

CHAPTER 7

HABITAT TYPES OF LARGER MAMMALS IN THE WATERBERG
BIOSPHERE RESERVE

7.1 Introduction

Ecotourism as an integral part of game ranching in the Limpopo Province, South Africa, earns foreign currency and contributes significantly to the economy of the Limpopo Province (Van der Waal & Dekker, 2000). Game viewing is regarded as the most popular tourist activity within game reserves in Southern Africa (Preston & Fuggle, 1988). Barnes *et al.* (1999) showed that tourists are willing to pay for wildlife viewing and wildlife conservation in Namibia, while Norris (1992) noted that 30 million Americans participated in wildlife viewing during 1991. Tourist will even be willing to pay to see only a single species, as shown by Harrison (1992).

However, the conservation of the mammal species viewed by tourists within nature reserves should still receive priority. Siegfried & Brown (1992) noted that the distribution of resident terrestrial mammalian species of southern Africa, indicates that the existing arrangement of nature reserves in the region corresponds closely with an ideal (hypothetical) configuration for maximizing protection of this fauna.

The number of mammal species supported by a plant community depends on several factors like the primary production, seasonal availability of resources, floral heterogeneity, diversity of plant structure, nature of the substratum and previous history (Delany, 1982). Each mammal species have a particular niche, which can be regarded as the sum of all ecological requirements of a species namely food, space, shelter and physical conditions. Mills & Hes (1997) stated that the distribution and abundance of animal species does not rigorously follow that of plant communities or biomes. Instead, mammal species seem to have certain preferences for a specific habitat type (Skinner & Smithers, 1990). Several authors have shown this preference of mammals to certain habitats through analysis (Beardall *et al.* 1984; Ben-Shahar, 1991; Dekker *et al.* 1996).

The aim of this chapter is to identify and classify the major habitat types of the larger mammals within the Waterberg Biosphere Reserve, and to show the importance of the threatened species' conservation. Descriptions of the habitat types are done according to habitat preferences of mammals. However, since habitat types of mammals consist of different overlapping plant communities (discussed in following sections), the specific value of certain plant species for grazing or browsing are not included. The main theme remains the value these mammals have for the tourism industry.

7.2 Methods

7.2.1 Mammal database

A database of the larger mammals occurring on game reserves, the Marakele National Park and other wilderness areas within the Waterberg Biosphere Reserve was created. Data sets were obtained from the following sources:

- Mammals occurring within quarter degree grid cells ($15' \times 15' \sim 700 \text{ km}^2$) within the Waterberg Biosphere Reserve were obtained from the Conservation Planning Unit, Department of Zoology and Entomology, University of Pretoria.
- Mammal lists were obtained from the game reserves and national park visited in the Waterberg Biosphere Reserve as listed in Chapter 5.

The mammals selected for the database were chosen as having the potential to be viewed by tourists visiting the game reserves and national park. Therefore smaller mammals (e. g. shrews, mice, rats and bats) not regularly sighted by tourists, were discarded when the database was created. Only when a smaller mammal species was considered to be of particular interest and tourists would possibly be interested in viewing them when sighted, the species was included in the database (e. g. Banded mongoose, dwarf mongoose, pangolin, rock dassie). However, some of the mammals are threatened and needs conservation management strategies, therefore the conservation status of the mammal species is included in Appendix 7.2, while a full description of the different categories is included in Appendix 7.3 as adapted from from Hilton-Taylor (2000).

7.2.2 Habitat preferences of mammals

Habitat preferences of mammals occurring within the Waterberg Biosphere Reserve were obtained from Skinner & Smithers (1990) and Mills & Hes (1997). These data were added to the database. The habitat preferences were linked to the 12 major plant communities identified in the Waterberg Biosphere Reserve (Chapter 4) by comparing the description of the plant communities (Chapter 4) to the description by Skinner & Smithers (1990) and Mills & Hes (1997). The mammal species list and habitat preferences are included as Appendix 7.1.

7.2.3 Habitat Classification and Identification

Habitat classification of the mammals was done using a Two-Way-Species-Indicator-Analysis (TWINSPAN) (Hill, 1979). In TWINSPAN the following parameters were used during classification:

- ◇ Cutlevels for cover abundance: 0 - 2 - 10 - 25 - 50
- ◇ Maximum level of divisions: 3
- ◇ Other parameters were left default although the option to visualize the cluster hierarchy was selected

The plant communities (Chapter 4) used during the TWINSPAN classification procedures as habitat types for mammals, were used similar to synrelevés in the classification of large vegetation datasets (Bredenkamp & Bezuidenhout, 1995). Although no cover abundance or constancy values were used for the mammals, as done with vegetation classification, the presence of a mammal species in a plant community was indicated as 1. However, mammal species may occur in more than one plant community, and was indicated accordingly in Table 7.2.

The TWINSPAN classification revealed 5 different habitat types for mammals within the Waterberg Biosphere Reserve, from which a classification table similar to a Braun-Blanquet table (Kent & Coker, 1996) for vegetation classification was created. This table showed which combination of plant communities in the Waterberg

Biosphere Reserve forms a preferred habitat to specific mammal species. A synoptic table was also created to show the new habitat types identified as well as the diagnostic mammal species within it.

7.3.2 Description of the large mammal habitat types

The habitat types were described after TWINSPAN classification according to mammal species composition and habitat characteristics (e. g. plants valuable for browsing / grazing within habitat).

7.3 Results and Discussion

7.3.1 Classification Hierarchy

Figure 7.1 represent the classification hierarchy of the habitat types of the mammal species occurring within the Waterberg Biosphere Reserve as follows:

- The first level of division for mammal habitat types were the separation of the mammals inhabiting land as their dominant habitat type and the typical water-inhabiting mammals, only occasionally seen feeding on land.
- The 'land mammal species are divided on a second level into mammals occurring within broken, rugged terrain and mammals inhabiting a flatter, more open terrain within the Waterberg Biosphere Reserve.
- The mammal species associated with the more open plains are divided on a third level into mammal associated with two habitat types, namely grassland associated species, and savanna woodland associated species. Vegetation structure play a major role in habitat selection by mammal species occurring in these habitats types (Delany, 1982; Ben Shahaar, 1991; Gros & Rejmanek, 1999; Dörgeloh, 2001), especially providing shelter to the smaller cats (e. g. serval, caracal, african wild cat) and herbivores (e. g. steenbok, scrub hare).
- The mammal species of the more rugged terrain are separated on a third level based primarily on physical habitat and vegetation structure. The first group represent the rocky mountain slopes of the mountainous areas within the Waterberg Biosphere Reserve, while the second group represents a dense vegetation habitat (e. g. Termitaria, encroached areas, kloof forests, riverine

vegetation and vegetation associated with dolerite / diabase dykes) dominated by woody species with very little undergrowth.

7.3.2 Description of the large mammal habitat types

The habitat types described here represent the areas within which tourists are most likely to see the mammal species. The mammals may also be spotted in other habitat types, but the habitat types in which they are described represent the habitat preference of the mammal in terms of food, space, shelter and physical conditions (Delaney, 1982). The habitat types do not only show the possibility for tourists to view the mammals, but also provide the basis for reserve managers to identify habitat types on their properties if they want to relocate certain mammal species. The plant community preference of a mammal species within a habitat type may also be described as an example of specialist feeding. However, this only indicates the most favorable habitat of the animal, and tourists on certain properties may view these animals in completely different habitat types if the animals were relocated on properties with unfavorable habitat types for the mammal species (e. g. gemsbok within moist environments). The synoptic table (Table 7.1) shows the frequencies of mammal species within the habitat types, and the "Braun-Blanquet" table (Table 7.2) show which plant communities (Chapter 4) represent the habitat types. Once the scientific names of mammals were mentioned within the habitat descriptions, their common names are used onwards in the chapter. The positions of the mammal species in the tables (e. g. Species Group 2, Table 7.1) are also only once referred to.

