Pedetes capensis – Springhare

Regional Red List status (2016)	Least Concern
National Red List status (2004)	Least Concern
Reasons for change	No change
Global Red List status (2016)	Least Concern
TOPS listing (NEMBA) (2007)	None
CITES listing	None
Endemic	No

The Springhare (*Pedetes capensis*) is the only remaining species in the genus in South Africa today. Two other South African species, *P. gracilis* and *P. hagenstadi*, are already extinct as revealed by the fossil record (Butynski 2013a). The Springhare is a keystone species and thus conserving local subpopulations is important.

Taxonomy

Pedetes capensis (Forster 1778)

ANIMALIA - CHORDATA - MAMMALIA - RODENTIA - PEDETIDAE - *Pedetes* - *capensis*

Common names: Springhare, South African Springhare (English), Springhaas (English and Afrikaans), Umahelane (isiNdebele), Tshipjane (Sesotho), Ntlolê, Ntlolane, Matlolane, Tshipo, Matsipane (Setswana), Nhire, Gwidzu (Shona), Ndlulwane (siSwati), Khadzimutavha (Venda), Indulane, Isandlulane (Zulu)

Taxonomic status: Species

Taxonomic notes: This species has not undergone any taxonomic changes since the 2004 assessment (Friedmann & Daly 2004) but the following key points are worth noting:

1. The Pedetidae exhibit both hystricomorphous (porcupine-like) and sciurognathous (rat-like) characters but phylogenetic analyses supports the grouping of the Pedetidae with the Sciurognathi (Matthee & Robinson 1997a).
2. For a long time the genus *Pedetes* was thought to be represented by a single species, *Pedetes capensis* (Misonne 1972; de Graaf 1981; Meester et al. 1986; Dieterlin 1993), but it is now accepted (Skinner & Chimimba 2005) that there are two distinct species in this genus, *P. surdaster* from Kenya and Tanzania, and *P. capensis* from southern Africa. The recognition of the two species is based on phenotypical (Davies 1982), behavioural (Butynski 1978; Anderson 1996), placental (Otiang'a-Owiti et al. 1992), phylogeographical and cytogenetical differences between these species (Matthee & Robinson 1997b).
3. Currently no subspecies of *P. capensis* are recognised within the assessment region (Meester et al. 1986; Skinner & Chimimba 2005).

Assessment Rationale

Springhares are widespread and abundant within the assessment region, occurring in a number of protected areas across their range. They utilise, and often prefer, cultivated and overgrazed environments. As such, there are no immediate threats to this species and there is no evidence of any obvious net population decline or range reduction. However, on a local scale, Springhares are particularly vulnerable to floods and persecution or overhunting. During country-wide surveys, a number of farmers reported localised extinctions and drastically reduced numbers following heavy past persecution. Whilst localised recolonisation over time is likely when culling efforts are ceased, the species provides an essential and as-yet unquantified mutualistic service to a number of other species (for example, Black-footed Cat, *Felis nigripes*), and is also an extremely important prey item for a range of species. Even a short period without the burrow refuge systems made available by Springhares could result in a devastating loss of safe burrow systems particularly in areas where other shelter options are limited. Thus, local extinctions of this species should be monitored as it may indicate broader biodiversity loss.

Regional population effects: There is presumably dispersal across the northern border of South Africa, especially across the contiguous arid habitat of the Kalahari. Immigration, and thus a rescue effect, is therefore possible but there is no evidence or reason to believe that there is currently a net movement of animals into or out of the country.

