Multi Species Action Plan for the Golden Moles of South Africa

October 2022 to October 2026

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A. Preamble

This document contains findings and recommendations towards a multispecies action plan for golden moles (*Chrysochloridae)* in South Africa. It concludes consultation with multiple stakeholders across several provinces and encapsulates their contributions.

The aim of this report is to provide insight into the current state of conservation activities for the species and provide a prioritized approach which, if implemented, will improve the conservation status of the species. The document is purposefully written concisely for ease of understanding and recommends several specific actions. A timeline of 36 months is suggested to make significant progress against the plan.

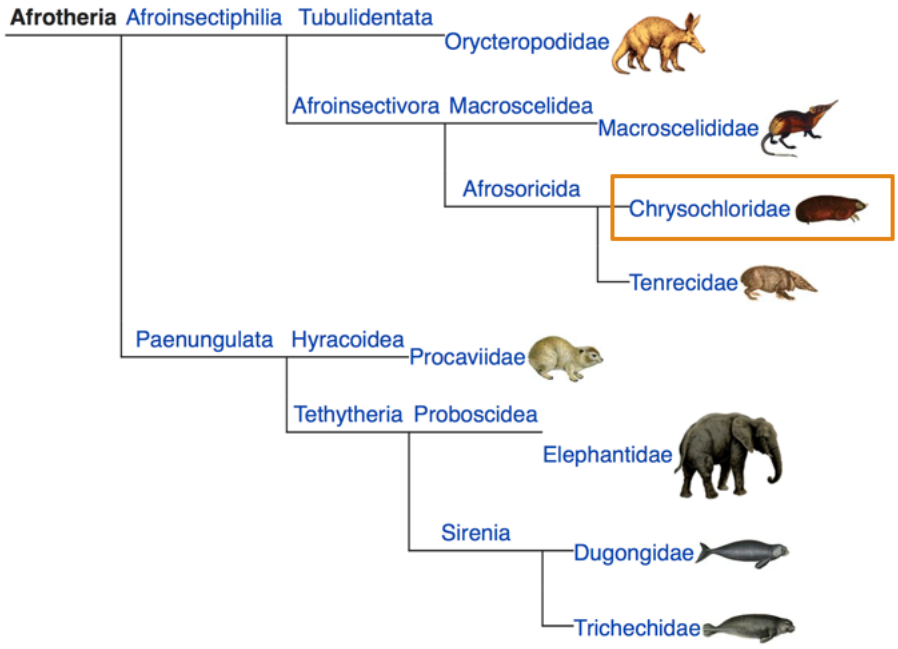
We would like to thank the IUCN SSC for their support in improving the conservation of the *Chrysochloridae* family.

B. Executive Summary

Golden moles belong to the Afrotheria and are one of the most threatened mammal groups in Sub Saharan Africa with six of the 21 species classified as Endangered or Critically Endangered.

In 2021 the Endangered Wildlife Trust (EWT) applied to the IUCN SSC for funding to develop a Multi Species Action Plan (MSAP) for several golden moles. The project was **paired and aligned** with a Foundational Biodiversity Information Programme (FBIP) grant held by Dr. Samantha Mynhardt and Prof. Paulette Bloomer of Stellenbosch University (SUN) and the University of Pretoria (UP) respectively. The latter was funded by the National Research Foundation.

The result of the pairing was that workshops could be presented in person and could be coupled with practical field work to create enthusiasm and interest around the species.



Above - the Afrotheria phylogeny

The following main insights resulted from the workshops.

1. Specific conservation measures for the various species in South Africa are almost non-existent, except in cases where the species are found in protected areas. Even so within protected areas they are protected only by **virtue of being within** them. Where signs of golden moles are found in protected areas it is often assumed that it is a specific species without verification. This leads to uncertainty in respect of the actual protection afforded to a number of species.

2. The presence of species in protected areas do not necessarily assure their survival. This view was held at almost all workshops.

3. Other than their inclusion in the species lists, which are used in the compilation of spatial conservation plans, there appear to be no other conservation measures targeted at protection of golden moles.

4. It is recommended that a **two-pronged approach** is developed for the conservation of golden moles – one for those within protected areas and one for those outside.

5. Species distributions across South Africa are based on **limited data points** and even for species where sufficient data exists there is significant room for improvement (see **Annexure 1**).

6. There are specific instances where **specialist studies or mitigation measures** have been done on golden moles as part of development applications, as is the case for Juliana's Golden Mole. Such actions, however, remain **limited to specific areas and species.** Developments are often poorly monitored during the construction phase. There is a need to investigate how effective mitigations measures listed in Environmental Authorisations are compared to what is happening in practice.

7. Overall awareness about golden moles was **low** but there was enthusiasm to learn more from those who attended the workshops. Most people, including many participants in our workshops, do not know the difference between golden moles and mole-rats, the only other group of subterranean mammals found in South Africa. **This is an important issue, as it indirectly results in persecution and ill-informed distribution records.**

Traveling to the different landscapes gave our team unique insights into the **conservation challenges** facing golden moles. In addition, it also highlighted the enormous opportunity to discover additional species, create awareness and to refine species distributions.

The workshops greatly contributed to **levels of awareness** about golden moles among participants as was demonstrated by questions and participation in discussions. Most of the conservationists that attended felt that their knowledge of golden moles was limited.

Conservation actions recommended in this document are generic in many cases due to the fact that it is precisely these actions that are required to establish a foundation for conservation. Without critical information it is impossible to implement meaningful conservation action for the species

This project has allowed us to better understand the potential conservation opportunities and the role of the EWT and other stakeholders.

C. Introduction

The Endangered Wildlife Trust (represented by Cobus Theron & Esther Matthew) and Dr. Samantha Mynhardt have been collaborating on golden mole research since 2019. During the course of this work, it became apparent that various species were under severe pressure and that our lack of knowledge about their ecology and distribution posed a serious impediment to their conservation.

In 2021 the EWT applied for EDGE funding to develop a Multi Species Action Plan (MSAP) for the species as a response to improve conservation measures.

More information on the golden moles will be distributed with this document.

D. Approach

In 2022 we conducted four of workshops and paired these with field work. The field work was aimed at expanding our knowledge of the distribution of certain species through the use of environmental DNA to identify species and multiple samples were taken across five provinces.

Workshops were predominantly aimed at conservation officials and other stakeholders who had an active interest in golden moles.



Above - Workshop 3 in held in the Northern Cape

Invitations were directed to conservation departments who were asked to nominate conservation officials to attend. We identified other stakeholders through local knowledge, conservation NGOs and academic institutions.

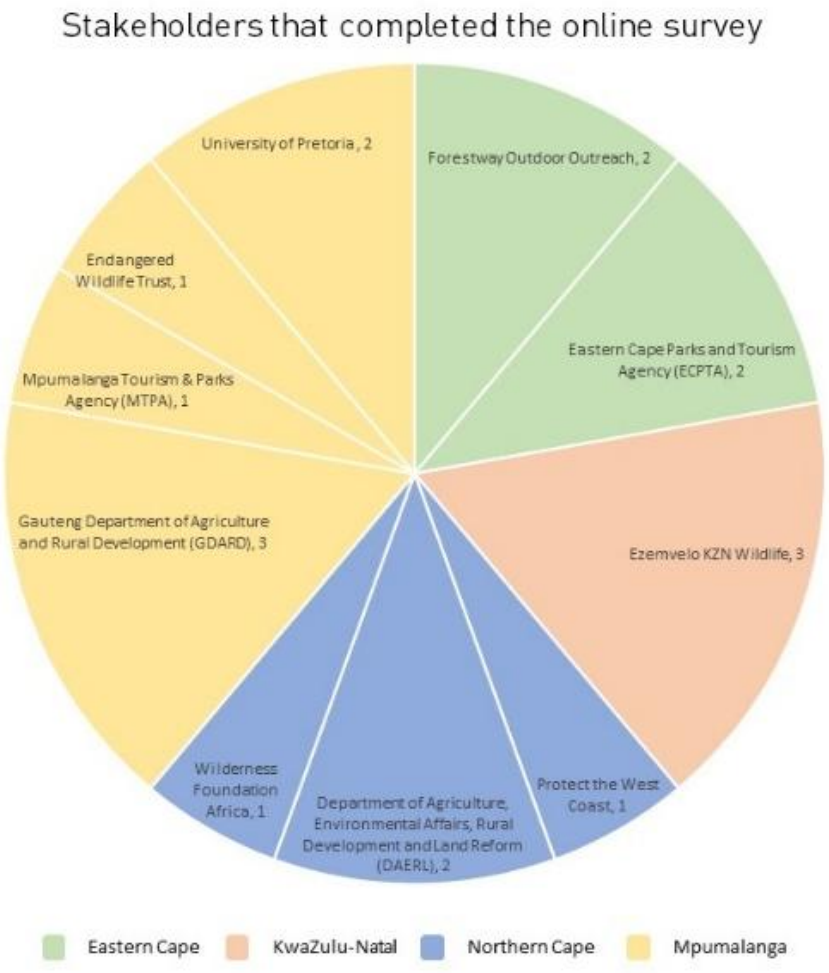
MSAP workshops were held in the following provinces:

1. Eastern Cape
2. KwaZulu-Natal
3. Mpumalanga
4. Northern Cape

Two of the workshops had virtual presence in addition to participants attending in person.

A total of 13 institutional stakeholders participated in the **workshops** (combined) representing six external stakeholders and seven provincial conservation agencies (see **Annexure 2 and 3**).

Surveys on golden moles were sent to all invitees prior to the workshop. Surveys revolved around questions that would allow us to get a better picture of the conservation of golden moles. **Eighteen participants** completed surveys.



Above - breakdown of participants who completed the survey.

Every workshop started with a **comprehensive presentation** on golden moles by Dr. Samantha Mynhardt, with specific reference to moles occurring in the province we were presenting in. This was

followed by a short EWT video (click here) on our work with golden moles. Discussions that followed were structured according to five themes and were conducted in conversational format. The aim of these discussions was to inform the drafting of the MSAP.

These findings were distilled and summarized in this report and the report was sent to stakeholders for review and input before a final version was produced.

E. Main summary of themes

We selected **five themes** to guide conversation around the development of this plan. Initially the themes were structured but we found that discussions were more fruitful when conducted in a conversational, informal style.



Above: Discussion Cycle with themes

Core and reoccurring contributions and inputs by participants on each of the themes have been captured below, under two sections:

1. **What is the status quo?**
2. **What action(s) are required to improve the conservation of golden mole species?**

3. What is the status quo?

1.1 Research

The lack of information on the distribution and ecology of golden moles is hampering conservation efforts. A number of research needs were identified and will be discussed in section 2.1. A list of papers published on the conservation of golden moles can be found in Annexure 4.

This is an extremely significant issue that needs to be addressed to improve the conservation status of all of the species.



Above – Dr Mynhardt collecting eDNA samples near Wakkerstroom.

1.2 Threats

A number of threats were identified by participants.

Herewith the common threats that were identified by participants. These likely apply to most or all of the species. Many of the threats are known, however the workshops also identified additional threats not taken into account.