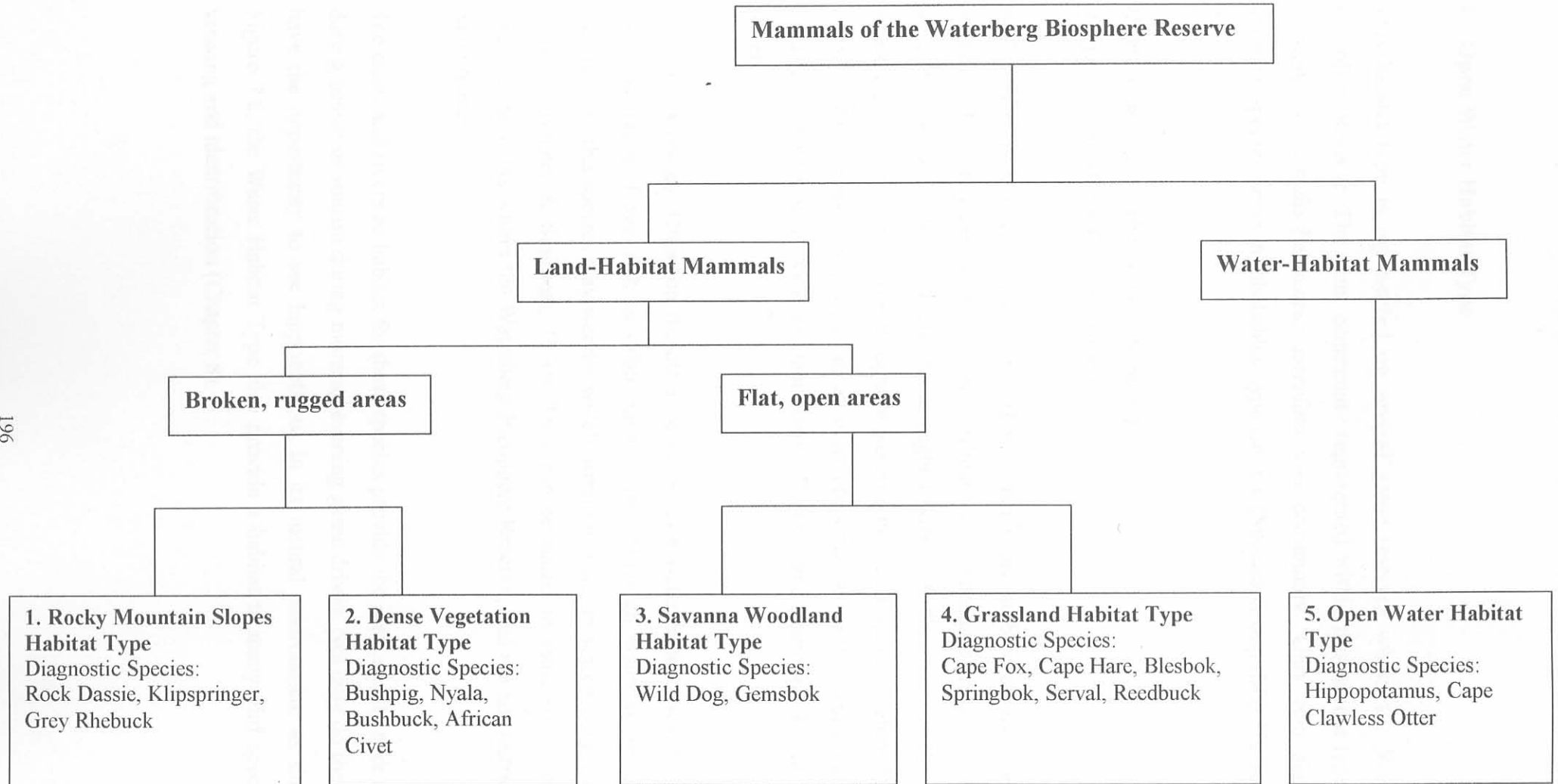


Figure 7.1. Dendrogram presenting TWINSpan hierarchy of Waterberg Biosphere Reserve mammal habitat types

1. Open Water Habitat Type

This habitat type is represented on several game reserves within the Waterberg Biosphere Reserve. The plant community represented within this habitat type is the *Phragmites australis-Persicaria serrulata* vlei community. Only two diagnostic mammal species occur in this habitat type namely [Species Group (SG) 10, Table (T) 7.1:

Hippopotamus amphibius (Hippopotamus)

Aonyx capensis (Cape Clawless Otter)

Both species need open surface water. Hippopotamus are herbivores that need open water in which they can submerge totally (Figure 7.2). Adequate grass close to their water habitat is essential for grazing at night (Skinner & Smithers, 1990). Places where hippos occur within the Biosphere Reserve include Entabeni Nature Reserve, Lapalala Wilderness Area (as well as all other properties along the Lephalala River), Emaweni Game Lodge, Mokolo Dam Nature Reserve and Shambala Private Game Reserve.

The Cape Clawless Otter, on the other hand, needs a water habitat, which supplies food like crabs, frogs, fish or other aquatic life. Although water is an essential requirement, this species may wander widely from the water in search of new feeding grounds (Skinner & Smithers, 1990). They can be found in most rivers, streams, swamps and dams within the Waterberg Biosphere Reserve, and are not restricted by game fences.

The dams and rivers as habitat for these species provide the ideal spot to take tourists during sunset or sunrise during morning/evening game drives. Not only do the tourist have the opportunity to see hippopotamus in its natural environment as shown in Figure 7.2, the Water Habitat Type also provide a habitat to many bird species for viewing and identification (Chapter 8).

