

Micromammals in the Northern Cape Province of South Africa, past and present

D. Margaret Avery¹ & Graham Avery^{1,2}

¹Iziko South African Museum, P.O. Box 61, Cape Town, 8000 South Africa

E-mail: mavery@iziko.org.za / gavery@iziko.org.za

²Department of Archaeology, University of Cape Town, Rondebosch, 7700 South Africa

(with 78 figures)

Received 19 January 2011. Accepted 30 June 2011

This paper provides a basis for conservation work by detailing the micromammalian taxa occurring in the Northern Cape Province. It presents new evidence from 30 barn owl pellet collections, augmented by previously published material from trapping or observation (here called 'conventional' reports) and owl roosts, divided into pre-1930, 1930–1979 and 1980 and newer as an indication of continuity of occurrence. A historical perspective is added by the inclusion of material from two archaeological sites dating to the Pleistocene (before about 10 000 years ago) and 11 from the Holocene (after about 10 000 years ago). Northern Cape Province synonymies are provided as an aid to equating older records with modern taxonomy. In all, 77 currently recognized micromammalian species have been recorded from the province. These comprise five Afrosoricida (golden moles), six Macroscelidea (elephant shrews), eight Soricomorpha (forest shrews), 16 Chiroptera (bats), and 42 Rodentia (rodents).

Key words: micromammals, distribution, Northern Cape Province, modern, Holocene, Pleistocene.

CONTENTS

Abstract	9	Afrosoricida	11	Rodentia	20
Introduction	9	Macroscelidea	12	Acknowledgements	32
Material and methods	11	Soricomorpha	14	References	32
Taxonomic survey	11	Chiroptera	16	Appendices	35

INTRODUCTION

The Northern Cape Province in its present configuration (Fig. 1) has been in place since 1994 when the current provinces were delineated. Before that, the region formed part of the Cape Province, which, additionally, comprised part of what is now North West Province in its northeast corner, the Western Cape Province and Eastern Cape Province. This, in itself, need not have caused problems in determining whether material was actually collected in the modern Northern Cape Province. When, however, these changes are compounded by lack of precision or name changes in collecting localities, there may well be some doubt. Some of the problems include the fact that the informal term 'northern Cape' was previously used to indicate that part of the previous Cape Province now largely, but not entirely, coincident with the current Northern Cape Province. Namaqualand is divided by the Orange River into Little Namaqualand (the western part of the Northern Cape Province, which was described by Shortridge (1942) as lying between the Orange River and 31°S, and from the west coast to 19°E) and Great Namaqualand, which is in Namibia. When the term Namaqualand is used it is not always certain which side of the Orange River is intended. Further east, what was once known as the Bechuanaland Protectorate is present-day Botswana whereas British Bechuanaland

became part of South Africa in 1895 (Skead 1973). The latter comprises the area south of the Molopo River between Kuruman in the Northern Cape Province and Vryburg in the North West Province. Thus, reference to Bechuanaland may mean modern-day Botswana or either of two South African provinces.

Study of the micromammals in the Northern Cape Province of South Africa has been periodic after a surprisingly early start, given the remoteness of the region. Possibly the first records are those by Gordon in 1779 of animals he called 'blesmollen' (*Georychus capensis*) from Ellenboogfontein (as discussed by Rookmaker 1989, pp. 115, 304, 307) and of the short-eared elephant shrew *Macroscelides proboscideus* from Voorsigtigskloof. A further 50 years elapsed before Smith described (1836) and illustrated (1849) material he collected from the Northern Cape. Around the same time, according to Skead (2011), Alexander (1838) and Backhouse (1844) encountered mole-rats in Namaqualand, and Backhouse also saw a probable *Myotomys unisulcatus* in the Herbert District (Skead 2011). A further 70 years after that C.D. Rudd undertook a collecting trip in Little Namaqualand (Thomas & Schwann 1904), and R.B. Woosman and R.E. Dent collected in the Kuruman area (Schwann 1906). Between the early 1920s (Shortridge 1942; Shortridge & Carter 1938; Thomas & Hinton 1923) and the early 1950s

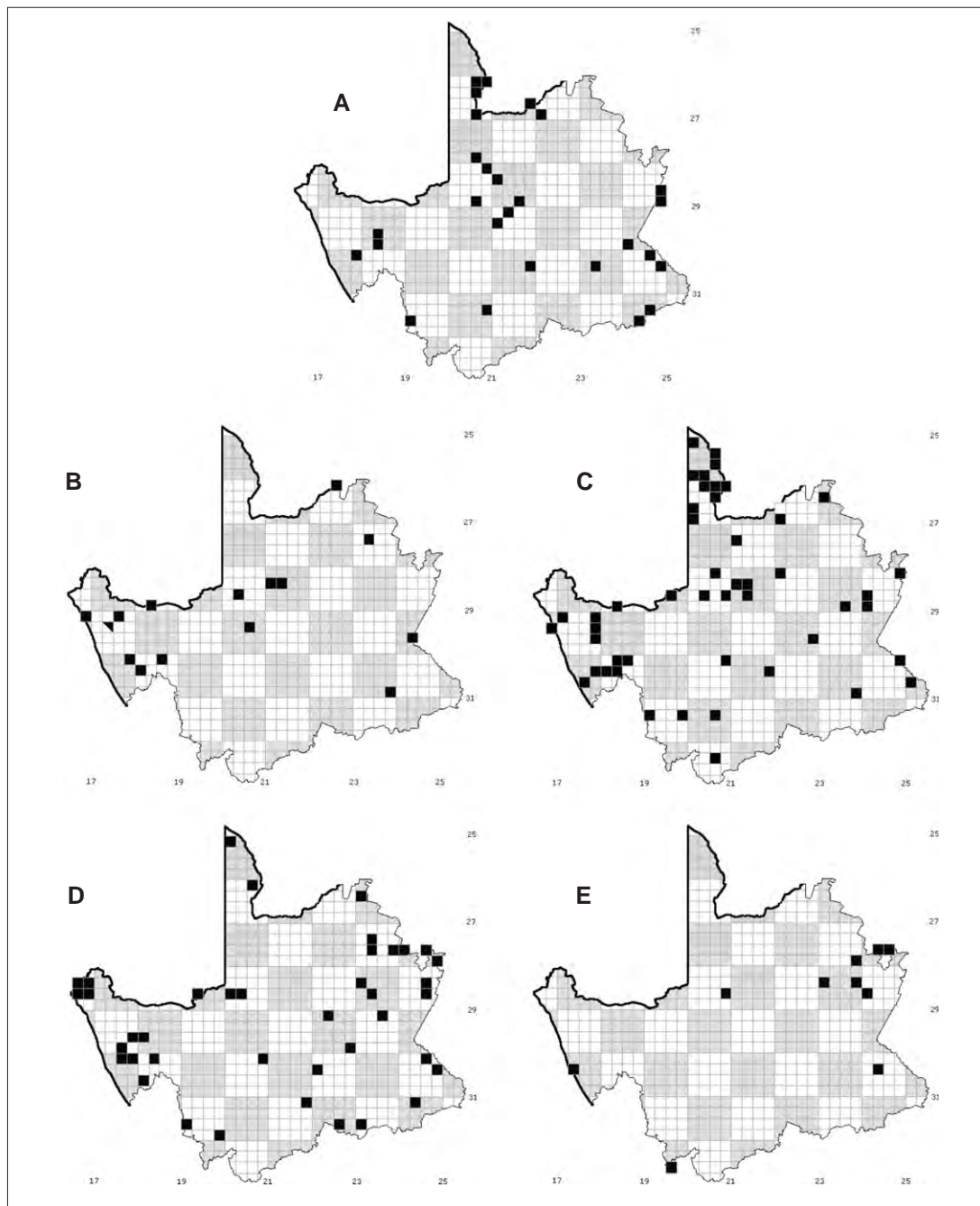


Fig. 1. Location of quarter-degree squares from which material is represented. **A**, New, unpublished owl-pellet material. **B**, Published before 1930 (triangle = questionable location). **C**, Published between 1930 and 1979. **D**, Published from 1980 onwards. **E**, Archaeological material. See Appendices 1–5 for further details.

(Lundholm 1955) further periodic collection was undertaken in the western part of the province but it was not until the 1970s that concerted attention was paid to the north-central region that is encompassed in the Kgalagadi Transfrontier Park (previously the Kalahari Gemsbok National Park) (De Graaff 1974; Nel & Rautenbach 1975; Nel *et al.* 1984; Rautenbach & Nel 1975; Rautenbach 1971) as well as the Augrabies Falls National Park (De Graaff 1974; Rautenbach *et al.* 1979).

Although earlier work was based on conventional collecting, most recent information on the distribution of micromammals in the Northern Cape Province has come

from the remains of animals eaten by barn owls. Davis (1959) was the pioneer of this line of investigation in South Africa and, indeed, he (Davis 1958) and Nel & Nolte (1965) listed the micromammals of the then Kalahari Gemsbok National Park based on this source of evidence even before the detailed fieldwork discussed above was undertaken. Following the report by Vernon (1972) for southern Africa as a whole, Dean (1975) and MacDonald & Dean (1984) restricted their attention to the Northern Cape Province. Again, the central part of the province remained effectively unexplored although, in this case, one reason is quite clear; finding barn owl roosts in this arid region is not easy.

Barn owls, primarily, with or without other predators, must also have been responsible for accumulating micromammalian remains in archaeological sites (see e.g. Andrews 1990) so the contribution of owls to our knowledge of micromammalian distributions also has a historical perspective. So far, not many archaeological sites have been found in the Northern Cape Province, for which there are various possible reasons. One may be the paucity of suitable caves and rockshelters. Another could be the aridity of the region but it must be borne in mind that climatic conditions changed during the past (see e.g. Tyson 1999) and it has long been known (Bowen 1933) that, even today, climate variation on a seasonal annual or decadal scale can influence the presence of predators such as barn owls in a marginal area. The existence of suitable roost sites for the avian raptor and conditions favourable to preservation of prey remains must also be considered. Finally, there is always the possibility that more sites remain to be found. The most important site with a long record of micromammals in the region is Wonderwerk Cave, which lies some 45 km south of Kuruman. Wonderwerk was first described by Malan & Cooke (1941), and from the 1970s onwards has received recurring attention (Beaumont, 1979; Thackeray 1984; R  ther *et al.* 2009). The prolific micromammal remains from this site have provided a history of the occurrence of many taxa during the Holocene (approximately the last 10 000 years) (Avery 1981) and during parts of the Pleistocene (approximately ~0.78–1.96 Ma) (Avery 1995; Chazan *et al.* 2008).

The present paper brings together information from primary publications on micromammals of the Northern Cape Province, partly as a historical record and partly as a service to conservation in the province. Although a few collations have been undertaken in the past (Stuart *et al.* 1978; Herselman & Norton 1985), these have either not been inclusive or are geographically non-specific, and are, in any case, in need of updating. In particular, new data resulting from the dedicated collection of owl pellet samples have provided significant new distributional information on various taxa. This illustrates the usefulness of such work for determining the species diversity of particular areas and its potential for providing a monitoring service for future conservation work in the province. That such material should be permanently lodged in a museum collection, for future study or verification, is crucial.

MATERIALS AND METHODS

The unpublished collections of barn owl pellets and bulk pellet residues discussed here were collected from sites throughout the Northern Cape Province and are lodged in Iziko South African Museum, Cape Town (Appendix 1, Fig. 1A). Individual pellets were measured and weighed, then prepared in a solution of sodium hydroxide to dissolve hair. Mandibles and maxillae were extracted from pellets and the bulk samples of decomposed pellets, and were identified, with and without teeth, by D.M.A. Further discussion of identification methods is given in Avery *et al.* (2002) and Avery (2007).

Material from each site is accessioned with a unique accession number and identified informally by a unique three-letter code, as given in Appendix 1. Multiple collec-

tions from one site are identified by collection number and by date. Individual pellets are allocated a unique number and the contents are stored in individual labelled plastic bags; bulk residues are identified by site and collection number, with different taxa in separate labelled plastic bags. Databases detailing the identified material from each pellet or bulk sample are available from the authors.

To give an indication of the known history of each taxon in the Northern Cape Province various supplementary sources were consulted. These include published primary conventional and owl-pellet records grouped according to whether they appeared before 1930, between 1930 and 1979, or from 1980 onwards. Only the original record is given where it is clear that earlier records are repeated in later publications. Records from archaeological sites are listed as either Pleistocene or Holocene. Appendices 2–5 give details of the collection sites and publications in each category. Museum databases have not been consulted directly but major Northern Cape holdings are housed in the Ditsong National Museum of Natural History (originally the Transvaal Museum, part of the former Northern Flagship Institution), the Amatola (previously Kaffrarian) Museum in King Williams Town and the Natural History Museum in London. Archaeological samples are currently housed in the Iziko South African Museum in Cape Town. Figures 1B to 1E show the quarter-degree squares from which material in each time category has been recovered.

Because this survey refers solely to material from the current Northern Cape Province, only type localities situated in this province are given. Similarly, only those synonyms based on specimens from the province are listed. The taxonomic arrangement follows Wilson & Reeder (2005), with subsequent amendments where necessary.

TAXONOMIC SURVEY

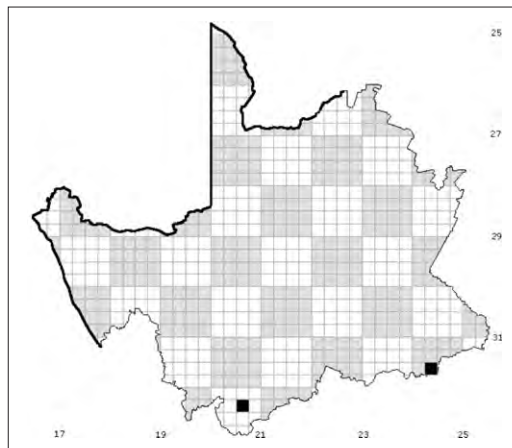
Order **AFROSORICIDA**

Family **CHRYSOCHLORIDAE**

Chlorotalpa sclateri (Broom, 1907),

Sclater's golden mole

Synonym: *C. shortridgei* Broom, 1950



Previous records

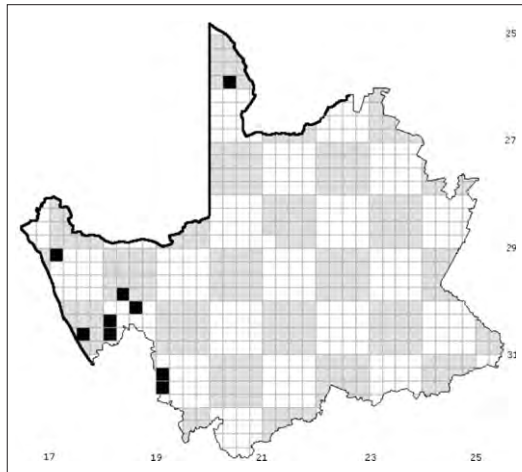
- 1930–1979: Sutherland.

New record: Vergelegen 132.

Comments: the type locality for *C. shortridgei* Broom, 1950 is Sutherland but, although Bronner & Jenkins (2005) list *shortridgei* as a synonym of *C. sclateri*, they do not mention the Northern Cape Province as within the range of this species.

Chrysochloris asiatica (Linnaeus, 1758),
Cape golden mole

Synonyms: *C. namaquensis* Broom, 1907; *C. tenuis* Broom, 1907; *C. concolor* Shortridge & Carter, 1938; *C. asiatica namaquensis* Broom, 1946; *C. dixonii* Broom, 1946; *C. elegans* Broom, 1946; *C. shortridgei* Broom, 1946.

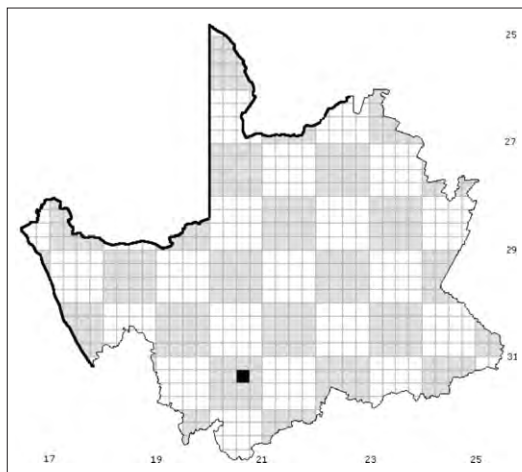


Previous records

- pre-1930: Garies.
- 1930–1979: Craiglockhart, Eselfontein, Garies, Kameelboom, Kamiesberg, Nieuwoudtville, 24 km inland of Port Nolloth, Witwater.

New records: Kaitob Berg, Lokenburg Farm.

Chrysochloris visagiei Broom, 1950,
Visagie's golden mole

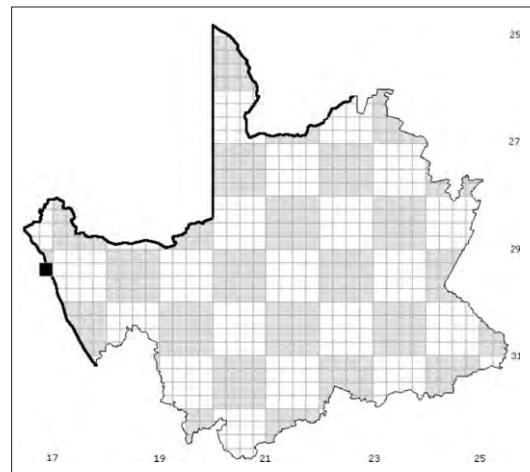


Previous records

- Type locality: Gouna.

Comments: the type locality remains the only place from which this species has been recorded.

Cryptochloris wintoni (Broom, 1907),
De Winton's golden mole

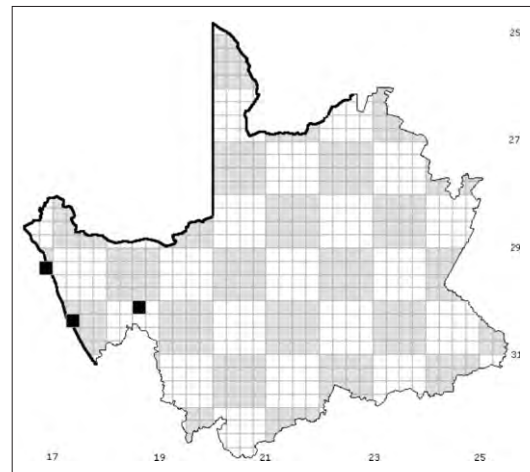


Previous records

- Type locality: Port Nolloth.

Comments: the type locality remains the only place from which this species has been recorded.

Eremitalpa granti (Broom, 1907),
Grant's golden mole



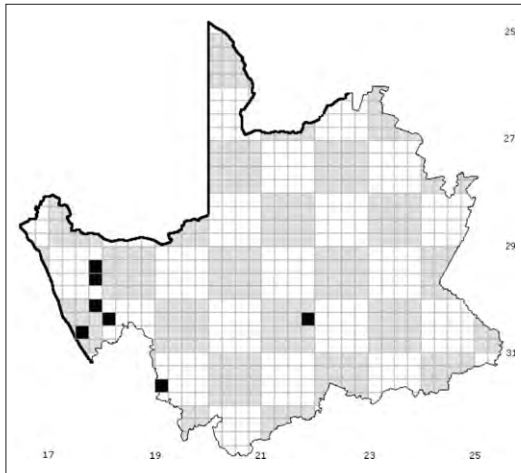
Previous records

- Type locality: Garies.
- 1930–1979: Port Nolloth.
- Holocene: Spoegrivier.

Comments: this taxon has not been found in owl pellet samples in the province. This is probably because collecting has not been conducted within its range because it has been found in barn owl pellets to the north in Namibia and to the south in the West Coast National Park (Avery *et al.* 1990). Its presence at Spoegrivier indicates that it has some antiquity in the region.

Order **MACROSCELIDEA**
Family **MACROSCELIDAE**

Elephantulus edwardii (A. Smith, 1839),
Cape elephant shrew



Synonyms: *E. karoensis* Roberts, 1938 was assigned to *E. edwardsii* by Schlitter (2005) but has recently been transferred to *E. rupestris* by Smit *et al.* (2008).