Known threats:

1. **Commercial and residential developments** – the effect of these may lead to fragmentation as building foundations create barriers to movement for golden moles, which live and move within the top 500 mm of the soil. In addition, while being constructed, these developments and associated infrastructure can have major impacts on habitat and result in species mortality. Residential developments are a major threat specifically for Juliana's Golden Mole. During the course of the workshops we were contacted on several occasions about planned developments by concerned residents in areas where Juliana's occur.
2. **Mining** – can significantly impact golden moles, specifically open-cast mining such as is currently taking place along the west coast of South Africa. On recent field visits here, the team observed a clear reduction in the amount of mole activity in the areas subject to mining. Mining could also potentially lead to the introduction of poisonous substances into soils which can affect golden moles and/or their habitat. Quartzite mining operations in Gauteng pose a great threat to the Bronberg subpopulation of Juliana's Golden Mole. A "Conservation line" was demarcated by the Gauteng provincial government, to avoid impacts of mining activities on the golden mole subpopulation. In recent years mining has occurred beyond this line, to stabilise slopes that were a danger to mine workers. These recent activities continue to pose threat to the survival of the

subpopulation as they may lead to fragmentation of suitable habitat, thus leading to genetic erosion and reduced population viability.

3. **Agricultural impacts** – ploughing, compaction, fertilization, use of pesticides and overgrazing may impact golden moles significantly.

4. **Alien Plants** – especially in dense stands have an impact on the soil quality and moisture, indirectly affecting golden moles by impacting the abundance and diversity of invertebrate prey.

5. **Forestry** – commercial forest areas represent monocultures. These are well known to be associated with a reduction in biodiversity. While golden moles were found in plantations during the field work it was also clear that they are far more abundant in natural areas adjacent to the plantations. Harvesting activities may also result in direct and indirect mortality of golden moles.

6. **Domestic dogs and cats** – during the course of the workshops we came across a number of anecdotal stories about domestic pets catching or killing golden moles. This is likely a significant issue in residential areas.

7. **Direct persecution in gardens and golf courses** – public perceptions of golden moles are extremely negative. They are often confused with mole rats (which produce the notorious "mole hills" on lawns). This leads to direct persecution through a variety of methods, including poisoning. This attitude and ignorant perceptions were encountered in every province throughout the workshops and fieldwork.

8. Virtually no attention is being paid to golden moles in **development applications** as officials do not have sufficient awareness to guide applications or mitigate impacts on golden moles. This lack of awareness among officials who approve developments must be regarded as a major threat.

9. **Low awareness of the species**, even among conservation authorities. This leads to inadequate attention being paid to conservation issues affecting the species.

10. **Overgrazing** – it was reported that overgrazing may be an underestimated threat to golden moles, both on farms and within protected areas where illegal cattle grazing is taking place.

Threats poorly understood but highly likely to represent a threat to golden moles:

1. **Climate change** – the impact of this is unknown but relevant. In the case of coastal species, such as the Critically Endangered De Winton's Golden Mole, rising sea leaves will impact available habitat. Since many golden moles prefer moist soils, increased drought frequency or higher temperatures could certainly threaten them directly, and/or indirectly through impacts on invertebrate prey abundance and distribution.

2. **Aerial borne Sulphur pollution** – it was identified that there is concern in KwaZulu-Natal that reported increased aerial Sulphur deposition (as a result of coal burning power stations in Mpumalanga) along the Drakensberg range may have an impact on subterranean invertebrates, which may affect golden moles.

3. **Alien nematodes, earthworms and insects** – these may have detrimental impacts on native species and may thus affect the available food sources of golden moles. These invasives are spreading particularly in KwaZulu-Natal. Little is known about the potential impacts of this.

4. **Off-road driving** – there were concerns that off-road driving could in some instances lead to direct mortality or contribute to compacting soils, which could alter dispersal patterns of golden moles in certain areas.
5. **Soil contamination from various sources** – agricultural pesticides etc. may impact golden moles indirectly by reducing prey abundance and/or altering prey distribution and/or diversity.
6. **Flooding** – major floods such as the KwaZulu-Natal floods earlier this year, could directly affect them by drowning, or indirectly through the washing away of their habitats.

Certain species-specific threats were also identified and discussed:

1. **Kelp Harvesting on beaches** – may impact De Winton's and van Zyl's Golden Moles. This activity will impact the abundance of invertebrate prey available and may thus impact golden moles. The team clearly observed mole trails leading to washed out kelp beds on the beaches, where golden moles are presumed to be feeding on the abundance of invertebrates found in the kelp. A number of beaches on the west coast are subject to kelp harvesting under permit. Companies holding concessions for kelp harvesting often get permits for off-road driving on beaches with tractors and wagons in order to collect the kelp, which poses an additional threat to golden moles.
2. **Potential Poaching with dogs in the forests** – may impact Giant Golden Moles. This was highlighted in our workshop where illegal hunting with dogs is an issue in the Eastern Cape forests. Due to their indiscriminate hunting behaviour there is a chance that this can have real impacts, especially on Giant Golden Moles which spend more time above ground than any of the other species.
3. **Subdivision** - impacting Juliana's Golden Mole. Currently the Bronberg Ridge and other ridges and koppies within the City of Tshwane are earmarked for subdivision portions as small as 5000sq meter. This only takes the availability of services into account and disregards the environment. This leads to bigger issues later on, when development proposals follow. These developments, following subdivisions, lead to habitat destruction and the fragmentation of the ecosystem and golden moles habitat. What exasperates this problem is that subdivisions are no longer a listed activity in terms of NEMA after SPLUMA came into effect, and consequently subdivisions rests solely on municipalities to approve or deny.

In most cases it was almost impossible to quantify or prioritize the threats, as information and expertise to do so was not sufficient. Due to golden moles' low dispersal rates, threats can have a significant impact on species and lead to localized extinction of populations.

1.3 Conservation Planning

It was concluded that current provincial **conservation planning** around golden moles could be greatly improved.

The following observations were made:

1. Many protected areas have golden moles on their species lists. The species are unconfirmed in several instances. There is a need to greatly increase awareness of the species among field rangers and to confirm species and note activity. In many cases the species lists for golden mole occurrence in protected areas have been compiled. It is unclear in most cases if the exact species of golden mole have been identified to inform these lists or simply assumed to be a specific species due to known distributions.
2. The EIA screening tool may list species presence in certain instances. Where this is the case, it will be flagged in development applications. Unfortunately, due to poor distribution information we cannot regard the EIA screening tool as generally providing enhanced protection for golden moles from a planning perspective. In some instances, e.g. Juliana's Golden Mole, confirmed locations and known habitat are not reflected in the Conservation Plan, which means that developments can go ahead without an EIA (Environmental Impact Assessment) or BAR (Basic Assessment Report) being done.
3. There is little evidence to suggest that golden moles have been explicitly included in any Protected Areas Expansion Plans. In certain instances, their presence may contribute to critical biodiversity areas (CBA) mapping, but this would be limited.
4. The survey with conservation authorities revealed no specific conservation plans which explicitly include golden moles. In some instances, golden moles may be listed as "Protected", meaning that no development may cause golden moles to be killed or captured without a permit, however there is no specific conservation plan for golden moles.

1.4 Capacity

The only **dedicated capacity** that exists in respect of golden moles appears to lie within academic institutions. This is seriously lacking in municipalities, which mostly do not have officials dedicated to biodiversity management or species conservation. There is almost no dedicated capacity within conservation departments other than the fact that seven conservation agencies have staff members that may be tasked with small mammal conservation initiatives. These staff members will be explicitly included in the mailing list and targeted as conservation champions.

Academia, through students focusing on golden mole related studies from time to time, however, these studies are seldom if ever incorporated into conservation actions other than locality data which contributes to our understanding of their distribution.

1.5 Awareness

Participants felt that awareness on the species is greatly lacking. This is mostly due to apathy and the lack of easily accessible and concise information. The EWT has created some awareness, specifically around research activities on the west coast where a poster was produced - **see Annexure 5.**

eDNA work conducted in 2021 also led to publications in the Washington Post and on CNN. The increased exposure has facilitated access to funding and raising the profile of the species. There is no communication strategy or plan or practical materials available on golden moles. During the workshop there was a strong feeling that priority audiences need to be identified for targeted messaging.

4. What action(s) are required?

As an outcome of the workshops the following actions have been identified to improve the conservation status of golden moles.

All required actions are assigned to one of the following priority categories:

High priority
Medium priority
Low priority

Each action suggests **Action Partners** that can contribute to realizing the action. These are merely suggestions, as each organization or institution's **involvement is determined by resources and other planning priorities.**

Actions need to be coordinated and this will be done through the establishment of a Coordinator within the Afrotheria group and through mole conservation champions that have been identified in this plan.

We suggest that **all activities in the plan need to be implemented** and that the plan must be revised and updated with new information **by 2026.**

These actions should be read together with the conservation measures suggested in the IUCN Red List assessments.

2.1 Research needs

There was a general consensus among participants that certain research needs should be addressed as a matter of urgency before effective attempts to mitigate or manage threats can be undertaken or before detailed conservation planning for the species can commence.

The lack of accurate and comprehensive distribution data for golden mole species is a major factor hampering their conservation. This needs an urgent and dedicated response.

Thus, in this section we will discuss the urgent research priorities, and then the urgent conservation actions. There may be instances in which specific conservation measures can be taken with regard to specific populations, however the actions below highlight the need for a much more holistic approach to the basic issues that impair golden mole conservation.

The following **research needs** were identified:

1. Refine species distributions, as well as taxonomy for certain species, e.g. Juliana's Golden Mole.
    - 1.1 Refine species distributions **within** protected areas.
    - 1.2 Refine species distributions **outside** protected areas.

2. Develop species level niche modeling to improve knowledge on **habitat criteria** for each species and improve predictive distribution or habitat.
3. Improve techniques for **species identification.**
4. Develop a better understanding of the **biology and ecology** of golden moles.

Research needs 2.1.1 Refine species distributions

Special attention must be directed towards establishing and confirming the distribution of species **inside** and **outside** protected areas. This provides insight into gaps in species protection, and identification of additional areas that should be protected in the future. Within protected areas conservation authorities can play a big role in enhancing understanding.

Actions 2.1.1.1 Develop a comprehensive understanding of the distribution of golden moles <u>within</u> Protected areas.

2.1.1.1a) **Existing data**

1. Scrutinize existing species lists for the reported presence of golden moles within Protected Areas across South Africa. Develop a comprehensive list and map of species present in protected areas.
2. Scrutinize current distribution maps and identify possible occurrence of species not listed above in protected areas (this is an urgent action and should not be delayed while niche modeling is being developed).
3. Develop a comprehensive list of species reported to be in protected areas and predicted to be in protected areas and distribute amongst protected area authorities.

2.1.1.1b) **Training and capacity**

1. Develop a data capturing application for rangers / field staff within protected areas to capture golden mole activity and threat data.
2. Provide training for rangers within protected areas identified above on the data capturing application and what to look out for. This can be conducted online and

be paired with regular training of rangers within these protected areas.

2.1.1.1 c) **Collection of additional data**

1. Use data collected by rangers to build detailed maps of the full extent of golden mole distribution within protected areas.

2.1.1.1 d) **Verification**

2. ID protected areas where species have not been confirmed and verify species present or predicted according to niche modeling (See Action 2.1.2.2)
3. Verify presence of species in Protected Areas in which species are predicted to occur based on current distribution.