Distribution

The species occurs across large parts of South Africa, Namibia, Botswana, Zimbabwe, Angola and Zambia as well as in the southern parts of the Democratic Republic of Congo and Mozambique (Skinner & Chimimba 2005). It is also predicted to occur marginally in the lowlands of Lesotho (Lynch 1994) and is listed in a recent compiled checklist of the mammals of Lesotho (Ambrose & Talukdar 2000). However, Boshof and Kerley (2013) doubt the accuracy of these predictions and, until voucher specimens have been procured, their presence in Lesotho

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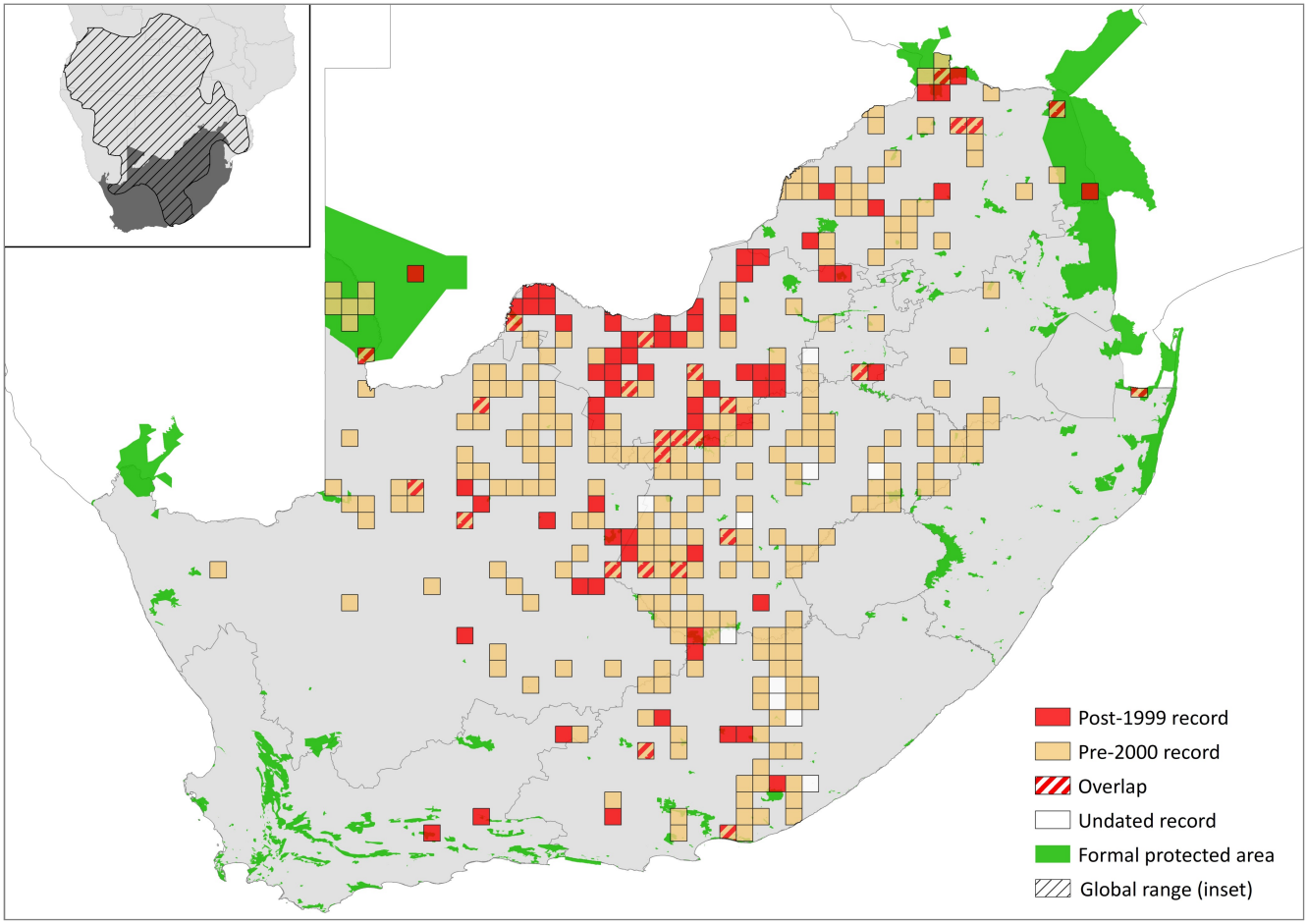

Figure 1. Distribution records for Springhare (*Pedetes capensis*) within the assessment region

Table 1. Countries of occurrence within southern Africa

Country	Presence	Origin
Botswana	Extant	Native
Lesotho	Possibly extant	Native
Mozambique	Extant	Native
Namibia	Extant	Native
South Africa	Extant	Native
Swaziland	Absent	-
Zimbabwe	Extant	Native

should be considered doubtful. Similarly, Butynski (2013b) report no records for either Lesotho or Swaziland.