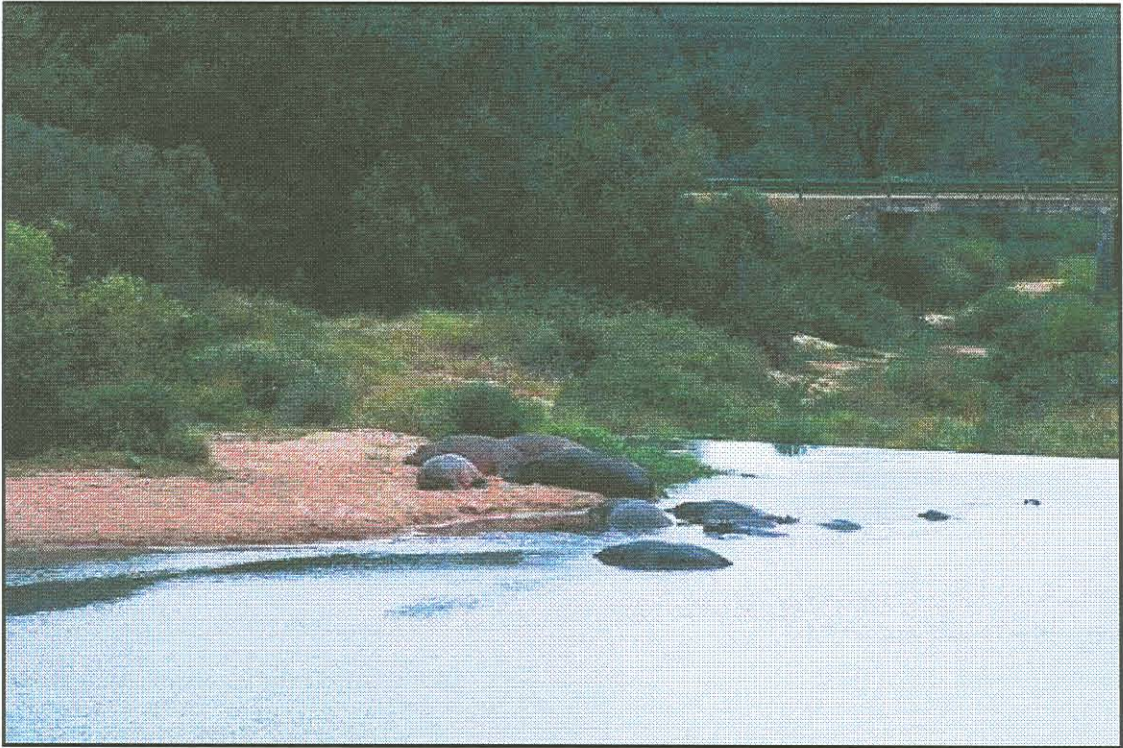


Figure 7.2 Typical Open Water Habitat suitable for hippopotamus. Hippopotamus need open water to totally submerge and several game reserves have relocated hippopotamus within the Biosphere Reserve.

2. Grassland Habitat Type

This habitat type is represented in three different plant communities described in Chapter 4, namely the *Fuirena pubescens-Andropogon huilensis* sponge community, *Cynodon dactylon-Dichrostachys cinerea* old fields community (early variation) and the *Setaria incrassata-Aristida bipartita* vertic clay community. The vegetation structure plays a major role within this habitat type in providing the necessary shelter and food to the mammal species. The structure is mostly a closed grassland (Edwards, 1983). The following species are diagnostic to the habitat type (SG 6, T 7.1):

Vulpes chama (Cape Fox)

Lepus capensis (Cape Hare)

Damaliscus pyrgarus phillipsi (Blesbok)

Antidorcas marsupialis (Springbok)

Redunca arundinum (Reedbuck)

Leptailurus serval (Serval)

The springbok and blesbok are classified as lower risk species, dependent on conservation (Hilton-Taylor, 2000). However, considering the many conservation areas in the Waterberg Biosphere Reserve, the species are under no immediate threat. Species like the cape hare, springbok and blesbok are confined only to old field plant communities described by Furniss (1998), Joubert (1998) and Newberry (1998) within the Waterberg Biosphere Reserve. The springbok and blesbok antelope species occurring on game reserves within the Waterberg Biosphere Reserve were introduced by game farmers and reserve managers to their properties, since the species did not occur in the Waterberg area in the past. The old fields created a valuable opportunity to game farmers to introduce these species into the habitat type as shown in Figure 7.3. Joubert (1998) noted that these old fields are also particularly favoured by large grazing species such as blue wildebeest (*Connochaetes taurinus*), burchell's zebra (*Equus burchellii*), red hartebeest (*Alcelaphus buselaphus*) (lower risk species), tsessebe (*Damaliscus lunatus*), impala (*Aepyceros melampus*) and white rhinoceros (*Ceratotherium simum*) (lower risk, conservation dependent) (SG 7, T 7.2). Short-legged grazing mammals species such as warthogs and steenbok (SG 7, T 7.1) prefer the short grassland variation of old fields, so they can keep a proper lookout for

predators (Eltringham, 1979). Fire further plays a major role in maintaining the grass cover of the old fields, as well as preventing the succession from developing beyond the grassland stage to undesirable thicket (Tainton, 1981). However, applying a burning program to these areas should consider factors such as overgrazing, drought, rainfall and available plant material (Brown, 1997).

The other plant communities represented in this habitat type include the sponge community and seasonally flooded grassland community located within the Marakele National Park and Nylsvley Nature Reserve respectively. Coetzee *et al.* (1976) described the floodplain area of Nylsvley Nature Reserve as mainly grassland, with an open stand of thorn savanna in areas where the water table is generally lower than in the grassland. These floodplains provide an important habitat for one of the most important natural breeding herds of the rare *Hippotragus equinus* (roan antelope; SG 7, T 7.2) (Dörgeleh, 1998). Both the sponge and floodplain communities are seasonally flooded and extremely sensitive to burning. Van Staden (in prep.) recommend that wetland areas in the Marakele National Park be burned alternatively every three years to prevent encroachment of woody species into the wetlands. Too frequent burning of these wetland areas would attract large numbers of grazing animals causing compaction of the soil and erosion (Van Staden, in prep.).

The Grassland Habitat Type further provides the ideal habitat for nocturnal specialized insect feeders like the aardvark (*Orycteropus afer*), aardwolf (*Proteles cristatus*), bat-eared fox (*Otocyon megalotis*) (SG 8, T 7.1) and pangolin (*Manis temminckii*) (SG 9, T 7.1), mostly being termite feeders (Skinner & Smithers, 1990). These animals are shy animals and rarely seen when night drives are provided to tourists on private game reserves such as Welgevonden Private Game Reserve, Entabeni Nature Reserve, Shambala Private Game Reserve. Longer exposure of these animals to game drive vehicles and floodlights at night might yield sightings that are more regular.

Furthermore, the grassland habitat provides the ideal habitat for prey species (e. g. shrews, mice, rats and several bird species) for the smaller nocturnal cats like caracal (*Caracal caracal*) (SG 7, T 7.1), serval (*Leptailurus serval*), african wild cat (*Felis lybica*) (SG 9, T 7.1), as well as the two south African jackal species [black backed

jackal (*Canis mesomelas*) SG 7, T 7.1) and side-striped jackal (*Canis adustus*), SG 8, T 7.1] and fox species (Cape Fox). Other typical prey species of these small predators within this habitat type include scrub hare (*Lepus saxatilis*) and springhare (*Pedetes capensis*) (SG 7, T 7.1). The only large predator occurring within the Grassland Habitat Type is the cheetah (*Acinonyx jubatus*) (SG 7, T 7.1), preferring open areas with adequate prey species like impala (Skinner & Smithers, 1990). Not many cheetahs occur within conservation areas in the Waterberg Biosphere Reserve, and their vulnerable conservation status (Hilton-Taylor, 2000) need to be seriously considered within conservation monitoring programs. The predators and insect-eating carnivores described above may occur throughout grasslands in the Waterberg Biosphere Reserve and are not restricted by fences.

The Grassland Habitat Type is the most suitable habitat for easy game viewing by tourists visiting reserves like the Nylsvlei Nature Reserve and old field areas in other reserves within the Biosphere Reserve. However, tall grass and reedbeds might hamper viewing in floodplain areas and secondary old fields during the warm summer months (growing season). The predators within this habitat type are mostly nocturnal, except the cheetah, and if night drives are provided tourists might see these animals (e. g. serval, caracal, african wild cat, jackal species) (Figure 7.4). Rare grazing species like reedbuck, roan and tsessebe also occur here, as well as grazers that are more common (blue wildebeest, Burchell's zebra, impala, blesbok and white rhinoceros). The open habitat type provides the ideal opportunity for day and night drive activities, and guided walking safaris.

It should however be emphasized that the different plant communities within this habitat type, have different plant species composition, resulting in differences in grazing capacity (Van Staden, in prep.; Newberry, 1998; Bothma, 2000), which in turn will influence the numbers of animals it can support. This will influence veld management strategies, which is not addressed in this study.

Figure 7.4 Small predator like serval occur within the Grassland Habitat Type in the vicinity of water.



Figure 7.3 Blesbok seen on the old fields at Jobedi Game Lodge. The old fields provide an added man-made habitat to blesbok in the Waterberg Biosphere Reserve.