2.1.1.1 e) **Revised lists and mapping**

4. Finalise list and map along with indication of which species appear to be sufficiently conserved in protected areas.

Action Partners	All protected area authorities, Endangered Wildlife Trust, Afrotheria Specialist Group

Actions 2.1.1.2 Develop a comprehensive understanding of the distribution of golden moles <u>outside</u> Protected areas.

2.1.1.2 a) **Collection of data for distribution outside of protected areas.**

Conduct concerted and coordinated eDNA and trapping work in localities listed below (especially where species distribution is unconfirmed or to confirm presence of localities predicted by the niche model developed in Action – 2).

Such concerted efforts need to be directed particularly in respect of the following species:

5. **De Winton's Golden Mole** (*Cryptochloris wintoni*; CR), which is, until recently, known from only the type locality at Port Nolloth, Northern Cape, and was last seen in 1937. However, we have reason to believe this species is still prevalent on the west coast, and its distribution is simply poorly understood. Improving distribution records and potentially broadening the known extent of occurrence of the species. Potentially this could result in down listing of the species' Red List status, however it is important to note that the west coast represents an area of high threat owing to radical habitat transformation by alluvial diamond mining, and that conservation action for this species will likely still be justified. In any event, a better understanding of the species' distribution will inform the appropriate conservation action. There is an urgent need to confirm its presence in protected areas on the west coast and to secure one site that has been identified by the EWT as an area worthy of protection for golden moles.

6. **Van Zyl's Golden Mole** (*Cryptochloris zyli*; EN), which is, until recently, known only from a single location near Lambert's Bay, Western Cape, but recorded from a second location near Groenriviermond, Northern Cape, in 2003, suggesting that the range of this species is more widespread than previously recognized. Dramatic habitat alteration owing to mining of coastal sands for alluvial diamonds and heavy metals could be impacting on the coastal dune habitats of this species. There is an urgent need to confirm its presence in protected areas on the west coast.

7. **Marley's Golden Mole** (*Amblysomus marleyi*; EN), which is known from only two isolated localities (Ubombo and Ingwavuma; 49km apart) on the eastern slopes of the Lebombo Mountains in KwaZulu-Natal. Owl pellet remains from Weenen, about 250 km southwest, appear to represent this species, suggesting that it may be more widespread than currently recognized. There is an urgent need to confirm its presence in a protected area or identify sites worthy of conservation. Site visits as part of this project, to the Ubombo Nature Reserve and Pongolapoort Nature Reserve revealed no obvious signs of activity. We await the outcome of eDNA samples collected here. Sites are protected.

8. **Giant Golden Mole** (*Chrysospalax trevelyani*; EN), which appears to be experiencing radical population declines. Although recorded from 17 localities in the Eastern Cape, this species is now possibly locally extinct at many sites and appears to survive only in larger patches of indigenous Afromontane forest on the eastern slopes of the Amathole mountains. Recent site visits to known localities, as part of this project revealed no obvious signs of presence. We await the outcome of eDNA samples collected here. Sites are protected.

9. **Rough-haired Golden Mole** (*Chrysospalax villosus*; VU), which is recorded from only 11 locations in Eastern Cape, KwaZulu-Natal, Gauteng and Mpumalanga. Based on recent field surveys it no longer occurs at three of these, as its preferred natural grassland habitats have vanished under urban sprawl (especially in Gauteng around Pretoria, and KwaZulu-Natal around Pietermaritzburg). Known locations are scattered far apart suggesting possible fragmentation into numerous subpopulations with little gene flow. Even at sites where this species occurs it is uncommon, suggesting that population densities are low. The species is Vulnerable due to its small area of occupancy, six locations where its presence is still certain, probable decline in number of locations and area/extent/quality of suitable habitat, and the persistent, varied threats to the population across its entire range. Should the number of known locations decline further or if evidence arises of severe fragmentation, it will certainly qualify for Endangered status. The distribution in Gauteng needs further investigation. This would be guided by a revised niche model for the species, as planned below. There is an urgent need to confirm its presence in protected areas or alternatively secure an existing or new site for conservation.

10. **Juliana's Golden Mole** (*Neamblysomus julianae*; EN), which comprises three known subpopulations, which are protected within the Kruger National Park (south-western Pretoriuskop, Matjulwana and Numbi gate areas), Nylsvley Provincial Nature Reserve and Faerie Glen Nature Reserve respectively.

    Faerie Glen Nature Reserve is located on the western extremity of the Bronberg Ridge, in City of Tshwane Metro. Bronberg Ridge is home to the Bronberg subpopulation of Juliana's golden mole, which is listed as CR by IUCN. One of the greatest threats facing the Bronberg subpopulation is urban residential developments engulfing the Bronberg Ridge. The Gauteng Ridge guidelines do not seem to have any impact on the granting of Environmental Authorisations, even when Juliana's golden moles' presence is confirmed on the development site. The Friends of Faerie Glen Nature Reserve identified a large undivided area which is home to a large number of Juliana's golden moles and is also informally known as the Golden Mole Sanctuary, otherwise known as Hedianga Farm located on the Remainder of Portion 18 of the farm Tweefontein 372-JR. This area is bordered by Shere Agricultural Holdings at its footslopes, where there is also a high concentration of Juliana's golden mole due to the deep sandy soils, characteristic of the species' primary habitat. The Shere Agricultural Holdings Area is in urgent need of a Juliana golden mole Management Plan to preserve the animals within the agricultural holdings and ensure their mobility.

11. **Gunning's Golden Mole** (*Neamblysomus gunningi*; EN), which is known from only six sites which probably represent a single location, a restricted distributional range estimated at 1,327 km^2 and the area of occupancy is estimated at 96 km^2 . The main threat is the continuous decline in the quality and extent of its preferred natural habitats within low-lying and high-altitude indigenous Afromontane forests in the Grootbos-Magoebaskloof area and adjoining montane grasslands.

Only small fragments of its habitat are protected in state-controlled forest reserves, however, protection measures on the ground are dubious and do not target management of this species. There is an urgent need to improve management in areas where it is protected.

12. **Robust Golden Mole** (*Amblysomus robustus*; VU), which is currently known from only five locations but probably more widespread than suggested by the sparse distribution records available. The species is listed as Vulnerable because of the low extent of occurrence, with continuing decline and possible severe fragmentation of habitat. The Highveld grasslands favoured by this species are being degraded by mining for shallow coal deposits to fuel numerous power stations that occur in the preferred high-altitude grassland habitats of this species, which is an inferred major threat. There is an urgent need to confirm its presence in protected areas or alternatively secure an existing or new site for conservation.

13. **Duthie's Golden Mole** (*Chlorotalpa duthiae*; VU), which is known from only nine locations in southern Cape Afro-temperate Forests, clustered in two subpopulations: an eastern subpopulation in the suburban parts of Port Elizabeth (three locations); and a western subpopulation in the indigenous coastal forest belt from Wilderness to Tsitsikamma (six locations). Gene flow between these two subpopulations seems unlikely owing to intervening drier strandveld habitats. The species is likely to occur more widely than current records indicate. There is an urgent need to confirm its presence in protected areas or alternatively secure an existing or new site for conservation.

14. **Visagie's Golden Mole** (*Chrysochloris visagiei*; DD), which is known from a single specimen collected from the type locality at Gouna, Northern Cape, South Africa. Several field trips to ground-truth the occurrence of this species have yielded no specimens, or even signs of golden moles, suggesting either an error in recording provenance, or that the original specimen was transported there by anthropogenic means (Bronner 2013) or even perhaps by floodwaters of the Renoster River, flowing from the Roggeveld mountains further south where several other species of golden moles occur. The possibility exists that the holotype originated from Gouna Forest near Knysna (Eastern Cape), but was incorrectly assumed (by Broom, 1950) to be from Gouna in Northern Cape; surveying at Gouna Forest is needed to assess this possibility. Agriculture has dramatically transformed habitat at the type locality, but impact thereof cannot be assessed given uncertainty about the provenance of the type specimen and/or the habitat requirements of the species.

These investigations should be conducted through initiating a coordinated conservation agency, non-governmental conservation sector and academic response to research on species above as part of post graduate research projects. See Action

	2.4.2 Golden mole Coordinator.
Action Partners	University of Pretoria/Stellenbosch University & Endangered Wildlife Trust and provincial authorities where applicable.

Research needs 2.1.2 Niche modelling.

Actions 2.1.2. Develop niche models for various species.

2.1.2.1 **Capture data**

1. Develop and introduce a standardized data collection application which allows capturing of habitat characteristics - see 2.1.1.1 b)
2. Provide training to provincial authorities on collecting data and using app.
3. Gather information and consolidate as the app is used.
4. Encourage continued use of the app.

2.1.2.2 **Develop niche models**

1. Use information gained in 2.1.1.1 a), 2.1.1.1b) and 2.1.2.1 to develop niche models for various species.

Priority species are endangered species that are not known to occur in protected areas. These are:

1. **De Winton's Golden Mole** (CR): presence in protected areas possible but unconfirmed; habitat under threat.
2. **Van Zyl's Golden Mole** (EN): presence in protected areas possible but unconfirmed; habitat under threat.
3. **Giant Golden Mole** (EN): presence in protected areas unknown; population in decline.
4. **Marley's Golden Mole** (EN): presence in Pongolapoort Nature Reserve possible, but unconfirmed. Distribution and threats poorly understood.
5. **Juliana's Golden Mole** (EN): three known subpopulations protected within the Kruger National Park, Nylsvlei Provincial Nature Reserve and Faerie Glen Nature Reserve but the most threatened (CR) Bronberg Ridge subpopulation largely

unprotected. There is an existing model that was developed for this species by Jackson & Robertson (2011) – this could serve as a starting point for a new refined model.

6. **Gunning's Golden Mole** (EN): limited presence in protected areas, however protection measures in these areas are dubious.

2.1.2.3

1. Identify at desktop level priority sites for ground-truthing where species are predicted to occur by the niche models.
2. Ground truth sites that fit criteria and verify presence of species.

Priority sites will be those that fit the following criteria:

1) Predicted to have species listed above present.

2) Areas that would be relatively easy to secure for conservation of the species.

3) Areas that could provide connectivity between populations.

Action Partners	University of Pretoria, University of Stellenbosch, Endangered Wildlife Trust and provincial authorities.

Research needs 2.1.3 Improve species identification techniques.

Actions 2.1.3 Develop improved species identification and detection techniques

2.1.3.1 Species ID

Previously, data collection for golden moles was severely limited as a result of challenges associated with:

1. detecting their presence, since their subterranean life provides little evidence of their presence to humans,

2. observing their behaviour in the wild,

3. trapping these animals in order to collect genetic material for DNA analysis, and

4. obtaining permits for any such attempts in the case of threatened species.

1. Develop improved species identification techniques, through:
   - the development of a visual ID guide with keys, including coat colour, claw length and ratio, and facial characteristics
   - the use of environmental DNA (eDNA) barcoding. eDNA provides us with the opportunity to non-invasively collect genetic material for golden moles directly from their environment, with a significantly reduced investment of time, energy and resources. DNA sequence analysis of genetic barcode markers amplified from this eDNA can subsequently facilitate accurate

species identification.