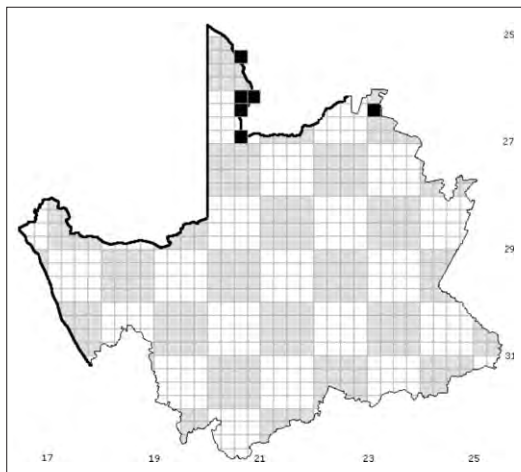
Previous records

- 1930–1979: Eselfontein, Kameelboom, Okiep, Paddagat, Vanwyksvlei, Witwater.
- 1980+: Namaqua National Park.

New records: Lokenburg.

Comments: in view of the site location, the material from Vanwyksvlei is probably referable to *E. pilicaudus* (see below).

Elephantulus intufi (A. Smith, 1836),
bushveld elephant shrew



Previous records

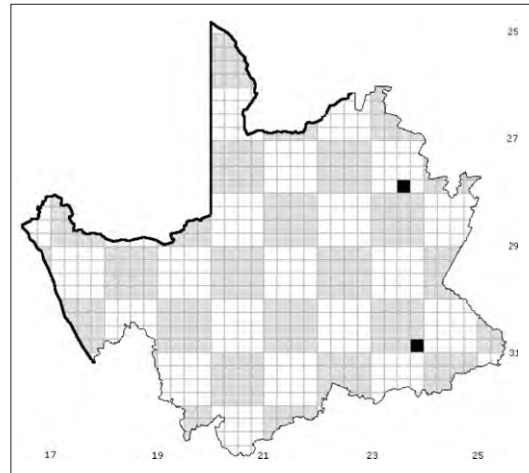
- 1930–1979: Aucterlonie, Ky Ky, Nossob Camp, Twee Rivieren Camp.
- 1980+: Heuningsvlei.

New records: Deekrand, Kransbrak.

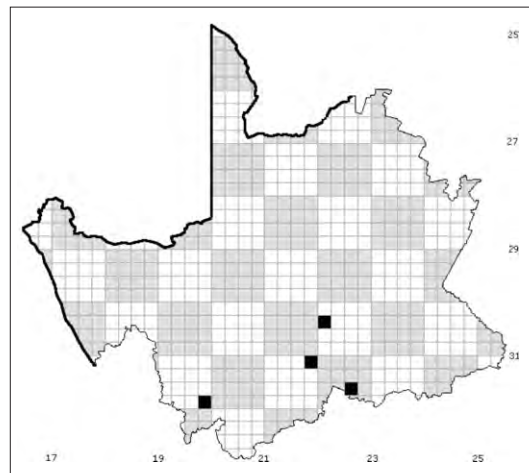
Elephantulus myurus (Thomas & Schwann, 1906),
eastern rock elephant shrew

Previous records

- 1930–1979: Deelfontein.
- Pleistocene: Wonderwerk.



Elephantulus pilicaudus Smit, 2008,
Karoo rock elephant shrew



Previous records

- Type locality: Vondelingsfontein Farm.
- 1980+: Carnarvon Commonage, Goraas Farm, Slytfontein Farm.

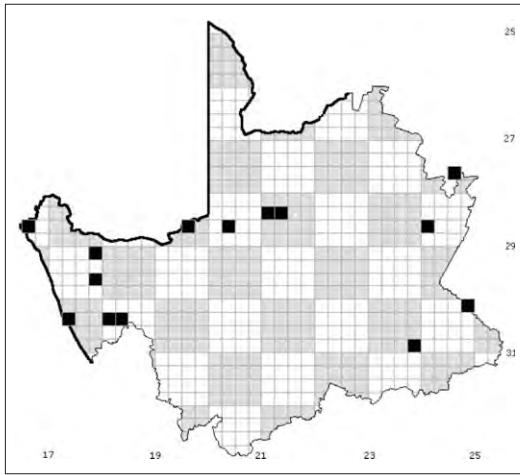
Comments: this species has only recently been distinguished from *E. edwardsii* (Smit *et al.* 2008). Although some external features have been found to separate the two species, osteological and dental characters are unfortunately not among them (Smit *et al.* 2008). For the present therefore it is not possible to determine to which of the two species the specimens from Lokenburg belong.

Elephantulus rupestris (A. Smith, 1831),
western rock elephant shrew

Synonyms: *E. barlowi gordoniensis* Roberts, 1946;
Elephantulus karoensis Roberts, 1938.

Previous records

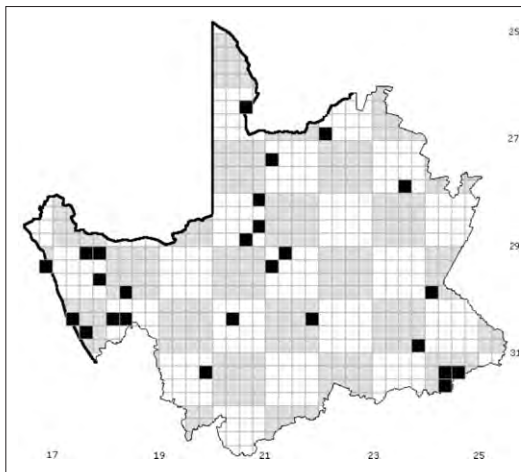
- Type locality: 'mts nr mouth Orange R'.
- 1930–1979: Augrabies Falls National Park, Augrabies Falls W, Deelfontein, Eenriet, Hester Malan Nature Reserve, Louisvale, Platbakkies, Rolfontein Nature Reserve, Rooidam, Stolzenfels, Upington, Upington E, Witwater published pellets: Springbok, Upington.
- Holocene: Limerock, Powerhouse, Spoegrivier.



Comments: *E. karoensis* has recently been found to cluster with *E. rupestris* (Smit *et al.* 2008) and has therefore been removed from *E. edwardii*, where it had been placed by Schlitter (2005).

Macroscelides proboscideus (Shaw, 1800),
short-eared elephant shrew

Synonyms: *M. p. chiversi* Roberts, 1933; *M. p. brandvleiensis* Roberts, 1938 ; *M. p. calviniensis* Roberts, 1938 ; *M. p. harei* Roberts, 1938; *M. p. isabellinus* Shortridge & Carter, 1938.



Previous records

- Pre-1930: Deelfontein, Klipfontein, Port Nolloth, Voorsigtigskloof.
- 1930–1979: Brandvlei, Brospan, Calvinia E, Eenriet, Hester Malan Nature Reserve, Kameelboom, Platbakkies, Samevloeïng, Upington N, Witwater.
- Holocene: Abbots, Spoegrivier, Zoovoorbij.
- Pleistocene: Wonderwerk.

New records: Driekoppen, Gelukspruit, Holpan, Kaitob Berg, Kenhardt Railway Bridge, Kleinbegin-Kenhardt road, Swartpad, Vanzylsrus, Vergelegen 132.

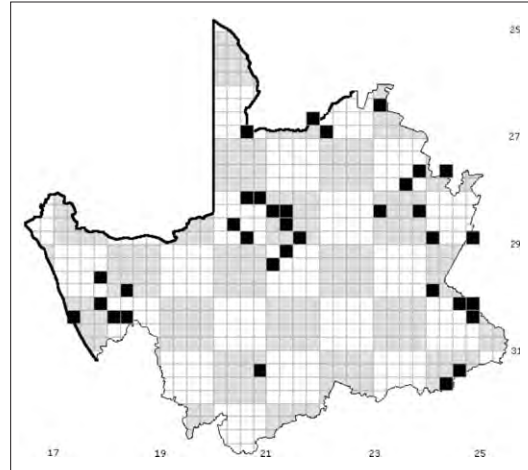
Comments: Van der Stel is said to have seen this species at Goede Hoep in 1685 but this place is now in the Western Cape Province and, in any case, the identification is based on the distribution of the species (Rookmaker 1989, p. 22).

Order **SORICOMORPHA**

Family **SORICIDAE**

Crocidura cyanea (Duvenoy, 1838),
reddish-grey musk shrew

Synonym: *Sorex concolor* A. Smith, 1836.



Previous records

- Pre-1930: Latakoo.
- 1930–1979: Augrabies Falls National Park, Bushmanputs, Eselfontein, Platbakkies, Rolfontein Nature Reserve, Springbok, Upington, Upington SE, Witwater.
- 1980+: Grootfontein, Heuningsvlei, Marrick, Swartmodder.
- Holocene: Blinkklipkop, Dikbosch 1, Klein Witkrans, Spoegrivier, Wonderwerk, Zoovoorbij.
- Pleistocene: Wonderwerk.

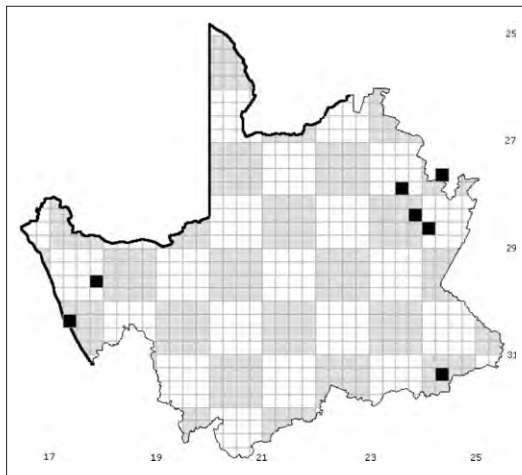
New records: Benfontein Game Reserve, De Cruis, Deekrand, Doornkloof Nature Reserve, Doornkuilen, Driekoppen, Gelukspruit, Holpan, Kaitob Berg, Kenhardt Railway Bridge, Kleinbegin Station, Kleinbegin-Kenhardt road, Lovers Leap, Spitzkop Nature Reserve, Skilpad, Swartpad, Wildflower Reserve, Vergelegen 132, Weltevrede

Crocidura flavescens (l. Geoffroy, 1827),
greater red musk shrew

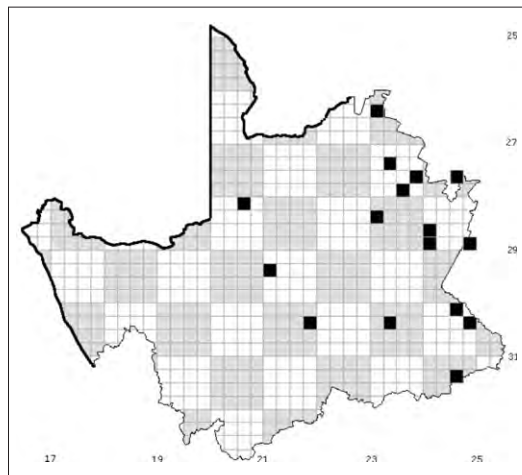
Previous records

- 1930–1979: Springbok.
- Holocene: Abbots, Dikbosch 1, Klein Witkrans, Limerock, Spoegrivier, Wonderwerk.
- Pleistocene: Wonderwerk.

Comments: the distribution of *C. flavescens* in the Northern Cape Province is shown as extending as far as Port Nolloth along the west coast (Skinner & Chimimba 2005). The record from Springbok (Vernon 1972) needs confirmation because in the 1990s only *C. cyanea* was found in the nearby Skilpad Wildflower Reserve. All the eastern samples are from archaeological sites, which indicate a wider distribution at various times during the past.



Crocidura fuscomurina (Heuglin, 1865),
bicolored musk shrew



Previous records

- 1930–1979: Kingston Farm, Marrick.
- 1980+: Grootfontein, Heuningsvlei, Marrick, Moffat Mission, Swartmodder, Vaalharts.
- Holocene: Blinkklipkop, Limerock, Wonderwerk.
- Pleistocene: Wonderwerk.

New records: Benfontein Game Reserve, Driekoppen, Doornkuilen, Doornkloof Nature Reserve, Kenhardt Railway Bridge, Laaikrale, Ongers River Bridge.

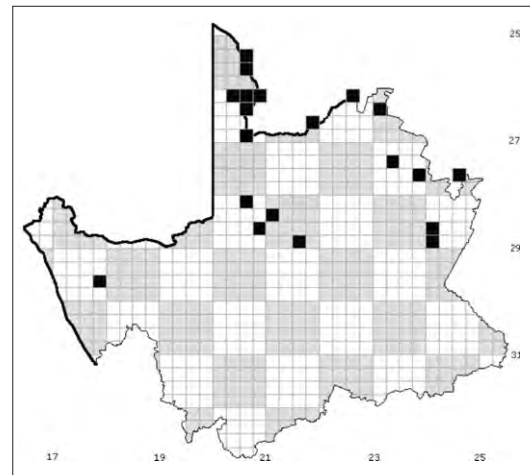
Comments: *Crocidura fuscomurina* is clearly widely distributed in the eastern half of the province but without owl pellet records this fact would not have been known.

Crocidura hirta Peters, 1852,
lesser red musk shrew

Synonym: *C. deserti* Schwann, 1906.

Previous records

- Pre-1930: Molopo R. W of Morokwen.
- 1930–1979: Aucterlonie, Batulama, Dikbaardskolk, Hester Malan Nature Reserve, Kamfersboom, Kingston Farm, Kransbrak, Ky Ky, Monro, Nossob Camp, Samevloeiing, Tweek Rivieren.
- 1980+: Grootfontein, Heuningsvlei, Marrick, Moffat



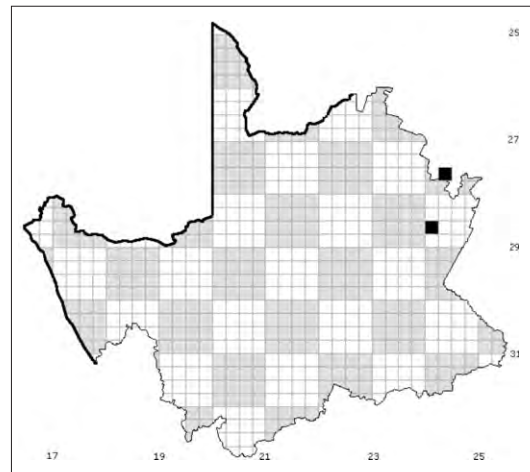
Mission, Swartmodder, Vaalharts.

- Holocene: Zoovorbij.

New records: Deekrand, Kleinbegin Station, Kransbrak, Lovers Leap, Spitzkop Nature Reserve, Tweek Rivieren C.

Comments: the record from the Hester Malan Nature Reserve constitutes a considerable extension to the range given by Skinner & Chimimba (2005).

Crocidura mariquensis (A. Smith, 1844),
swamp musk shrew



Previous records

- Holocene: Klein Witkrans, Limerock.

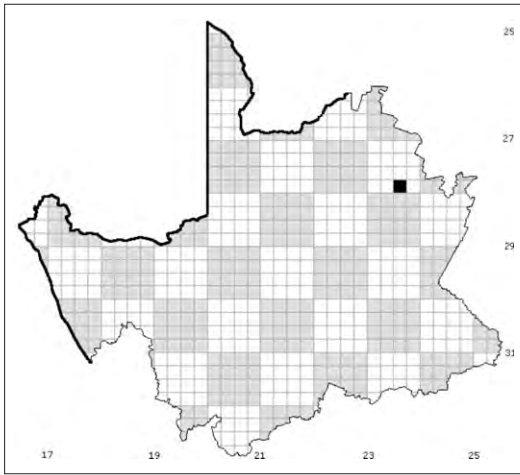
Comments: so far this shrew has not been found in modern samples from the province so conditions may no longer be favourable for it.

Suncus lixus (Thomas, 1898),
greater dwarf shrew

Previous records

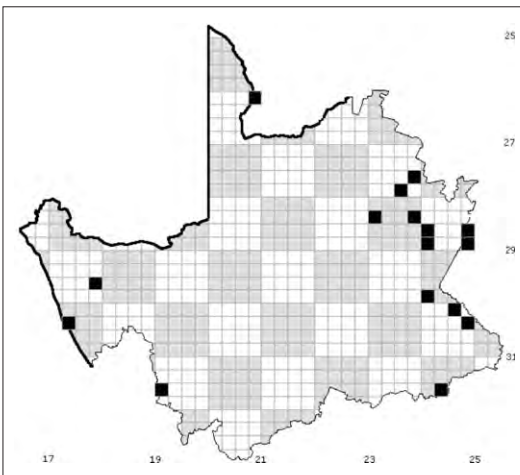
- Holocene: Wonderwerk (<200 years).

Comments: the occurrence within the last few hundred years of *S. lixus* very far from its current area of distribution may be explained in terms of different climatic conditions from those of the present day. This suggestion is supported by other micromammalian evidence from Abbots Cave, which



reflects climate and vegetational change during the Little Ice Age of the 19th Century in the interior of South Africa (Avery 1991).

Suncus varilla (Thomas, 1895),
lesser dwarf shrew



Previous records

- 1930–1979: Kingston Farm, Marrick, Springbok.
- 1980+: Grootfontein.
- Holocene: Blinkklipkop, Dikbosch 1, Spoegrivier, Wonderwerk.

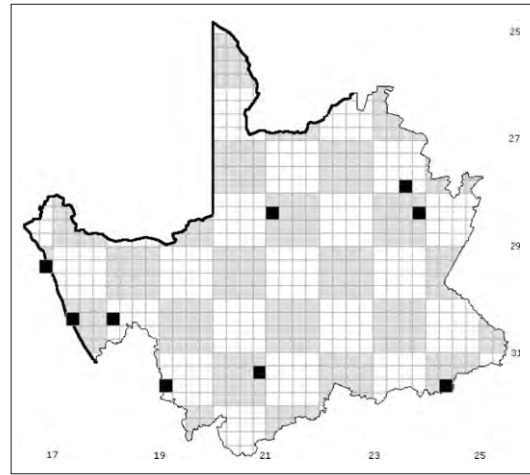
New records: Benfontein Game Reserve, Doornkuilen, Dronfield Game Reserve, Doornkloof Nature Reserve, Holpan, Kransbrak, Lokenburg Farm, Vergelegen 132.

Comments: the only records of this species in the Northern Cape Province are from modern owl pellets and archaeological sites. The current western samples, and especially that from the Kalahari Gemsbok National Park, represent range extensions from the Free State Province.

Myosorex varius (Smuts, 1832),
forest shrew

Previous records

- pre-1930: Port Nolloth.
- 1930–1979: Eselfontein, Port Nolloth.



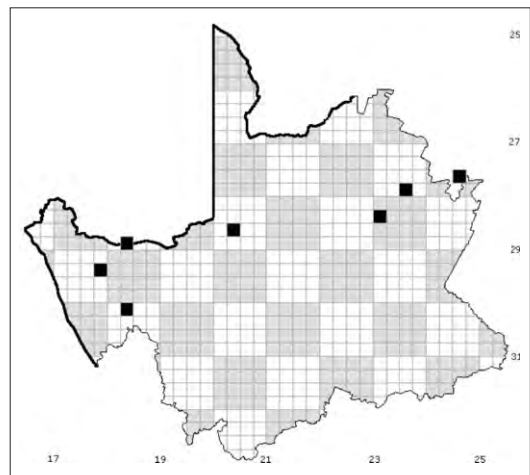
- Holocene: Dikbosch 1, Spoegrivier, Wonderwerk.
- Pleistocene: Wonderwerk.

New records: De Cruis, Lokenburg Farm, Spitzkop Nature Reserve, Vergelegen 132.

Comments: the records north of 29°S show that this species is, and was, more widely distributed in the province than is shown by Skinner & Chimimba (2005).