Within South Africa, the species occurs across large parts of the Northern Cape, North West, Free State, Gauteng, Limpopo and Eastern Cape provinces (Figure 1), where there are sufficient sandy areas for burrowing, and open short grassland for foraging (Skinner & Chimimba 2005; Power 2014). In addition, it occurs in the western parts of Mpumalanga, the eastern areas of the Western Cape and marginally in the extreme northern and western parts of KwaZulu-Natal (Figure 1). It is absent from the eastern half of the Eastern Cape Province.

It is, however, important to note that within these areas their distribution is patchy and discontinuous. There is no clear evidence in the literature to indicate that the current distribution range has changed substantially from the historical distribution range. In Coetzee's (1979) assessment of the distribution and status of some of the mammals of the Albany district (Eastern Cape Province). he does indicate that the species is absent from some areas where one might otherwise expect it to occur, and that this could be due to sport hunting. Although this seems to be localised and relatively insignificant, this trend throughout its range bears monitoring, as localised extinctions of subpopulations may be on the increase.

Population

This species is common to abundant across most of its range and is the most frequently encountered mammal while spotlighting in the more arid parts of the country (Power 2014). Highest densities are reached on flood plains and fossil lake beds (pans) where the vegetation is open, the grass is short and green, and sandy soils are available (Butynski 2013b). Population size is difficult to estimate but the following Springhare densities have been reported in the literature:

- Across seven sites in the Kimberley region, density ranged from 3 individuals / km^2 in Kalahari Sandveld to 19 individuals / km^2 in panveld (Anderson 1996); and 5 individuals / km^2 on Benfontein Game Farm (Stenkewitz et al. 2010).
- Across fifteen sites in the Eastern Cape Province, densities ranged from 1 individual / km^2 to 99 individuals / km^2 (Peinke 2000; Peinke & Brown 2006).
- At Sandveld Nature Reserve, Free State Province: 40 individuals / km^2 (Watson 1992).

- At SA Lombard Nature Reserve, North West Province: 10 individuals / km^2 (van der Walt 1989).

Assuming that Springhare only occur over 30% of their defined area of occupancy (due to their need for deep sandy soils resulting in the patchy distribution) it can be estimated that there are conservatively between 2.23 million (8 x 278,700 km^2) and 11.15 million (40 x 278,700 km^2) Springhare in the country. Secondly, assuming that on average 74% of the aboveground population are adults (Butynski 1978; Anderson 1996; Peinke & Bernard 2005) then there are an estimated 1.65 and 8.25 million mature individuals in the national population. This is, however, only a very rough estimate and should be treated with extreme caution.

When only one Springhare species was recognized, it was listed as Vulnerable by the IUCN in 1996 due to an approximately 20% decrease in the population over the previous ten years. This was caused by intense hunting and the loss of habitat. This negative trend has not persisted, however, and the species is now listed as Least Concern. No current information is available on population trends, but the overall trend is suspected to be stable. Certain localised areas in the central Karoo, Eastern Cape and lower Kalahari have already reported lower numbers than those recorded 30–40 years ago. This may be indicative of a gradual decline as a result of persecution and severe competition with livestock such as sheep for forage. Additionally, this trend could also be attributed to climatic changes, associated with wetter conditions, which lead to habitat alteration in the form of taller grasslands. Long-term monitoring is needed to validate these observations and to quantify the decline, if it exists.