2. Develop improved capacity, through training, to identify species via the app.

Action Partners	Endangered Wildlife Trust and University of Pretoria/Stellenbosch University.

Research needs 2.1.4: Develop a better understanding of the biology and ecology of golden moles.

Action 2.1.4: Activate coordinated research initiatives.

2.1.4.1 Coordination:

Through the IUCN SSC Afrotheria Specialist Group and the national golden mole coordinator (2.4.1), activate partnerships with universities and motivate for the priority research questions to be investigated by post graduate students as part of research projects.

2.1.4.2 Research

Building on academic and stakeholder collaborations we need to activate the following research topics (in addition to priority needs identified in 2.1 above) as identified in the workshops:

1. Impact of overgrazing, alien plants, and fire on golden moles.
2. Studies that investigate behavioural ecology of the species including the following aspects - diet, activity patterns, mating strategies, vocalization (bioacoustics).
3. The use of bioacoustics in monitoring presence.
4. Research on the effect of atmospheric pollution on insects in the soil.
5. Effect of pesticides and insecticides on golden moles.
6. Development of new technologies to study golden moles.
7. Development of novel techniques to estimate population densities e.g., acoustic modeling.

8. Estimate effective population sizes for various species.
9. Effect of pollution in the ocean on dune dwelling moles.
10. Ecological role and importance of golden moles – pest control, aeration of soil.
11. Persistence of golden mole eDNA (i.e., degradation rate) in different soil types / environmental conditions.
12. Potential link between soil types (e.g., particle size) and golden mole presence/absence.
13. Telemetry to investigate dispersal distances and/or success of artificial dispersal corridors.
14. Investigate how mining rehabilitation could make better provision for re-introduction of golden moles, especially as the current use of shade netting to reduce wind erosion during rehabilitation may pose barriers for movement of golden moles.

Action Partners	Afrotheria Specialist Group, Endangered Wildlife Trust, University of Pretoria/ Stellenbosch University

2.2 Threats

Threat 2.2.1: Lack of protection for certain species

Action 2.2.1: Secure habitat for poorly protected species

2.2.1.1 ID Sites for securing habitat

1. Identify relevant sites (as per Action 2.1.2.1 c) and initiate protection of these sites through property purchase or voluntary conservation agreements.

2.2.1.2 Improve management inside Protected Areas

2. Use results from 2.1.1.1 b) above to map locality and create protected area threat list. Rank threats within protected areas and include threats in management plans for mitigation.

Action 2.2.2: Improve protection through development planning

2.2.2.1 Improve development planning

1. Create widespread awareness of golden moles among Environmental Impact assessors, consultants and officials involved in development applications.
2. Create a list of standard conservation actions to mitigate impacts on golden moles where developments have been approved. Distribute these to both planning and development officials and Environmental Impact assessors. Ideally these would be included in the Record of Decision for applications.
3. Municipalities should include golden mole habitats in their Bioregional Plans and consequently Land Use Schemes and Regional Spatial Development Frameworks to include restrictions on subdivisions in areas with high biodiversity value and specifically golden mole habitats.

2.2.2.2 Improve Screening tool

1. Collate and update all known occurrence records - high sensitivity layer.
2. Create species distribution modeling a medium sensitivity layer.
3. Ensure that information is loaded into the tool.

Action Partners	Endangered Wildlife Trust, DFFE and SANBI

Action 2.2.3 Develop specific conservation actions to address/mitigate specific threats identified outside conservation areas

2.2.3.1 Provincial authorities to:

1. Use lists created in 2.1.1 and Niche model to identify key areas for conservation of golden moles.
2. Assess areas by:
    1. compiling a list of relevant threats
    2. ranking the threats for that province
    3. developing mitigation strategies for threats
    4. feedback information to development planning and other conservation units in the province.

List of threats to be assessed.

1. Business and residential developments

	2. Mining 3. Agricultural impacts 4. Wind farm and solar developments 5. Alien Plants 6. Forestry 7. Domestic dogs and cats 8. Direct persecution in gardens and golf courses 9. Climate change 10. Aerial borne Sulphur pollution 11. Alien nematodes and insects 12. Off-road driving 13. Soil contamination
Action Partners	Provincial Agencies with assistance from the mole coordinator

2.3 Conservation Planning

Action 2.3. Enhance conservation planning

2.3.1.	1. Update EIA screening tool 2. Update Critical Biodiversity Areas with information from 2.1.1 above. It was suggested that the EIA screening tool should be updated with known golden mole distributions and that current and new distribution data could be used to inform the Protected Area Expansion Plans for each province.
2.3.2	Ensure that information collected in 2.1.1 above is communicated to provincial stakeholders and fed into conservation planning.
2.3.3	PAES with information collected in 2.1.1 and 2.1.2 above.
Action Partners	Information coordinated by Endangered Wildlife Trust, tools updated by National Government and provincial conservation authorities.

2.4 Capacity

Action 2.4.1 Activate a national golden mole conservation coordinator

2.4.1	**Coordinator** Create the capacity for data to be captured by a national golden mole conservation coordinator. Such a coordinator could be situated within the EWT or the University of Pretoria/Stellenbosch University or the IUCN Regional Planning Group and within the IUCN Afrotheria Group.

Action 2.4.2 Activate a species action group

2.4.2.	**Coordination** Create a species action node under the coordinator within the IUCN SSC Afrotheria Specialist Group. This group will meet regularly to discuss actions identified in this plan and follow up on them. The group will also invite external governmental conservation agencies.
Action Partners	Endangered Wildlife Trust

Action 2.4.3 Engage with stakeholders

2.4.3.1	Create opportunity for engagement with conservation officials tasked with development planning.
2.4.3.2	Distribute information to all stakeholders. This will include posters and fact sheets (see Action 2.5.1)
2.4.3.3	Create / Develop dedicated capacity and assigned responsibility in each conservation agency.

Action 2.4.4 Activate champions to drive golden mole conservation

2.4.4.1	In addition to the actions outlined above, it is essential to activate a network of golden mole champions in the landscape. Names have been suggested for these champions - see Annexure 7. Champions will serve as local contacts, distribute information, refer or resolve queries and contribute to the implementation of conservation actions as far as possible.
Action Partners	Endangered Wildlife Trust, provincial departments

2.5 Awareness

Action 2.5.1 Create improved awareness among key stakeholder groups and audiences

2.5.1 **Key Audiences**

Identification of points of engagement and **appropriate messaging** with the following key audiences:

1. **Environmental impact assessment practitioners (discussed below; see 2.5.3)**
2. **Conservation officials (discussed below; see 2.5.4)**
3. **Municipal planning officials (environmental and city)**
4. Agricultural sector (landowners)
5. Mining sector (mines' environmental officers)
6. NGO sector
7. Business sector
8. Reserve managers and rangers
9. Academics
10. Residents
11. Schools located within golden mole distributions
12. Golf courses (managers and staff)
13. Gardening clubs

Communication with these audiences is key to enhancing golden mole conservation and should be prioritized over communication to other audiences or general communications (see below).

2.5.2 **Materials**

1. Development of communication materials including a summary poster detailing action to be taken to conserve golden moles inside and outside reserves as detailed in this plan. This poster will be predominately aimed at conservation and planning officials.
2. Development of messaging **fact sheets** for each of the audiences.

2.5.3.	**Critical engagement - EIA sector** Develop and offer an awareness session with the International Association of Impact assessment (IAIA) where Environmental Impact Assessment Practitioners can be made aware of the plight of golden moles. This will lead to improved inputs surrounding golden mole conservation during the assessment of developments by authorities.
2.5.4	**Critical Engagement - Provincial Conservation Authorities** Give presentations on golden mole conservation to provincial authorities in quarterly landscape meetings and/or quarterly meetings.
Action Partners	Endangered Wildlife Trust, provincial and municipal authorities.

Action 2.5.2 Ideas for creating improved public awareness

2.5.2.1	Publication of popular media articles around golden mole conservation projects.
2.5.2.2	Activate research and awareness initiatives, such as a “beach run” to search for golden mole activity.
2.5.2.3	Create awareness through eco-schools or innovative education initiatives such as apps, games or books for children or for schools, potentially even linked with the curriculum.
2.5.2.4	Development of appropriate educational signage on golden moles and habitat in areas of special concern.
Action Partners	EWT, Other NGO’s, provincial conservation agencies.

2.6 Funding conservation initiatives.

Action 2.6 Activating funding for work

2.6.1	Identify funds or funders that are likely to fund some of the actions in this document.
2.6.2	Identify a conservation project or relevant research project based on the information contained within this document - plan and budget for the conservation project.
2.6.3	Draft the project into funding application or concept note.
2.6.4	Submit to donor
Action Partners	Endangered Wildlife Trust, Academic institutions

F. Additional project impacts and information gathered during the course and scope of this project

In general workshop participants were very interactive and keen to learn. The workshops were well received and has created unprecedented awareness of the plight of the species.

This improved awareness as a direct result of this project led to three independent people contacting us, having found golden moles on their properties.

1. Golden mole collected in Stutterheim, Eastern Cape

The power of the workshops was demonstrated when the team was alerted to a dead golden mole that ended up in a swimming pool in Stutterheim, within 48hrs of a workshop in the Eastern Cape. This mole was subsequently identified via genetic analysis as a Hottentot golden mole (*Amblysomus hottentotus*).

2. Golden mole collected in Garies, Northern Cape

Due to awareness around this project, the EWT was contacted to collect a mole near Garies in the Northern Cape. Through genetic analysis, this specimen was identified as a Grant's golden mole (*Eremitalpa granti*), but is divergent to both known subspecies of Grant's, *E. g. granti* and *E. g. namibensis*. It is possible that the new specimen may represent a cryptic *Eremitalpa* (sub)species. Further investigations will ensue.

3. Golden mole collected in George, Western Cape

Two moles were also collected from members of the public in George, and although they appeared morphologically distinct, both have been identified as Fynbos golden moles (*Amblysomus corriae*).

4. Golden mole activity was found in several high-altitude localities in the Western Cape

These require further investigation.

5. Contemporary Conservation Symposium

As a result of this project a dedicated small mammal session has come about at the 2022 Contemporary conservation symposium to be held in KwaZulu-Natal in November 2022. The findings of this project and the FBIP will be shared there.

6. Public enquiries

We also received a number of public enquiries about developments that could negatively affect golden moles.

G. Champions

We are proposing the use of champions to drive actions listed above in the respective provinces. We understand that this is subject to resources and time constraints. Champions could assist with the following to promote conservation of these species.

14. Serving as contact people in each province.
15. Disseminating information to improve awareness on golden moles.
16. Promote research needs with various academic institutions
17. Promote actions within provincial conservation authorities.

We have identified a number of individuals during the course and scope of the development of this plan who could act as champions. A list is attached in **Annexure 7**. The EWT will formally approach them once the national mole coordinator is in place. The list is to be kept confidential until champions are approached and have accepted to participate.

H. Conclusion

Golden mole conservation is significantly hampered by lack of distribution data. This is true for both protected areas and other areas of occurrence. Conservation actions must be geared towards taking stock and confirming which species receive some degree of protection within protected areas. In addition, distribution outside protected areas need further refining and in cases there will be a strong argument for the development of new protected areas which provide protection for golden moles. Improved awareness with targeted audiences is imperative. The actions identified in this document needs coordination and as such partners will have to develop a strategy to enable a coordination.

