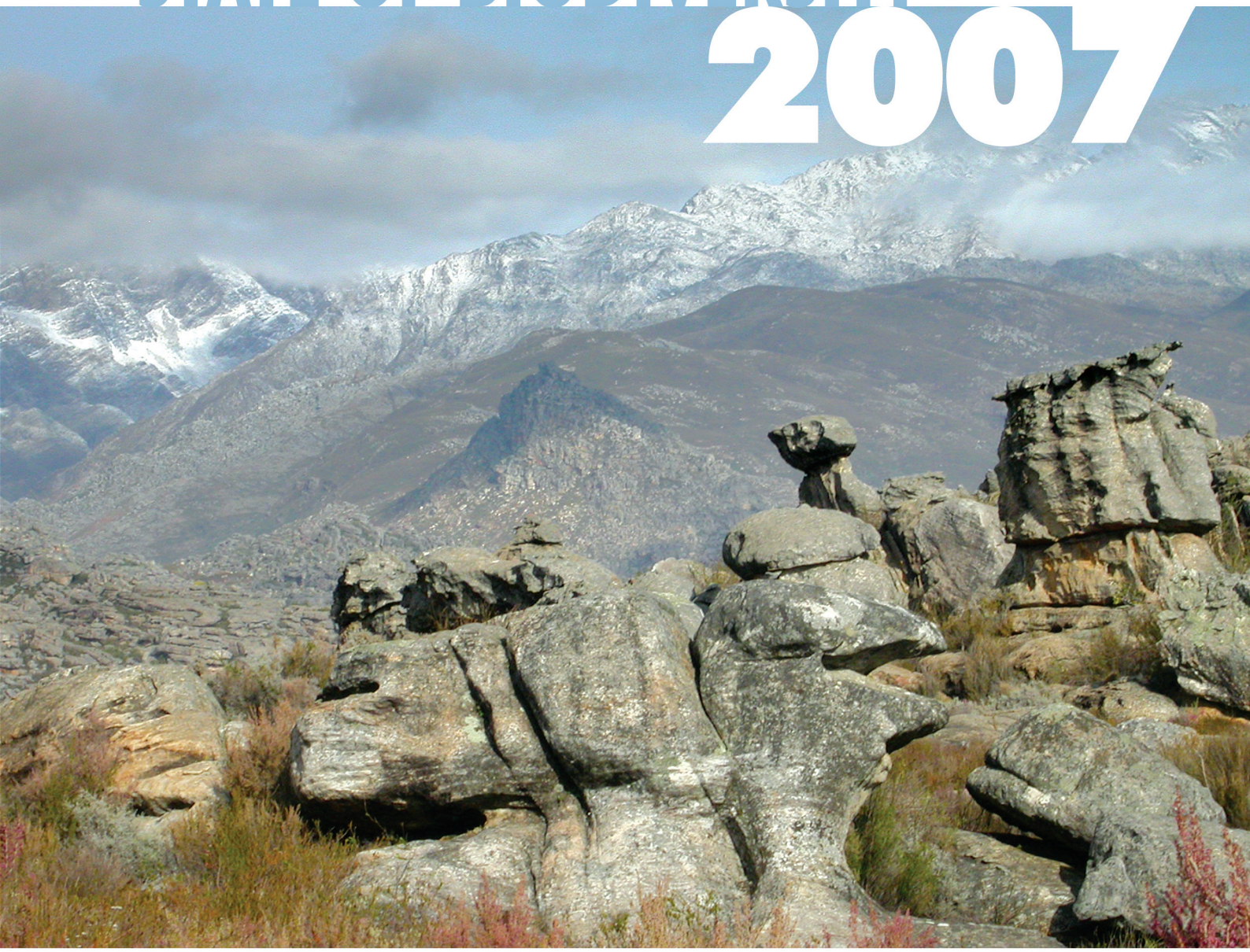
WESTERN CAPE PROVINCE STATE OF BIODIVERSITY 2007



CapeNature

SCIENTIFIC SERVICES

CHAPTER 5

REPTILES

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Executive Summary

Both reptile systematics and conservation status are out of date and in need of urgent review. There are plans underway to revise both these aspects that are crucial to evaluating the state of reptiles in the Western Cape Province. There are several active research projects that are making significant contributions to the knowledge of Western Cape Province reptiles and these will help provide the basis for more rigorous conservation assessments in the future. A substantial number of new distribution records have been accumulated, particularly from formalized surveys. There is insufficient population monitoring of reptiles and this is an area that needs to be addressed.