Current population trend: Stable

Continuing decline in mature individuals: Unknown

Number of mature individuals in population: Approximately 1.65–8.25 million; although this is a vague estimate and should be treated with extreme caution.

Number of mature individuals in largest subpopulation: Unknown

Number of subpopulations: Unknown

Severely fragmented: No

Habitats and Ecology

Springhares are the largest, hopping rodent species in southern Africa. With long back legs and short forelegs, they are kangaroo-like in appearance. With their long hind legs, they can reach speeds of 8.5 km / hour and jump distances of 0.8 m which is essential to avoid predators, a large number of which have been recorded utilising this species as prey. Despite their name, Springhares are neither hares nor rabbits, but are rodents and are placed in their own unique genus. They have a sandy, cinnamon-coloured pelt, with a long bushy tail ending in a dark brown or black tip. Whilst there is some size variation regionally, the only significant colour variation recorded previously is from a very dark, almost melanistic, individual in the collection of the American Museum of Natural History (Butynski 2013b). More recently in 2010, a similar specimen, almost jet-black, was collected near Cradock in the Eastern Cape and is now housed in the McGregor Museum collection (B. Wilson unpubl. data).

With the exclusion of deserts and forested areas, the Springhare has a wide distribution in flat, arid and semi-arid areas. Pans and pan fringes can be considered optimum habitat. They prefer relatively flat and open habitats with short grass (in particular *Cynodon* spp.; Monadjem et al. 2015), usually where there is little or no woody vegetation (Smithers 1971; Butynski & Mattingly 1979; Butynski 1984, 2013b; Augustine et al. 1995; Anderson 1996; Skinner & Chimimba 2005). They are generally absent from areas of tall grass, dense woodland and Mopane (*Colophospermum mopane*) or miombo (*Brachystegia* spp.) where the soils are clay and poorly drained (Butynski 2013b). The species is a prolific burrower, remaining in any one burrow for only a few consecutive days (Peinke & Brown 2005) and, as such, is largely dependent on the presence of deep, compact, sandy soils that are suitable for burrowing into, and is absent from areas where the substrate is harder or unsuitable for burrowing (Smithers 1971; Butynski & Mattingly 1979; Coetzee 1979; Anderson 1996; Skinner & Chimimba 2005; Peinke & Brown 2006). Springhare also do well in areas that have been disturbed by cultivation and/or heavy grazing (Smithers 1971; de Graaf 1981; Augustine et al. 1995; Skinner & Chimimba 2005; Peinke & Brown 2006; Butynski 2013b). They are grazers feeding mainly on green grass seeds which are high in protein and water, but will also selectively feed on grass stems, leaves, corms, roots and rhizomes. As highly selective feeders, Springhare often uproot entire plants, feed on only chosen sections and discard the remainder (Skinner & Chimimba 2005).

The species is almost exclusively nocturnal, but is sometimes encountered in the late afternoons during winter months. They forage in groups of two to six individuals, however, group adhesion is not persistent, and members may join and leave with little reaction from others (Butynski 1984). Activity patterns are noticeably influenced by moonlight intensity, where they are known to forage much further from burrows (up to 400 m) during new moon cycles, and remain closer to burrows (about 30 m) at periods of full moon (Anderson 1996). Springhares are non-territorial (Anderson 1996). Passive scent marking by means of a perianal gland takes place during feeding episodes, causing scent highways that the animal uses to locate its burrow quickly (Anderson 1996). This can be applied inside the burrow as well. Springhares are non-seasonal breeders, giving birth to one young after a gestation of an average of 77 days, and thus has a slow reproductive rate for a rodent (Butynski 1979; van der Merwe et al. 1980; Monadjem et al. 2015). Females may reproduce up to three times per year. Fatherhood is ensured by the depositing of a sperm plug into the female, thus preventing other males from impregnating that specific female (Anderson 1996). Its home range varies greatly between different individuals from 0.3 ha up to 28 ha (Peinke & Brown 2005). Burrows can cover an area of 170 m^2, displacing approximately one ton of subsoil in the process (Anderson 1996). Burrows are occupied by a single animal or a mother and kitten.