I. List of Annexures

Annexure 1: Golden moles and their distribution.

Annexure 2: Invite and attendees list.

Annexure 3: Attendance registers.

Annexure 4: List of papers published on golden moles.

Annexure 5: Golden mole poster.

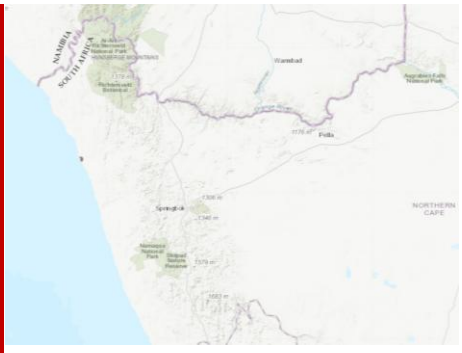
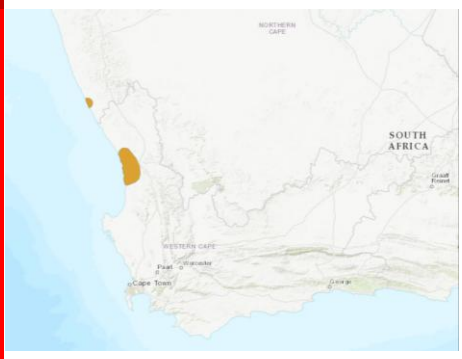
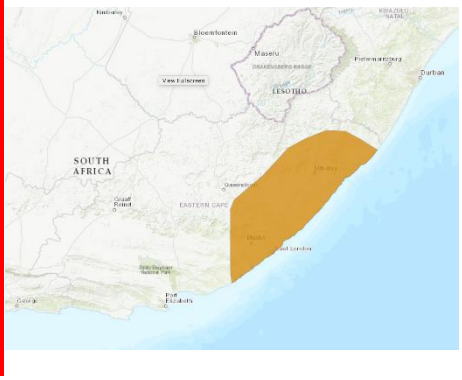
Annexure 6: Golden mole posters developed during this project – still to be approved for printing.

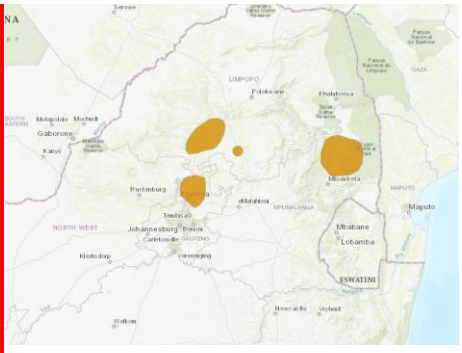
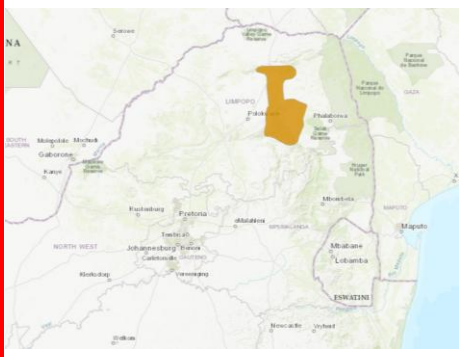
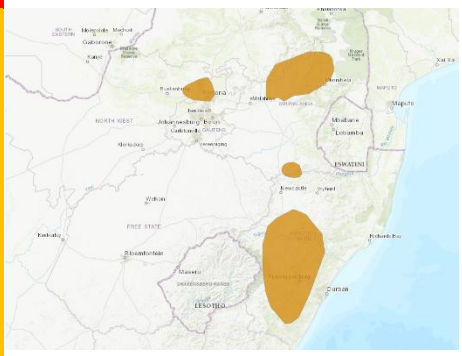
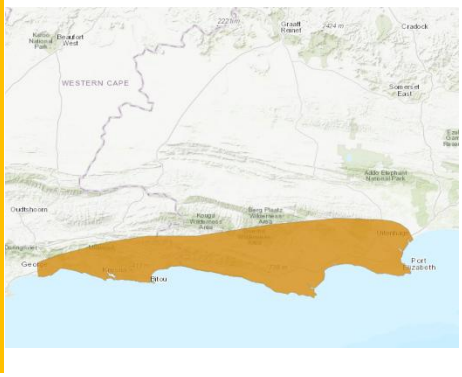
Annexure 7: List of potential champions.

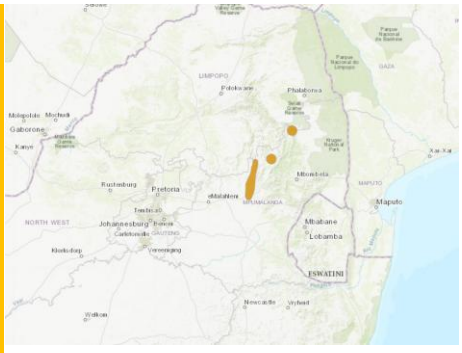
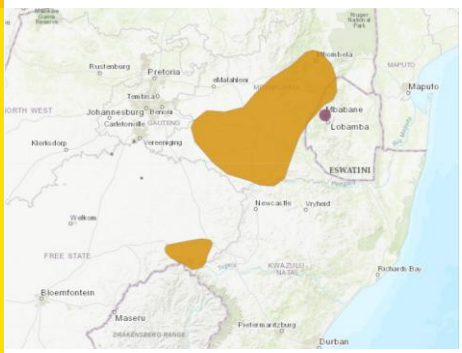
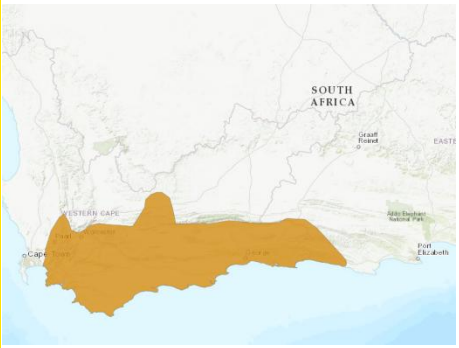
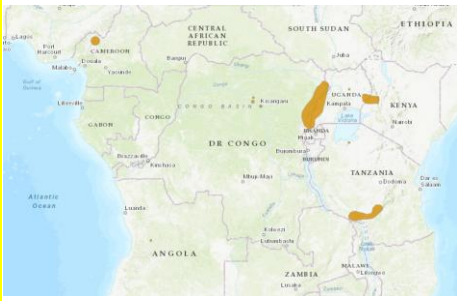
Annexure 8: Sample of presentation on golden moles

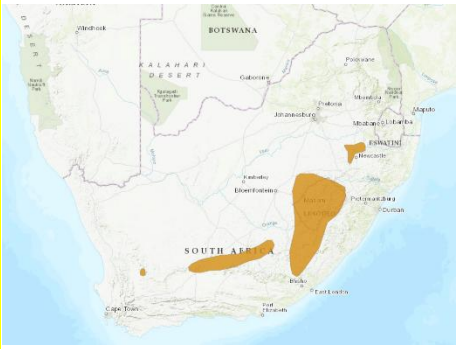
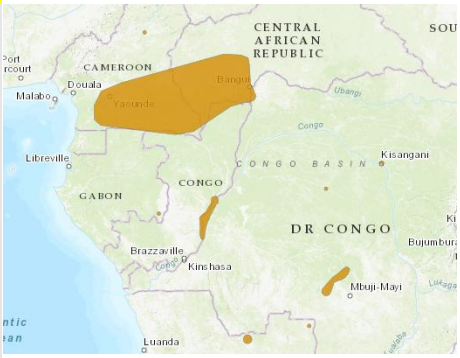
Annexure 1

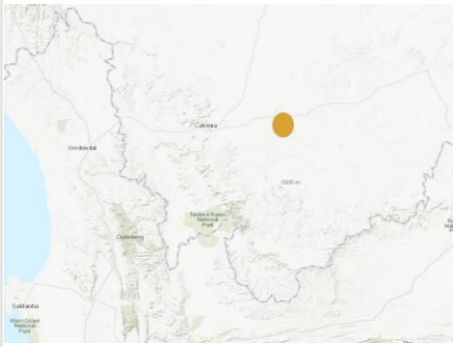
Golden moles and their distributions.

Species	Common name	Threat classification	Distribution
1. *Cryptochloris wintoni*	De Winton's Golden Mole	CR	
2. *Cryptochloris zyli*	Van Zyl's Golden Mole	EN	
3. *Amblysomus marleyi*	Marley's Golden Mole	EN	
4. *Chrysospalax trevelyani*	Giant Golden Mole	EN	

5.	*Neamblysomus julianae*	Juliana's Golden Mole (Bronberg subpopulation)	EN (CR)	
6.	*Neamblysomus gunningi*	Gunning's Golden Mole	EN	
7.	*Chrysospalax villosus*	Rough-haired Golden Mole	VU	
8.	*Carpitalpa arendsi*	Arend's Golden Mole	VU	
9.	*Chlorotalpa duthieae*	Duthie's Golden Mole	VU	

10.	*Amblysomus robustus*	Robust Golden Mole	VU	
11.	*Amblysomus septentrionalis*	Highveld Golden Mole	NT	
12.	*Amblysomus corriae*	Fynbos Golden Mole	NT	
13.	*Amblysomus hottentotus*	Hottentot Golden Mole	LC	
14.	*Chrysochloris stuhlmanni*	Stuhlmann's Golden Mole	LC	

15. *Eremitalpa granti*	Grant's Golden Mole	LC		
16. *Chrysochloris asiatica*	Cape Golden Mole	LC		
17. *Chlorotalpa sclateri*	Sclater's Golden Mole	LC		
18. *Calcochloris obtusirostris*	Yellow Golden Mole	LC		
19. *Huetia leucorhina*	Congo Golden Mole	DD		

20. *Calcochloris tytonis*	Somali Golden Mole	DD	
21. *Chrysochloris visagiei*	Visagie's Golden Mole	DD	

Annexure 2

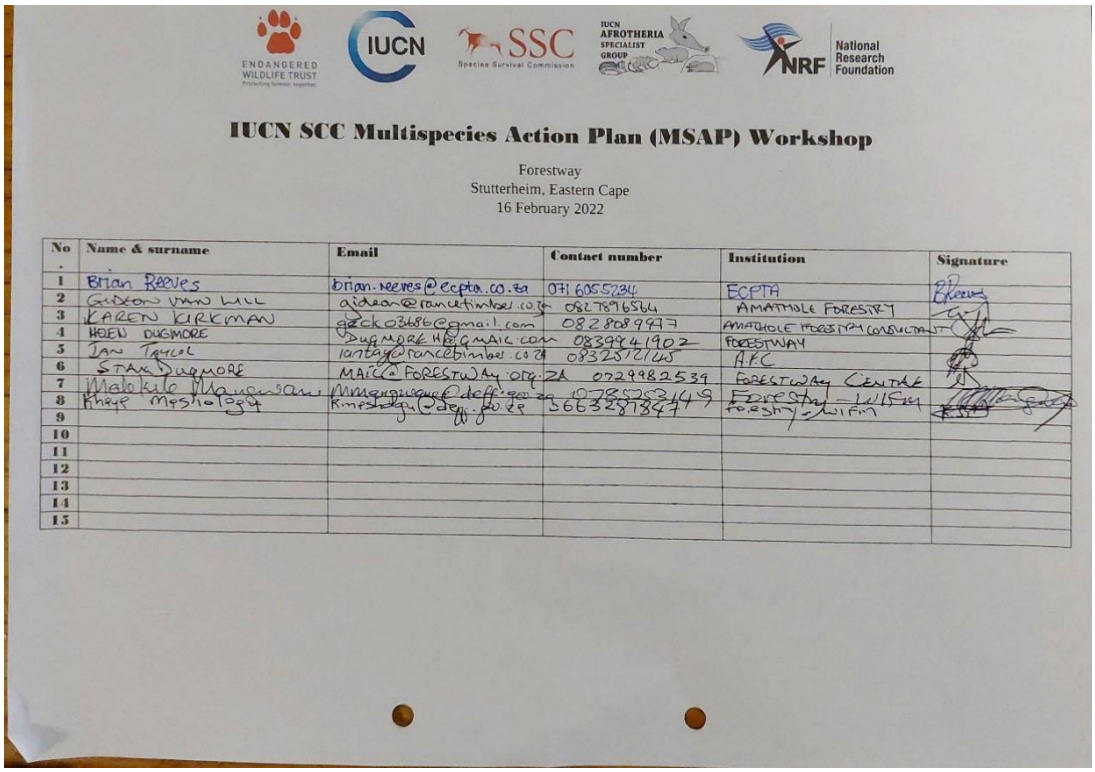
Invite and attendees list.