INTRODUCTION

The 2002 Western Cape State of Biodiversity report dealt with reptiles and amphibians in one chapter (Baard & De Villiers 2002). This report treats each class separately and this approach is taken for several reasons:

1. the conservation status of South African amphibians has been formally revised within the last reporting period (Minter *et al.* 2004);
2. the conservation status of South African reptiles is outdated (Branch 1988) and has not yet been revised; and
3. the two classes, although often treated together, are biologically very different and interact with the environment and humans in very different ways (see Chapter 4 on Amphibians).

The Western Cape Province (WCP) is home to a large number of reptile species. One hundred and forty eight of the 411 species and subspecies (36%) found in South Africa are known to occur here. This is due to the diversity of habitats in the province and the ability of reptiles to utilise all these habitats.

The Southern African Reptile Conservation Assessment (SARCA) was launched in May 2005 to begin a revision of the distribution and conservation status of Southern Africa's reptile species, and will revise the outdated SA Red Data List for Reptiles and Amphibians (Branch 1988). This project is funded by the South African National Biodiversity Institute (SANBI) and run in collaboration with the Avian Demography Unit of the University of Cape Town.

METHODS

General methods are covered in Chapter 2. Specific methods largely follow Baard & and De Villiers 2002 with the following differences. Since the 2002 report by Baard & De Villiers *op. cit.*) there have been substantial contributions of good quality and in the form of recent distribution data. The majority of these have come from the species diversity, genetic diversity and conservation of the Cape Fold Montane Herpetofauna Project (CFMHP) and the Survey of Cederberg Amphibians and Reptiles for Conservation and Ecotourism (SCARCE). The number of reptile distribution records that we were able to draw on for the current report was 24 216 which represents a significant increase over the 13 754 records available for the 2002 report.

SYSTEMATIC ACCOUNT

As reported in the previous report (Baard and De Villiers 2002), systematic knowledge of the Western Cape Province's reptiles is still in an alpha taxonomic stage with new species still being discovered and described. In the WCP, at least 9 new species have been discovered and one has been described (Bauer *et al*. 2003). This mirrors the situation in southern Africa generally where current estimates put the total number of reptile species at 520 or more (Branch 2006), which represents a dramatic increase from the last published total of 397 (Branch 1998). A complete list of described reptile taxa known to occur in the WCP is given in Appendix 1.

A major advance has been the resolution of the Western and Eastern Cape dwarf chameleon (*Bradypodion*) taxonomy by Dr Krystal Tolley (SANBI) (Tolley & Burger, 2004, Tolley *et al.* 2004, Tolley *et al.* 2006a). We now have a much clearer view of the systematics of this group although we are still awaiting the description of several new species. In addition, we have also gained insight into the evolution of this group in conjunction with vegetation and climatic changes that are also likely to have been important drivers of evolution and speciation in other groups.

Advances have also been made in the notoriously difficult lacertid family with the phylogenetic work done by Sakwa Makhoka (University of Stellenbosch) focussing on the genus *Pedioplanis* (Makokha 2006). Greater insights into the Gekkonid genera *Afrogecko* and *Goggia* are being provided by the ongoing work by Kelley Whitaker (University of Pretoria) and Bill Branch (Bayworld).

The extensive revisionary work of Bauer and colleagues (see Bauer references in Branch 2006) is clarifying systematic relationships in several lizard groups *e.g. Pachydactylus, Pedioplanis, Scelotes, Nucras, Afroedura*.

The ability of field-based herpetologists to discover new species is unfortunately greater than the ability of systematists to name and describe them. However, co-operation on this task seems to be improving and is currently being addressed by a proposal to re-evaluate the systematics of Southern African reptiles (see Tolley *et al.* 2006b, Cunningham *et al.* 2006 and Branch 2006).

Given the dynamic state of reptile taxonomy, we include both subspecies and species in this chapter. Recent trends indicate that many described subspecies deserve specific status and to ignore the currently described subspecies may in effect be ignoring valid species. Some examples of this are *Pseudocordylus capensis robertsi*, *Acontias lineatus grayi,* and *Agama atra knobeli.*

Contrary to the previous report (Baard & De Villiers 2002), we do not provide summary statistics for the snakes, lizards and tortoises separately. Recent phylogenetic analyses (e.g. Vidal & Hedges 2004) show that the grouping commonly referred to as lizards (incorporating the families Scincidae, Lacertidae, Chameleonidae, Amphisbaenidae, Varanidae etc.) is paraphyletic with respect to snakes (families Colubridae, Elapidae, Viperidae etc.) and thus is not a justified systematic grouping.

