conservation of the Riverine Rabbit for more than 15 years in the Northern and Western Cape. Bonnie Schumann, Senior Field Officer responsible for the survey has five years' experience conducting camera trap surveys in the Nama Karoo. Through our partnership with the University of Cape Town we are also continuously improving methods for use in the field.

3. Rationale - Riverine Rabbit conservation status and threats

The Riverine Rabbit (*Bunolagus monticularis*) is a specialised Lagomorph that is endemic to the semi-arid Nama and Succulent Karoo Biomes of South Africa and is fairly restricted to seasonal river vegetation (riparian habitat), particularly in the Nama Karoo. According to the World Conservation Union's (IUCN) Red List criteria, the Riverine Rabbit is Critically Endangered (2004) and is recognized as one of the most threatened terrestrial mammals in southern Africa. This is due to the fact that two-thirds of its habitat has been fragmented or destroyed in the past 50 years as result of anthropogenic disturbances into the Central and Upper Karoo region of South Africa's Northern and Western Cape provinces. The Riverine Rabbit has a very restricted distribution within unique riverine vegetation adjacent to seasonally dry rivers in the Nama Karoo. The alluvial soil terraces on either side of seasonal rivers provide a unique (karroid) shrubland habitat type that is essential for the Riverine Rabbit for food and cover. The Riverine Rabbit is also short-lived and has a very low breeding rate.

The Riverine Rabbit is a keystone conservation species for the riparian shrubland associated with the seasonal drainage system of the Karoo, where its presence is an indicator of ecosystem health. Its extinction in many areas of its former natural distribution range is indicative of degradation, fragmentation and loss of the valuable riparian vegetation cover caused by over-utilization and cultivation. Populations become isolated where riverbanks and floodplains have been transformed for cultivation of crops, posing an additional risk to the species' migration and survival. The Karoo eco-region is also under increasing pressure from proposed industrial developments such as uranium mining, wind farming and gas explorations, and this is a worrying emerging threat to the species. This elusive, shy and very rare animal is solitary and nocturnal in habit. Riverine Rabbits also rarely leave

any detectable signs (e.g. tracks) to indicate presence, making the use of cameras highly desirable in determining presence/absence.

4. Camera trap methodology

Camera trapping uses fixed cameras triggered by infra-red sensors to 'trap' images of passing animals. It is a quantitative technique that has relatively low labour costs, is non-invasive, incurs minimal environmental disturbance, is robust to variation in ground conditions and climate and, most importantly, can be used to gain information on highly cryptic species and in difficult terrain where other field methods are likely to fail. We have already established the effectiveness of using camera traps to detect Riverine Rabbits in four separate trials. These trials showed that camera traps were more effective at detecting presence than person-surveys. In one trial the cameras captured 17 images of this rare animal in just four nights, which is a far better success rate and much more cost effective than the walking surveys that were carried out in the past. Therefore, we have reasonable assurance in the results of this study.

4.1 Methodology applied within Groot-Paardekloof:

- 4.1.1 Areas of potential Riverine Rabbit habitat were identified on the farm Groot-Paardekloof adjacent to the current two SKA farms. The riparian habitat on Groot-Paardekloof, covering approximately 2.6km² (Figure2), is representative of the two current core area farms. Cameras were set here to avoid possible complications caused by restricted access to the existing core area and proximity to existing satellite dishes (5 km no-go zone for cameras around dishes) in the existing core area.
- 4.1.2 The areas were selected in collaboration with Simon Todd (botanical and faunal specialist working with SAEON). These areas were selected based on their potential suitability for Riverine Rabbits in terms of proximity to a river system and plant structure and composition.
- 4.1.3 A survey for Riverine Rabbits was conducted on this farm using 32 camera traps (Bushnell HD) for a period of six weeks. The cameras were placed strategically in potentially likely habitat in the most suitable areas, (Appendix 4). These areas were selected using a combination of Google Earth imagery and through ground-truthing of the terrain. The approximate percentage of the available habitat surveyed by the cameras was 0.73km², or approximately 28 % of the total riparian area identified for the survey. After three

weeks the cameras battery levels were inspected and cards were changed. The coordinates for these site locations are included in Appendix 1.

- 4.1.4 A detailed evaluation of the habitat was undertaken, including identifying plants species, 48 species (Appendix 3), found within close proximity (approximately 20 m radius) of the cameras. A photo of each station capturing an overview of the surrounding vegetation showing the habitat (Placement photos database) was taken during the setting of the cameras.
- 4.1.5 Additional information such as the time the photo was recorded , the moon phase and temperature (Appendix 1) were captured, providing additional information on activity patterns of other wildlife capture during the survey, which could add value to future research on these species.
- 4.1.6 The outcomes of the camera trap survey allowed us to assess the probability of occurrence of Riverine Rabbits in this area.
- 4.1.7 Recommendations for future long-term monitoring are given, based on the results.