Figure 7.4 Small predators like serval occur within the Grassland Habitat Type in the vicinity of water.

3. Savanna Woodland Habitat Type

This habitat type is typical of the savanna woodlands of the low-lying and flat areas within the Waterberg Biosphere Reserve. One of the most important facts out of a tourist's point of view is that it has the potential (and in some locations like the Welgevonden Private Game Reserve, it does) to host the big five (lion, elephant, rhinoceros, buffalo and elephant). Three different plant communities provide habitats to mammals namely the *Terminalia sericea-Eragrostis pallens* deep sand community, the *Burkea africana-Setaria sphacelata* community of foothills, undulating plains and terraces, and the *Acacia nigrescens-Grewia flava* plains community (Chapter 4). The savanna woodland of southern Africa occupies the major portion of the subcontinent. It varies widely between two principal types - the arid "sweet" bushveld and the moist "sour" bushveld types. The distinction is reflected in the degree to which the nutritional (grazing) value of grasses, shrubs and trees of these two savanna woodland types is maintained into the long, dry winter (Mills & Hes, 1997). Two diagnostic mammal species occur within this habitat type as follows (SG 3, T 7.1):

Lycaon pictus (Wild dog)

Oryx gazella (Gemsbok)

The wild dog is listed in the South African Red Data List as endangered species (Hilton-Taylor, 2000), and the occurrence of free-roaming packs of wild dogs is extremely rare, although they are occasionally seen. Reich (1977) found that their home ranges within the Kruger National Park are as large as 450 km². However, wild dogs have been relocated recently on the Shamabala Private Game Reserve and Marakele National Park within the Biosphere Reserve, and the potential of these fascinating predators for tourism could be hugely beneficial to the large reserves within the Biosphere Reserve.

Gemsbok are essentially a species of open, arid country (Skinner & Smithers, 1990), and due the lack of many of such conservation areas in South Africa, they are classified as lower risk species, dependent on conservation. Although game reserves and game farmers do have gemsbok on their properties within the Sour Bushveld Veld Type (Acocks, 1988), these areas are not suitable habitat and they are better

adapted for the Arid Sweet Busveld (Acocks, 1988) areas to the north of the Biosphere Reserve. Reserves like the Wonderkop Nature Reserve, Keta Private Nature Reserve and Masebe Nature Reserve provides the suitable habitat for gemsbok.

Several herbivores occur within this Savanna Woodland habitat type, and are separated into grazers (grass-eating species) or browsers (leaf-eating species) (Eltringham, 1979). Grazers, browsers or grazer-browser species (e. g. impala, eland, elephant) occurring typically within the plains of the *Acacia nigrescens-Grewia flava* community (Chapter 4), are typical arid savanna species like elephant (*Loxodonta africana*), black rhinoceros (*Diceros bicornis minor*) (SG 4, T 7.2), kudu (*Tragelaphus strepsiceros*), buffalo (*Syncerus caffer*), blue wildebeest, Burchell's zebra, impala (SG 7, T 7.1) and giraffe (SG 8, T 7.1) (*Giraffa camelopardalis*) (Mills & Hes, 1997). Typical arid areas where some of these species can be seen within the Waterberg Biosphere Reserve include the Marakele National Park and Wonderkop Nature Reserve.

The other two plant communities occur mostly within the Waterberg Mountain range and usually carry soils that are poor in nutrients and occasionally waterlogged during the rainy season. The vegetation is subsequently of low nutritive value and low density ungulate species such as roan antelope and sable antelope do occur here (Mills & Hes, 1997). White rhinoceros, red hartebeest and tsessebe, all being classified as lower risk species occur on the low-lying areas (*Terminalia sericea-Eragrostis pallens* community, Chapter 4) of conservation areas, while species like chacma baboon, mountain reedbuck and Jameson's red rock rabbit can be seen on the rocky terraces and undulating plains. Bothma (2000) noted that rare antelope species like sable antelope (lower risk species, conservation dependent) and roan antelope can be utilized commercially in breeding programs, and many game farmers have recognized game ranching as an agricultural enterprise in the Limpopo Province (Van der Waal & Dekker, 2000).

Predators are specialized mammal species, and can be of great value on large game farms and reserves in controlling ungulate numbers (Bothma, 2000). Several predator species (including the big cat species lion, leopard and cheetah) occur within this

habitat type. Leopards roam freely in the Waterberg, and Grimbeeck (1991) observed that leopard density and distribution patterns within the Waterberg area are relatively safe. Leopards occur throughout the Waterberg Biosphere Reserve, and although rarely seen by tourists, they may be seen more regularly if game drives (day and night) are provided so that these cats can become used to the game drive vehicles. Reports by guides on the Welgevonden Private Game Reserve have in fact confirmed that leopards are seen more regularly when exposed to game drive vehicles and floodlights (Kilian, pers. comm.). The vulnerable (Hilton-Taylor, 2000) lion occurs in the Welgevonden Private Game Reserve, Touchstone Game Lodge, Shambala Private Game Reserve and Entabeni Game Reserve within the Biosphere Reserve (Figure 7.5). They need to be implemented as part of a special conservation strategy on reserves where they occur. Lion occur in a wide range of habitats mostly dependent on the availability of prey species (Skinner & Smithers, 1990). Although cheetah prefers open areas for hunting, Gros & Rejmanek (1999) noted that cheetah prefers habitats with a 25-50% woody cover and grasses of medium height in Uganda, similar to this habitat type. Cheetahs have been relocated on places such as the Welgevonden Private Game Reserve and Shambala Private Game Reserve, yet wild individuals roam the Waterberg Biosphere Reserve and are occasionally seen by tourists on game reserves. The other large predators, although mostly scavenging, include the brown hyaena (*Parahyaena brunnea*) (SG 5, T 7.1), occurring mostly within the sour bushveld communities described above, and the spotted hyaena (*Crocuta crocuta*) (SG 7, T 7.1), occurring on the arid sweet plains, although being rarely seen. Hilton-Taylor (2000) classifies both of these species as lower risk species dependent on conservation areas. The lack of many conservation areas on the arid sweet plains makes the presence of the spotted hyaena highly unlikely, although individuals may occur. This is totally different for the brown hyaena, which thrives in the many reserves within the moist mountainous areas. Other smaller nocturnal predators occurring within this habitat type and could possibly be seen on night drives offered by game reserves include large spotted genet, small spotted genet (arid areas) (SG 5, T 7.1), caracal, black backed jackal (SG 7, T 7.1), sidestriped jackal (SG 8, T 7.1) and african wild cat (SG 9, T 7.1).

This habitat type provides an excellent opportunity for tourists to see most of the grazer species in the Waterberg Biosphere Reserve. The open woodland vegetation

structure provides excellent viewing of species such as blue wildebeest. This habitat can also host the "Big Five" (if present on the reserve). It is also quite suitable for short, easy guided walks on reserves. Nocturnal animals and predators abound and night drive activities through these areas are recommended for tourists.



Figure 7.5 Lion prefers the Savanna Woodland Habitat Type since prey species abound within it. The relocation of lion to larger reserves within the Waterberg Biosphere will certainly play a major part in increasing foreign tourist visits.