DISTRIBUTION DATA

Distribution data have steadily accumulated since the previous report. Two major contributions to these data have come from the CFMHP and the Survey of Cederberg Amphibians and Reptiles for Conservation and Ecotourism (SCARCE). Further contributions are expected to start flowing in from the SARCA.

The current report is based on a total of 28354 reptile records for the Western Cape Province.

ENDEMISM

Reptile endemism in the WCP is lower in comparison to amphibians (see Chapter 4) and freshwater fish (see Chapter 3), but recent research indicates that the species richness has been underestimated as cryptic species continue to be revealed. These new species are generally endemic to the WCP and will increase the level of reptile endemism. Currently 23 of the 148 (16%) known indigenous reptile species and subspecies are endemic to the WCP (Table 1).

Table 1. Reptile species endemic to the Western Cape province.

Scientific Name	English Name
Psammobates geometricus	geometric tortoise
Bradypodion damaranum	Knysna dwarf chameleon
Bradypodion gutturale	Robertson dwarf chameleon
Bradypodion pumilum	Cape dwarf chameleon
Cordylus minor	dwarf girdled lizard
Cordylus niger	black girdled lizard
Cordylus oelofseni	Oelofsen's girdled lizard
Pseudocordylus capensis	graceful crag lizard
Pseudocordylus nebulosus	dwarf crag lizard
Afroedura hawequensis	Hawequa flat gecko
Afrogecko swartbergensis	Swartberg African leaf-toed gecko
Goggia braacki	Braack's dwarf leaf-toed gecko
Goggia microlepidota	small-scaled leaf-toed gecko
Australolacerta australis	southern rock lizard
Scelotes bipes	silvery dwarf burrowing skink
Scelotes gronovii	Gronovi's dwarf burrowing skink
Scelotes kasneri	Kasner's dwarf burrowing skink
Scelotes montispectus	Tableview dwarf burrowing skink
Bitis armata	southern adder

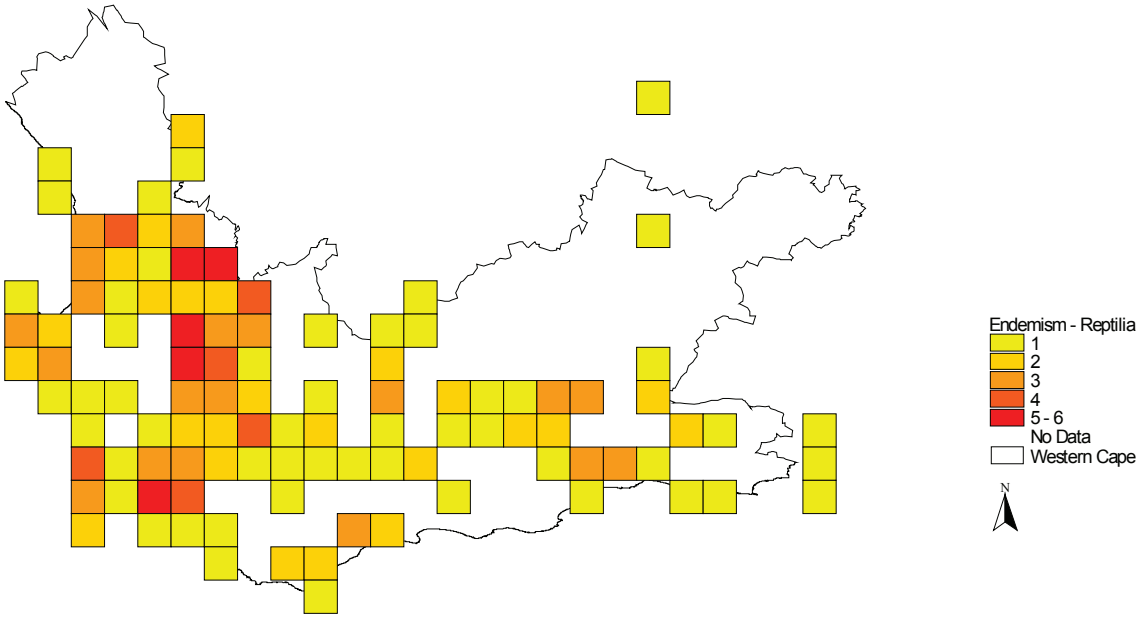

Figure 1. Map showing reptile endemism for each quarter degree in the Western Cape Province.

Although comprehensive geographic coverage of reptile occurrence of the WCP has not yet been achieved, Figure 1 indicates a general pattern of increased endemism over the Cape Fold Mountains. This is probably a result of the complex topography, old age and changing climate and vegetation patterns over time (e.g. see Linder & Hardy 2004).