Order **CHIROPTERA** (excluding family Pteropodidae)
Family **RHINOLOPHIDAE**

Rhinolophus capensis Lichtenstein, 1823,
Cape horseshoe bat



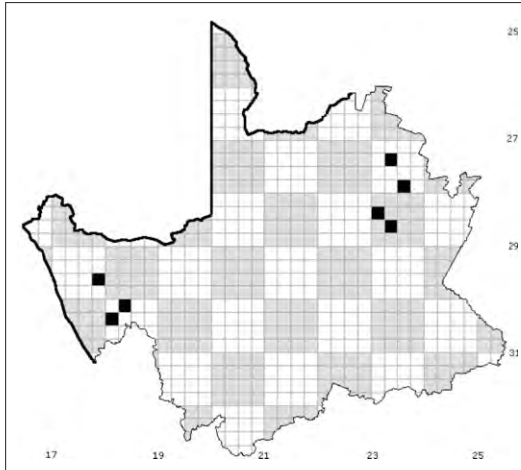
Previous records

- 1930–1979: Augrabies Falls National Park, Goodhouse, Lelifontein, Orrelgat, Paddagat.
- Holocene: Blinkklipkop, Powerhouse Cave, Wonderwerk
- Pleistocene: Wonderwerk.

Comments: the archaeological material from the eastern part of the province requires re-examination before it can be accepted that this species was previously more widespread than it is currently. On present evidence it seems more likely that *R. denti* is the species represented (see below).

Rhinolophus clivosus Cretzschmar, 1828,
Geoffroy's horseshoe bat

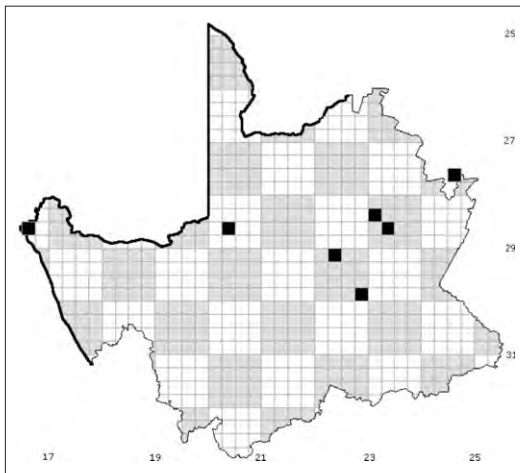
Synonym: *R. augur* K. Andersen, 1904.



Previous records

- pre-1930: Kuruman.
- 1930–1979: Leliefontein.
- 1980+: Die Oog Kuruman, Koegelbeen Cave, Roodebergskloof, Simon van der Stel Mine.
- Holocene: Blinkklipkop, Wonderwerk.
- Pleistocene: Wonderwerk.

Rhinolophus darlingi K. Andersen, 1905,
Darling's horseshoe bat



Previous records

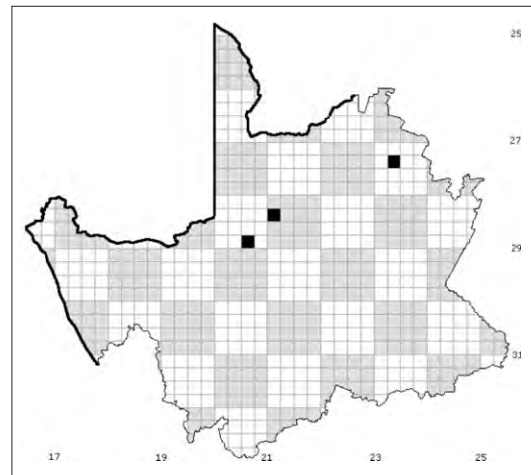
- 1980+: Alexander Bay NE, Augrabies Falls National Park, Buxton Mine, Gatkoppies, Keikamsport Farm 71, Koegelbeen Cave, Leelykstaat Farm.

Rhinolophus denti Thomas, 1904,
Dent's horseshoe bat

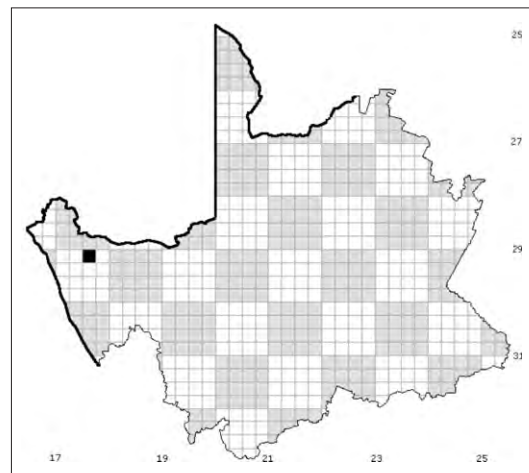
Previous records

- pre-1930: Kuruman.
- 1930–1979: Louisvale.

New records: Swartpad.



Rhinolophus fumigatus Rüppell, 1842,
Rüppell's horseshoe bat



Previous records

- pre-1930: Klipfontein.

Comments: Monadjem *et al.* (2010, p. 208) note that because the specimens from Klipfontein cannot be located this record should be treated as unsubstantiated, especially in view of the fact that the nearest confirmed localities are some 750 km to the north in Namibia.

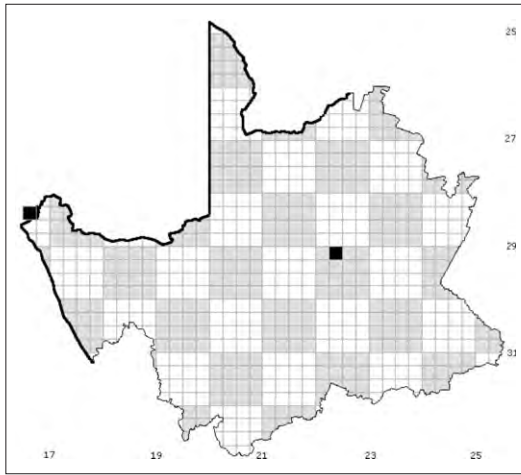
Family **HIPPOSIDERIDAE**

Hipposideros caffer (Sundevall, 1846),
Sundevall's leaf-nosed bat

Previous records

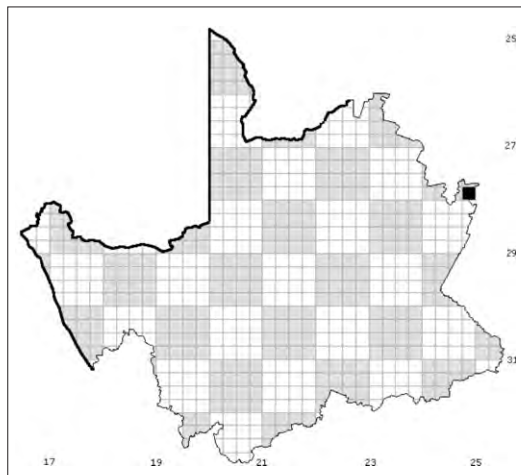
- 1980+: Brandkaros, Leelykstaat Farm.

Comments: the Brandkaros occurrence listed by Herselman & Norton (1985) constitutes a slight extension to the range shown by Monadjem *et al.* (2010). However, that from Leelykstaat is far from other recorded occurrences, a fact that caused Erasmus & Rautenbach (1984) to speculate that this species has a much wider subcontinental range than was then accepted. The fact that the specimens were caught close to the Orange River may also have a bearing on distribution.



Family **EMBALLONURIDAE**

Taphozous mauritanus E. Geoffroy, 1818,
Mauritian tomb bat

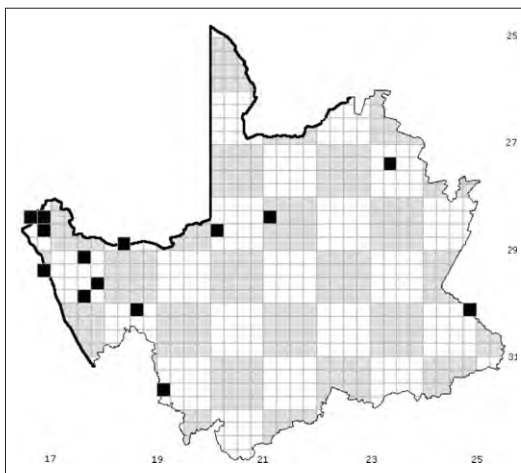


Previous records

- 1980+: Hartswater.

Family **NYCTERIDAE**

Nycteris thebaica E. Geoffroy, 1813,
Egyptian slit-faced bat

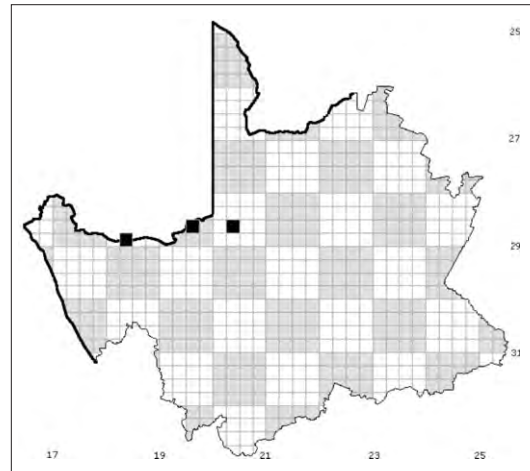


Previous records

- Pre-1930: Anenous, Kuruman, Louisvale.
- 1930–1979: Garies, Goodhouse, Hester Malan Nature Reserve, Louisvale, Port Nolloth, Rolfontein Nature Reserve.
- 1980+: Blouputs, Brandkaros, Doringpoort R, Hester Malan Nature Reserve, Okiep, Sewefontein, Welbedacht Mine, Wondergat.

Family **MOLOSSIDAE**

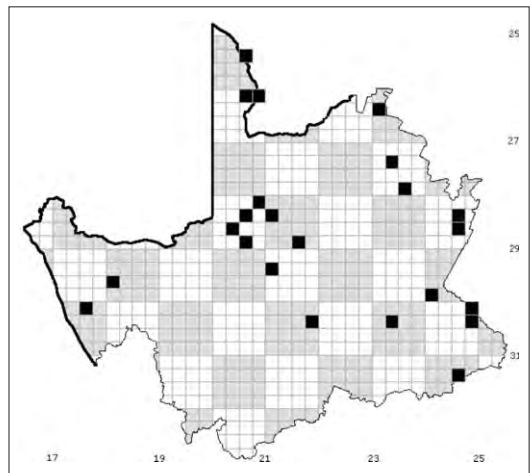
Sauromys petrophilus (Roberts, 1917),
Roberts's flat-headed bat



Previous records

- 1930–1979: Augrabies Falls National Park, Goodhouse, Stolzenfels.

Tadarida aegyptiaca (E. Geoffroy, 1818),
Egyptian free-tailed bat



Previous records

- pre-1930: Kuruman, Louisvale.
- 1930–1979: Aucterlonie, Kransbrak, Louisvale, Nossob Camp, Rolfontein Nature Reserve.
- 1980+: Abraham Kriel, Aronegas, Augrabies Falls, Barkly West, Goegab, Heuningsvlei, Rolfontein Nature Reserve.
- Holocene: Wonderwerk.

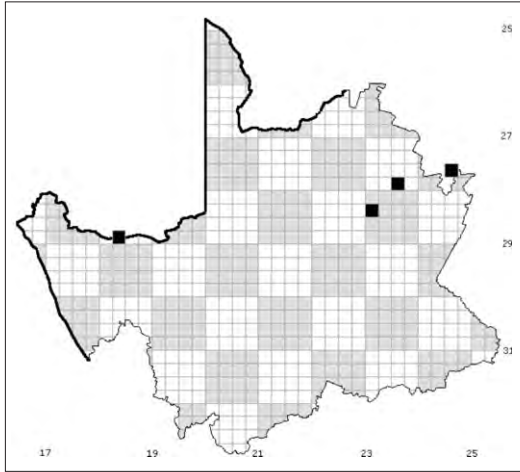
- Pleistocene: Wonderwerk.

New records: Doornkloof Nature Reserve, Driekoppen, Gelukspruit, Holpan, Kransbrak, Kenhardt Railway Bridge, Kleinbegin Station, Kleinbegin-Kenhardt road, Laaikrale, Ongers River Bridge, Swartpad.

Family VESPERTILIONIDAE

Eptesicus hottentotus (A. Smith, 1833),
long-tailed serotine

Synonym: *E. megalurus pallidior* Shortridge, 1942.

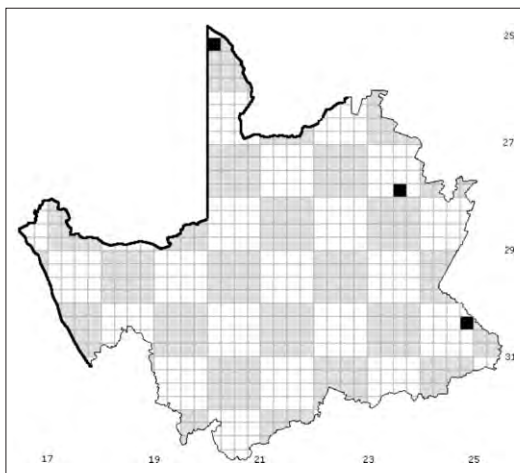


Previous records

- 1930–1979: Goodhouse.
- 1980+: Taung.
- Holocene: Blinkklipkop.
- Pleistocene: Wonderwerk.

Comments: Monadjem *et al.* (2010) list a specimen from Kuruman and it is clear from their map that this species potentially occurs over much of the Northern Cape Province although its distribution appears patchy due to a requirement for rocky crevices and caves in which to roost (Monadjem *et al.* 2010).

Scotophilus dinganii (A. Smith, 1833),
yellow-bellied house bat



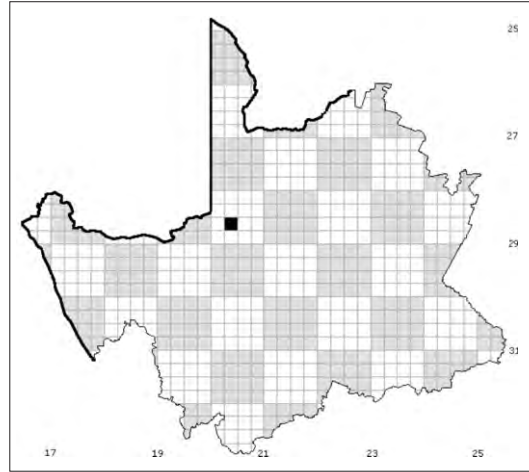
Previous records

- 1980+: Dankbaar.
- Pleistocene: Wonderwerk.

New records: Doornkloof Nature Reserve.

Comments: these records constitute a major extension to the actual and potential range of this species and provide additional evidence of greater habitat tolerance than was once suspected (Monadjem *et al.* 2010).

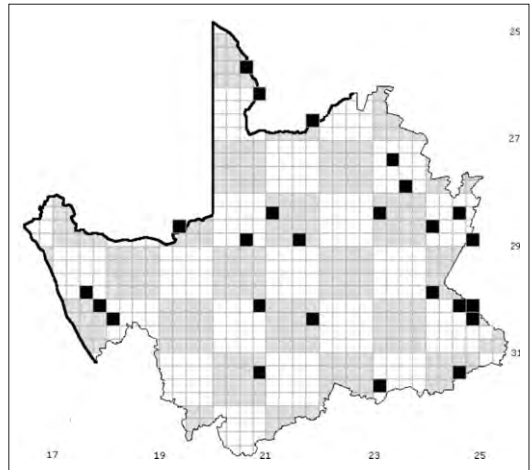
Pipistrellus ruepellii (J. Fischer, 1829),
Rüppell's pipistrelle



Previous records

- 1930–1979: Augrabies Falls National Park.

Neoromicia capensis (A. Smith, 1829),
Cape serotine



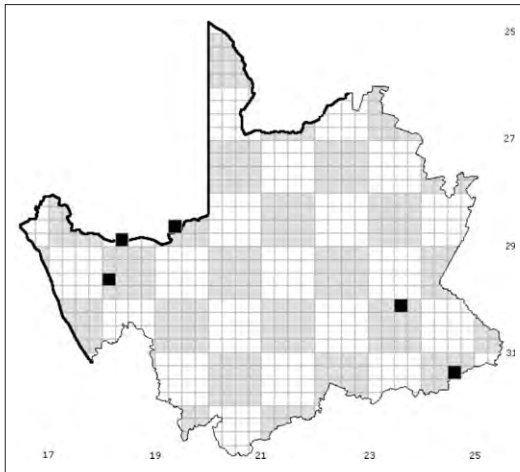
Previous records

- pre-1930: Kuruman, Louisvale.
- 1930–1979: Eselfontein, Kaspersdraai, Louisvale, Rolfontein Nature Reserve.
- 1980+: Barkly West, Brandvlei, Die Oog Kuruman, Hester Malan Nature Reserve, Moffat Mission, PK le Roux Dam, Rolfontein Nature Reserve, Steyerskraal, Three Sisters.
- Holocene: Blinkklipkop, Limerock, Wonderwerk.
- Pleistocene: Wonderwerk.

New records: Benfontein Game Reserve, De Cruis, Doornkloof Nature Reserve, Driekoppen, Holpan, Kransbrak, Kleinbegin Station, Laaikrale, Lovers Leap, Skilpad Wildflower Reserve, Swartpad.

Comments: this taxon is now considered to include *N. melckorum* (Roberts, 1919), which was recognized by Simmons (2005) as a separate species, although with some doubt as to whether the southern African material is distinguishable from *N. capensis* (Monadjem *et al.* 2010). Accordingly, material from the Hester Malan Nature Reserve and Three Sisters, which Herselman & Norton (1985) assigned to *N. melckorum*, have here has been included in *N. capensis*.

Cistugo seabrae Thomas, 1912,
Angolan wing-gland bat



Previous records

- 1930–1979: Goodhouse.
- 1980+: Goegab, Goodhouse, Mazelsfontein, Steyerkraal.

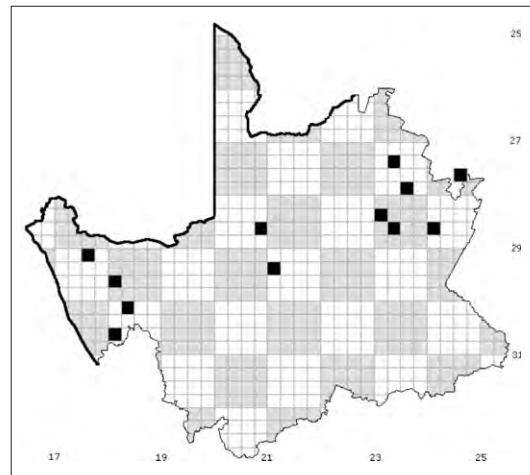
New records: Driekoppen.

Comments: according to Monadjem *et al.* (2010), although the taxonomic relationship between *C. seabrae* and *C. lesueuri* Roberts, 1919 has not been fully resolved, the former species is restricted to the arid western parts of southern Africa whereas the latter appears to be associated with high altitude montane grasslands. For this reason it seems most likely that the material from Mazelsfontein, which Herselman & Norton (1985) assigned to *C. lesueuri*, belongs with *C. seabrae*. Both Mazelsfontein and Driekoppen fall near the eastern extent of the potential range as shown by Monadjem *et al.* (2010).

Miniopterus natalensis (A. Smith, 1833),
Natal long-fingered bat

Previous records

- pre-1930: Klipfontein, Kuruman.
- 1980+: Die Oog Kuruman, Goegab, Koegelbeen Cave, Moffat Mission, Norlim Mine Taung, Orrelgat, Roodebergskloof.
- Holocene: Blinkklipkop, Limerock, Zoovoorbij.
- Pleistocene: Wonderwerk.



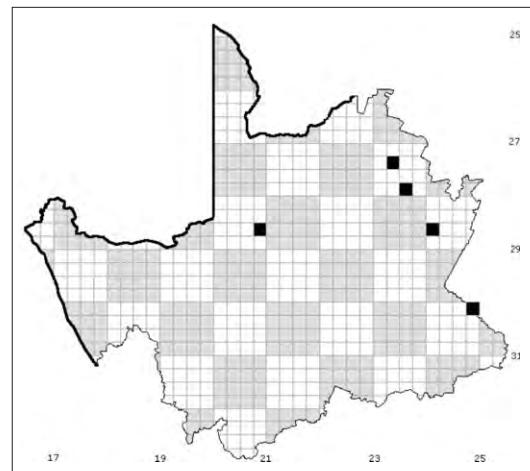
New records: Kenhardt Railway Bridge.