Name and surname	Organization	Email	Workshop province	Invite sent (Y/N)	Attended (Y/N)	Virtual / In-person
Dr Dean Pinke	ECPTA	Dean.Peinke@ecpta.co.za	Eastern Cape	Y	N	N/A
Brian Reeves	ECPTA	Brian.Reeves@ecpta.co.za	Eastern Cape	Y	Y	In-person
Kagiso Mangwale	ECPTA	Kagiso.Mangwale@ecpta.co.za	Eastern Cape	Y	N	N/A
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Tembela Paqula	DFFE	TPaqula@dffe.gov.za	Eastern Cape	Y	N	N/A
Gideon van Lill	Amathole Forestry Company	gideon@rancetimber.co.za	Eastern Cape	Y	Y	In-person
Karen Kirkman	Amathole Forestry Consultancy	gecko3686@gmail.com	Eastern Cape	Y	Y	In-person
Helen Dugmore	Forestway	dugmoreh@gmail.com	Eastern Cape	Y	Y	In-person
Ian Taylor	Amathole Forestry Company	iantay@rancetimber.co.za	Eastern Cape	Y	Y	In-person
Malekile Mangwani	Forestway	mmangwani@deff.gov.za	Eastern Cape	Y	Y	In-person
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Catharine Hanekom	EKZN Wildlife	Catharine.Hanekom@kznwildlife.com	KwaZulu Natal	Y	Y	In-person
Ferdi Myburgh	EKZN Wildlife	Ferdi.Myburgh@kznwildlife.com	KwaZulu Natal	Y	Y	In-person
Rickert van der Westhuizen	EKZN Wildlife	Rickert.VanDerWesthuizen@kznwildlife.com	KwaZulu Natal	Y	Y	In-person
Petros Ngwenya	EKZN Wildlife	Petros.Ngwenya@kznwildlife.com	KwaZulu Natal	Y	N	N/A
Lehlohonolo Phadima	EKZN Wildlife	Lehlohonolo.Phadima@kznwildlife.com	KwaZulu Natal	Y	N	N/A
Dinae Watson	EKZN Wildlife	Dinae.Watson@kznwildlife.com	KwaZulu Natal	Y	N	N/A
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Kirsten Oliver	Wildlands Conservation Trust	kirsteno@wildtrust.co.za	KwaZulu Natal	Y	N	N/A
Andrew Baxter	WESSA	Andrew.baxter@wessa.co.za	KwaZulu Natal	Y	N	N/A
Louise Geldenhuys	DAERL	geldenhuys.louise1@gmail.com	Northern Cape	Y	Y	In-person
Tebogo Mawela	DAERL	mawela.td@gmail.com	Northern Cape	Y	Y	In-person
JP Le Roux	DAERL	jplrx002@gmail.com	Northern Cape	Y	Y	In-person
Marnus Smit	DAERL	zmsmit.denc@gmail.com	Northern Cape	Y	Y	In-person
Mandy Schumann	DAERL	bokkeveld@gmail.com	Northern Cape	Y	Y	In-person
Rona van der Merwe	Protect the West Coast	ronavdm@gmail.com	Northern Cape	Y	Y	In-person
D'Reull De Beer	Wilderness Foundation	dreull@wfa.africa	Northern Cape	Y	Y	In-person

Este Matthew	EWT	estherm@ewt.org.za	Northern Cape	Y	Y	In-person
Marienne de Villiers	CapeNature	mdevilliers@capenature.co.za	Northern Cape	Y	Y	Virtual
Martine Jordaan	CapeNature	mjordaan@capenature.co.za	Northern Cape	Y	Y	Virtual
Ismat Adams	CapeNature	iadams@capenature.co.za	Northern Cape	Y	N	N/A
Sydney Adams	Richtersveld Local Municipality	sydney@richtersveld.gov.za	Northern Cape	Y	N	N/A
Innocent Hinana	Richtersveld Local Municipality	innocent@richtersveld.gov.za	Northern Cape	Y	N	N/A
Anton Van Wetten	Department of Economic Development, Environment & Tourism	vanwettenaa@ledet.gov.za	Mpumalanga	Y	N	N/A
Dr Karen Steenkamp	Department of Economic Development, Environment & Tourism	SteenkampK@ledet.gov.za	Mpumalanga	Y	N	N/A
Lientjie Cohen	Mpumalanga Tourism and Parks Agency	Lientjie.Cohen@mtpa.co.za	Mpumalanga	Y	Y	In-person
Simon Mafu	Gauteng Department of Agriculture and Rural Development	simon.mafu@gauteng.gov.za	Mpumalanga	Y	N	N/A
Marc Leroy	Gauteng Department of Agriculture and Rural Development	marc.leroy@gauteng.gov.za	Mpumalanga	Y	N	N/A
Stephan Veldsman	Gauteng Department of Agriculture and Rural Development	STEPHAN.VELDSMAN@gauteng.gov.za	Mpumalanga	Y	Y	Virtual
Lihle Dumalisile	Gauteng Department of Agriculture and Rural Development	lihle.dumalisile@gauteng.gov.za	Mpumalanga	Y	Y	In-person
Cathy Greaver	SANParks	Cathy.Greaver@sanparks.org	Mpumalanga	Y	Y	Virtual
Russel Smart	SANParks	Russel.Smart2@sanparks.org	Mpumalanga	Y	N	N/A
Matthew Child	SANBI	M.child@sanbi.org.za	Mpumalanga	Y	N	N/A
Gary Bronner	UCT	gary.bronner@uct.ac.za	Mpumalanga	Y	N	N/A
Bradley Gibbons	EWT	bradleyg@ewt.org.za	Mpumalanga	Y	Y	In-person
Chanel Rampartab	CapeNature	crampartab@capenature.co.za	Mpumalanga	Y	N	N/A
Ruth Michielsen	Unaffiliated	ruth.michielsen@gmail.com	Mpumalanga	Y	N	N/A
Paulette Bloomer	UP	paulette.bloomer@up.ac.za	Mpumalanga	Y	Y	Virtual
Sarita Maree	UP	mareesarita@gmail.com	Mpumalanga	Y	Y	In-person
Demi Westendorp	UP MEEP	Demileighvw@gmail.com	Mpumalanga	Y	Y	In-person
Arrie Klopper	UP MEEP	arrie.klopper@up.ac.za	Mpumalanga	Y	Y	Virtual
Frederik van Heerden	UP MEEP	frederikjvanheerden@gmail.com	Mpumalanga	Y	Y	Virtual
Anri van Wyk	UP MEEP	anriraath@gmail.com	Mpumalanga	Y	Y	Virtual
Amanda Maswanganye	UP MEEP	amaswang@yahoo.co.uk u02527154@tuks.co.za	Mpumalanga	Y	Y	Virtual
Dominique Paynee	UP MEEP	dompaynee18@gmail.com	Mpumalanga	Y	Y	Virtual
Ditiro Moloto	UP MEEP	u20818263@tuks.co.za	Mpumalanga	Y	Y	Virtual
Danny Govender	UP MEEP		Mpumalanga	Y	N	N/A
Sam Ferreira	UP MEEP		Mpumalanga	Y	N	N/A
Bornwell Seemani	UP MEEP	bornseemani@yahoo.co.uk	Mpumalanga	Y	Y	Virtual
Cirsti Moolman	UP MEEP		Mpumalanga	Y	Y	Virtual

Annexure 3

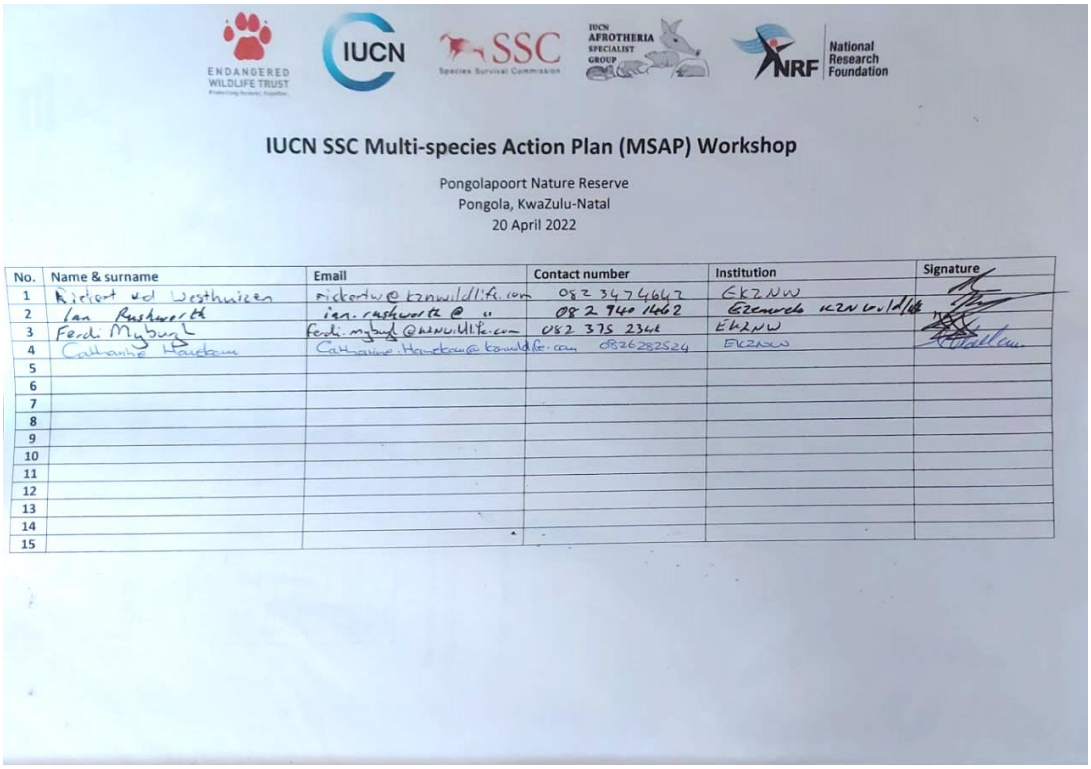
Attendance registers.