CONSERVATION STATUS

The conservation status South African reptiles has not been formally assessed since the 1988 South African Red Data Book – Reptiles and Amphibians (Branch 1988). This situation is currently being addressed by the SARCA project. The SARCA is partially based on the concept of atlassing reptile species distributions, as done very successfully by the Southern African Bird Atlas Project (Harrison *et al.* 1997a, 1997b) and Southern African Frog Atlas Project (Minter *et al.* 2004). However it differs from these two atlas projects in that it does not aim, at least in its initial phase, to provide complete geographic coverage of Southern Africa. Instead it is taking a more directed approach by focussing on areas that are both historically neglected in terms of reptile distribution data and likely to house a representative diversity of reptiles. This approach is necessitated by the short time frame of SARCA Phase 1 relative to the enormity of the South African land surface and its incredible wealth of reptile diversity.

The conservation status of WCP reptiles is summarised in Figure 2. Each currently listed species' conservation status (Branch 1988 and IUCN 2006) is discussed below.

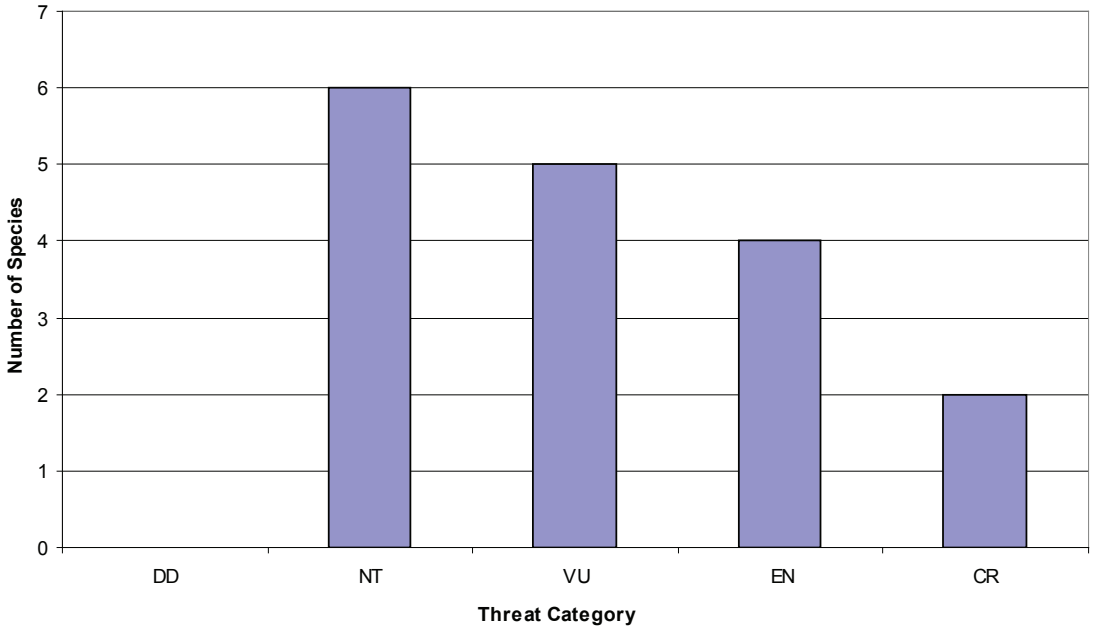

Figure 2. Number of reptiles species in each IUCN threat category. CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened and DD = Data Deficient.

CRITICALLY ENDANGERED

Eretmochelys imbricata and Dermochelys coriacia

Only the marine turtles *Eretmochelys imbricata* (hawksbill turtle) and *Dermochelys coriacia* (leatherback turtle) are currently classified as Critically Endangered. Both these species typically frequent warmer waters to the north and east of the WCP and do not breed on WCP shores. However, it is unknown to what extent they are making use of WCP waters as migratory routes or feeding sites. It is also unknown to what extent fishing activities in WCP marine waters affect these species. Several specimens, and mostly sub-adults, have washed up on WCP shores, usually following periods of rough seas or of significant upwelling events following strong off-shore winds causing ocean temperatures to drop significantly.