Figure2: Map showing the placements of the cameras traps in the riparian zone on Groot-Paardekloof.

5. Results

The presence of small stock on the farm resulted in a few thousand photos of sheep which is unavoidable when cameras are set in the presence of livestock. This did not affect camera performance in that none of the cards reached capacity prior to collection. However, this added greatly to the time taken to record images as each image had to be examined to ensure no wildlife was missed. The sheep could possibly contribute to disturbance leading to less wildlife images or shy species avoiding areas where the sheep are active. However, given the range of species captured, and the fact that individual cameras capturing lots of sheep images also recorded a good range of other species in between, the wildlife is most probably well adapted to co-existing to the presence of sheep in the habitat (Appendix 1).

5.1 Habitat suitability

The vegetation offers near-suitable structure and some of the key Riverine Rabbit habitat component plant species such as Beesganna (*Salsola aphylla*) and Rivierdraaibos (*Tripteris spinescens*) are present. However, the habitat is fairly open with few dense areas that can serve as daytime refuges for Riverine Rabbits. Patches of dense vegetation are an essential habitat feature to ensure the Rabbit's ability to avoid detection and capture by predators, in particular to hamper coursing by predators when the Rabbit is flushed. The presence of numerous hares (captured by 28 out of the 32 cameras) is considered to be counter indicative of the presence of Riverine Rabbits. The reason for this is that hare presence is suggestive of the more open nature of the vegetation. In addition, signs of habitat degradation such as trampling and erosion further decrease the likelihood of Rabbits occurring here.

5.2 Absence of Riverine Rabbits

No Riverine Rabbits were detected on any of the camera traps (total camera trap nights 725) nor were any seen by the Drylands Conservation Programme team in the field when setting and checking cameras.

We can therefore conclude with a fair degree of certainty that Riverine Rabbits do not occur on the area surveyed. However, we would recommend further intensive surveys on other SKA properties, given that this is a novel area for Riverine Rabbits distribution. Their known distribution to date is

further south of this location, with the Sak River catchment being a prime example of typical Riverine Rabbit habitat in the Nama Karoo.

5.3 Other Wildlife Present

A great deal of other biodiversity was captured during the survey, with the total number of mammal species being 16, and at least 11 bird species (Appendix 2). The only Lagomorphs captured were common hares; the Scrub hare (*Lepus saxatilis*), making up most of the captures, and the Cape hare (*Lepus capensis*). We have not distinguished between when summing up images given the difficulty in distinguishing the two species particularly on the images taken at night. The hares can be distinguished from the Riverine Rabbit by unique features such as the black and white markings on their tails and the absence of a black stripe on the cheek, unique to Riverine Rabbits. There is also the possibility of the presence of African Spring hare, but we were unable to confidently identify Spring hare with the limited amount of photos from the trap camera (Camera NV108- second phases).

Other fauna ranged from small carnivores such as mongoose, to the larger Caracal and Black backed jackal, as well as Aardvark, Steenbok and Kudu. The full tally of all fauna and avifauna captured per camera trap per phase was recorded (Appendix1). This detailed database includes the camera name, GPS location, and the number of the different faunal images captured per camera per phase. Additional detail such as the moon phase, time, and temperature were also recorded.

A pair of Verreauxs' eagles (*Aquila verreauxii*) was observed during the monitoring. A nest is situated on the cliffs west of the main homestead. Dassies (*Procavia capensis*) were also observed on the adjacent koppies.

6. Conservation recommendations for further long-term monitoring and research programme on the SKA sites

Although the area covered in this preliminary survey were not optimal for Riverine Rabbits, we must emphasize the fact that intensive surveys have not been conducted in these areas in the past, warranting more research to determine the northern most extent of Riverine Rabbit distribution in the Northern Cape.

A desktop study mapping current known locations of Riverine Rabbits, taking into account proximity or linkages between catchments (and any of the catchments falling in the SKA areas) should be used as a starting point for developing a strategy in the search for undiscovered populations of Riverine

Rabbits. We highly recommend the initiation of such a desktop study, following this initial survey of part of the core area. Ideally this should be followed up by ground surveys to determine at what point known Riverine Rabbit distribution in a northern direction peters out. This work could be correlated to the distribution modelling already undertaken in terms of habitat suitability to accurately determine the northern-most extent of Riverine Rabbit distribution.