IUCN SCC Multispecies Action Plan (MSAP) Workshop

Forestway
Stutterheim, Eastern Cape
16 February 2022

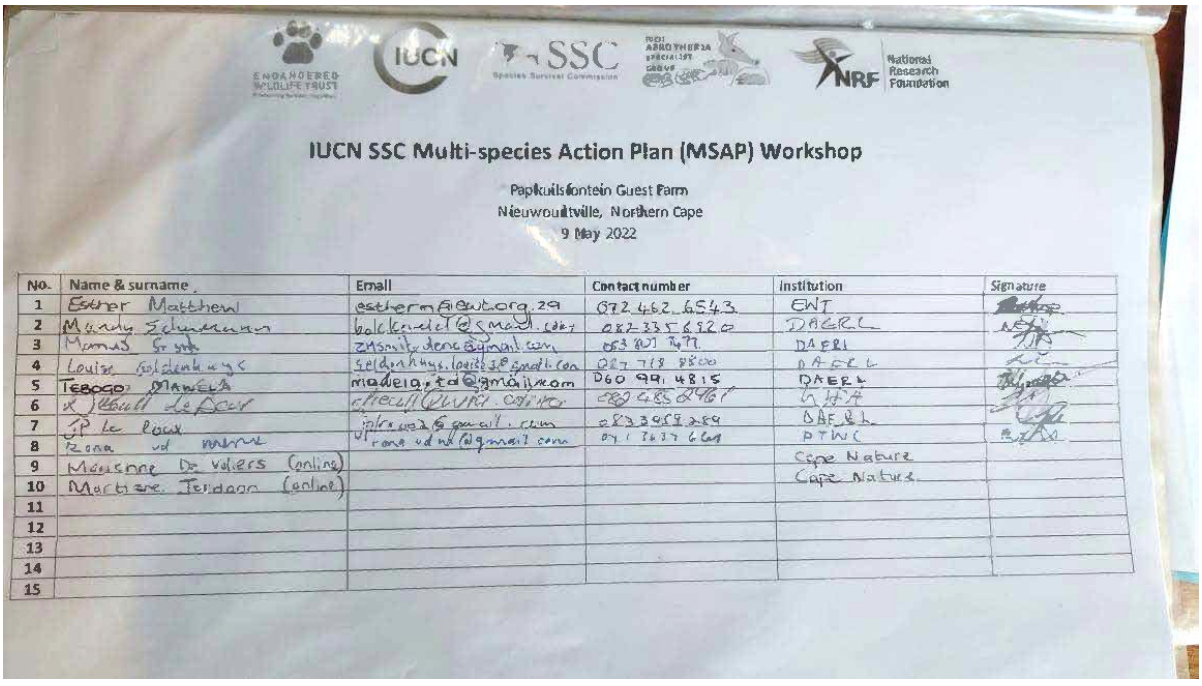
No.	Name & surname	Email	Contact number	Institution	Signature
1	Brian Reeves	brian.reeves@ecpta.co.za	071 605 5234	ECPTA	
2	Gideon van Lill	gideon@rancefimber.co.za	082 789 6564	Amathole Forestry	
3	Karen Kirkman	gzck03486@gmail.com	082 808 9977	Amathole Forestry Consultant	
4	Hoen Dugmore	Dugmorehg@gmail.com	083 984 1902	Forestway	
5	Ian Taylor	iantay@rancefimber.co.za	083 251 7145	AFC	
6	Stan Dugmore	mail@forestway.org.za	072 998 2539	Forestway Centre	
7	Malokuhle Maqungwana	Mmaqungwana@deff.gov.za	078 553 1419	Forestry - DEFF	
8	Khaya Mashologu	Kmashologu@deff.gov.za	56632873477	forestry - DEFF	
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IUCN SSC Multi-species Action Plan (MSAP) Workshop

Pongolapoort Nature Reserve
Pongola, KwaZulu-Natal
20 April 2022

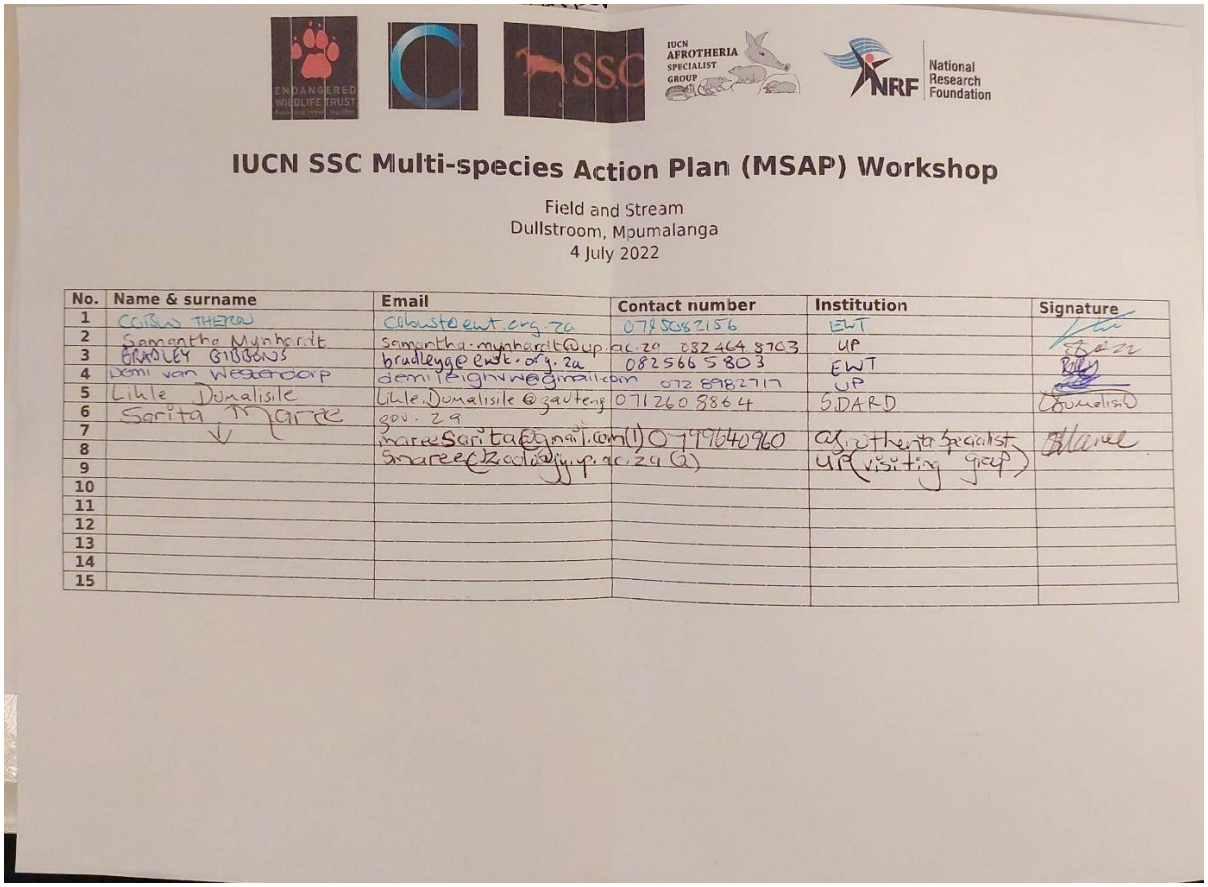
No.	Name & surname	Email	Contact number	Institution	Signature
1	Richard vd Westhuizen	richardw@kznwildlife.com	082 347 4662	EKZNW	
2	Ian Rushworth	ian.rushworth@	082 940 1462	EZemvelo KZN Wildlife	
3	Ferdi Mybugh	ferdi.mybugh@KZNWildlife.com	082 375 2361	EKZNW	
4	Catharine Hardaw	Catharine.Hardaw@kznwildlife.com	0826282524	EKZNW	
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IUCN SSC Multi-species Action Plan (MSAP) Workshop

Papkuilsfontein Guest Farm
Nieuwoudtville, Northern Cape
9 May 2022

No.	Name & surname	Email	Contact number	Institution	Signature
1	Esther Matthew	estherm@ewt.org.za	072 462 6543	EWT	
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3	Mamas Groot	ZMSmithdenc@gmail.com	083 801 7477	DAERI	
4	Louise Goldenhuys	lgoldenhuys.logistics@gmail.com	027 718 8500	DAERL	
5	Teboco Mabela	mabela.td@gmail.com	060 991 4815	DAERL	
6	K Abell Le Roux	cheeli@vlei.co.za	082 485 2967	SANPARKS	
7	JP le Roux	jplroux26@gmail.com	082 395 5259	DAFFL	
8	Rona vd Merwe	rona.vdm@gmail.com	071 363 6648	PTNC	
9	Maxsinne De Villiers (online)			Cape Nature	
10	Martiere Jordaan (online)			Cape Nature	
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IUCN SSC Multi-species Action Plan (MSAP) Workshop

Field and Stream
Dullstroom, Mpumalanga
4 July 2022

No.	Name & surname	Email	Contact number	Institution	Signature
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3	Bradley Gibbons	bradley.gibbons@ewt.org.za	0825665803	EWT	
4	Demi van Wegeraarp	demi.leigh.vw@gmail.com	072 598 2717	UP	
5	Lilie Dumalisile	Lilie.Dumalisile@gauteng	0712608864	GDARD	
6	Sarita Maree	gov.za			
7		maree.sarita@gmail.com (1)	0779640960	afrotheria specialist	
8		Smaree@zoology.up.ac.za (2)		UP (visiting grp)	
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Annexure 4

List of papers published on golden moles.

Cowan, Oliver S., Dominic AW Henry, and Ian T. Little. "A big leap forward for Afrotheria conservation in South Africa: A new environmental screening tool ensures cryptic species of conservation concern are not overlooked during the environmental impact assessment process." Journal for Nature Conservation 63 (2021): 126044.

Freitag, Stefanie, and A. S. Van Jaarsveld. "Relative occupancy, endemism, taxonomic distinctiveness and vulnerability: prioritizing regional conservation actions." Biodiversity & Conservation 6.2 (1997): 211-232.

Jackson, Craig R., et al. "Ecological variables governing habitat suitability and the distribution of the endangered Juliana's golden mole." African Zoology 43.2 (2008): 245-255.

Jackson, Craig R., et al. "Soil properties and the distribution of the endangered Juliana's golden mole." Journal of Zoology 274.1 (2008): 13-17.

Jackson, Craig R., and Mark P. Robertson. "Predicting the potential distribution of an endangered cryptic subterranean mammal from few occurrence records." Journal for Nature Conservation 19.2 (2011): 87-94.

Kuntner, Matjaž, Laura J. May-Collado, and Ingi Agnarsson. "Phylogeny and conservation priorities of afrotherian mammals (Afrotheria, Mammalia)." Zoologica Scripta 40.1 (2011): 1-15.