4. Dense Vegetation Habitat Type

This habitat type is represented as patches of vegetation within the Waterberg Biosphere Reserve. Three different plant communities identified in Chapter 4 are represented in this habitat type namely the kloof forest community (*Podocarpus latifolius-Diospyros whyteana*), termitaria and encroached areas community (*Acacia tortilis-Panicum maximum-Ziziphus mucronata*) and the sweet diabase/dolerite community (*Dombeya rotundifolia-Panicum maximum*). These communities have a dense woody component, although the undergrowth cover is low, especially in encroached areas and kloofs. Herbivores occurring in this habitat type are browsers, or both browsers and grazers. The following mammal species are diagnostic (SG 3, T 7.1):

Potamochoerus larvatus (Bushpig)

Tragelaphus angassi (Nyala)

Tragelaphus scriptus (Bushbuck)

Civettictis civetta (African Civet)

The bushpig and African civet are strictly nocturnal animals and omnivorous and carnivorous respectively (Skinner & Smithers, 1990). They are rarely seen, although the African civet are known to be in the vicinity of chalets and camping sites situated along riverine areas. The nyala and bushbuck are often in competition for the same habitat along riverine or forested areas. The nyala (classified as a lower risk, conservation dependent species) is mostly diurnal and browser-grazers, whilst bushbuck browses and is nocturnal in undisturbed areas, although they will also browse during the day (Skinner & Smithers, 1990). Both these species are extremely shy, though are more regularly sighted when introduced on game ranches.

Other typical herbivore species preferring this habitat type include elephant, black rhinoceros, common duiker (*Sylvicapra grimmia*) (SG 4, T 7.1) and kudu (SG 5, T 7.1) (Skinner & Smithers, 1990). The encroached areas on the plains within the Marakele National Park (Fig. 7.7) seem to be preferred by both black rhinoceros and elephant (Engelbrecht, pers. comm). However, both these species need to be incorporated in a monitoring and management plan of reserves, especially elephant

which requires a certain habitat (Bothma, 2000). Although the Waterberg area does not provide the most suitable habitat for black rhinoceros, they are selective feeders (Muya & Oguge, 2000), and the presence of a dolerite/diabase dyke on a large reserve or game farm might provide an added preferred habitat for the possible introduction of black rhinoceros. Other reserves where they can be seen within the Waterberg Biosphere Reserve include Lapalala Wilderness and Shambala Private Nature Reserve. The black rhinoceros are classified as critically endangered and the elephant as endangered by Hilton-Taylor (2000) and therefore need to be implemented as part of a conservation management strategy if present on reserves. In addition to tall closed woodland preferred by elephant (like kloof vegetation), as shown by Gertenbach (1987) in the Kruger National Park, they also utilize termitarium vegetation (Ruggiero & Fay, 1994). The presence of elephant on game reserves, as one of "The Big Five", could be vital in increasing tourism in the Biosphere Reserve. They have been introduced on most of the big reserves in the Biosphere Reserve (e. g. Entabeni Game Reserve, Marakele National Park, Lapalala Wilderness, Kwalata Game Lodge, Touchstone Game Lodge, Welgevonden Game Reserve and Shambala Private Nature Reserve).

Giraffe (SG 8, T 7.1) often browse the leaves of *Acacia* species occurring on termitaria, especially in open areas such as in the Nylsvlei Nature Reserve, whilst tree squirrels (*Paraxerus cepapi*), chacma baboon and vervet monkeys (*Chlorocebus mitis*) (SG 5, T 7.1) utilize the available fruits, seeds and gum from tree species such as *Pappea capensis*, *Acacia* species and *Grewia* species growing on termitaria (Chapter 6). Smaller carnivorous species like dwarf mongoose (*Helogale parvula*) (SG 8, T 7.1) and banded mongoose (*Mungos mungo*) (SG 4, T 7.1) use termitaria both as habitat and as feeding site, being carnivorous (Skinner & Smithers, 1990). Other animals like common duiker (SG 4, T 7.1) and nyala use termitaria vegetation mostly as shelter.

Nocturnal animals and predators especially associated with this dense vegetation structure include the thicktailed bushbaby, south African lesser bushbaby (SG 4, T 7.1), both genet species, leopard (SG 5, T 7.1), side-striped jackal (SG 8, T 7.1), African wild cat and lion (SG 9, T 7.1). Leopards and African wild cats use these thickets and riverine areas to hunt, and stalk their prey, whilst lion often rest in these

thickets (excluding kloof forest). The bushbaby- and genet species feed mostly on the insects occurring in the scanty undergrowth (Skinner & Smithers, 1990). Other nocturnal mammals with wide habitat tolerances (Skinner & Smithers, 1990) that may be sighted within this habitat type are porcupine (*Hystrix africae australis*), pangolin, honey badger (*Mellivora capensis*) and striped polecat (*Ictonyx striatus*) (SG 9, T 7.1).

This habitat type is very dense and it is difficult to view these mammal species. These areas should be approached quietly and slowly by guides to prevent scaring of animals and for increased viewing chance, whether in a game drive vehicle or on foot. Dangerous animals like elephant and black rhinoceros often occur in this habitat type, and therefore these areas should be assessed before entering, during guided walks. Mostly browsers or browser-grazers (like black rhinoceros, elephant, bushbuck and nyala) can be seen among the dense woody vegetation, whilst carnivores (leopard, African wild cat and African civet) use the dense vegetation as cover during hunting. Other species use the densely wooded areas as shelter (lion, common duiker).



Figure 7.7 Typical black rhinoceros and elephant habitat within the Marakele National Park

5. Rocky Mountain Slopes Habitat Type

This habitat type occurs over large mountainous terrain in the Biosphere Reserve. The plant communities represented include the *Diplorhynchus condylocarpon-Englerophyton magalismontanum* warm slopes community, and the *Protea caffra-Loudetia simplex* cool slopes community. This habitat type is present on the rocky slopes of most reserves and game farms within the main Waterberg Mountain Range. Bothma (2000) notes that mountainous areas are separate management units, and the soils of the mountainous areas is of a sandy rubbly nature, very poor in nutrients and acidic (Acocks, 1988). The vegetation of these areas are thus mostly Sour Bushveld (Acocks, 1988), which supports selective grazing mammal species. The following species are diagnostic (SG 1, T. 7.1).

Procavia capensis (Rock Dassie)

Oreotragus oreotragus (Klipspringer)

Pelea capreolus (Grey Rhebuck)

The klipspringer and grey rhebuck are classified as being lower risk species dependent on conservation. The habitat of these species within conservation areas in the Biosphere Reserve is however well represented and therefore they are not under immediate threat. This habitat type also includes typical mountain grasslands (Bothma, 2000), and this area support low densities of species like the grey rhebuck, eland (*Taurotragus oryx*), Mountain reedbuck (*Redunca fulvorufula*) and Jameson's red rock rabbit (*Pronolagus randensis*) (SG 5, T 7.1). This veld consists of short grasses (Bothma, 2000) and typical areas are represented in the High Altitude Mountain Ecozone (Chapter 5). Grazers mostly occur in these areas, although the highly selective browser, the klipspringer, and less selective browser, the kudu may occur in the shrubveld variation of the *Protea caffra-Loudetia simplex* plant community (Chapter 4).

The low lying, deciduous broadleaf plant communities of the rocky slopes in the Waterberg Biosphere Reserve (Coetzee *et al.* 1981), support similar species as the mountain grasslands, although overlapping habitats of the lowlands and slopes are more common. Certain species will graze or browse in the mountainous areas early in

the season after veld fires, since the young grass growth is more palatable then. Species like buffalo (Fig. 7.8), eland, kudu and mountain reedbuck (SG 5, T 7.1) can be found in this habitat type, while species like Burchell's zebra and red hartebeest (SG 7, T. 7.1) do not prefer this habitat but will occasionally utilize it. When fruit and seeds are present on trees such as *Sclerocarya birrea*, *Pappea capensis*, *Englerophytum magalismsontanum* and *Strychnos* species in this habitat type, chacma baboons and vervet monkeys will always be in the close vicinity.