Comments: *M. natalensis* was previously considered to be a subspecies of *M. schreibersii* (Simmons 2005), and all published material was assigned to the latter species. More recently, however, *M. natalensis* has been shown to be a separate species (Miller-Butterworth *et al.* 2005) and is accepted as such by Monadjem *et al.* (2010). Although *M. natalensis* is actually or potentially distributed over much of southern Africa there is a gap in the more arid interior of South Africa. It is therefore of some interest to note that the Kenhardt Railway Bridge material and the archaeological sample from Zoovoorbij fall within this gap. It may be that these sites are on migration routes between summer maternity roosts and winter hibernacula (Monadjem *et al.* 2011) so it would be worth collecting more pellets from Kenhardt at different times of the year.

Order **RODENTIA**
Family **GLIRIDAE**

Graphiurus microtis (Noack, 1887),
large savanna African dormouse

Synonym: *G. griselda* Schwann, 1906.

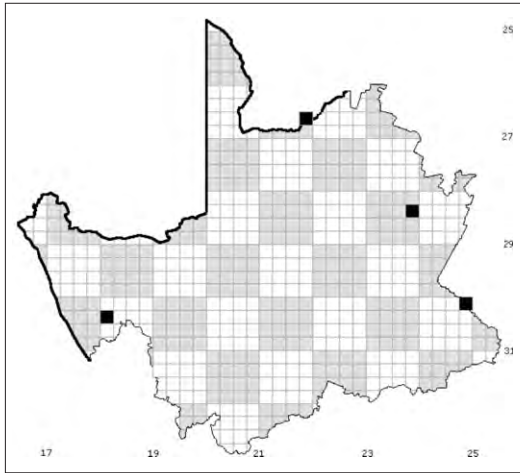


Previous records

- pre-1930: Kuruman.
- 1930–1979: Rolfontein Nature Reserve.
- Holocene: Limerock, Wonderwerk, Zoovoorbij.

Comments: the archaeological specimens and material from Rolfontein Nature Reserve (Jooste 1977; Stuart *et al.* 1978) were originally assigned to *G. murinus* at a time when the two species were not recognized as distinct, and the Kuruman material was assigned to *G. griselda*. The latter is now recognized as a synonym of *G. microtis* by Holden (2005), who considers populations of *G. murinus* to be restricted to forest habitats.

Graphiurus ocularis (A. Smith, 1829),
spectacled African dormouse



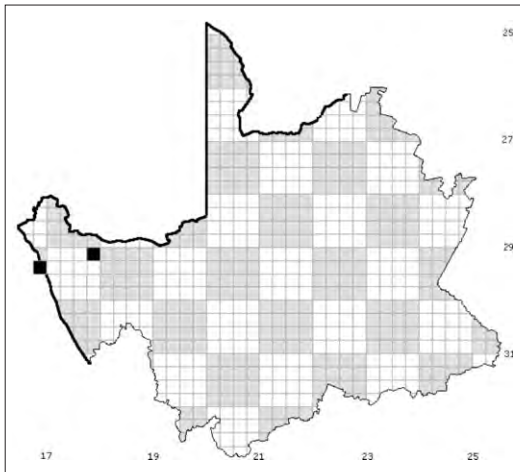
Previous records

- 1930–1979: Eselfontein, Rolfontein Nature Reserve, Witwater.
- Holocene: Dikbosch 1.

New records: Lovers Leap.

Graphiurus rupicola (Thomas & Hinton, 1925),
rupicolous African dormouse

Synonym: *Gliriscus rupicola australis* Shortridge & Carter, 1938.



Previous records

- 1930–1979: Eenriet, Port Nolloth.

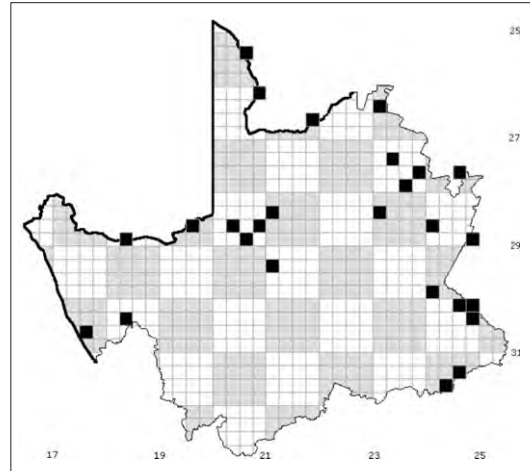
Comment: for about 25 years this species was considered to be a subspecies of *G. playtops* (Ellerman *et al.* 1953;

Genest-Villard 1978) but Holden (2005) has reverted to the original view of Thomas & Hinton (1925) that it represents a separate species.

Family **NESOMYIDAE**

Saccostomus campestris Peters, 1846,
southern African pouched mouse

Synonym: *S. hildae* Schwann, 1906.

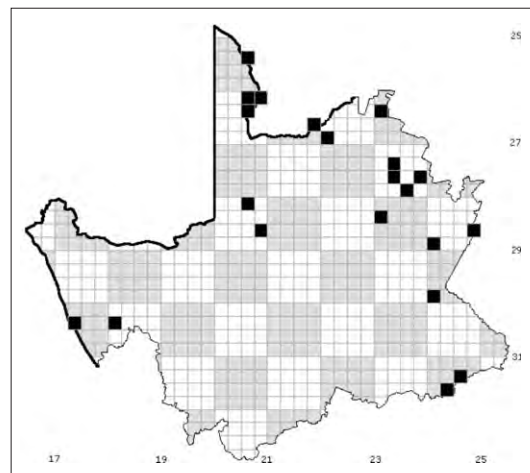


Previous records

- pre-1930: Kuruman, Louisvale.
- 1930–1979: Augrabies Falls National Park, Goodhouse, Kameelboom, Kingston Farm, Louisvale, Nossob Camp, Platbakkies, Rolfontein Nature Reserve, Stolzenfels.
- 1980+: Grootfontein, Heuningsvlei.
- Holocene: Blinkklipkop, Limerock, Powerhouse, Wonderwerk.
- Pleistocene: Wonderwerk, Zoovoorbij.

New records: Benfontein Game Reserve, Doornkloof Nature Reserve, Doornkuilen, Driekoppen, Holpan, Kenhardt Railway Bridge, Kransbrak, Lovers Leap, Swartpad, Vergelegen 132.

Dendromus melanotis (A. Smith, 1834),
grey African climbing mouse



Synonym: *Poemys melanotis insignis* Shortridge & Carter, 1938.

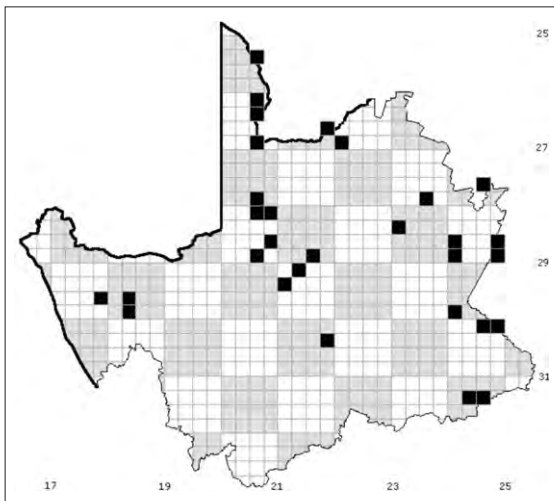
Previous records

- 1930–1979: Aucterlonie, Eselfontein, Nossob Camp, Twee Rivieren Camp.
- 1980+: Grootfontein, Heuningsvlei, Marrick, Moffat Mission, Swartmodder, Woodstock Farm.
- Holocene: Blinkklipkop, Spoegrivier, Wonderwerk, Zoovoorbij.
- Pleistocene: Wonderwerk.

New records: Driekoppen, Dronfield Game Reserve, Holpan, Kransbrak, Lovers Leap, Vanzylsrus, Vergelegen 132.

Comments: the records from south of about 29°S and east of about 20°E represent an extension of the range of this species shown by Skinner and Chimimba (2005), indicating that the gap in distribution is not as large as it appears. A record of *D. mystacalis* from the Kalahari Gemsbok National Park (De Graaff 1974) lies well outside the known range of the species (Skinner & Chimimba 2005) and is very likely a mistake. For this reason, the presence of this species in the Northern Cape Province is discounted until confirmation is forthcoming.

Malacothrix typica (A. Smith, 1834),
large-eared African desert mouse

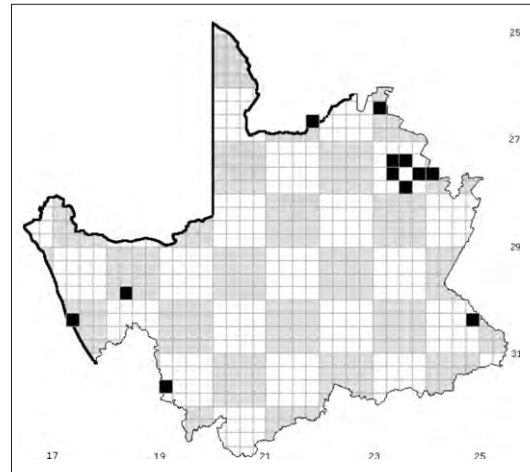


Previous records

- 1930–1979: Ky Ky, Kingston Farm, Kwang Pan, Marrick, Nossob Camp, Samevloeiing, Springbok.
- 1980+: Rolfontein Nature Reserve, Marrick, Swartmodder.
- Holocene: Abbots, Blinkklipkop, Limerock, Powerhouse, Wonderwerk, Zoovoorbij.
- Pleistocene: Wonderwerk.

New records: Benfontein Game Reserve, Deekrand, Doornkuilen, Driekoppen, Dronfield Game Reserve, Gelukspruit, Holpan, Kaitob Berg, Kangnas Farm, Kenhardt Railway Bridge, Klein Witpan, Kleinbegin Station, Kleinbegin-Kenhardt road, Laaikrale, Lovers Leap, Swartpad, Vanzylsrus, Weltevrede.

Steatomys krebsii Peters, 1852,
Krebs's African fat mouse



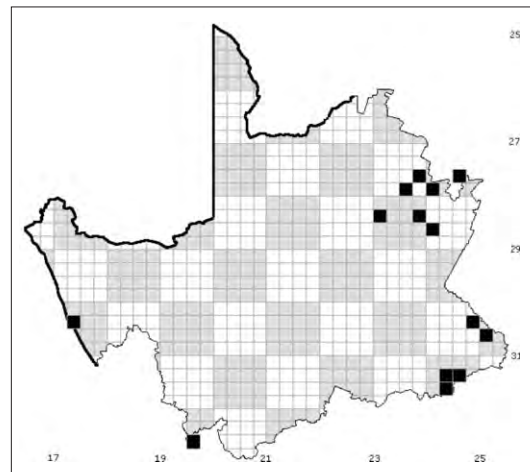
Previous records

- 1980+: Grootfontein Farm, Grootfontein, Heuningsvlei, Moffat Mission, Woodstock Farm.
- Holocene: Spoegrivier, Wonderwerk.
- Pleistocene: Wonderwerk.

New records: Doornkloof Nature Reserve, Kaitob Berg, Lokenburg Farm, Lovers Leap.

Comments: the published pellet specimens were originally assigned to *S. pratensis* (Macdonald & Dean 1984), this being the only species recognized in South Africa at the time. Now, however, it is most likely that this material should be assigned to *S. krebsii* since *S. pratensis*, as understood today, is confined to the northwest of South Africa (Skinner & Chimimba 2005).

Mystromys albicaudatus (A. Smith, 1834),
African white-tailed rat



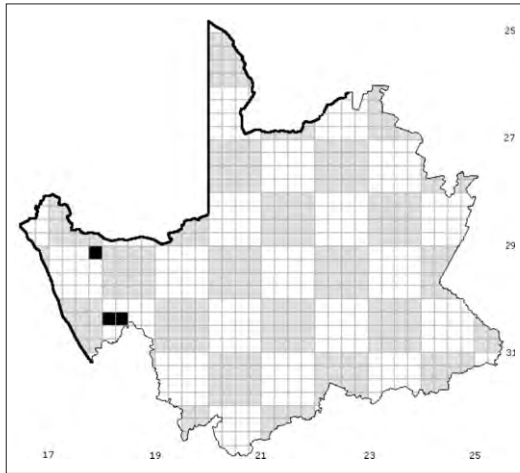
Previous records

- 1930–1979: Colesburg.
- 1980+: Grootfontein.
- Holocene: Abbots, Aspoort, Blinkklipkop, Dikbosch 1, Equus, Klein Witkrans, Limerock, Powerhouse, Spoegrivier, Wonderwerk.
- Pleistocene: Equus, Wonderwerk.

New records: Doornkloof Nature Reserve, Driekoppen, Vergelegen 132.

Comments: the main, eastern, area of distribution of this species has been shown as extending to about 25°E (Skinner & Chimimba 2005) so that most, if not all, the current records comprise a westwards extension to the existing record.

Petromyscus barbouri Shortridge & Carter, 1938,
Barbour's pygmy mouse



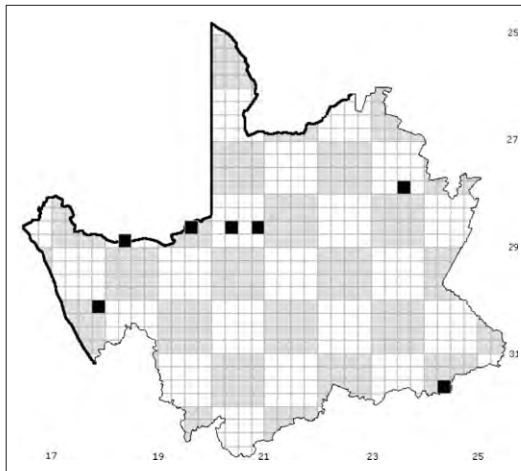
Previous records

- Type locality: Witwater.
- 1930–1979: Eenriet, Eselfontein, Platbakkies.

Comments: there are no recent records of this species.

Petromyscus collinus (Thomas & Hinton, 1925),
pygmy rock mouse

Synonym: *P. collinus capensis* Shortridge & Carter, 1938.



Previous records

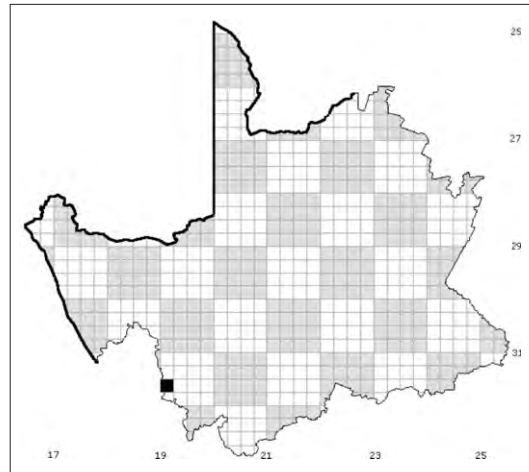
- 1930–1979: Augrabies Falls National Park, Goodhouse, Stolzenfels.
- Holocene: Zoovoorbij.
- Pleistocene: Wonderwerk.

New records: Skilpad Wildflower Reserve, Vergelegen 132.

Comments: the archaeological record from Wonderwerk suggests this taxon may once have been more widely distributed than it is today.

Family **MURIDAE**

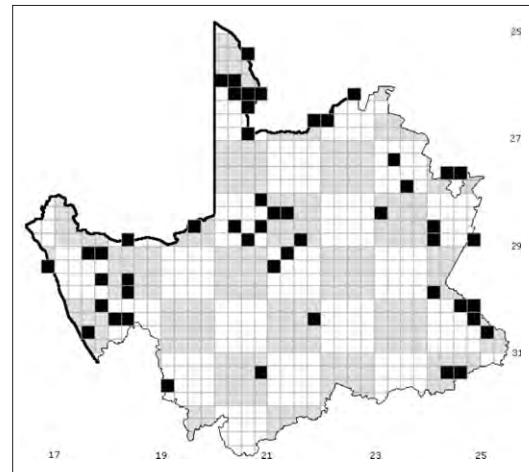
Acomys subspinosus (Waterhouse, 1838),
Cape spiny mouse



New records: Lokenburg Farm.

Comments: this is a new, albeit marginal, record for the Northern Cape Province.

Desmodillus auricularis (A. Smith, 1834),
Cape short-tailed gerbil



Previous records

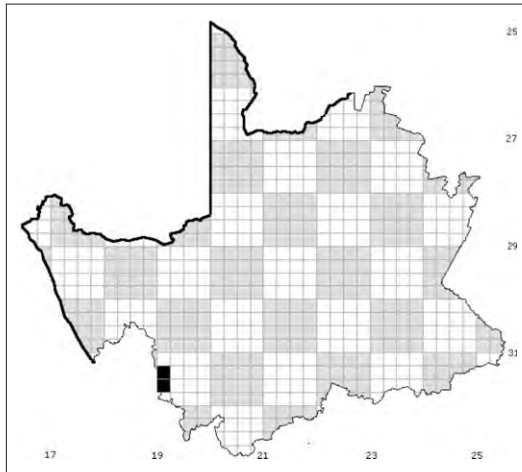
- Type locality: Kamiesberg.
- pre-1930: Anenous, Augrabies Falls, Kuruman, Molopo.
- 1930–1979: Aucterlonie, Augrabies Falls, Augrabies Falls W, Batulama, Bushmanputs, Colesburg, Craiglockhart, Eenriet, Goodhouse, Hester Malan Nature Reserve, Kameelboom, Kamfersboom, Keimoes Island, Kingston Farm, Kransbrak, Ky Ky, Louisvale, Marrick, Mata Mata Camp, Monro, Nossob Camp, Platbakkies, Port Nolloth, Rolfontein Nature Reserve, Rooddam, Samevloeiing, Springbok, Stolzenfels, Twee

Rivieren Camp, Upington, Upington E, Witwater.

- Holocene: Abbots, Blinkklipkop, Klein Witkrans, Limerock, Powerhouse, Wonderwerk, Zoovorbij.
- Pleistocene: Wonderwerk.

New records: Auchterlonie, Benfontein Game Reserve, De Cruis, Deekrand, Doornkloof Nature Reserve, Doornkuilen, Driekoppen, Gelukspruit, Holpan, Kangnas Farm, Kaitob Berg, Kenhardt Railway Bridge, Kleinbegin Station, Kleinbegin-Kenhardt Road, Kransbrak, Laaikrale, Lokenburg Farm, Lovers Leap, Skilpad Wildflower Reserve, Spitzkop Nature Reserve, Swartpad, Twee Rivieren A, B and C, Weltevrede.

Gerbilliscus afra (Gray, 1830),
Cape gerbil



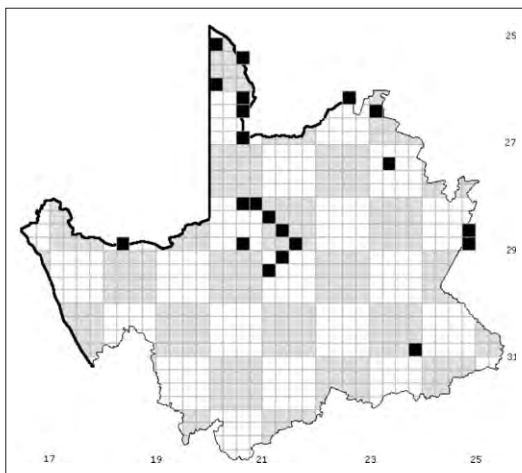
Previous records

- 1930–1979: Nieuwoudtville.

New records: Lokenburg Farm.

Comments: large southern African gerbils were previously referred to the genus *Tatera* but the latter name is now restricted to India (Musser & Carleton 2005).

Gerbilliscus brantsii (A. Smith, 1836),
highveld gerbil



Synonyms: *Tatera miliaria* Wroughton, 1906; *Tatera lobengulae griquae* Wroughton, 1906; *Tatera brantsii namaquensis* Shortridge & Carter, 1938.