ENDANGERED

Psammobates geometricus

The conservation status of the geometric tortoise remains very concerning as suitable habitat for this species continues to be lost to agriculture. Remaining populations and natural lowland renosterveld habitats as reported by Baard (1997) remain under threat of being ploughed, overgrazed or otherwise disturbed. The extent of the habitat varies from small (<10 ha) to reasonably large (>1000 ha), but as population status surveys over the full extent of occurrence have not been systematically undertaken during this reporting period and thus population trends are currently unknown. During the reporting period, a very promising development has been the establishment of the CapeNature Stewardship Programme through which remaining Critically Endangered lowland habitats are being targeted for inclusion into the protected area network, as has been the case recently with the Voëlvlei- Conservancy, as recommended by Baard (1995, 1997). Several other habitats critical to the survival of isolated geometric tortoise populations, however, remain unprotected and there is a reasonably high risk of losing these if no proactive steps are taken.

In order to assess the conservation status of this species properly, a Population and Habitat Viability Assessment is urgently required. Recent analysis of aspects such as its breeding ecology and the potential

impact of more arid climatic conditions in future on fecundity and breeding success, may render this species highly vulnerable (Dr Retha Hofmeyr, UWC, pers. comm.). The geometric tortoise may be classified in a higher threat category pending further research into its general ecology and a proper analysis of its current extent of occurrence, area of occupancy and updated population status surveys.

VULNERABLE

Scelotes kasneri

Kasner's dwarf burrowing skink is rarely encountered which is probably due to its fossorial lifestyle. Recent records may indicate that its distribution is greater than previously known and may extend much further inland. The effect of increasing agriculture and urban expansion within the distribution range of this species should be examined before the conservation status of this species can be reliably determined.

Cordylus cataphractus

The armadillo lizard has a wide distribution and may be locally abundant but is very habitat specific and is restricted to certain areas with appropriate rock shelters. From a conservation status point of view and based on its wide distribution, relatively healthy population numbers and non-arable habitat, this species may be regarded as not threatened by any of the general threatening processes experienced in the region such as agricultural and urban expansion, coastal development or alien invasive species.

Legal commercial trade in this species is not permitted in the WCP. This species is in demand in the pet trade, and illegal collection of this species, despite strict legislation, appears to continue as witnessed by the arrest of several illegal collectors over the reporting period. Due to its gregarious lifestyle, the collection involves large numbers of individuals and may threaten small populations with local extinction.

Cordylus mclachlani

McLachlan's girdled lizard is now known to occur widely in the Cederberg mountains which are fortunately mostly within protected areas. The extent to which this species is traded is unknown. Based on its large distribution within these protected areas, its conservation status as Vulnerable should be reassessed.

Pseudocordylus nebulosus

The dwarf crag lizard was recently the subject of a focussed research project which also re-assessed its conservation status, including its extent of occurrence and area of occupancy (Costandius *et al.* 2006). These authors recommended keeping this species in the VU category as its range is larger than previously known, although still small at less than 11 km^2. This species occurs within a formally protected area as well, which renders it reasonably protected against the typical threats such as habitat destruction, invasive alien species, *etc.*, and following the recent assessment of its status (Costandius *et al.* 2006), a formal monitoring programme is being put in place to continue monitoring its status (see section on monitoring below). While Mouton and Van Wyk (1995) were concerned about the illegal collection of specimens from the type locality and the threat of uncontrolled, frequent wildfires bringing habitat change, this concern may be less now that a formal assessment of its habitat has shown that it occurs in a wider area which is not generally accessible to the public. Habitat change due to more frequent fires and a more arid climate in future (it appears to frequent damper habitats), however, cannot be excluded.

Lamprophis fiskii

The enigmatic Fisk's house snake appears to have a very wide distribution over the drier parts of the province. It is rarely encountered as is borne out by only four records in the CapeNature biodiversity

database and another two known records for the Western Cape Province (also see Baard 2000) probably due to its fossorial and nocturnal habits. However this species is still illegally traded and thus remains a concern. Its current listing as Vulnerable is still appropriate.

Bitis schneideri
The Namaqua dwarf adder is very seldom seen and occurs only peripherally in the WCP (only one WCP record in the CapeNature Biodiversity Database). This species is threatened by coastal mining activities north of the Olifants River and there is also a demand for this species in the pet trade.

NEAR THREATENED

Scelotes gronovii
Gronovi's dwarf burrowing skink occurs in an area with rapid ongoing habitat destruction. The impact of habitat transformation for potato farming, coastal town development and its associated threats along the West Coast is unknown.

Gerrhosaurus typicus
There has been an increase in the number of observations of the Namaqua plated lizard although significant field effort is required to establish the presence of this species. Its apparent scarcity is probably due to its largely fossorial habits and wariness.