Although larger mammal species may not be as common in this habitat type, smaller species such as the dassie and Jameson's red rock rabbit are important prey species to predators in this habitat type. Dassies are the main prey of leopard (SG 5, T 7.1) and black eagles in the rocky areas (Walker, 1986). The scavenger, the brown hyaena (SG 5, T 7.1), also seems to prefer these rocky areas to hide during the daytime, and these shy animals are more regularly sighted on game reserves in the Waterberg Biosphere Reserve when exposed to game drive vehicles and floodlights for long periods (Kilian, pers. comm.). Lion (SG 9, T 7.1) can be seen in this habitat type (if present on property), although it being more dependant on the availability of prey species (Skinner & Smithers, 1990). Other typical nocturnal animals which may be spotted by tourists in this habitat type include large spotted genet, small spotted genet and South African hedgehog (SG 5, T 7.1), and species with a wide habitat tolerance such as, African wild cat, porcupine, pangolin, honey badger and striped polecat (SG 9, T 7.1).

This habitat type is rugged and rocky and often difficult to access without fourwheel-drive vehicles. Although mammal species are not as common in these areas as in the grassland and savanna woodland habitat types, selective grazers and browsers do occur here. The area also provides plenty of shelter and mammals moving between lowlands and plateaus may be seen in this habitat type. Tourists must be prepared for a difficult and uncomfortable game drive when this habitat type is exploited within reserves. However, the spectacular scenery over the Waterberg and interesting variety of plant species increases makes this habitat type worthwhile to see for tourists.



Figure 7.8 Buffalo, spotted among *Protea caffra* representing the Rocky Mountain Slopes Habitat Type in the Entabeni Game Reserve

7.4 Conclusion

Game viewing is certainly one of the most popular tourist activities on game reserves in the Waterberg Biosphere Reserve. The incidence of a mammal species depend rather heavily on their food source availability and shelter (Delany, 1982), and therefore mammals will often move around in search of areas where their needs are optimally satisfied. However, although mammals are not absolutely restricted to specific habitat types, they still have certain preferences. Five different habitat types for the larger mammals within the Waterberg Biosphere Reserve were identified according to habitat preferences as follows:

- Open Water Habitat Type
- Grassland Habitat Type
- Savanna Woodland Habitat Type
- Dense Vegetation Habitat Type
- Rocky Mountain Slopes Habitat Type

These habitat types provide tourists and tourist guides the most likely localities where the mammals might be seen. Different mammal species might be seen in different habitat types comprised of different plant communities during different times of the day. Most herbivore species can be seen during the day during game drives, although night drives give tourists the opportunity to see shy nocturnal animals (e. g. aardvark, genets, bushbabies) and predators (e. g. leopard, brown hyaena, caracal). An aspect not included in this chapter is the seasonal variation in feeding periods of herbivores (Eltringham, 1997), which subsequently will also influence predator movements. Future research on this topic could provide further useful information in this regard to game reserves and parks hosting tourists in the Waterberg Biosphere Reserve.

Furthermore, the habitat types provide game farmers and reserve managers with useful information on which animals could be introduced on their property. However, most areas of the Waterberg Biosphere Reserve falls within the Sour Bushveld Veld Type (Acocks, 1988) and therefore the mammal species should be actively managed (game numbers, water, grazing capacity etc.) through a wildlife management plan.

This is even more important considering the species included in Appendix 7.2 listed as threatened in the IUCN red data list of South African mammals. Species like the critically endangered black rhinoceros, vulnerable cheetah and lion and endangered elephant and wild dog need monitoring programs and special conservation management strategies on their locations within the Waterberg Biosphere Reserve. However, the other species included as lower risk species in Appendix 7.2, dependent on conservation, are well represented within the conservation areas of the Waterberg and are not as threatened.

Species	Waterberg	Waterberg Biosphere Reserve	Total
Black Rhinoceros	1	1	2
Cheetah	10	10	20
Lion	10	10	20
Elephant	10	10	20
Wild Dog	10	10	20
Other species

Table 7.1 Synoptic Table of the mammal habitat types within the Waterberg Biosphere Reserve

Habitat Type	Rocky slopes	Dense Vegetation	Savanna Woodland	Grassland	Open Water
Number of Plant Communities	2	3	3	3	1
Species Group 1					
Rock Dassie	100				
Klipspringer	100				
Grey Rhebuck	50				
Species Group 2					
Bushpig		100			
Nyala		100			
Bushbuck		100			
African Civet		66			
Species Group 3					
Gemsbok				100	
Wild dog				100	
Species Group 4					
Thick-tailed Bushbaby		100	33		
African Elephant		100	66		
Black Rhinoceros		100	33		
South African Lesser Bushbaby		33	100		
Banded Mongoose		66	66		
Common Duiker		66	66		
Species Group 5					
Large Spotted Genet	50	100	100		
Leopard	100	66	33		
Brown Hyaena	50	33	100		
Small Spotted Genet	50	33	100		
African Buffalo	50		66		
Kudu	50	33	33		
Tree Squirrel	50	66	100		
South African Hedgehog	50	33	100		
Eland	50		66		
Mountain Reedbuck	100		33		
Jameson's Red Rock Rabbit	100		33		
Chacma Baboon	50	66	33		
Vervet Monkey	50	100	66		

Species Group 6

Cape Fox	66
Cape Hare	33
Blesbok	33
Springbok	33
Reedbuck	66
Serval	66

Species Group 7

Springhare	33	100
Caracal	100	66
Roan	100	33
Sable	100	66
Scrub Hare	100	66
Warthog	100	66
Steenbok	66	66
Tsessebe	66	100
Cheetah	66	66
Black Backed Jackal	66	66
Blue Wildebeest	66	66
Spotted Hyaena	66	33
Burchell's Zebra	66	66
Impala	100	33
White Rhinoceros	100	66
Red Hartebeest	100	100

Species Group 8

Bat-eared Fox	33	33
Aardvark	33	66
Side-Striped Jackal	33	66
Waterbuck	33	66
Aardwolf	33	33
Giraffe	33	100
Dwarf Mongoose	33	100

Species Group 9

African Wild Cat	100	100	100	66
Porcupine	50	66	100	66
Pangolin	50	33	100	33
Lion	100	66	100	33
Honey Badger	100	100	100	100
Striped Polecat	100	66	100	100

Species Group 10

Hippopotamus	100
Cape Clawless Otter	33

Table 7.2 Classification of the larger mammal species within the Waterberg Biosphere Reserve (Plant Community numbers as described in Chapter 4)