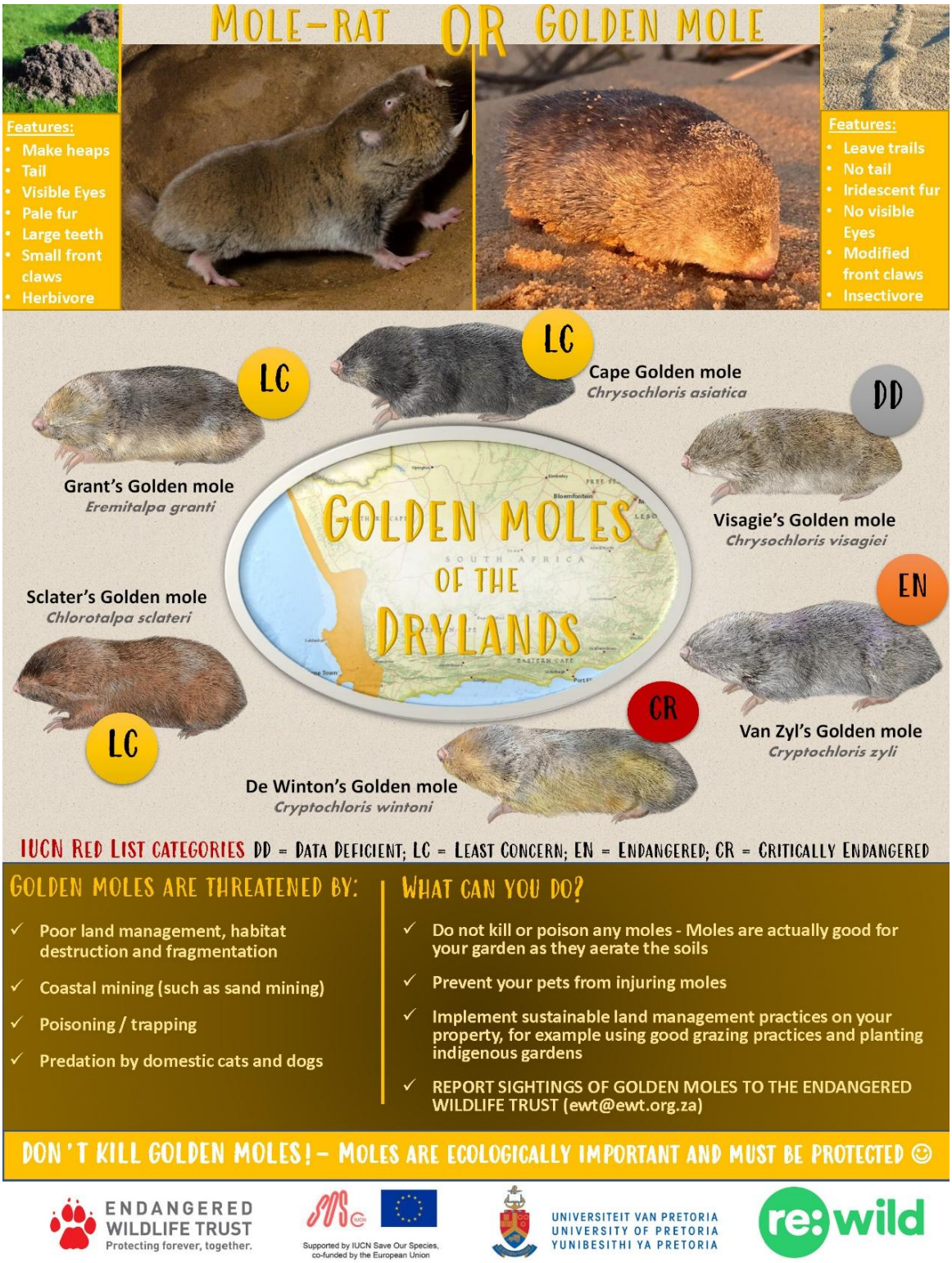
Mynhardt, Samantha, Nigel C. Bennett, and Paulette Bloomer. "New insights from RADseq data on differentiation in the Hottentot golden mole species complex from South Africa." Molecular phylogenetics and evolution 143 (2020): 106667.

Mynhardt, Samantha, et al. "Phylogeography of a morphologically cryptic golden mole assemblage from South-Eastern Africa." PloS one 10.12 (2015): e0144995.

Mynhardt, Samantha, and Cobus Theron. "Diamond mine or gold mine? Using eDNA to identify golden moles along the west coast of South Africa." (2021).

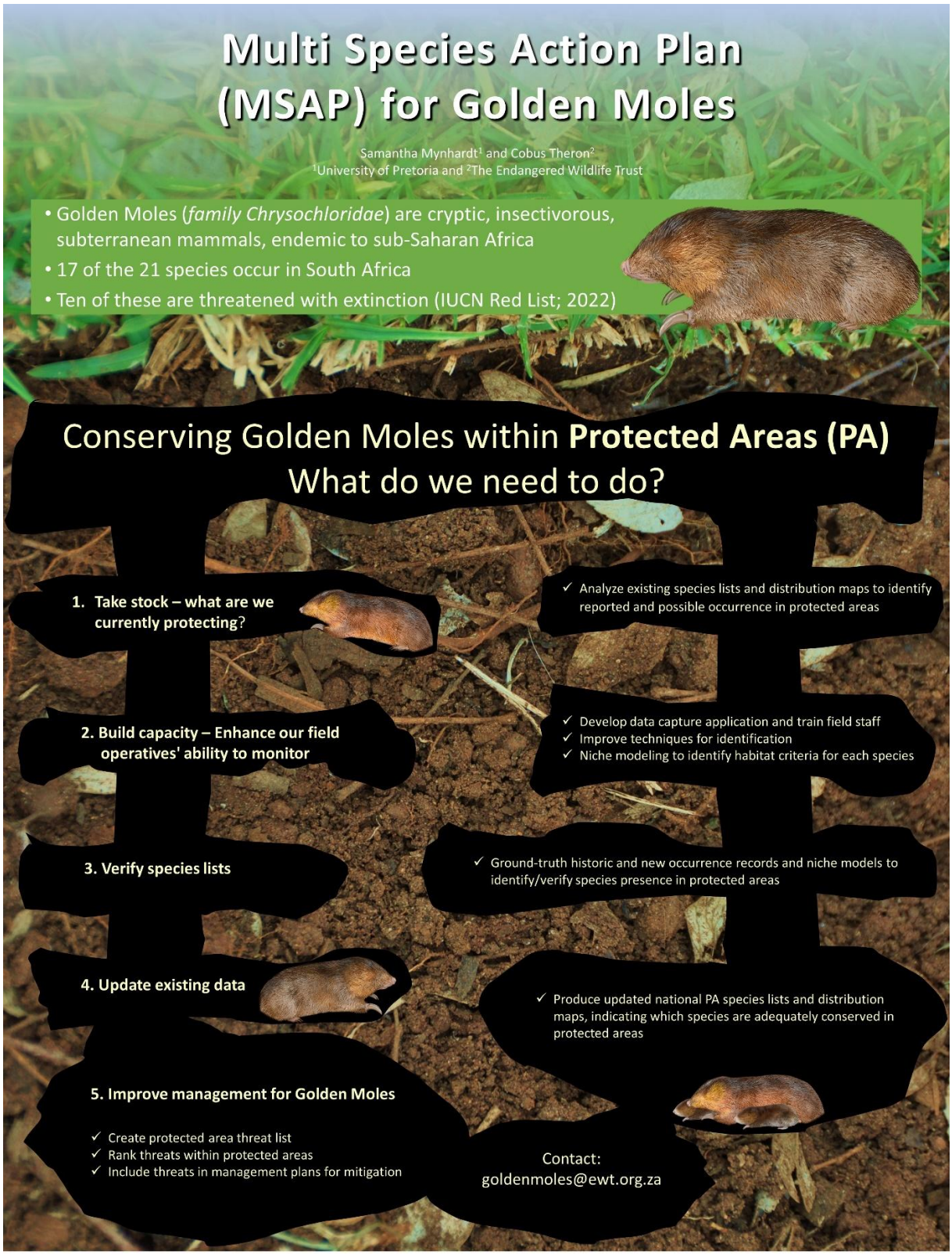
Annexure 5

Golden mole poster develop under a previous grant and distributed to stakeholders during the course of this project.



Annexure 6

Golden mole posters developed during this project – still to be approved for printing.




Multi Species Action Plan (MSAP) for Golden Moles
Samantha Mynhardt[1] and Cobus Theron[2]
[1]University of Pretoria and [2]The Endangered Wildlife Trust
• Golden moles (*family Chrysochloridae*) are cryptic, insectivorous, subterranean mammals, endemic to sub-Saharan Africa
• 17 of the 21 species occur in South Africa
• Ten of these are threatened with extinction (IUCN Red List; 2022)
Conserving Golden Moles **outside** Protected Areas
What do we need to do ?
1. Improve knowledge on species distribution
✓ Increase research to improve distribution data
✓ Develop niche model
✓ Ground-truth niche model
2. Plan for better protection
✓ Use niche modeling to identify habitat criteria for each species
✓ Update EIA Screening tool, Critical Biodiversity Areas and Protected Area Expansion Strategy
✓ ID sites for future conservation
3. Improve development application inputs
✓ Create awareness amongst Environmental Assessment Practitioners
✓ Create awareness amongst planning officials
✓ Add mitigation criteria to Record of Decisions (EIA)
4. Develop Coordination
✓ Establish a National Golden Mole Coordinator
✓ Activate Golden Mole champions in each province
✓ Collate data
5. Awareness and Tracking
✓ Identify audiences
✓ Create targeted messaging
✓ Share data
✓ Follow up on progress on the MSAP
Contact:
goldenmoles@ewt.org.za

Annexure 7

List of potential champions

Person	Province	Organization	Contact
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Ian Rushworth	KwaZulu-Natal	EKZN Wildlife	ian.rushworth@kznwildlife.com
Cathy Greaver	Mpumalanga	SANParks	Cathy.Greaver@sanparks.org
Marienne De Villiers	Western Cape	Cape Nature	mdevilliers@capenature.co.za
Martine Jordaan	Western Cape	Cape Nature	mjordaan@capenature.co.za
Rona van der Merwe	Northern Cape	Protect the West Coast	ronavdm@gmail.com
Brian Reeves	Eastern Cape	ECPTA	Brian.Reeves@ecpta.co.za
Guy at Kai Kai	Northern Cape		
Sarita Maree	Gauteng	Private	mareesarita@gmail.com
Paulette Bloomer	Gauteng	University of Pretoria	Paulette.bloomer@up.ac.za
Lihle Dumalisile	Gauteng	Gauteng Department of Agriculture and Rural Development	lihle.dumalisile@gauteng.gov.za
Lientjie Cohen	Mpumalanga	Mpumalanga Tourism and Parks Agency	Lientjie.Cohen@mtpa.co.za
Bradley Gibbons	KwaZulu-Natal	EWT	bradleyg@ewt.org.za
Louise Kritzinger	Gauteng	The Friends of the Faerie Glen Nature Reserve (FFGNR)	

Annexure 8 - Sample presentation conducted at MSAP workshops

See attached PDF