Afroedura hawequensis
The Hawequa flat gecko occurs in fairly inaccessible sites although apparently at low density. More information is required to adequately asses the conservation status of this species and it should rather be regarded as Data Deficient at present.

Goggia microlepidota
The small-scaled leaf-toed gecko may be removed from this category and placed in the Least Concern category due to its relative abundance and large distribution range. Also, the generally inaccessible habitats it occupies, indicates that the category of Least Concern is more appropriate.

Lamprophis fuscus
Very little is known about the yellow-bellied house snake and very few recent observations have been made. It is undoubtedly rare throughout its range, but the reasons for this are unknown as it does not appear to be fossorial in habit.

RARE

Naja woodi
There has been an increase in the number of records of the black spitting cobra based on several recent and regular observations in the southern parts of its range (Jaco van Deventer, CapeNature pers. comm.). This is perhaps an anthropogenic effect of increased agricultural activities which may be modifying both habitats (drier, open areas) and food resources (rodents) to the favour of this species. This species appears to be reasonably abundant and widespread and should be assessed according to the current IUCN categories (IUCN 2001).

DATA DEFICIENT

This important category was not in use when the reptiles were last formally assessed for conservation status (Branch 1988). It is important to place those species in this category for which there is not enough

or the reliable information to assign a threat category. This serves to highlight those species for which more information is required but which will only be obtained by active research.

Species not currently listed that are candidates for listing in a threat category pending further information include *Scelotes montispectus, Cordylus oelofseni, Bitis armata, Psammophis leightoni.*

LEGAL STATUS

The legal status of reptiles in the WCP is currently being revised on two fronts. Firstly, at a national level, the National Environmental Management: Biodiversity Act (NEMBA) Act 10 of 2004 provides the legal protection through the listing of threatened and protected species and by the implementation of Biodiversity and Ecosystem Management Plans. The lists of threatened and protected species require review and the implementation of Biodiversity and Ecosystem Management Plans remains to be tested as a binding legal instrument but has the potential to be very useful.

Secondly, CapeNature is currently revising the provincial ordinance and bringing it in line with the NEMBA, and the policy on the conservation and utilisation on herpetofauna has been updated.

HABITAT STATUS

Reptiles are widely distributed across all habitats in the WCP including the marine environment, although the relatively cold waters of this coast are not ideal for the six marine species recorded from the WCP coast. Several habitats are especially important for reptile conservation. These include those habitats that are themselves threatened with destruction and those particular habitat features that are essential for certain requirements of reptiles *e.g.* specialised shelter needs.

In the first category, the reptiles restricted to the Sand Fynbos, Strandveld and Renosterveld vegetation types of the Cape West Coast are being placed under increasing pressure from coastal development, primarily for holiday housing, water abstraction, and in particular, centre-pivot irrigation agriculture, primarily for potato farming (see Chapter 9). These remnant patches of lowland fynbos types still harbour populations of Cape sand snakes (*Psammophis leightoni*). The conservation status of this species is uncertain as taxonomic clarity regarding species and distribution boundaries are still unclear despite the revision by Broadley (2002). However, this problem should be readily resolved using molecular techniques which are currently underway (Chris Kelly, Oxford University, pers. comm.).

In the second category there are several places that have special microhabitats necessary for the survival of several species. Exposed rocky koppies with abundant cracks and fissures are essential for many cordylid and other rupicolous lizard species. Fortunately, many areas of exposed Table Mountain Sandstone fall within conserved areas and this allows for extensive habitat conservation for those species reliant on these. Exposed sandstone and granite koppies are less well protected particularly in the northern and northwestern parts of the province, and there may be a particular concern as regards the isolated nature of and the increasing fragmentation of natural veld/habitat between koppies to act as efficient corridors for the movement of koppie-dwelling species such as the southern speckled padloper and several cordylid species.

A large proportion of lowland Renosterveld (both coastal and inland) vegetation types have been lost to agriculture. Fortunately, few reptiles are confined to this vegetation type, such as the geometric tortoise and a morphotype of dwarf chameleon (*Bradypodion sp.*) associated with this vegetation type.

Current research by Krystal Tolley and collaborators at SANBI is investigating the taxonomic status and distribution of this chameleon taxon and will be instructive when assessing its conservation status.

THREATS

Loss of habitat is likely to remain the greatest single threat to reptiles in the WCP. While more research is required on the habitat requirements for several reptile species, many species appear to occur at low densities indicating that relatively large areas are required to host viable populations. It is important that research be undertaken to test this hypothesis and to quantify the area required for at least several umbrella species (species whose protection serves to protect many co-occurring species).