Plant communities

4 5 3 9 10 6 7 11 1 8 12 2

Species Group 1

Rock Dassie

1	1
---	---

Klipspringer

1	1
---	---

Grey Rhebuck

1

Species Group 2

Bushpig

1	1	1
---	---	---

Nyala

1	1	1
---	---	---

Bushbuck

1	1	1
---	---	---

African Civet

1	1
---	---

Species Group 3

Gemsbok

1	1	1
---	---	---

Wild dog

1	1	1
---	---	---

Species Group 4

Thick-tailed Bushbaby

1	1	1			1
---	---	---	--	--	---

African Elephant

1	1	1	1		1
---	---	---	---	--	---

Black Rhinoceros

1	1	1			1
---	---	---	--	--	---

South African Lesser Bushbaby

		1		1	1	1
--	--	---	--	---	---	---

Banded Mongoose

		1	1	1	1	
--	--	---	---	---	---	--

Common Duiker

		1	1	1		1
--	--	---	---	---	--	---

Species Group 5

Large Spotted Genet

		1	1	1	1	1	1	1
--	--	---	---	---	---	---	---	---

Leopard

1	1	1	1			1		
---	---	---	---	--	--	---	--	--

Brown Hyaena

		1			1	1	1	1
--	--	---	--	--	---	---	---	---

Small Spotted Genet

		1			1	1	1	
--	--	---	--	--	---	---	---	--

African Buffalo

		1					1	
--	--	---	--	--	--	--	---	--

Kudu

		1			1			
--	--	---	--	--	---	--	--	--

Tree Squirrel

		1		1	1	1	1	1
--	--	---	--	---	---	---	---	---

South African Hedgehog

		1			1	1	1	1
--	--	---	--	--	---	---	---	---

Eland

1						1		1
---	--	--	--	--	--	---	--	---

Mountain Reedbuck

1	1					1		
---	---	--	--	--	--	---	--	--

Jameson's Red Rock Rabbit

1	1					1		
---	---	--	--	--	--	---	--	--

Chacma Baboon

		1	1	1		1		
--	--	---	---	---	--	---	--	--

Vervet Monkey

		1	1	1	1	1		1
--	--	---	---	---	---	---	--	---

Species Group 6

Cape Fox	1	1
Cape Hare	1	
Blesbok	1	
Springbok	1	
Reedbuck	1	1
Serval	1	1

Species Group 7

Springhare	1	1	1	1
Caracal	1	1	1	1
Roan	1	1	1	1
Sable	1	1	1	1
Scrub Hare	1	1	1	1
Warthog	1	1	1	1
Steenbok	1	1	1	1
Tsessebe	1	1	1	1
Cheetah	1	1	1	1
Black Backed Jackal	1	1	1	1
Blue Wildebeest	1	1	1	1
Spotted Hyaena	1	1	1	
Burchell's Zebra	1	1	1	1
Impala	1	1	1	1
White Rhinoceros	1	1	1	1
Red Hartebeest	1	1	1	1

Species Group 8

Bat-eared Fox	1	1		
Aardvark	1	1	1	1
Side-Striped Jackal	1	1	1	1
Waterbuck	1	1	1	1
Aardwolf	1	1	1	1
Giraffe	1	1	1	1
Dwarf Mongoose	1	1	1	1

Species Group 9

African Wild Cat	1	1	1	1	1	1	1	1	1
Porcupine	1	1	1	1	1	1	1	1	1
Pangolin	1	1	1	1	1	1	1	1	1
Lion	1	1	1	1	1	1	1	1	1
Honey Badger	1	1	1	1	1	1	1	1	1
Striped Polecat	1	1	1	1	1	1	1	1	1

Species Group 10

Hippopotamus	1
Cape Clawless Otter	1

7.5 References

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Appendix 7.1 Larger mammals of the Waterberg Biosphere Reserve and their habitat preferences according to two references

GENUS	SPECIES	Common name	Habitat Preferences (Skinner & Smithers, 1990)	Habitat Preferences (Mills & Hes, 1997)
ACINONYX	JUBATUS	Cheetah	Savanna woodland; open plains	Open plains, savanna woodland
AEPYCEROS	MELAMPUS	Impala	Open woodland, ecotone of grassland and woodland	Woodlands with shrubs, flat and gently undulating areas
ALCELAPHUS	BUSELAPHUS	Red hartebeest	Open grassland, vleis, open woodland	Open woodland, grassland, arid
ANTIDORCAS	MARSUPIALIS	Springbok	Open arid grassland	Short grass savanna
AONYX	CAPENSIS	Cape clawless otter	Aquatic, water areas with sufficient cover around; woodland, forest, grassland	Freshwater
ATELERIX	FRONTALIS	South African hedgehog	Any habitat with dry cover, not forests	Avoid mesic habitats, Acacia woodland
CANIS	ADUSTUS	Side-striped jackal	Closed savanna woodland, water closeby	Well watered broadleaf savanna
CANIS	MESOMELAS	Black-backed jackal	Open savanna woodland and grassland	Open terrain
CARACAL	CARACAL	Caracal	Open savanna woodland, associated with open vleis and grassland	Open areas (vleis, wooded savanna, rocky areas)
CERATOTHERIUM	SIMUM	White rhinoceros	Open savanna woodland, grasslands, water essential(mud)	Open savanna bushveld
CHLOROCEBUS	MITIS	Vervet monkey	Riparia savanna vegetation, riverine woodland	Forest edges, sufficient tree woodlands
CIVETTICTIS	CIVETTA	African civet	Forest, thicket along permanent water	Woodland and riverine
CONNOCHAETES	TAURINUS	Blue wildebeest	Savanna woodland, water and shade essential	Short grass plains in savannas
CROCUTA	CROCUTA	Spotted hyaena	Open woodland and plains	Open plains and savannas
DAMALISCUS	LUNATUS	Tsessebe	Floodplains, areas close to open surface water, open woodland	Lightly wooded savannas, not arid
DAMALISCUS	PYRGARGUS	Blesbok	Grasslands with water available	Open grassland with water
	PHILLIPSI			
DICEROS	BICORNIS MINOR	Black rhinoceros	Closed savanna woodland, thicket (tamboti), forest margins, ridges, encroached areas	Riverine and drainage line thicket, termitaria
EQUUS	BURCHELLI	Burchell's zebra	Open woodland, grassland (plains), water essential	Open plains, savanna woodland and grasslands
FELIS	LYBICA	African wild cat	Rocky hillsides, riverine underbrush, reedbeds, tall grass, kloofs, termitaria	Wide range, not arid
GALAGO	MOHOLI	South African lesser bushbaby	Savanna woodland, Acacia woodland; mixed Acacia associations	Open woodland
GENETTA	GENETTA	Small-spotted genet	Open savanna woodland, dry grasslands or vleis -arid areas	Woodland and riverine, dry areas
GENETTA	TIGRINA	Large-spotted genet	Riverine areas, savanna woodland	Closed woodland with water, forest
GIRAFFA	CAMELOPARDALIS	Giraffe	Open savanna woodland and scrub, Acacia species nb	Acacia savanna, open woodland
HELOGALE	PARVULA	Dwarf mongoose	Dry open woodland and grassland, termitaria	Open woodland, termitaria
HETEROHYRAX	BRUCEI	Yellow-spotted rock dassie	Rocky terrain, hills and outcrops	Rocky outcrops
HIPPOPOTAMUS	AMPHIBIUS	Hippopotamus	Open water with sandy banks	Open water, nearby grasslands
HIPPOTRAGUS	EQUINUS	Roan	Open savanna woodland with tall grass, water essential	Medium to tall grass in open savanna
HIPPOTRAGUS	NIGER	Sable	Open woodland with adjacent vleis or tall grassland, water	Open savanna bushveld, medium height grass