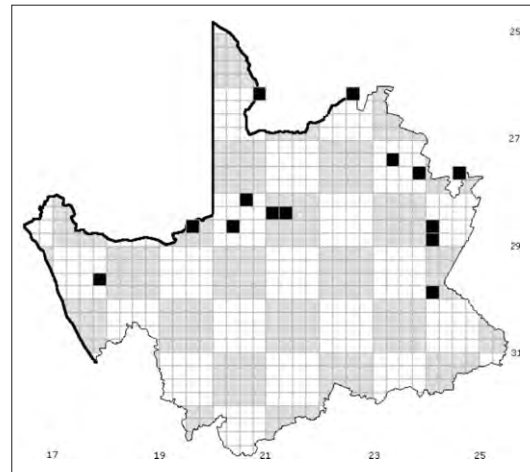
Previous records

- pre-1930: Deelfontein, Kuruman, Molopo.
- 1930–1979: Auchterlonie, Dankbaar, Goodhouse, Kamfersboom, Ky Ky, Louisvale, Mata Mata Camp, Nossob Camp, Swartkop, Twee Rivieren Camp.
- 1980+: Heuningsvlei, Moffat Mission, Swartmodder.

New records: Auchterlonie, Benfontein Game Reserve, Deekrand, Dronfield Game Reserve, Gelukspruit, Kenhardt Railway Bridge, Kleinbegin Station, Kleinbegin-Kenhardt road, Swartpad, Twee Rivieren A, B and C, Weltevrede.

Gerbilliscus leucogaster (Peters, 1852),
bushveld gerbil

Synonym: *Tatera miliaria stellae* Wroughton, 1906.



Previous records

- pre-1930: Kuruman, Louisvale, Molopo.
- 1930–1979: Augrabies Falls W, Augrabies Falls National Park, Hester Malan Nature Reserve, Stolzenfels, Upington E.
- 1980+: Grootfontein, Kingston Farm, Marrick, Swartmodder, Vaalharts.

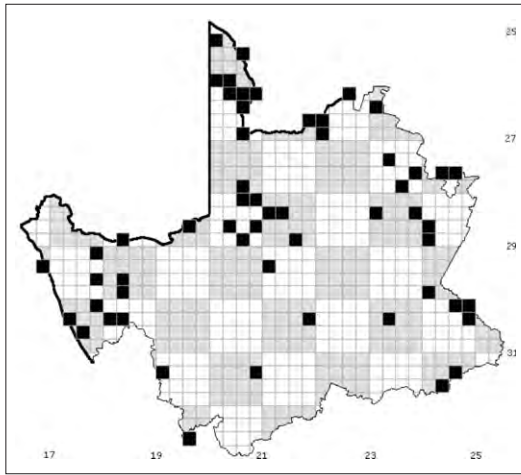
New records: Holpan, Kransbrak, Spitzkop Nature Reserve.

Gerbillurus paeba (A. Smith, 1836),
paeba hairy-footed gerbil

Synonyms: *Gerbillus tenuis* A. Smith, 1842; *Gerbillus paeba broomi* Thomas, 1918; *Gerbillus calidus* Thomas, 1918.

Previous records

- Pre-1930: Latakoo N, Molopo R. W of Morokwen, Port Nolloth.
- 1930–1979: Auchterlonie, Augrabies Falls National Park, Batulama, Bushmanputs, Craiglockhart, Dankbaar, Eenriet, Goodhouse, Hester Malan Nature Reserve, Kameelboom, Kamfersboom. Kingston Farm, Kransbrak, Ky Ky, Marrick, Mata Mata Camp, Monro, Nieuwoudtville, Nossob Camp, Platbakkies, Port Nolloth, Rolfontein Nature Reserve, Rooidam,

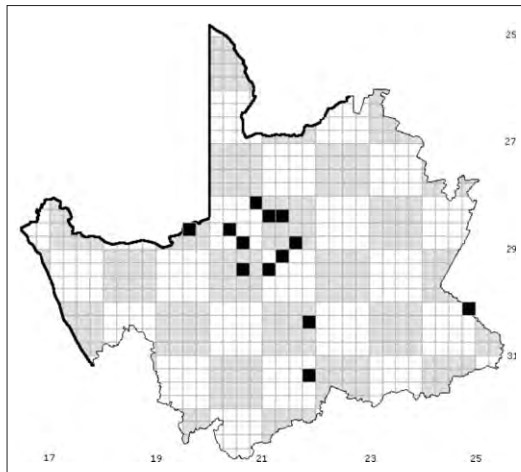


Samevloeïing, Stolzenfels, Twee Rivieren Camp, Upington, Upington E, Witwater.

- 1980+: Grootfontein, Heuningsvlei, Marrick, Moffat Mission, Namaqua National Park, Swartmodder.
- Holocene: Aspoort, Blinkklipkop, Dikbosch 1, Klein Witkrans, Powerhouse, Spoegrivier, Wonderwerk, Zoovoorbij.
- Pleistocene: Wonderwerk.

New records: Aachterlonie, De Cruis, Deekrand, Doornkloof Nature Reserve, Doornkuilen, Driekoppen, Gelukspruit, Holpan, Kangnas Farm, Kaitob Berg, Kransbrak, Kenhardt Railway Bridge, Klein Witpan, Kleinbegin Station, Laaikrale, Lovers Leap, Ongers River Bridge, Skilpad Wildflower Reserve, Spitzkop Nature Reserve, Swartpad, Twee Rivieren A, B and C, Vergelegen 132, Weltevrede.

Gerbillurus vullinus (Thomas, 1918),
brush-tailed hairy-footed gerbil



Previous records

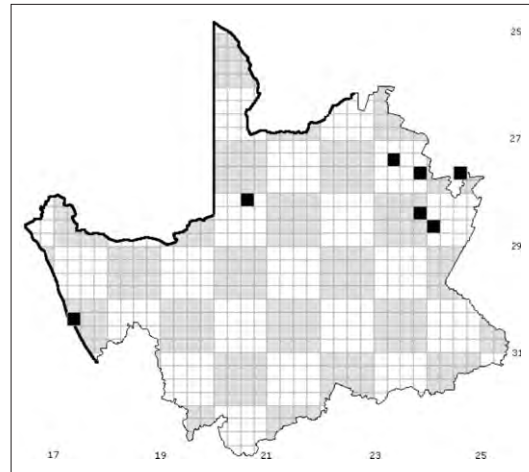
- Type locality: Tuin Kenhardt.
- 1930–1979: Augrabies Falls National Park, Augrabies Falls W, Rolfontein Nature Reserve, Rooidam, Stolzenfels, Upington E.

New records: De Cruis, Gelukspruit, Kenhardt Railway

Bridge, Kleinbegin Station, Kleinbegin-Kenhardt road, Laaikrale, Spitzkop Nature Reserve, Swartpad.

Comments: the outliers to the south and east indicate a wider range than that shown in Skinner and Chimimba (2005).

Aethomys ineptus (Thomas & Wroughton, 1908),
veld aethomys



Previous records

- 1980+: Grootfontein, Swartmodder, Vleiplaas Farm.
- Holocene: Dikbosch 1, Equus, Limerock, Powerhouse, Spoegrivier.

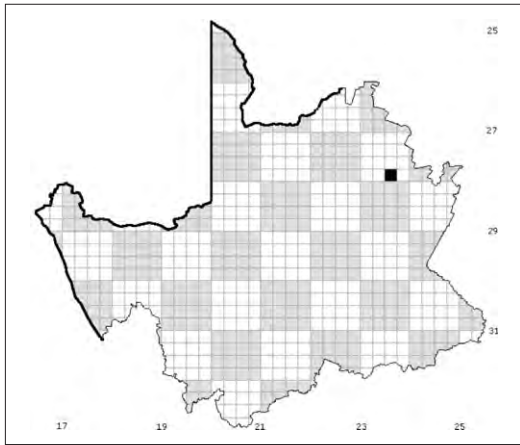
Comments: records of *Aethomys* from the Northern Cape Province were published as *A. chrysophilus* before *A. ineptus* was recognized as a separate species (Chimimba *et al.* 1999). A subsequent study (Linzey *et al.* 2003) to determine the distribution of the two species based on firmly identified specimens found only one specimen from either species, an *A. ineptus*, from the Northern Cape Province (Vleiplaas Farm near Kuruman). It appears, however, that the range of *A. ineptus* may extend further south than that of *A. chrysophilus* (Linzey *et al.* 2003) and that it is the exclusive occupant of the high elevation interior of South Africa (Chimimba & Linzey 2008). The eastern Holocene samples may represent a slightly extended range in the past. The material from Swartmodder and Spoegrivier represents evidence of a much wider distribution than that of today (Chimimba *et al.* 1999; Linzey *et al.* 2003).

Dasymys incomtus sensu lato Peters, 1875,
common dasymys

Previous records

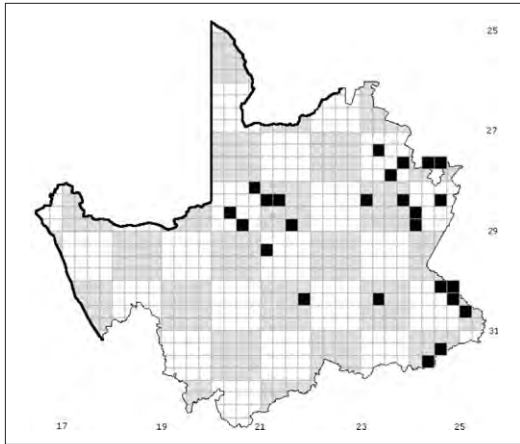
- Pleistocene: Wonderwerk.

Comments: only one species of *Dasymys* is recognized in South Africa by Wilson & Reeder (2005) but it has recently been proposed that there are, in fact, three (Mullin *et al.* 2005). Two disjunct populations in the Western Cape are referred to *D. capensis*, *D. incomtus sensu stricto* is restricted to KwaZulu-Natal, and *D. robertsii* is found in the extreme north of the country as well as marginally in Botswana. The material from Wonderwerk was referred to *D. incomtus sensu lato* and it remains to be seen to which species it



should now be referred. Although this Pleistocene record is far from any current known localities, it is of some interest to note that Wonderwerk effectively lies on the proposed dispersion route from the earliest *Dasymys* at Makapansgat, north of Pretoria, to the southern populations now ascribed to *D. capensis* (Mullin *et al.* 2005). Moreover, the habitat of this genus is discontinuous, being marshes and other wet ground, (Skinner & Chimimba 2005) so variations in past climate will have played a critical role in its distribution, as Mullin *et al.* (2005) themselves acknowledged.

Mastomys coucha (A. Smith, 1834),
southern African mastomys



Previous records

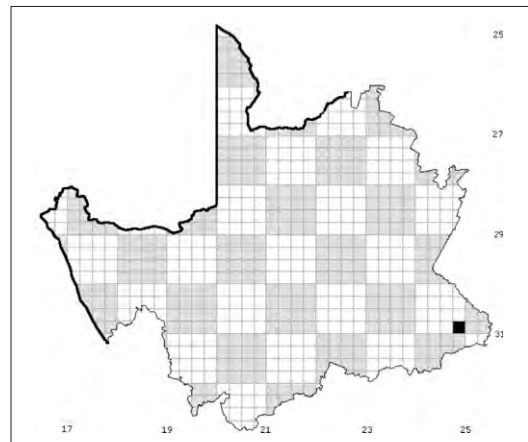
- Type locality: Kuruman (fixed by Roberts 1951).
- pre-1930: Louisvale.
- 1930–1979: Augrabies Falls National Park, Augrabies Falls W, Colesburg, Kingston Farm, Marrick, Rolfontein Nature Reserve, Rooidam, Upington.
- 1980+: Grootfontein, Marrick, Vaalharts.
- Pleistocene: Wonderwerk.
- Holocene: Blinkklipkop, Dikbosch 1, Equus, Klein Witkrans, Limerock, Powerhouse.

New records: Driekoppen, Doornkloof Nature Reserve, Doornkuilen, Gelukspruit, Kenhardt Railway Bridge, Kleinbegin Station, Laaikrale, Ongers River Bridge, Spitzkop Nature Reserve, Swartpad, Vergelegen 132.

Comments: material listed here as *M. coucha* includes specimens published as *M. natalensis* at a time when the former

was not recognized as a species. Subsequently, the two species have been separated on karyotypic grounds (Venturi *et al.* 2004) but, while three West African species of *Mastomys* have been differentiated on the basis of cranial and dental criteria (Granjon *et al.* 1997), this has not yet been done for the two southern African taxa. Therefore there is currently no reliable means of separating the two species on cranial remains because it is not certain that osteological criteria can be transferred from one geographical region to another. However, *M. natalensis* appears to be restricted to the lower altitude wetter eastern part of South Africa (Venturi *et al.* 2004) and it is probable that all the Northern Cape records, which represent a westwards extension of the known range of the genus, would today be assigned to *M. coucha*.

Micaelamys granti (Wroughton, 1908),
Grant's micaelomys

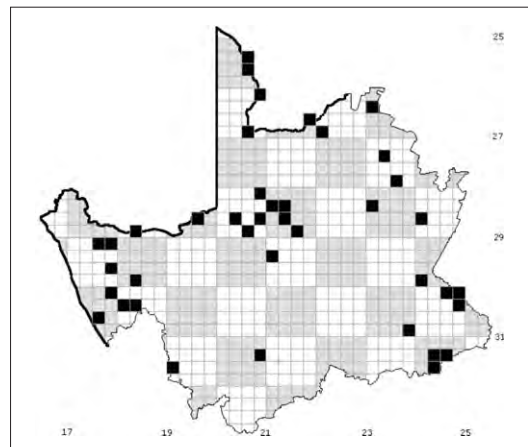


Previous records

- Type locality: Deelfontein.

Micaelamys namaquensis (A. Smith, 1834),
Namaqua rock rat

Synonyms: *Mus auricomis centralis* Schwann, 1906; *Mus lehocla* A. Smith, 1836.



Previous records

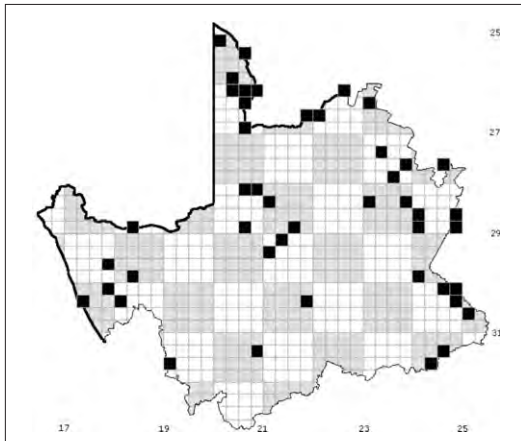
- pre-1930: Augrabies Falls, Deelfontein, Klipfontein, Kuruman, Louisvale.

- 1930–1979: Augrabies Falls National Park, Augrabies Falls W, Eenriet, Eselfontein, Goodhouse, Hester Malan Nature Reserve, Kameelboom, Kaspersdraai, Kingston Farm, Keimoes Island, Nossob Camp, Rolfontein Nature Reserve, Rooidam, Platbakkies, Stolzenfels, Swartkop, Upington E, Witwater.
- 1980+: Heuningsvlei.
- Holocene: Abbots, Blinkklipkop, Wonderwerk, Zoovoorbij.
- Pleistocene: Wonderwerk.

New records: De Cruis, Deekrand, Doornkloof Nature Reserve, Doornkuilen, Driekoppen, Gelukspruit, Holpan, Kaitob Berg, Kenhardt Railway Bridge, Kleinbegin Station, Kransbrak, Lokenburg Farm, Lovers Leap, Skilpad Wildflower Reserve, Swartpad, Vanzylsrus, Vergelegen 132.

Mus indutus (Thomas, 1910),
desert African pygmy mouse

Mus minutoides A. Smith, 1834,
southern African pygmy mouse



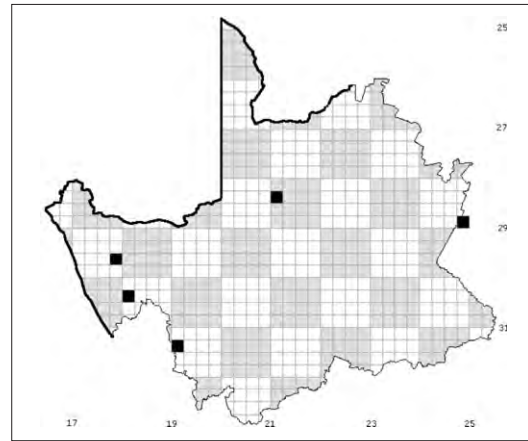
Previous records

- Type locality: *M. indutus* Molopo R, W of Morokwen.
- 1930–1979: Aucterlonie, Batulama, Bushmanputs, Colesburg, Craiglockhart, Dankbaar, Eselfontein, Goodhouse, Hester Malan Nature Reserve, Kamfersboom, Kingston Farm, Kransbrak, Ky Ky, Monro, Nossob Camp, Rolfontein Nature Reserve, Samevloeing, Springbok, Twee Rivieren Camp.
- 1980+: Grootfontein, Heuningsvlei, Marrick, Moffat Mission, Namaqua National Park, Swartmodder, Vaalharts.
- Holocene: Blinkklipkop, Dikbosch 1, Powerhouse, Spoegrivier, Wonderwerk.
- Pleistocene: Wonderwerk.

New records: Aucterlonie, Benfontein Game Reserve, De Cruis, Deekrand, Doornkloof Nature Reserve, Doornkuilen, Driekoppen, Dronfield Game Reserve, Gelukspruit, Holpan, Kaitob Berg, Kenhardt Railway Bridge, Kleinbegin Station, Kleinbegin-Kenhardt road, Klein Witpan, Kransbrak, Laaikrale, Lokenburg Farm, Lovers Leap, Skilpad Wildflower Reserve, Spitzkop Nature Reserve, Swartpad, Twee Rivieren A, B and C, Vergelegen 132, Weltevrede.

Comments: *M. indutus* in the Northern Cape Province is thought to be restricted to the extreme northern part whereas *M. minutoides* occurs in the southern half of the province (Skinner & Chimimba 2005). Although the generalized distribution maps of the two species are largely complementary, there is an area in the northeastern part of the province where neither is shown (Skinner & Chimimba 2005). The present records indicate, however, that either or both species do occur in part, at least, of this area. It should also be noted that, in recording *Leggada m. minutoides* from Goodhouse on the Orange River, Shortridge (1942) commented that this was a new record for Little Namaqualand. Moreover, it is not impossible that some of the material from along the Northern Cape–Free State border should be assigned to *M. orangiae*, which, although currently known only from the Free State, is considered a good species pending resolution of relationships within the genus (Musser & Carleton 2005). If so, this would constitute a westwards extension of *M. orangiae*.

Mus musculus Linnaeus, 1758,
house mouse

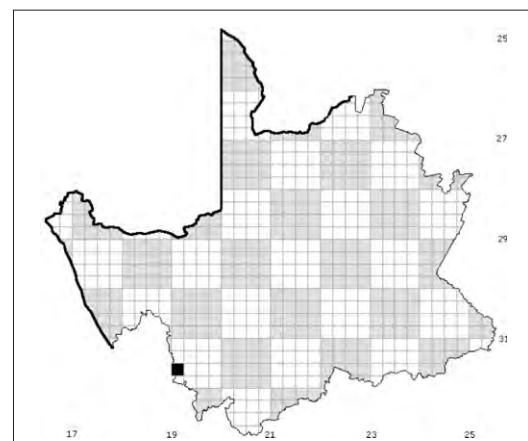


Previous records

- 1930–1979: Eselfontein, Hester Malan Nature Reserve, Louisvale, Nieuwoudtville, Witwater.

New records: Benfontein Game Reserve.

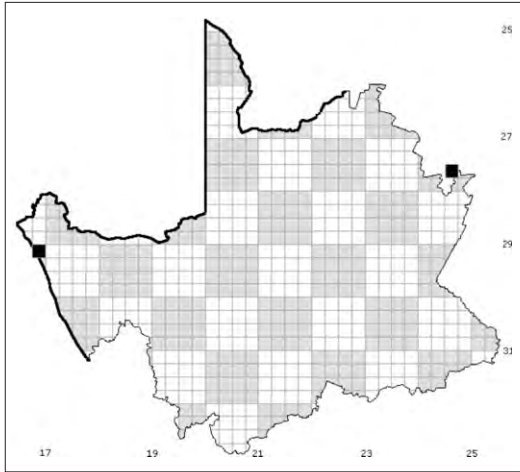
Myomyscus verreauxii (A. Smith, 1834),
Verreaux's white-footed rat



New records: Lokenburg Farm.