Ecosystem and cultural services: This species is a keystone species in many of the ecosystems in which it occurs (Butynski 2013b). As such, the long-term survival of the species needs to be ensured. Firstly, Springhare burrows provide shelter and core areas for foraging for at least 20 other mammal, three bird, six reptile and 22 invertebrate species (Anderson 1996; Skinner & Chimimba, 2005). These include other threatened species such as Temminck's Ground Pangolin (*Smutsia temminckii*) and Black-footed Cat (*Felis nigripes*)

Table 2. Use and trade summary for the Springhare (*Pedetes capensis*)

Category	Applicable?	Rationale	Proportion of total harvest	Trend
Subsistence use	Yes	Bushmeat, skins and tails	Unknown	Stable
Commercial use	Yes	Recreational hunting	Unknown	Unknown
Harvest from wild population	Yes	Bushmeat, skins and tails	Unknown	Unknown
Harvest from ranched population	Yes	Recreational hunting	Unknown	Unknown
Harvest from captive population	No	-	-	-

(B. Wilson unpubl. data). The use of Springhare burrows by other species is particularly common in semi-arid regions of the Northern Cape, where burrows provide stable micro-environments away from extreme ranges in temperature and humidity (Skinnner & Chimimba 2005).

Additionally, Springhares are an important prey component within the food chains of all ecosystems in which they occur. From various studies on the species, Anderson (1996) and Skinner and Chimimba (2005) reported at least 20 mammals, seven birds and four reptiles as having preyed upon Springhares. One highly interesting case involved active hunting of Springhare by a pair of Bateleur Eagles (*Terathopius ecaudatus*) in the Kalahari, and this probably took place during late afternoon or moonlit nights (Anderson & Maritz 1994).

Use and Trade

At a subsistence scale, Springhares are believed to be an important source of protein in rural communities. Butynski (1973) estimated that in Botswana 2.5 million Springhares are cropped annually for food. In 1991, the Board on Science and Technology for International Development National Research Council (BOSTID 1991) reported that at least 3.3 million kilograms of Springhare meat reached the Botswana market as the main source of bushmeat for human consumption in the country. To put this into perspective, this is equivalent to 30,000 cattle! Similar studies have yet to be conducted in South Africa and it is reasonable to assume that this practise extends into the assessment region too. The monitoring of subpopulations should be a priority in areas such as the Kalahari, and in North West and Limpopo provinces.

Recreational hunting, as a rite-of-passage for many young South African boys, is also known to take place on farms across its range. In commercial trophy hunting operations, Springhares are often offered as complimentary, non-trophy fee animals to clients. These may even enter the taxidermy industry afterwards for trophy mounting (B. Wilson unpubl. data).

There is limited commercial utilisation but where there is, it is assumed to be from the wild. However, there seems to be a growing market for the unusual and internet searches readily reveal prices such as US$75 for a skull, US$150 for a live animal as a pet, US$50–150 to hunt an animal in the Eastern Cape and, in game auctions in South Africa, between R60 and R400 for restocking purposes. There are even a number of websites providing information on how to raise and train them as pets.

Wildlife ranching has generally contributed positively to the conservation of the species by expanding and protecting available habitat. On game ranches Springhare are now often seen as an important game viewing species that contributes to visitor experience. This is quite different to the situation on commercial farms where Springhare are often regarded as pests because of damage to crops and competition with livestock.

Finally, apart from being a food source, the San have other cultural uses for Springhare. Skins are softened and used to make containers for food and water, as well as mats and karosses, while thread is derived from the sinews in the tail. Dung may even be mixed with other ingredients to make smoking tobacco.