HYSTRIX	AFRICAEAUSTRALIS	Porcupine	essential	with moist vleis
ICTONYX	STRIATUS	Striped polecat	Rocky terrain, hills and outcrops, savanna woodland	Forests, woodland, savannas, grasslands
KOBUS	ELLIPSIPRYMNUS	Waterbuck	Open grassland, savanna woodland and forest	All habitats except forest
LEPTAILURUS	SERVAL	Serval	Water associated areas, floodplains, open woodland	Dense, woody vegetation near water, open water, floodplains
LEPUS	CAPENSIS	cape hare	Permanent water, tall grass, underbush and reedbeds	Moist tall grasslands
LEPUS	SAXATILIS	Scrub hare	Grassland, open arid country	Open arid terrain, short open grassland
LOXODONTA	AFRICANA	African elephant	Savanna woodland, scrub	Scrub, tall grassland and savanna
LYCAON	PICTUS	Wild dog	Riverine valleys, woodland, forests, water essential	Savanna and woodland, forests
MANIS	TEMMINCKII	Pangolin	Open plains and savanna woodland	Savanna woodlands, broken hilly terrain
MELLIVORA	CAPENSIS	Honey badger	Savanna woodland with scrub, rocky hills, sandveld	Savanna woodlands, floodplains, rocky slopes, sandveld, termitaria
MUNGOS	MUNGO	Banded mongoose	Any habitat	All habitats
OREOTRAGUS	OREOTRAGUS	Klipspringer	Closed savanna woodland, underbush, termitaria, thicket	Woodland and open savanna, termitaria
ORYCTEROPUS	AFER	Aardvark	Rocky habitat, mountainous	Rocky outcrops, slopes
ORYX	GAZELLA	Gemsbok	Open woodland, scrub and grassland (sandy), termitaria, not rocky	Open disturbed grassland, sandveld, floodplains
OTOCYON	MEGALOTIS	Bat-eared fox	Open grassland, bush savanna and woodland, arid	Arid open grasslands, rocky areas also
OTOLEMUR	CRASSICAUDATUS	Thick-tailed bushbaby	Short open grassland with termitaria, open woodland with scant undercover	Short grassland with scattered shrubs
PANTHERA	LEO	Lion	Forests, thicket and closed savanna woodland	Open woodland savanna, prefer riverine thicket
PANTHERA	PARDUS	Leopard	Any habitat except forest	Not forests and arid extremes
PAPIO	URSINUS	Chacma baboon	Rocky koppies, hills, mountain ranges and forest	Mountains, rocky, bushveld, woodlands
PARAHYAENA	BRUNNEA	Brown hyaena	Mountainous terrain, riverine woodland, forests	Cliffs, high trees
PARAXERUS	CEPAPI	Tree squirrel	Open woodland savanna, rocky mountainous areas with bush cover	Open woodland
PEDETES	CAPENSIS	Springhaas	Savanna woodland	Savanna woodland
PELEA	CAPREOLUS	Grey rhebok	Sandy soils, grasslands, vleis, floodplains	Short grassland, open vegetation, sandy soils, floodplains
PHACOCHOERUS	AFRICANUS	Warthog	Rocky hills, mountain slopes and mountain plateaus with grassland	Hills, mountains, slopes and plateaus, no rocks
POTAMOCHOERUS	LARVATUS	Bushpig	Open woodland, scrub, grassland, floodplains around waterholes	Savanna and open woodlands
PROCAVIA	CAPENSIS	Rock dassie	Forest, thicket, riparian undercover, tall grassland, water essential	Forests and riverine
PRONOLAGUS	RANDENSIS	Jameson's red rock rabbit	Rocky terrain, hills and outcrops	Rocky outcrops with forage
PROTELES	CRISTATUS	Aardwolf	Rocky koppies, escarpment, rocky kloofs and gorges, boulder strewn hillsides	Rocky mountainous escarpment
			Open grassland and open savanna, vleis, termitaria	Open grassland, scrub

RAPHICERUS	CAMPESTRIS	Steenbok	Open grassland and open woodland	Open areas, tall grass with bushclumps
REDUNCA	ARUNDINUM	Reedbuck	Tall grassland, reedbeds, vleis,	Moist grassland
REDUNCA	FULVORUFULA	Mountain reedbuck	Dry grasslands on stony mountain lower slopes, open mountain grassland	Grassy mountain slopes with bushclumps
SYLVICAPRA	GRIMMIA	Common duiker	Closed woodland with underbush	Savanna woodland, shrubby grassland
SYNCERUS	CAFFER	African buffalo	Savanna woodland, water, grass and shade essential	Open woodland, grass and water
TRAGELAPHUS	ORYX	Eland	Open savanna woodland, scrub	Mountain grassland, moist savannas
TRAGELAPHUS	ANGASSI	Nyala	Closed woodland savanna, thicket, riverine woodland, forest	Dense woodland, thicket
TRAGELAPHUS	SCRIPTUS	Bushbuck	Riverine, underbush, water essential	Forest, closed woodland, riverine woodland
TRAGELAPHUS	STREPSICEROS	Kudu	Savanna woodland, rocky terrain with water, riverine woodland (thicket)	rocky hills, woodland
VULPES	CHAMA	Cape fox	Open grassland, grassland with scattered thicket	Open grassland, scattered thicket

Appendix 7.2 Conservation Status of mammal species in South Africa as classified by Hilton-Taylor (2000) in the Red data species list of the IUCN

Common name	Status
Cheetah	Vulnerable
Impala	Lower Risk (cd)
Red hartebeest	Lower Risk (cd)
Springbok	Lower Risk (cd)
Cape clawless otter	Common
South African hedgehog	Common
Side-striped jackal	Common
Black-backed jackal	Common
White rhinoceros	Lower Risk (cd)
Vervet monkey	Common
African civet	Common
Blue wildebeest	Lower Risk (cd)
Spotted hyaena	Lower Risk (cd)
Tsessebe	Lower Risk (cd)
Blesbok	Lower Risk (cd)
Black rhinoceros	Critically Endangered
Burchell's zebra	Common
Caracal	Common
African wild cat	Common
Serval	Common
South African lesser bushbaby	Common
Small-spotted genet	Common
Large-spotted genet	Common
Giraffe	Lower Risk (cd)
Dwarf mongoose	Common
Yellow-spotted rock dassie	Common
Hippopotamus	Common
Roan	Common
Sable	Lower Risk (cd)
Brown hyaena	Lower Risk (cd)
Porcupine	Common
Striped polecat	Common
Waterbuck	Lower Risk (cd)
cape hare	Common
Scrub hare	Common
African elephant	Endangered
Wild dog	Endangered
Pangolin	Lower Risk (cd)
Honey badger	Common
Banded mongoose	Common
Klipspringer	Lower Risk (cd)
Aardvark	Common
Gemsbok	Lower Risk (cd)
Bat-eared fox	Common
Thick-tailed bushbaby	Common

Lion	Vulnerable
Leopard	Common
Chacma baboon	Common
Tree squirrel	Common
Springhaas	Common
Grey rhebok	Lower Risk (cd)
Warthog	Common
Bushpig	Common
Rock dassie	Common
Jameson's red rock rabbit	Common
Aardwolf	Common
Steenbok	Common
Reedbuck	Lower Risk (cd)
Mountain reedbuck	Lower Risk (cd)
Common duiker	Common
African buffalo	Lower Risk (cd)
Eland	Lower Risk (cd)
Nyala	Lower Risk (cd)
Bushbuck	Common
Kudu	Common
Cape fox	Common

Appendix 7.3 Conservation status descriptions as classified in the IUCN red data list of threatened animals (Hilton-Taylor, 2000)

Critically Endangered:

A Taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future.

Endangered:

A Taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future.

Vulnerable (Vu):

A Taxon is Vulnerable when it is not Critically Endangered or Endangered but is facing a very high risk of extinction in the wild in the medium-term future.

Lower Risk (LR):

A Taxon is Lower Risk when it has been evaluated, does not satisfy the criteria for any of the categories Critically Endangered, Endangered or Vulnerable. Taxa in the Lower Risk category can be separated into three subcategories:

1. Conservation dependent (cd). Taxa which are the focus of a continuing taxon-specific or habitat-specific conservation program targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories above within a period of five years
2. Near Threatened (nt). Taxa which do not qualify for Conservation Dependent, but which are close to qualifying for Vulnerable
3. Least Concern (lc). Taxa which do not qualify for Conservation Dependent or Near Threatened