Comments: *M. verreauxii* is almost entirely restricted to the Western Cape Province (Skinner & Chimimba 2005) and no more than this marginal encroachment into the Northern Cape Province is expected.

Rattus rattus (Linnaeus, 1758),
roof rat



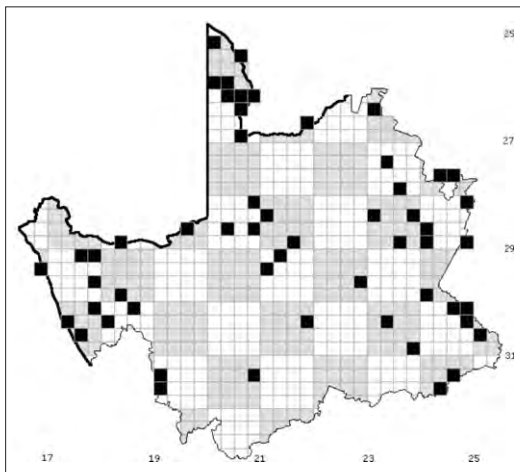
Previous records

- 1930–1979: Port Nolloth.
- 1980+: Vaalharts.

Rhabdomys dilectus (De Winton, 1897),
mesic four-striped mouse

Rhabdomys pumilio (Sparman, 1784), xeric four-striped
grass rat

Synonym: *R. dilectus*: *R. pumilio griquoides* Roberts, 1946.
R. pumilio: *Arvicanthis pumilio cinereus* Thomas & Schwann, 1904; *A. p. griquae* Wroughton, 1905; *A. p. intermedius* Wroughton, 1905; *R. p. orangiae* Roberts, 1946; *R. p. prieskae* Roberts, 1946.



Previous records

- pre-1930: Deelfontein, Garies, Klipfontein, Kuruman, Louisvale, Port Nolloth.
- 1930–1979: Aughterlonie, Augrabies Falls National Park, Augrabies Falls W, Batulama, Campbell,

Colesburg, Craiglockhart, Dankbaar, Eenriet, Eselfontein, Fourteen Streams, Goodhouse, Hester Malan Nature Reserve, Kameelboom, Kingston Farm, Kransbrak, Ky Ky, Mata Mata Camp, Monro, Nieuwoudtville, Nossob Camp, Prieska, Rooddam, Rolfontein Nature Reserve, Samevloeing, Springbok, Stolzenfels, Twee Rivieren Camp, Witwater.

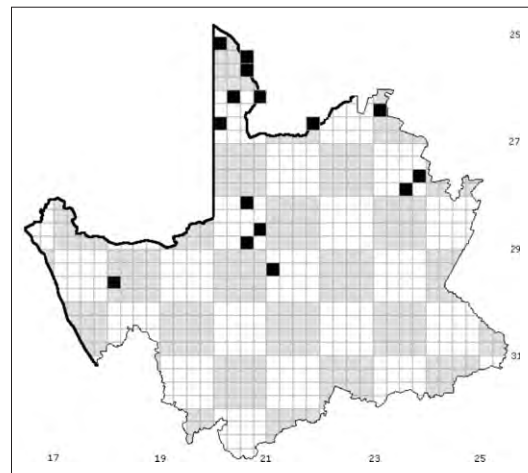
- 1980+: Heuningsvlei, Marrick, Vaalharts.
- Holocene: Blinkklipkop, Dikbosch 1, Equus, Klein Witkrans Limerock, Powerhouse, Spoegrivier, Wonderwerk, Zoovoorbij.
- Pleistocene: Wonderwerk.

New records: Aughterlonie, Benfontein Game Reserve, De Cruis, Deekrand, Doornkloof Nature Reserve, Doornkuilen, Driekoppen, Gelukspruit, Holpan, Kaitob Berg, Kenhardt Railway Bridge, Kleinbegin Station, Kleinbegin-Kenhardt Road, Kransbrak, Laaikrale, Lokenburg Farm, Lovers Leap, Ongers River Bridge, Skilpad Wildflower Reserve, Twee Rivieren C, Vergelegen 132.

Comments: *R. dilectus* is a mesic form recognized by Musser and Carleton (2005) but not Skinner and Chimimba (2005) and only recorded in South Africa from the eastern part of the country (Musser & Carleton 2005, quoting Rambau *et al.* 2003). However, *R. p. griquoides* has been referred to *R. dilectus* (Musser & Carleton 2005) and Fourteen Streams is the type site of this taxon, which would suggest a more westerly occurrence of the species than that, and a marginal incursion into the Northern Cape Province. More analysis would seem to be warranted to determine the truth of the situation.

Thallomys nigricauda (Thomas, 1882),
black-tailed thallomys

Synonym: *Thallomys nigricauda davisi* Lundholm, 1955.



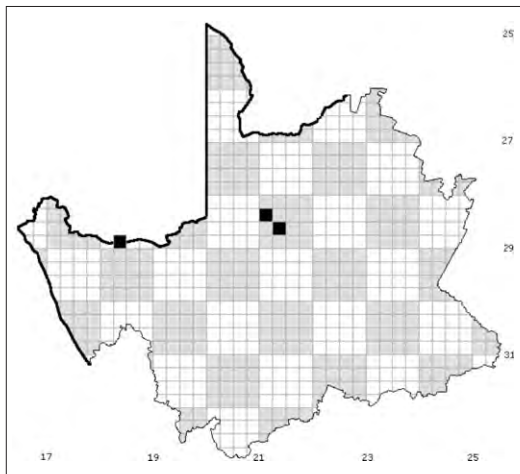
Previous records

- 1930–1979: Batulama, Dankbaar, Kaspersdraai, Kwang Pan, Nossob Camp, Rietfontein.
- 1980+: Goegab, Grootfontein, Heuningsvlei, Swartmodder.
- Holocene: Wonderwerk, Zoovoorbij.

New records: Kenhardt Railway Bridge, Kransbrak, Lovers Leap, Swartpad.

Comments: at times *T. nigricauda* was not recognized as distinct from *T. paedulcus* so some of the material now included above was published under the latter name. More recently, however, *T. nigricauda* is considered the Northern Cape form (Taylor *et al.* 2008), whereas *T. paedulcus* only reaches as far south as northern South Africa (Taylor & Boitani 2008); *Thallomys paedulcus*, on the other hand, is probably restricted to the more mesic zones to the north and east (Musser & Carleton 2005; Taylor *et al.* 2008) although Taylor *et al.* (1995) have suggested that the distribution of the two species may not be as clear-cut as it would appear (see also Musser & Carleton 2005 and Skinner & Chimimba 2005). Material from Nossob and Twee Rivieren Camp, identified by Rautenbach & Nel (1975) as *T. shortridgei*, should almost certainly be assigned to *T. nigricauda* according to current usage. The new record from Kenhardt appears to represent an extension of the existing records.

Thallomys shortridgei Thomas & Hinton, 1923,
Shortridge's thallomys



Previous records

- Type locality: Louisvale.
- 1930–1979: Goodhouse, Louisvale, Swartkop.

Comments: this species, which is accepted by Musser & Carleton (2005) but whose status is considered not fully resolved by Boitani & Taylor (2008), is said to be restricted to the south bank of the Orange River between about Upington and Goodhouse. It therefore seems likely that the post-1970 specimens from the Kgalagadi Transfrontier Park should now be referred to *T. nigricauda*.

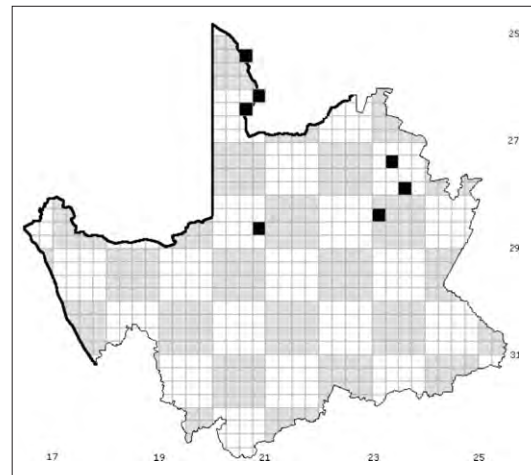
Zelotomys woosnami (Schwann, 1906),
Woosnam's zelotomys

Previous records

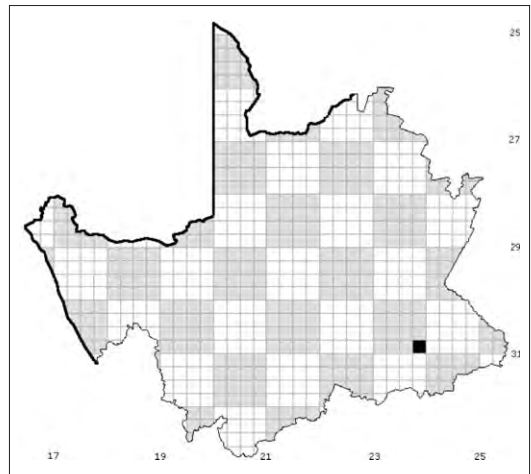
- Type locality: Kuruman.
- pre-1930: Nossob Camp, Twee Rivieren Camp.
- Holocene: Blinkklipkop, Wonderwerk, Zoovoorbij.
- Pleistocene: Wonderwerk.

New records: Kransbrak, Twee Rivierenn C.

Comments: the material from Zoovoorbij indicates that this species previously had a wider range than appears to be the current case.



Myotomys sloggetti (Thomas, 1902),
rock karoo rat



Previous records

- Type locality: Deelfontein.

Comments: the record from the Hester Malan Nature Reserve (Stuart *et al.* 1978) constitutes an outlier from the main area of distribution for this species, which is much further east (Skinner & Chimimba 2005).

Myotomys unisulcatus (F. Cuvier, 129),
bush karoo rat

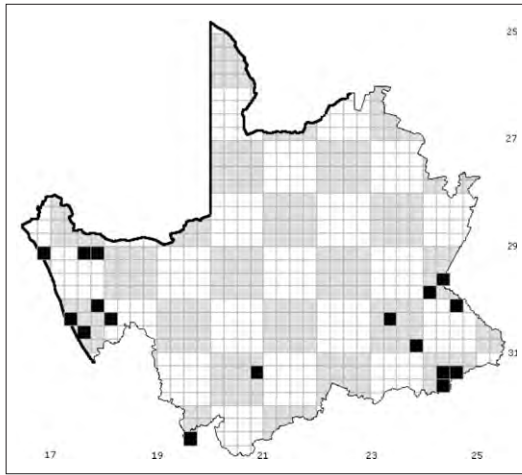
Synonyms: *Otomys unisulcatus broomi* Thomas, 1902;
Otomys unisulcatus granti Thomas, 1902.

Previous records

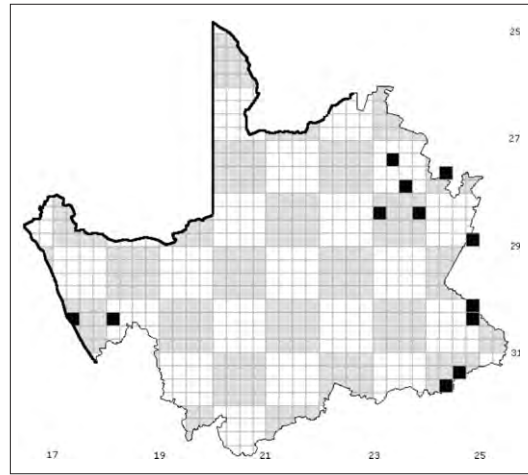
- pre-1930: Deelfontein, Klipfontein, Port Nolloth, Ramah
- 1930–1979: Eenriet, Esselfontein, Kameelboom, Witwater.
- Holocene: Abbots, Aspoort, Spoegrivier.

New records: De Cruis, Doornkuilen, Driekoppen, Holpan, Ongers River Bridge, Skilpad Wildflower Reserve, Vergelegen 132.

Comments: a probable *M. unisulcatus* was also recorded from the Herbert District (Skead 2011).

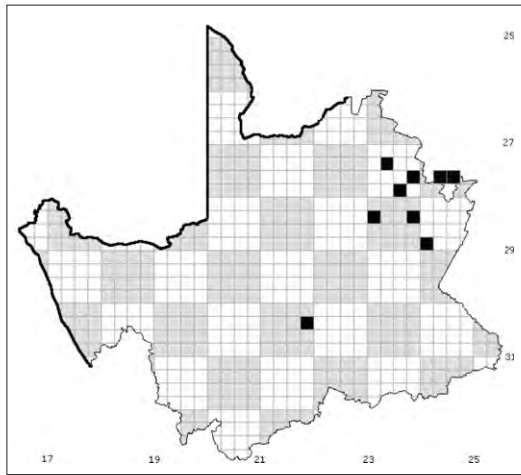


Otomys angoniensis Wroughton, 1906,
Angoni vlei rat



case (Skinner & Chimimba 2005), possibly at times of higher rainfall.

Otomys karoensis Roberts, 1931,
karoo vlei rat



Previous records

- 1980+: Grootfontein, Marrick Farm, Moffat Mission, Vaalharts.
- Holocene: Blinkklipkop, Dikbosch 1, Klein Witkrans, Wonderwerk.
- Pleistocene: Wonderwerk.

New records: Laaikrale.

Otomys irroratus (Brants, 1827),
southern African vlei rat

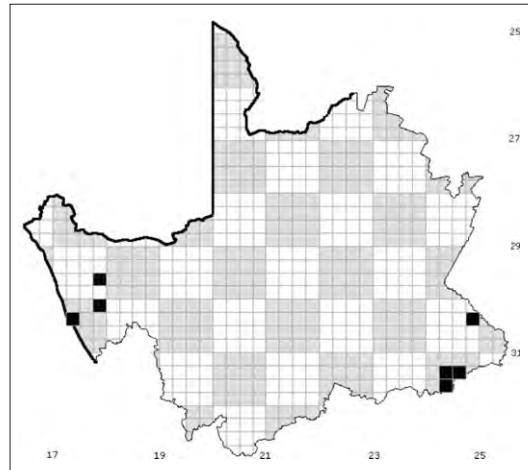
Synonym: *Otomys irroratus coenosus* Thomas, 1918.

Previous records

- pre-1930: Kuruman.
- 1930–1979: Eselfontein, Rolfontein Nature Reserve
- Pleistocene: Wonderwerk.
- Holocene: Blinkklipkop, Dikbosch 1, Klein Witkrans, Spoegrivier, Wonderwerk.

New records: Benfontein Nature Reserve, Driekoppen, Doornkloof Nature Reserve, Vergelegen 132.

Comments: the archaeological samples suggest that *O. irroratus* previously ranged further west than is currently the



Previous records

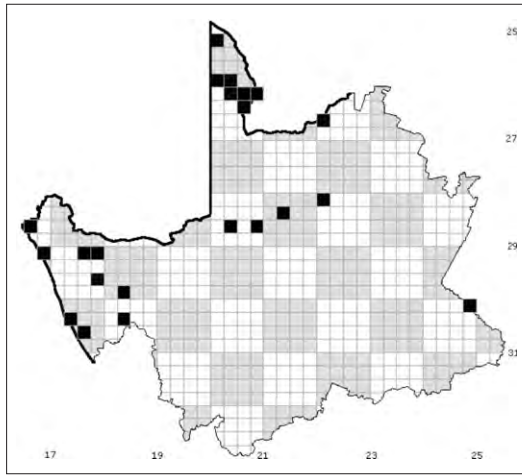
- 1930–1979: Hester Malan Nature Reserve.
- Holocene: Abbots, Spoegrivier.

New records: Doornkloof Nature Reserve, Driekoppen, Skilpad Wildflower Reserve, Vergelegen 132.

Comments: the material from Spoegrivier was published at a time when *O. karoensis* was subsumed within *O. saundersiae*. Recently, however, Taylor *et al.* (2009) have shown conclusively that the latter is not a good species while *O. karoensis* may be regarded as such in the western part of South Africa. In view of the fact that all these records, if correct, represent range extensions for *O. karoensis* and because there is considerable morphometric variation in *O. irroratus* (Taylor *et al.* 2009), these identifications require confirmation.

Parotomys brantsii (A. Smith, 1834),
Brants's whistling rat

Synonyms: *P. b. deserti* Roberts, 1933; *P. b. luteolus* Thomas & Schwann, 1904; *Euryotomys pallida* Wagner, 1841.



Previous records

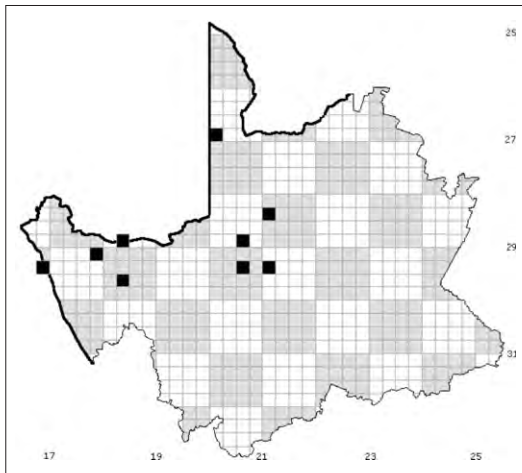
- Type locality: 'towards the mouth of the Orange R'.
- pre-1930: Anenus, Klipfontein, Port Nolloth.
- 1930–1979: Aughterlonie, Augrabies Falls National Park, Batulama, Bushmanputs, Craiglockhart, Dankbaar, Eenriet, Hester Malan Nature Reserve, HSP, Kameelboom, Kransbrak, Ky Ky, Mata Mata Camp, Platbakkies, Port Nolloth, Rolfontein Nature Reserve, Samevloeïng, Twee Rivieren Camp, 2821AD, 2822AA.
- Holocene: Spoegrivier, Zoovoorbij.

New records: Aughterlonie, Kaitob Berg, Twee Rivieren C.

Comments: Thunberg's 1811 painting of *Arctomys vigil* was identified as *Parotomys brantsii* by Rookmaker (1989, p. 305).

Parotomys littledalei Thomas, 1918,
Littledale's whistling rat

Synonym: *P. l. molopensis* Roberts, 1933.



Previous records

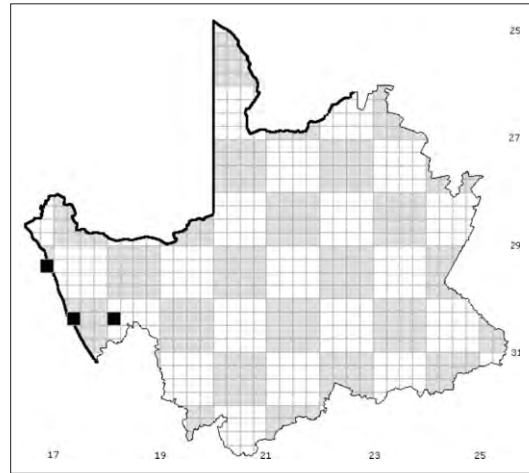
- Type locality: Tuin Kenhardt.
- pre-1930: Louisvale.
- 1930–1979: Eenriet, Goodhouse, Hakscheen Pan, Louisvale, Port Nolloth.

New records: Kangnas Farm, Kenhardt Railway Bridge, Swartpad.

Family BATHYERGIDAE

Bathyergus janetta Thomas & Schwann, 1904,
Namaqua dune mole-rat

Synonym: *B. j. inselbergensis* Shortridge & Carter, 1938.

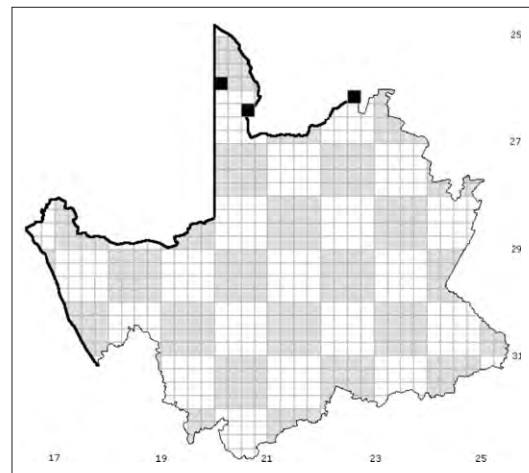


Previous records

- Type locality: Port Nolloth.
- 1930–1979: Eselfontein, Kamiesberg, Port Nolloth
- Holocene: Spoegrivier.