Threats

While there are no quantified major threats to this species, its slow reproductive rate and sensitivity to disturbance means that several minor threats may cause local declines or extinctions:

1. **Persecution because of damage caused to crops.** Butynski (1973) estimated that 10–15% of maize, sorghum, beans and groundnuts grown in Botswana were destroyed by Springhare but there is no information available on the extent of this problem or on the control measures implemented by farmers. The impact is felt on commercial crops, but probably more significantly by subsistence crop growers. Coetzee (1979) does report that Springhares are absent from some farms where one would expect them to be, and indicates that this could be due to persecution. Their digging activities have also reportedly damaged roads, and anecdotal claims that eight foraging Springhares consume the same amount as a sheep are commonly heard from farmers. For these reasons, attempts to eradicate or significantly reduce resident

Table 3. Possible net effects of wildlife ranching on the Springhare (*Pedetes capensis*) and subsequent management recommendations

Net effect	Positive
Data quality	Suspected
Rationale	Wildlife ranching has expanded available habitat.
Management recommendation	Monitor local subpopulations and avoid heavy persecution.

Table 4. Threats to the Springhare (*Pedetes capensis*) ranked in order of severity with corresponding evidence (based on IUCN threat categories, with regional context)

Rank	Threat description	Evidence in the scientific literature	Data quality	Scale of study	Current trend
1	*5.1.1 Hunting & Collecting Terrestrial Animals*: hunting for recreation and subsistence purposes.	Butynski 1973	Empirical	National	Possibly increasing with human settlement expansion.
		Coetzee 1979	Indirect	Regional	
2	*5.1.3 Persecution/Control*: persecution as a damage-causing animal.	Butynski 1973	Indirect	National	Stable
		Coetzee 1979	Indirect	Regional	
3	*2.1 Annual & Perennial Non-Timber Crops*: habitat loss and transformation.	Driver et al. 2012	Indirect	National	Ongoing
4	*2.2 Wood & Pulp Plantations*: habitat loss and transformation.	Driver et al. 2012	Indirect	National	Ongoing
5	*3.2 Mining & Quarrying*: habitat loss and transformation.	Driver et al. 2012	Indirect	National	Ongoing
6	*1.1 Housing & Urban Areas*: habitat loss and transformation.	Driver et al. 2012	Indirect	National	Ongoing
7	*11.4 Storms & Flooding*: increase in severity of flood events from climate change.	-	Anecdotal	-	-

subpopulations on some properties have resulted in localised declines and even extinctions in some cases. The general absence of information on this, however, suggests that it may not be a serious problem.

2. **Hunting for recreation and subsistence purposes** (Butynski 1973; Coetzee 1979). Hunting for recreational and subsistence purposes takes place but there is no quantitative information available from the assessment region. As both recreational and subsistence hunting have been happening for many years without any apparent impact this may not be a serious problem. It is, however, important to note that Springhare are very easily hunted at night with a spotlight and are consequently are very easily eradicated from areas. This, combined with a relatively low reproductive output (especially for a rodent), means that they could be vulnerable to high levels of hunting or utilisation.
3. **Habitat loss and transformation** (Driver et al. 2012). Overall, 18% of South Africa's surface area has already been irreversibly transformed mostly through cultivation, mining, forestry and urban development. In some regions the percentage of natural habitat lost is much higher and the rates of loss are alarming.
4. **Periods of abnormally high rainfall and floods** will definitely affect Springhare subpopulation numbers, due to drowning. Additionally, persistently high rainfall levels, associated with climate change, may result in habitat loss, due to alteration in the form of increased grass height and woody cover. As a result of their fossorial habits, as well as their preference to colonise pan fringes (optimum habitat), Anderson (1996) modelled that excessive rainfall episodes is the biggest driving force in population regulation in the Northern Cape as a result of drowning.

This genus already has two extinct South African species of *Pedetes* known from fossil records (Butynski 2013a), namely *P. gracilis* (Davies 1982) and *P. hagenstadi* (Cooke 1955), having occurred in the region of Taung, North West and Hagenstad Salt Pan (now known as Florisbad), Free State), respectively. These extinct species perhaps suggest the genus is vulnerable to disturbance and provide a cautionary tale for current conservation.