It would be greatly beneficial for any future studies using camera traps to exclude livestock from areas monitored as this will lead to a significant reduction of photographs to be assessed.

Alien invasive *Prosopis spp* were observed along the water courses during the camera trap survey. While not yet very dense, these pose a great future risk to the integrity of the riparian ecosystem as they will change the floral composition and ecological functioning of the riparian ecosystem considerably if they are not controlled.

7. Conservation recommendations in Riverine Rabbit distribution areas

It would be critical that further studies are done on the potential impacts of satellite dish construction and maintenance disturbance on future known Riverine Rabbit populations, should these be discovered in any of the SKA sites, by undertaking pre-, during- and post-construction monitoring. This information would lead to one of the first South African studies on the disturbance impacts of satellite developments on small terrestrial fauna and would provide greater clarity on the mitigations required for minimal impact on fauna.

The placement of SKA structures in riparian zones should be avoided as these are highly productive areas in terms of biodiversity, form important corridors for the movement of species, and in the Nama Karoo consist of a unique vegetation type not yet fully described as part of the South African vegetation types.

Road construction and subsequent road traffic in the riparian zones should be avoided where possible and speed restrictions imposed in these zones (40 km/hour as in most reserves). Rabbit activity has been recorded during daylight hours from as early as 3pm to as late as 10am. Our research elsewhere has shown that Riverine Rabbits in the Northern Cape are not strictly nocturnal. Rabbits are particularly vulnerable to being hit by vehicular traffic. This recommendation will also benefit a multitude of other species.

Monitoring activity levels as well as species persistence in a given area for pre-, during- and post-development could be greatly enhanced using camera traps arrays.

7.1 Recommendations for baseline- and during- and post-construction monitoring in any areas should Riverine Rabbits be discovered in the future. Specific monitoring would include, but not be limited to:

- Pre-, during- and post-construction monitoring of numbers, behaviour and movements of established Riverine Rabbit populations in close proximity to developments, through the use of camera trap grid arrays.
- Pre-construction dispersal patterns of established Riverine Rabbit populations in close proximity to developments.
- Monitor all pre-, during- and post-construction traffic volumes and roadkill numbers of all faunal species on existing roads and implement as new roads are constructed. Standardised protocols for monitoring road-kill and measures to reduce road-kill have been developed by the Endangered Wildlife Trust's Wildlife and Roads Project.
- The construction phase of the SKA structures would be of high risk for the Rabbit, in terms of noise, disturbance and the presence of construction crews which could also lead to poaching incidents. The EWT-DCP would recommend that Construction Crew Biodiversity Training is implemented, including rabbit identification, regulations required for minimizing disturbance impacts, speed control measures and poaching restrictions.
- Pre- and post-construction soil stability and erosion rates.
- We would recommend the publication and dissemination of the monitoring results in the broader scientific community, not just in required reports.
- The EWT-DCP would recommend the development of a comprehensive rehabilitation plan, as erosion processes happening on higher ground will impact the rivers downstream, particularly in the sensitive arid environment of the Nama-Karoo, with repercussions for rabbit habitat.
- Monitoring of riparian vegetation over time pre-and post- withdrawal of livestock. This could make for an interesting case study.

Note: Due to the fact that the SKA development will result in a massive Protected Area that is proximal to populations of Riverine Rabbit, the EWT-DCP would also like to propose the use of the Protected Area as a case study for the development of a model / approach that could be applied for the

relocation or reintroduction of the species to new sites in the SKA project area that may be suitable. While this does not imply that the SKA site will be a suitable site for reintroduction, the knowledge gained would greatly inform future conservation action for the species across their current and potential range.

8. Conclusion

Although no Riverine Rabbits were found on Groot-Paardekloof, during this survey, the EWT-DCP reserves the right to make additional comments or raise additional concerns should Riverine Rabbits be discovered in the current and proposed SKA areas in the future. The EWT-DCP is satisfied that it is highly probable there are no Riverine Rabbits in the area *as defined within this study*.

This conclusion is based on the review of the current Riverine Rabbit distribution maps and the local conditions on Groot-Paardekloof. Our opinion is subject to revision if the distribution of Riverine Rabbits is found to be outside the known areas either by future research or opportunistic sightings (the Endangered Wildlife Trust or other).

The presence of other ecologically important species such as Aardvark, Porcupine and threatened species such as Verreauxs' eagles lends value to this area in terms of possibly developing a specialist reserve/protected area. Further investigation to determine the distribution of species such as Golden Moles in these areas is also warranted.