Illegal collection for the pet trade remains a threat and constant vigilance by conservation agencies such as CapeNature is required to curtail this activity. Greater public awareness of this particular threat is the most effective way to counter it. Anyone seen catching a reptile in the WCP should be able to produce a valid permit from CapeNature allowing that activity, failing which, the incident should be reported to CapeNature or another law enforcement authority. The reporting of suspicious behaviour of visitors to the West Coast region, and the reporting of unusual room contents by cleaning staff of a local hotel have led to the arrest of illegal collectors of several species which are popular on the international pet trade. This public vigilance is to be commended.

Global climate change is predicted to have varying effects on the Western Cape Province (Midgely *et al*. 2005). One of these effects is a general drying and warming trend, especially in the western part of the province. Many southern African reptiles are well adapted to drier conditions and are not likely to be adversely affected by small increases in temperature and decreases in annual rainfall. However, there is a suite of cold-adapted, mountain summit-dwelling lizards that are likely to be negatively impacted. They occur at the summits because they are relictual populations from previously wider occurring populations during colder climates. If these species cannot tolerate the degree of warming they will go extinct as the mountain tops are the last thermal refuges. Other species, which may rely on good and regular rainfall to maintain and promote successful breeding events, may also be negatively affected. This may put certain species in the western parts of the province at risk.

INVASIVE ALIEN SPECIES

Fortunately the WCP is affected by few invasive alien species. The flowerpot snake (*Rhamphotyphlops braminus*) is continuing to spread via anthropogenic means as recent records continue to be derived from urban areas *viz*. Porterville. The effect of this small, fossorial, insectivorous species on local species and ecosystems is unknown. Containing its spread may be possible by more careful screening of soil used in nurseries but is unlikely to be a practicable solution. Controlling and containing escaped populations is also unlikely to be feasible due to their fossorial behaviour.

The taxonomy of the tropical house gecko (*Hemidactylus mabouia*/*mercatorius*) group of geckos is still being clarified, but the presence of geckos in this group in the WCP is undoubtedly the result of people translocating these geckos, probably unknowingly, in caravans, trailers, firewood *etc*. The spread of these geckos in the WCP is not well documented and is not the subject of active research. Historical occurrence records from Gordon's Bay and Simonstown (Brooke, Lloyd & De Villiers 1986) were not assessed in this reporting period. There has been a single record of this species at the Algeria campsite in the Cederberg

Wilderness Area. It is not known whether any of these populations are breeding successfully. The effect of this gecko on local species such as *Afrogecko porphyreus* is unknown but is unlikely to have a serious impact unless *Hemidactylus sp*. populations increase very significantly. Surveys in areas where *Hemidactylus* sp. are known to occur in the WCP should prove useful.

In the current reporting period Cape dwarf geckos (*Lygodactylus capensis*) were recorded as present and breeding for the first time in the Western Cape Province (De Villiers 2006). The number of records of Cape dwarf geckos in the WCP which are naturally indigenous to the northern and eastern parts of South Africa are increasing. This gecko has no reptilian ecological analogue in the WCP and is thus unlikely to displace any local reptile species. Its affect on other species or ecosystems is unknown.

MONITORING

Only the geometric tortoise has been the subject of population monitoring operations since the previous report by Baard and De Villiers (2002). These monitoring activities followed to some extent the monitoring protocol as recommended by Baard (1993), but effectively, since 1994, detailed studies and monitoring has only taken place at the Elandsberg Private Nature Reserve and Voëlvlei Nature Reserve populations and the fragmented Chelancé-Onderplaas-Hartebeestrivier population to the immediate West of Worcester in the Breede River valley (Eberle 2003). Subsequent to Baard's (1990) work on the Elandsberg population, intensive ecological studies, including habitat use and home range, feeding ecology, breeding and fecundity, and general population ecology and dynamics have been completed for this population by Dr Retha Hofmeyr and her research team from the University of the Western Cape (Hofmeyr pers. comm.). The Voëlvlei population has been monitored by the Waterval Nature Reserve staff. These data require detailed analysis and integration with that of the Elandsberg population to ascertain the population status of the combined area.

Plans to re-activate and repeat a population status survey of all remaining geometric tortoise populations and any new sites as identified by the CapeNature Stewardship Programme, unfortunately did not materialise because of budget constraints during the 2006-07 financial year. This will be re-visited in the 2007-08 financial year.