Current habitat trend: Stable. The species occupies a wide variety of habitats, including agricultural landscapes. However, the loss of grassy areas or pans will impact local subpopulations.

Table 5. Conservation interventions for the Springhare (*Pedetes capensis*) ranked in order of effectiveness with corresponding evidence (based on IUCN action categories, with regional context)

Rank	Intervention description	Evidence in the scientific literature	Data quality	Scale of evidence	Demonstrated impact	Current conservation projects
1	*1.2 Resource & Habitat Protection*: engage wildlife ranch owners, commercial and subsistence farmers and communities to conserve pans and patches of grassy habitat.	-	Anecdotal	-	-	-
2	*3.1.1 Harvest Management*: review provincial legislation and evaluate the need for hunting restrictions (season and bag limits) in problem areas.	-	Anecdotal	-	-	-

Conservation

As a keystone species, the long-term survival of the species needs to be ensured. Springhares are well conserved in a number of protected areas scattered across their distribution range, including Augrabies Falls National Park, Kgalagadi Transfrontier Park, Tswalu Game Reserve, Molopo Nature Reserve and the Mountain Zebra National Park. Conservationists must ensure that these protected areas are adequately funded and managed. No specific conservation interventions are necessary at present. However, long-term monitoring schemes and research into the capacity for sustainable harvest of this species should be initiated (see Management Recommendations and Research Priorities). However, hunting should be regulated in areas where the species is declining.

Recommendations for land managers and practitioners: Currently there are no conservation plans for the species and the creation of such plans is undermined by a lack of data of subpopulation health and trends. It can be reasonably expected that the numbers will decline in some regions and localised areas. These areas need to be identified.

Persecution as a problem-causing species will continue, but judicious and sustainable harvesting techniques must be employed to minimise the impact on the populations.

- Initiate long-term monitoring programmes to provide information on population trends.
- Review legislation related to the hunting and harvesting of this species.
- Establish sustainable harvesting guidelines, considering the slow breeding rate.
- Develop management plans in areas where numbers have significantly dropped.

Research priorities:

- The economic value of the species.
- Levels of sustainable harvest, under various natural and man-made conditions, and the extent to which Springhares are hunted for recreational and subsistence reasons in South Africa.
- The effect of environmental conditions and population density on behaviour.
- Quantification and description of agricultural damage caused by Springhares on a national scale, how they are managed in problem areas and if this constitutes a significant threat to the species.
- The degree of commensalism with this species and others (particularly protected or threatened species) to determine its importance in the ecosystem as a refuge provider.
- Comparative ecological, behavioural and physiological studies with the equatorial *P. surdaster.*
- The status and population trends associated with subpopulations.

Encouraged citizen actions:

- Report sightings on virtual museum platforms (for example, iSpot and MammalMAP), especially outside protected areas.

Data Sources and Quality

Table 6. Information and interpretation qualifiers for the Springhare (*Pedetes capensis*) assessment

Data sources	Field survey (literature)
Data quality (max)	Estimated
Data quality (min)	Suspected
Uncertainty resolution	Best estimate
Risk tolerance	Evidentiary

- Establish citizen science monitoring programmes. Springhare are very easy to monitor and it would be useful if some long term population monitoring sites could be established on public and private land across the range of this species. This information could be coordinated at provincial level and fed into regional databases used for decision-making during the conservation ordinance amendment processes. Ideally spotlight counts should be conducted along set routes and repeated on at least three consecutive nights. Preferably, data should be collected during the first half of the evening, on moonless nights (Peinke & Brown 2006) and during mid-winter and again in summer. For even better density estimates, the distance sampling method, described in Stenkewitz et al. (2010) could be implemented; however, this would require additional effort from the monitors. Data should be submitted to provincial coordinators, and subsequently to the national coordinator. Should citizens be willing to establish long-term monitoring sites, the assessment authors may be contacted.

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Details of the methods used to make this assessment can be found in *Mammal Red List 2016: Introduction and Methodology.*