Comments: the mole-rats recorded from near the mouth of the Orange River (Alexander 1838) and at Robbe Bay, Port Nolloth (Backhouse 1844) may have been *B. janetta*.

Cryptomys damarensis (Ogilby, 1838),
Damara mole-rat



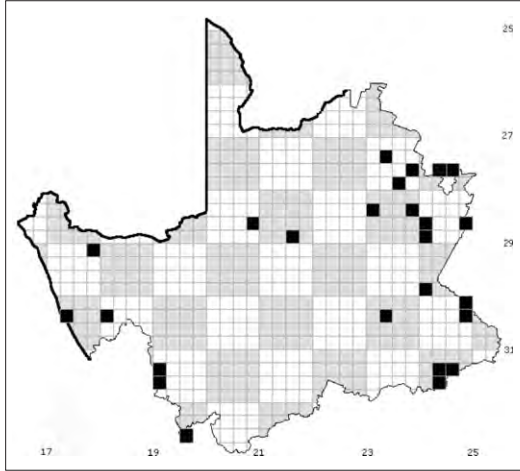
Previous records

- pre-1930: Molopo R west of Morokwen.
- 1930–1979: Ky Ky, Mata Mata Camp, Twee Rivieren Camp.

Comments: Rautenbach (1971, citing De Graaff, pers. comm.) recorded *C. hottentotus damarensis* from the Kalahari Gemsbok National Park so it is probable that other records published as *C. hottentotus* (e.g. Nel *et al.* 1984) followed the same source and included *damarensis* in

C. hottentotus. Certainly today it is accepted that only *C. damarensis* occurs in the Kgalagadi TP (Skinner & Chimimba 2005).

Cryptomys hottentotus (Lesson, 1826),
southern African mole-rat

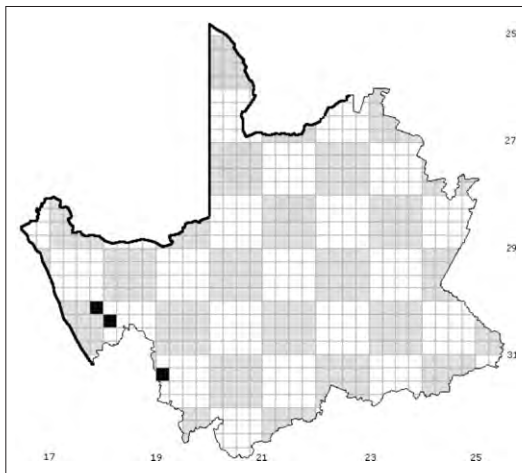


Previous records

- 1930–1979: Eenriet, Eselfontein, Nieuwoudtville, Rolfontein Nature Reserve, Witwater.
- 1980+: Grootfontein, Marrick Farm, Moffat Mission, Vaalharts.
- Holocene: Abbots, Aspoort, Blinkklipkop, Dikbosch 1, Equus, Klein Witkrans, Limerock, Powerhouse, Spoegrivier, Wonderwerk, Zoovoorbij.
- Pleistocene: Equus, Wonderwerk.

New records: Doornkloof Nature Reserve, Driekoppen, Dronfield Game Reserve, Holpan, Kleinbegin Station, Lokenburg Farm, Ongers River Bridge, Vergelegen 132.

Georychus capensis Illiger, 1811,
Cape dune mole-rat



Previous records

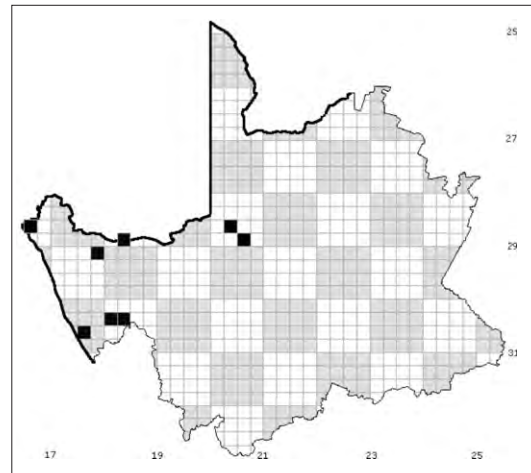
- Pre-1930: Ellenboogfontein, Kamiesberg.
- 1930–1979: Nieuwoudtville.

Comments: Rookmaker (1989, p. 304) proposed that the 'blesmollen' collected by Gordon in 1779 from Ellenboog-

fontein and Kamiesberg may have been either *Bathyergus janetta* or *Cryptomys hottentotus* grounds that these localities are far outside the known range of this taxon. However, since Nieuwoudtville is not, in fact, a great further south and Kamiesberg is very close to Ellenboogfontein, there seems no reason to reject the latter record.

Family **PETROMURIDAE**

Petromus typicus A. Smith, 1831,
dassie rat



Previous records

- Type locality: 'mountains towards mouth of Orange River'.
- Pre-1930: Augrabies Falls.
- 1939–1979: Augrabies Falls National Park, Eenriet, Goodhouse, Kameelboom, Platbakkies, Witwater.

New records: Swartpad.

ACKNOWLEDGEMENTS

Iziko South African Museum provided facilities and curates many of the collections of modern owl pellets. The study would not have been possible without the help of many collectors, in particular the late R.K. Brooke. A. Monadjem, University of Swaziland, made important comments on current taxonomy; any remaining mistakes are not his.

REFERENCES

- ALEXANDER, J.E. 1838. An expedition into the interior of Africa, through the hitherto undescribed countries of the great Namaqua, Boschmans and Hill Damaras. London: Henry Colburn. (*Africana Collectanea* **XXII** and **XXIII**. 1967. Cape Town: Struik).
- ANDERSEN, K. 1904. Five new rhinolophii from Africa. *Annals & Magazine of Natural History* (7)**14**: 378–388.
- ANDREWS, P. 1990. *Owls, Caves and Fossils*. pp. 1–231. London: Natural History Museum Publications.
- AVERY, D.M. 1981. Holocene micromammalian faunas from the northern Cape Province, South Africa. *South African Journal of Science* **77**: 265–273.
- AVERY, D.M. 1991. Micromammals, owls and vegetation change in the eastern Cape Midlands, South Africa, during the last millennium. *Journal of Arid Environments* **20**: 357–369.
- AVERY, D.M. 1992. Micromammals and the environment of early pastoralists at Spoeg River, western Cape Province, South Africa. *South African Archaeological Bulletin* **47**: 116–121.

- EVERY, D.M. 1995. Southern savannas and Pleistocene hominid adaptations: the micromammalian perspective. In: VRBA, E.S., DENTON, G.H., PARTRIDGE, T.C. & BURCKLE, L.H. (eds) *Paleoclimate and Evolution with Emphasis on Human Origins*. pp. 459–478. New Haven & London: Yale University.
- EVERY, D.M. 2007. Pleistocene micromammals from Wonderwerk Cave, South Africa: practical issues. *Journal of Archaeological Science* **34**: 613–625.
- EVERY, D.M., AVERY, G. & ROBERTS, A. 2002. A contribution from barn owl pellets to known micromammalian distributions in KwaZulu-Natal, South Africa. *African Zoology* **37**: 131–140.
- EVERY, D.M., RAUTENBACH, I.L. & RANDALL, R.M. 1990. An annotated checklist of the land mammal fauna of the West Coast National Park, South Africa. *Koedoe* **33**: 1–18.
- BACKHOUSE, J. 1844. *A Narrative of a Visit to the Mauritius and South Africa*. London: Hamilton, Adams.
- BEAUMONT, P.B. 1979. A first account of recent excavations at Wonderwerk Cave. Unpublished papers for Biennial Conference of the Southern African Association of Archaeologists, Cape Town 1979.
- BOITANI, L. & TAYLOR, P.J. 2008. *Thallomys shortridgei*. In: IUCN 2010. *IUCN Red List of Threatened Species*. Version 2010.4. <www.iucnredlist.org>. Downloaded on 22 April 2011.
- BOWEN, W.W. 1933. African bird distribution in relation to temperature and rainfall. *Ecology* **14**: 247–271.
- BRONNER, G.N. & JENKINS, P.D. 2005. Order Afrosoricida. In: WILSON, D.E. & REEDER, D.M. (eds) *Mammal Species of the World I*: 71–81. Baltimore: Johns Hopkins University Press.
- BROOM, R. 1907. A contribution to the knowledge of the Cape golden moles. *Transactions of the South African Philosophical Society* **18**: 283–311.
- BROOM, R. 1946. Some new and some rare golden moles. *Annals of the Transvaal Museum* **20**: 329–335.
- BROOM, R. 1950. Some further advances in our knowledge of the Cape golden moles. *Annals of the Transvaal Museum* **21**: 234–241.
- CHAZAN, M., RON, H., MATMON, A., PORAT, N., GOLDBERG, P., YATES, R., AVERY, M., SUMNER, A. & KOLSKA HORWITZ, L. 2008. Radiometric dating of the Earlier Stone Age sequence in Excavation I at Wonderwerk Cave, South Africa: preliminary results. *Journal of Human Evolution* **55**: 1–11.
- CHIMIMBA, C.T., DIPPENAAR, N.J. & ROBINSON, T.J. 1999. Morphometric and morphological delineation of southern African species of *Aethomys* (Rodentia: Muridae). *Biological Journal of the Linnean Society* **67**: 501–527.
- CHIMIMBA, C.T. & LINZEY, A.V. 2008. *Aethomys ineptus*. *Mammal Species* **809** 1–7.
- DAVIS, D.H.S. 1958. Notes on some small mammals in the Kalahari Gemsbok National Park, with special reference to those preyed upon by barn owls. *Koedoe* **1**: 184–188.
- DAVIS, D.H.S. 1959. The barn owl's contribution to ecology and palaeoecology. *Ostrich* (Suppl.) **3**: 144–153.
- DE GRAAFF, G. 1974. Notes on the occurrence of rodents in South African national parks. *Koedoe* **17**: 173–183.
- DEAN, W.R.J. 1975. *Tyto alba* prey in South West Africa and the northern Cape. *Zoologica africana* **10**: 217–219.
- ELLERMAN, J.R., MORRISON-SOTT, T.C.S. & HAYMAN, R.W. 1953. *Southern African mammals 1758 to 1951: a Reclassification*. 363 pp. London: British Museum (Natural History).
- ERASMUS, B.H. & RAUTENBACH, I.L. 1984. New records of occurrences of six species of small mammals in the northern Cape Province. *South African Journal of Wildlife Research* **14**: 91–96.
- GENEST-VILLARD, H. 1978. Révision systématique du genre *Graphiurus* (Rongeurs, Gliridae). *Mammalia* **42**: 391–426.
- GRANJON, L., DUPLANTIER, J.-M., CATALAN, J. & BRITTON-DAVIDIAN, J. 1997. Systematics of the genus *Mastomys* (Thomas, 1915) (Rodentia: Muridae). *Belgian Journal of Zoology* **127** (Suppl.): 7–18.
- HERSELMAN, J.C. & NORTON, P.M. 1985. The distribution and status of bats (Mammalia: Chiroptera) in the Cape Province. *Annals of the Cape Provincial Museums (Natural History)* **16**: 73–126.
- HOLDEN, M.E. 2005. Family Gliridae. In: WILSON, D.E. & REEDER, D.M. (eds) *Mammal Species of the World II*: 819–843. Baltimore: Johns Hopkins University Press.
- HUMPHREYS, A.J.B. & THACKERAY, A.I. 1983. Ghaap and Gariap. *South African Archaeological Society Monograph Series* **2**: 1–328.
- HUMPHREYS, A.J.B. 1978. The re-excavation of Powerhouse Cave and an assessment of Dr Frank Peabody's work on Holocene deposits in the Taung area. *Annals of the Cape Provincial Museums Natural History II* (12): 217–244.
- JOOSTE, J.F. 1977. The distribution and habitat preference of some small mammals in the Rolfontein Nature Reserve. *Research Report of the Cape Provincial Administration Department of Nature and Environmental Conservation Mammals* **1977**: 199–220.
- KLEIN, R.G., CRUZ-URIBE, K. & BEAUMONT, P.B. 1991. Environmental, ecological and paleoanthropological implications of the Late Pleistocene mammalian fauna from Equus Cave, northern Cape Province, South Africa. *Quaternary Research* **36**: 94–119.
- LINZEY, A.V., KESNER, M.H., CHIMIMBA, C. & NEWBERY, C. 2003. Distribution of veld rat sibling species *Aethomys chrysophilus* and *Aethomys ineptus* (Rodentia: Muridae) in southern Africa. *African Zoology* **38**: 169–174.
- LUNDHOLM, B.G. 1955. Descriptions of new mammals. *Annals of the Transvaal Museum* **22**: 279–303.
- MACDONALD, I.A.W. & DEAN, W.R.J. 1984. Vertebrate prey of the barn owl *Tyto alba* in the Cape Province north of the Orange River. *Fifth Pan-African Ornithological Congress Proceedings*: 517–541.
- MALAN, B.D. & COOKE, H.B.S. 1941. A preliminary account of the Wonderwerk Cave, Kuruman District, South Africa. *South African Journal of Science* **37**: 300–312.
- MILLER-BUTTERWORTH, C.M., EICK, G.N., JACOBS, D.S., SCHOEMAN, M.C. & HARLEY, E.H. 2005. Genetic and phenotypic differences between South African long-fingered bats, with a global Miniopterine phylogeny. *Journal of Mammalogy* **86**: 1121–1135.
- MONADJEM, A., TAYLOR, P.J., COTTERILL, F.P.D. & SCHOEMAN, M.C. 2011. *Bats of Southern and Central Africa*. 596 pp. Johannesburg: Wits University Press.
- MULLIN, S.K., PILLAY, N. & TAYLOR, P.J. 2005. The distribution of the water rat *Dasymys* (Muridae) in Africa: a review. *South African Journal of Science* **101**: 117–124.
- MUSSER, G.G. & CARLETON, M.D. Superfamily Muroidea. In: WILSON, D.E. & REEDER, D.M. (eds) *Mammal Species of the World II*: 894–1531. Baltimore: Johns Hopkins University Press.
- NEL, J.A.J. & NOLTE, N. 1965. Notes on the prey of owls in the Kalahari Gemsbok National Park, with special reference to the small mammals. *Koedoe* **8**: 75–81.
- NEL, J.A.J. & RAUTENBACH, I.L. 1975. Habitat use and community structure of rodents in the southern Kalahari. *Mammalia* **39**: 9–29.
- NEL, J.A.J., RAUTENBACH, I.L., ELS, D.A. & DE GRAAFF, G. 1984. The rodents and other small mammals of the Kalahari Gemsbok National Park. *Koedoe* (Suppl.): 195–220.
- RAMBAU, R.V., STANYON, R. & ROBINSON, T.J. 2003. Molecular genetics of *Rhabdomys pumilio* subspecies boundaries: mtDNA phylogeography and karyotypic analysis by fluorescence *in situ* hybridization (FISH). *Molecular Phylogenetics and Evolution* **28**: 564–575.
- RAUTENBACH, I.L. 1971. Notes on the small mammals of the Kalahari Gemsbok National Park. *Koedoe* **14**: 137–144.
- RAUTENBACH, I.L. & NEL, J.A.J. 1975. Further records of smaller mammals of the Kalahari Gemsbok National Park. *Koedoe* **18**: 195–198.
- RAUTENBACH, I.L., SCHLITZER, D.A. & DE GRAAFF, G. 1979. Notes on the mammal fauna of the Augrabies Falls National Park and surrounding areas with special reference to regional zoogeographical implications. *Koedoe* **22**: 157–175.