The Endangered Wildlife Trust appreciates the opportunity provided by the developer to comment and participate in this process from the early stages of planning, and applauds the pro-active inclusion of biodiversity into the strategic planning of this project.

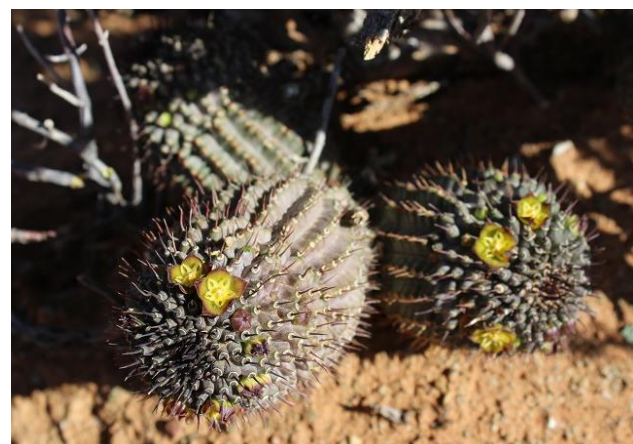
We look forward to your response and any other opportunities for collaboration.

The Drylands Conservation Programme Team

9. Selected photos taken during the survey



Above – Day and night photos taken by camera traps
Below – Plants photographed during survey. L-R *Androcymbium spp* and *Hoodia flava*



10. Dataset headings clarification

The majority of the heading on the dataset has comments attached to them. These comments will assist in clarifying the background of the data entered. The following information will expand on some of the descriptive comments.

Phases

Phase 1 refers to the photos taken in the first free weeks. Phase 2 refers to the photos taken in the last 3 weeks of the 6week study. After the first 3 weeks the cards and batteries were changed.

Camera Names

Camera names starting with TC and NV refers to cameras that are owned by EWT (27 cameras). The three cameras starting with ST, were borrowed to us by Simon Todd. The camera names starting with CH refers to the 2 cameras sponsored by Cape Hunt. These names are only used to keep track of camera performance and to provide feedback to sponsors.

Photo number

All the photos taken by a camera is recorded by numbers. The photo number column provides the number of the photo taken by a specific camera. The number is associated with a certain phase and camera name. In the same row as the photo number, the species observed in the photo is marked. The **number of animals** in the photo is marked in the corresponding species column.

Date

This is the day that the picture was taken. Unfortunately, due to batteries that pop out of their slots, some of the cameras reset to their factory default date and time (01/01/2012 00:00:00). In the event of a reset "N/A" will be located in the date and time column or multiple dates will be found in the date column to give an estimate of date. This is determined by the last correct entry on the camera and the date that the team changed memory cards.

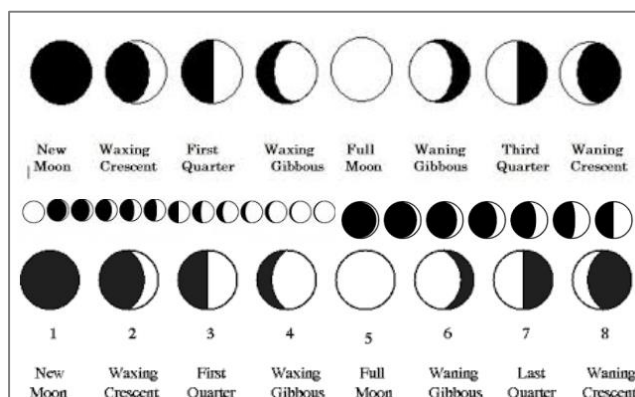
GPS and elevation

The GPS coordinates and the elevation at each camera fixed point was take manually with a portable GPS device. These did not change between the first and second phases, as the cameras where not moved within the 6-week period.

Moon phases

The moon phases where recorded as follow:

- 1- New Moon
- 2- Waxing crescent
- 3- First quarter
- 4- Waxing gibbous
- 5- Full moon



- 6- Waning gibbous
- 7- Last quarter
- 8- Waning crescent

The moon phase symbol appears on each photo in the same row as the time, date and temperature.

Birds

The bird column refers to the number of birds on the photo, while 2 hidden columns reveal the common name and species name for the birds that were possible to identify from the photo.

Other and livestock

The data located underneath these headings are considered irrelevant. The numbers refer to the total **number of photos** per camera that captured sheep, farm workers (humans) or nothing. In this case nothing refers to photos with no animals present (causes can include shadows and the movement of plants or cameras (often due to wind)). For each camera there is at least one row representing this data in total for a specific camera.