- ROBERTS, A. 1919. Descriptions of some new mammals. *Annals of the Transvaal Museum* **6**: 112–115.
- ROBERTS, A. 1933. Eleven new forms of South African mammals. *Annals of the Transvaal Museum* **15**: 26–270.
- ROBERTS, A. 1938. Description of new forms of mammals. *Annals of the Transvaal Museum* **19**: 231–245.
- ROBERTS, A. 1946. Descriptions of numerous new subspecies of mammals. *Annals of the Transvaal Museum* **20**: 303–328.
- ROOKMAKER, L.C. 1989. *The Zoological Exploration of Southern Africa 1650–1790*. 368 pp. Rotterdam: A.A. Balkema.
- RÜTHER, H., CHAZAN, M., SCHROEDER, R., NEESER, R., HELD, C., WALKER, S.J., MATMON, A. & KOLSKA HORWITZ, L. 2009. Laser scanning for conservation and research of African cultural heritage sites: the case study of Wonderwerk Cave, South Africa. *Journal of Archaeological Science* **36**: 1847–1856.
- SCHLITTER, D.A. 2005. Order Macroscelidea. In: WILSON, D.E. & REEDER, D.M. (eds) *Mammal Species of the World I*: 82–85. Baltimore: Johns Hopkins University Press.
- SCHWANN, H. 1906. A list of the mammals obtained by Messrs R.B. Woosnam and R.E. Dent in Bechuanaland. *Proceedings of the Zoological Society of London* **1906**(i): 101–111.
- SHORTRIDGE, G.C. 1942. Field notes on the first and second expeditions of the Cape museums' mammal survey of the Cape Province: descriptions of some new subgenera and subspecies. *Annals of the South African Museum* **36**: 27–100.
- SHORTRIDGE, G.C. & CARTER, D. 1938. A new genus and new species and subspecies of mammals from Little Namaqualand and the north-west Cape Province; and a new subspecies of *Gerbillus paeba* from the eastern Cape Province. *Annals of the South African Museum* **32**: 281–291.
- SIMMONS, N.B. 2005. Order Chiroptera. In: WILSON, D.E. & REEDER, D.M. (eds) *Mammal Species of the World I*: 312–529. Baltimore: Johns Hopkins University Press.
- SKEAD, C.J. 1973. Zoo-historical gazetteer. *Annals of the Cape Provincial Museums* **10**: 1–259.
- SKEAD, C.J. 2011. *Historical Incidence of the Larger Land Mammals in the Broader Western and Northern Cape*. 2nd edn, 519 pp. BOSHOFF, A.F., KERLEY, G.I.H. & LLOYD, P.H., (eds). Port Elizabeth: Centre for African Conservation Ecology, Nelson Mandela Metropolitan University.
- SKINNER, J.D. & CHIMIMBA, C.T. 2005. *The Mammals of the Southern African Subregion*. 814 pp. Cambridge: Cambridge University Press.
- SMIT, H.A., ROBINSON, T.J., WATSON, J. and JANSEN VAN VUUREN, B. 2008. A new species of elephant-shrew (Afrotheria: Macroscelidea: *Elephantulus*) from South Africa. *Journal of Mammalogy* **89**: 1257–1269.
- SMITH, A. 1836. *Report of the Expedition for Exploring Central Africa from the Cape of Good Hope, June 23, 1834, Under the Superintendence of Dr A. Smith*. 62 pp. Cape Town: Government Gazette Printers.
- SMITH, A. 1849. Illustrations of the zoology of South Africa; consisting of figures and descriptions of the objects of natural history collected during an expedition into the interior of South Africa in the years 1834, 1835 and 1836; fitted out by 'The Cape of Good Hope Association for exploring in central Africa'. London: Smith, Elder. [unpaginated]
- SMITH, A.B. & RIPP, M.R. 1978. An archaeological reconnaissance of the Doorn/Tanqua Karoo. *South African Archaeological Bulletin* **33**: 118–133.
- SMITH, A.B. (ed.) 1995. *Einiqualand: People of the Orange River Frontier*. 330 pp. Cape Town: UCT Press.
- STUART, C.T., PALMER, N.G. & MUNNIK, B.M. 1978. A preliminary report on the vertebrate fauna of Cape Provincial Nature Reserves. *Research Report of the Cape Provincial Administration Department of Nature and Environmental Conservation Mammals*. **1978**: 1–235.
- TAYLOR, P.J. & BOITANI, L. 2008. *Thallomys paedulus*. In: IUCN 2010. *IUCN Red List of Threatened Species*. Version 2010.4. <www.iucnredlist.org>. Downloaded on 22 April 2011.
- TAYLOR, P.J., COETZEE, N. & BOITANI, L. 2008. *Thallomys nigricauda*. In: IUCN 2010. *IUCN Red List of Threatened Species*. Version 2010.4. <www.iucnredlist.org>. Downloaded on 22 April 2011.
- TAYLOR, P.J., MAREE, S., VAN SANDWYK, J., BAXTER, R. & RAMBAU, R.V. 2009. When is a species not a species? Uncoupled phenotypic, karyotypic and genotypic divergence in two species of South African laminate-toothed rats (Murinae: Otomyini). *Journal of Zoology* **277**: 317–332.
- TAYLOR, P.J., RAUTENBACH, I.L., GORDON, D., SINK, K. & LOTTER, P. 1995. Diagnostic morphometrics and southern African distribution of two sibling species of tree rat, *Thallomys paedulus* and *Thallomys nigricauda* (Rodentia: Muridae). *Durban Museum Novitates* **20**: 49–62.
- THACKERAY, J.F. 1984. Man, animals and extinctions: the analysis of Holocene faunal remains from Wonderwerk Cave, South Africa. pp. 1–293. Unpublished PhD thesis. New Haven: Yale University.
- THOMAS, O. 1902. On some new forms of *Otomys*. *Annals & Magazine of Natural History* (7)**10**: 311–314.
- THOMAS, O. 1910. Further new African Mammalia. *Annals & Magazine of Natural History* (8)**5**: 282–285.
- THOMAS, O. 1918a. New forms of *Dendromus*, *Dipodillus* and *Gerbillus*. *Annals & Magazine of Natural History* (9)**2**: 59–64.
- THOMAS, O. 1918b. New species of *Gerbillus* and *Taterillus*. *Annals & Magazine of Natural History* (9)**2**: 146–151.
- THOMAS, O. 1918c. A revised classification of the Otomyinae, with descriptions of new genera and species. *Annals & Magazine of Natural History* (9)**2**: 203–211.
- THOMAS, O. & HINTON, M.A.C. 1923. On mammals collected by Capt. Shortridge during the Percy Sladen and Kaffrarian Museum Expedition to the Orange River. *Proceedings of the Zoological Society of London* **1923**: 483–499.
- THOMAS, O. & HINTON, M.A.C. 1925. On mammals collected in 1923 by Captain G.C. Shortridge during the Percy Sladen and Kaffrarian Museum Expedition to South-West Africa. *Proceedings of the Zoological Society of London* **1925**: 221–246.
- THOMAS, O. & SCHWANN, H. 1904. On a collection of mammals from British Namaqualand presented to the National Museum by Mr C.D. Rudd. *Proceedings of the Zoological Society of London* **1904**: 171–183.
- TYSON, P.D. 1999. Late-Quaternary and Holocene palaeoclimates of southern Africa: a synthesis. *South African Journal of Geology* **102**: 335–349.
- VAN DEVENTER, M. & NEL, J.A.J. 2006. Habitat, food, and small mammal community structure in Namaqualand. *Koedoe* **49**: 99–109.
- VENTURI, F.P., CHIMIMBA, C.T., VAN AARDE, R.J. & FAIRALL, N. 2004. The distribution of two medically and agriculturally important cryptic rodent species, *Mastomys natalensis* and *M. coucha* (Rodentia: Muridae) in South Africa. *African Zoology* **39**: 235–245.
- VERNON, C.J. 1972. An analysis of owl pellets collected in southern Africa. *Ostrich* **43**: 109–124.
- WILSON, D.E. & REEDER, D.M. (eds) 2005. *Mammal Species of the World*. 3rd edn, pp. 1–2142. Baltimore: Johns Hopkins University Press.
- WROUGHTON, R.C. 1905. Notes on the various forms of *Arvicanthis pumilio* Sparrm. *Annals & Magazine of Natural History* (7)**16**: 629–639.
- WROUGHTON, R.C. 1906a. Notes on the genus *Tatera*. *Annals & Magazine of Natural History* (7)**17**: 474–499.
- WROUGHTON, R.C. 1906b. Notes on the genus *Otomys*. *Annals & Magazine of Natural History* (7)**18**: 264–278.
- WROUGHTON, R.C. 1909. Three new species of *Mus*. *Annals & Magazine of Natural History* (8)**1**: 255–257.

Appendix 1. Details of unpublished barn owl roosts in the Northern Cape Province from which material has been collected. SAM–ZT: accession number of collection in the Iziko South African Museum Taphonomy Collection. See Fig. 1A. GR: Game Reserve. NR: Nature Reserve. NP: National Park.

Site	Code	SAM–ZT	¼° Square	Coll. year	Collector	Notes
Auchterlonie	ALK	000283	2620BA	2005	D.M. Avery, G. Avery	Visitor centre on top of cliff above Auob River bank. Very open vegetation.
Benfontein GR	BGR	000142	2824DD	2001	D.M. Avery, R. Visagie	Outside old house used as store among farm buildings. Some trees. On edge of open grassland.
De Cruis	DCS	000271	3120BD	2003	G. Avery	Just south of Williston on Fraserburg road on Sakrivier. Ostriches, some irrigation, riverine vegetation, etc. O. Louw, owner.
Deekrand	DRD	000284	2620DC	2005	G. Avery, F. Laudet, J–F. Tournepiche	Calcrete cliff, arid thornveld, ±50 km S of Twee Rivieren.
Doornkloof NR	DNR	000277	3024BD	2005	D.M. Avery, G. Avery	Cliff with fairly thick riverine bush, more open vegetation away from river.
Doornkuilen	DKR	000053	3024BA	1988	A. Martin, M. Odendaal, G. van der Merwe	Near black eagle nest. Cape Nature Conservation file no. LNO 16/19/16/2/1.
Driekoppen	DKN	000054	3124BC	1988	D.M. Avery, G. Avery, C.G. Sampson	Rockshelter on hillside overlooking plains with sparse . vegetation
Dronfield GR	DND	000145	2824DB	2001	D.M. Avery, A. Anthony	Below trees in grounds of manager's house.
Gelukspruit	GLS	000084	2820BB	1992	R.K. Brooke	Abandoned salt works ±45 km NW of Upington.
Holpan	HLN	000147	2924CC	2001	R. Visagie	
Kaitob Berg	KTB	000043	2918CD	1986	R.K. Brooke?	
Kalahari Gemsbok NP	KNP	000078	2620BB		J.J. Heroldt	<i>cf.</i> Kransbrak
Kangnas Farm	KGN	000081	2918CB	1992	R.K. Brooke, J.A. Harrison	Cave on farm, west of farmhouse (E of Hester Malan NR).
Kenhardt Railway Bridge	KRB	00272	2921AC	2003	D.M. Avery, G. Avery	Just north of Kenhardt to west of Keimoes road. Arches across Hartbees River under Sishen–Saldanha railway line.
Klein Witpan	KWP	000057	2720DC	1988?	R.K. Brooke?	
Kleinbegin Station	KBS	000280	2821DC	2005	D.M. Avery, G. Avery	Abandoned station workers house in open grass with bushes on Kalahari sand.
Kleinbegin–Kenhardt road	KKR	000282	2921AB	2005	D.M. Avery, G. Avery	Old house on deserted farm. Bush with grass. Kenhardt road from Kleinbegin, ±30 km from Kenhardt (?Middelpos).
Laaikrale	LKL	000275	3021BD	2004	D.M. Avery, G. Avery	Barn on farm Laaikrale, 6. 5 km out of Van Wyksvlei on R357 to Prieska. Low succulent scrub, some eucalyptus trees.
Lokenburg Farm	LKB	000285	3119CA	2005	N.G. Palmer	40 km S of Nieuwoudtville. Roost in open shed, not nest. 1 Ad bird flushed. TMS koppies, sheep & rooibos. NGP2361.
Lovers Leap	LVL	000279	2621DB	2005	D.M. Avery, G. Avery, D. Kriek	Base of cliff in Molopo R. open thornveld. Owners Karen & Jan Kriek.
Ongers River Bridge	ORB	000273	3023AD	2003	G. Avery	±30 km north of Britstown on Preiska road under road arches across Ongers River.
Skilpad Wildflower Reserve	SWR	000094	3017BB	1995, later sample	I.A.W. Macdonald	Abandoned outhouse ±50 m below main homestead. Exceptionally good flowering season following good rains.
Spitzkop NR	SNR	000130	2821AC	1989	ex Transvaal Museum (via E.M. Herholdt)	
Swartpad	STD	000274	2820DC	2003	D.M. Avery, G. Avery	Abandoned farm buildings just south of Kakamas on Kenhardt road on Marais River. Very sparse vegetation away from river bed. Owner Mr Mans.
Twee Rivieren	TWA TWB TWC	000298 000299 000300	2620BC	2001	A. Wardle	Three localities near Rest Camp
Van Zylsus	VZR	000048	2622CC	1987–8	?R.K. Brooke	
Vergelegen 132	VGL	000136	3124CB		N.G. Palmer?	
Weltevrede	WVK	000281	2821DC	2005	D.M. Avery, G. Avery	Old house on farm, D.J. Malan, owner. Kalahari sand, near rail bridge, grass & scrub. Kenhardt road from Kleinbegin at turn off to Klipbakke, ±60 km from Kenhardt.

Appendix 2. Details of records from the Northern Cape Province published before 1930. NP: National Park, NR: Nature Reserve. See Fig. 1B.

Site name	¼° Square	Reference
Anenous	2917BA	Thomas & Schwann 1904
Augrabies Falls	2820CB	Thomas & Hinton 1923
Deelfontein	3023DD	Wroughton 1905, 1906a,b, 1909
Ellenboogfontein	3017BB	Gordon 1779 (<i>in</i> Rookmaker 1989)
Garies	3018BA	Broom 1907
Kamiesberg	3018AC	Smith 1836
Klipfontein	2917BA	Thomas & Schwann 1904
Kuruman	2723AD	Smith 1836; Andersen 1904; Wroughton 1905, 1906a; Schwann 1906; Thomas 1918c
Latakoo (=Litakun near Kuruman)		Smith 1836
Latakoo N		Smith 1836
Louisvale	2821AC	Thomas & Hinton 1923
Molopo R, W of Morokwen	2622BA	Schwann 1906; Thomas 1910, 1918a
Mountains near mouth of Orange R		Smith 1836
Port Nolloth	2916BD	Thomas 1902, 1918a; Thomas & Schwann 1904
Ramah	2924CB	Backhouse 1844 (<i>in</i> Skead 2011)
Tuin Kenhardt	2920BC	Thomas 1918b
Upington	2821AD	Thomas & Hinton 1923
Voorsigtigskloof	2917AD?	Gordon 1779 (<i>in</i> Rookmaker 1989)

Appendix 3. Details of records from the Northern Cape Province published between 1930 and 1979. NP: National Park, NR: Nature Reserve. See Fig. 1C.

Site name	¼° Square	Reference
Auchterlonie	2620BA	Davis 1958; Nel & Nolte 1965
Augrabies Falls & Augrabies Falls NP	2820CB	De Graaff 1974; Rautenbach <i>et al.</i> 1979
Augrabies Falls W (21 km W of)	2820CB	Rautenbach <i>et al.</i> 1979
Batulama	2620AB	Nel & Nolte 1965
Brandvlei	3020BB	Roberts 1938
Brospan	3021BD	Roberts 1938
Bushman Pits (=Boesmansputs), Bushmanputs	2622CA	Roberts 1933; Vernon 1972
Calvinia E (24 km East of)	3119BD	Roberts 1938
Campbell	2823DC	Roberts 1946
Colesberg	3025CA	Vernon 1972
Craiglockhart	2520CD	Nel & Nolte 1965
Dankbaar	2520AA	Rautenbach 1971; Erasmus & Rautenbach 1984
Deelfontein	3023DD	Roberts 1938, 1946
Dikbaardskolk	2520DA	Rautenbach 1971
Eenriet	2917BB	Shortridge & Carter 1938; Shortridge 1942
Eselfontein	3018AC	Shortridge & Carter 1938; Shortridge 1942; Broom 1946
Fourteen Streams	2824BB	Roberts 1946
Garies	3018BA	Shortridge 1942
Goodhouse (& Raman's Drift)	2818CD	Shortridge & Carter 1938; Shortridge 1942; Roberts 1946
Gouna	3120BC	Broom 1950
Hakscheen Pan	2620CC	Roberts 1933
Hester Malan NR	2917DB	Stuart <i>et al.</i> 1978
Heuningsvlei	2623AC	Dean 1975
Kameelboom	3017DA	Shortridge 1942
Kamfersboom	2620BA	Davis 1958
Kamiesberg	3018AC	Shortridge & Carter 1938; Shortridge 1942
Kamieskroon	3017BD	Shortridge 1942

Continued on p. 37

Site name	¼° Square	Reference
Kaspersdraai	2520DA	Rautenbach & Nel 1975
Keimoes Island	2820DB	Rautenbach <i>et al.</i> 1979
Kij Kij/ Ky Ky	2620BC	Davis 1958; Nel & Nolte 1965
Kingston Farm	2824CA	Dean 1975
Klipfontein	2917BA	Shortridge 1942
Kransbrak	2620BB	Nel & Nolte 1965
Kwang Pan	2520BC	Rautenbach 1971
Leliefontein	3018AB	Shortridge 1942
Louisvale	2821AC	Shortridge 1942
Marrick Farm	2824CC	Dean 1975
Mata Mata Camp	2520CC	Rautenbach 1971
Monro	2620BC	Davis 1958
Nieuwoudtville	3119AC	Shortridge 1942
Nossob Camp	2520BC	Rautenbach 1971; Rautenbach & Nel 1975
Okiep	2917DB	Roberts 1938
Orrelgat	3018AB	Shortridge 1942
Paddagat	2917BD	Shortridge 1942
Platbakkies	3018AD	Shortridge & Carter 1938; Shortridge 1942
Port Nolloth	2916BD	Shortridge & Carter 1938; Shortridge 1942; Broom 1946
Port Nolloth (24 km E of)	2917AA	Shortridge 1942
Port Nolloth (40 km E of)	2917AA	Roberts 1938
Prieska	2922DB	Roberts 1946
Rietfontein	2620CA	Lundholm 1955
Rolfontein NR	3024BB	Stuart <i>et al.</i> 1978
Rooidam	2820CB	Rautenbach <i>et al.</i> 1979
Samevloeiing	2620BA	Nel & Nolte 1965; Rautenbach 1971
Springbok	2917DB	Vernon 1972
Stolzenfels	2819DA	Rautenbach <i>et al.</i> 1979
Sutherland	3220BC	Broom 1950
Swartkop	2821CB	Shortridge 1942
Twee Rivieren, Twee Rivieren Camp	2620BC	Rautenbach 1971; Rautenbach & Nel 1975
Upington	2821AD	Thomas & Hinton 1923; Vernon 1972
Upington E (21 km E of)	2821AD	Rautenbach <i>et al.</i> 1979
Upington N (122 km N of)	2721AC	Roberts 1933
Upington SE (9 km SE of)	2821CB	Rautenbach <i>et al.</i> 1979
Vanwyksvlei	3021BD	Roberts 1938
Witwater	3018AC	Shortridge & Carter 1938; Shortridge 1942
(no name)	2821AD	Rautenbach <i>et al.</i> 1979
(no name)	2822AA	Rautenbach <i>et al.</i> 1979

Appendix 4. Details of records from the Northern Cape Province published from 1980 onwards. NP: National Park, NR: Nature Reserve. See Fig. 1D.

Site name	¼° Square	Reference
Abraham Kriel	2824DA	Herselman & Norton 1985
Alexander Bay NE (45 km NE of)	2816DA	Erasmus & Rautenbach 1984
Aronegas	3017BA	Herselman & Norton 1985
Augrabies Falls NP	2820CB	Erasmus & Rautenbach 1984
Barkly West	2824BC	Herselman & Norton 1985
Blouputs	2820CA	Herselman & Norton 1985
Brandkaros	2816BC	Herselman & Norton 1985
Brandvlei	3020BB	Herselman & Norton 1985
Buxton Mine	2724DA	Erasmus & Rautenbach 1984
Carnarvon Commonage	3022AC	Smit <i>et al.</i> 2008
Dankbaar	2520AA	Erasmus & Rautenbach 1984
Die Oog Kuruman	2723AD	Herselman & Norton 1985
Doringpoort R	2816DB	Herselman & Norton 1985
Gatkoppies	2823AC	Erasmus & Rautenbach 1984
Goegab	2918CA	Herselman & Norton 1985
Goraas Farm	3121BB	Smit <i>et al.</i> 2008
Grootfontein	2723DB	MacDonald & Dean 1984
Grootfontein Farm	2724CA	Erasmus & Rautenbach 1984
Hanover	3124AB	Herselman & Norton 1985
Hartswater	2724DD	Erasmus & Rautenbach 1984
Hester Malan NR	2917DC	Herselman & Norton 1985
Heuningsvlei	2623AC	MacDonald & Dean 1984
Kamferboom	2620BA	Herselman & Norton 1985
Keikamspoort	2922DD	Herselman & Norton 1985
Keikamspoort Farm 71	2922DD	Erasmus & Rautenbach 1984
Koegelbeen Cave	2823CB	Erasmus & Rautenbach 1984; Herselman & Norton 1985
Leelykstaat farm	2922AB	Erasmus & Rautenbach 1984
Marrick Farm	2824CC	MacDonald & Dean 1984
Mazelsfontein	2923BA	Herselman & Norton 1985
Moffat Mission	2723AD	MacDonald & Dean 1984
Namaqua NP	3017BB	Van Deventer & Nel 2006
Norlim Mine Taung	2724DA	Herselman & Norton 1985
Okiep	2917DB	Herselman & Norton 1985
Orrelgat Cave	3018AB	Herselman & Norton 1985
PK Le Roux Dam	3024BA	Herselman & Norton 1985
Rolfontein	3024BD	Herselman & Norton 1985
Roodebergskloof	3018CA	Herselman & Norton 1985
Sewefontein	3119CA	Herselman & Norton 1985
Simon van der Stel Mine	2917DB	Herselman & Norton 1985
Slytfontein Farm	3122DA	Smit <i>et al.</i> 2008
Steyerskraal	2819CB	Herselman & Norton 1985
Swartmodder	2820BA	MacDonald & Dean 1984
Taung	2724DA	Herselman & Norton 1985
Three Sisters	3123CA	Herselman & Norton 1985
Vaalharts IS Plot 419	2724DA	MacDonald & Dean 1984
Vleiplaas Farm	2723AD	Linzey <i>et al.</i> 2003
Vondelingsfontein Farm	3119DD	Smit <i>et al.</i> 2008
Welbedacht Mine	2917DB	Herselman & Norton 1985
Wondergat	2816BD	Herselman & Norton 1985
Woodstock Farm	2723CB	Erasmus & Rautenbach 1984

Appendix 5. Details of archaeological records from the Northern Cape Province. See Fig. 1E.

Site Name	Square	Approx. age before present	Reference
Pleistocene			
Equus	2724DA	>?32 700	Klein <i>et al.</i> 1991
Wonderwerk	2723DC	~0.78–1.96 Ma	Chazan <i>et al.</i> 2008
Holocene			
Abbots	3124AD	<1000	Avery 1991
Aspoort	3219DA	690, 5200	Smith & Ripp1978
Blinkklipkop	2823AC	<1200	Avery 1981
Dikbosch 1	2823BD	13 700–12 400, 3100	Humphreys & Thackeray 1983
Equus	2724DA	2400–7400	Klein <i>et al.</i> 1991
Klein Witkrans	2724CB	±7500, 4700, 1500	Humphreys 1978
Limerock	2824CA	<1700	Humphreys & Thackeray 1983
Powerhouse	2724DA	4000–2000	Humphreys 1978
Spoegrivier	3017AD	<2000	Avery 1992
Wonderwerk	2723DC	<10 000	Avery 1981
Zoovoorbij	2820DB	<3000	Smith 1995