A plan has recently been developed to monitor the dwarf crag lizard (*Pseudocordylus nebulosus*), a high altitude, water-associated species (Costandius *et al.* 2006) which is likely to be sensitive to global climate change. The recommendations by Costandius *et al.* (2006) have been drafted into a formal population monitoring plan to be executed on a regular basis in order to keep track of this high-altitude, cold-adapted, melanisitc species

Except for the possibility to conduct a population status survey of the southern speckled padloper (*Homopus signatus cafer*), no other reptiles have been identified at this stage for focussed population monitoring.

PUBLIC AWARENESS

A pamphlet illustrating the tortoises of the WCP and their conservation issues was published during this reporting period. This pamphlet has been very well received and continues to make a useful contribution to the awareness of tortoises in the WCP.

CapeNature has regularly met with the Cape Reptile Club (CRC) and has established a successful working relationship with its members. Interaction with the CRC has covered issues ranging from legal matters, conservation principles to genetic conservation.

In the WCP members of the public occasionally encounter snakes on their properties and require to have them removed. Currently there are several private individuals permitted to catch these animals and release them in a suitable and safe natural environment. CapeNature has engaged with all interested and affected parties and is in the process of formalising these arrangements.

In 2004 a group of herpetologists from the Universities of Cape Town, Stellenbosch and Western Cape, and CapeNature formed CapeHerp, an informal association of people interested in herpetological research and conservation. CapeNature continues to be an active member of CapeHerp and provides input into directing herpetological research and activities.

In 2005 CapeNature in conjunction with the University of Stellenbosch and the Herpetological Association of Africa was privileged to host the 5th World Congress of Herpetology in Stellenbosch, the first time this event was held in Africa. This event brought together over 400 delegates from 50 countries to present the latest international herpetological research.

RESEARCH

In addition to the systematic research mentioned above, there have been university-led research projects including feeding, breeding and physiological health of tortoises; chameleon, skink *(Trachylepis)* and Cape grass lizard *(Chamaesaura anguina anguina)* reproductive biology, cordylid lizard distribution, behaviour and ecology; and Agama Phylogeography. Other research has focused on the behaviour and population biology of dwarf adders.

CAPACITY

The WCP is still fortunate to have herpetological expertise within its staff although none of the three authors is employed in the post of herpetologist. Herpetological expertise within South African National Parks and the SA Museum is lacking (see Chapter 4). CapeNature continues to be actively involved in herpetological research and reaps the rewards of conservation-directed research and information sharing through regular interaction with other herpetologists.

CONCLUSIONS & RECOMMENDATIONS

It is difficult to assess the change in the state of the WCP reptiles since the previous report, as the formal conservation assessment (SARCA) will only be completed in 2009. However, based on the information at hand, indications are that we have underestimated the level of reptile species richness and endemism. Fortunately, it appears that improving our knowledge of the distribution of the reptiles has resulted in larger known areas of occurrence for many species. However, it is also clear that there has been very significant destruction of natural habitats for reptiles. This often means that not only is there a reduction of suitable habitat, but that remaining suitable habitats become isolated and subsequently, dispersal

between these remnant vegetation patches becomes very hazardous or even impossible. Reptiles, and in particular snakes and chelonians, are easily killed by vehicles on roads and are also more vulnerable to predators when in exposed positions (Rosen & Lowe 1994, Bonnet *et al*. 1999, Dodds *et al*. 2004, Steen & Gibbs 2004).

Very little is known of the size of habitat required to support viable populations of each reptile species. Research elsewhere indicates that reptile species may require much larger areas for survival than previously suspected (Gibbons *et al.* 2000). Until more research into the spatial and habitat requirements of several threatened species have been done, a conservative approach in this regard may be appropriate.

It is clear that there is still much work to be done on the Western Cape Province's reptiles. This includes investigating the basic systematics, conducting distribution and population status surveys, completing conservation status assessments, researching basic habitat requirements, population biology and ecology, and assessing whether the current and future protected area network would be adequate to protect representative samples of the reptile fauna of this region. The SARCA will contribute significantly to updating the conservation status of the reptiles and bring the assessment in line with standardised IUCN methods.

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APPENDICES

Appendix 1. List of all reptile species and subspecies known to occur within the Western Cape province. Species introduced to the province are marked with an asterisk.

Family	Scientific name	English name	SARDB Status	IUCN Status
Agamidae	*Agama aculeata aculeata*	ground agama	Null	Null
Agamidae	*Agama anchietae*	Anchieta's agama	Null	Null
Agamidae	*Agama atra atra*	southern rock agama	Null	Null
Agamidae	*Agama atra knobeli*	southern rock agama	Null	Null
Agamidae	*Agama hispida*	spiny agama	Null	Null
Chamaeleonidae	*Bradypodion damaranum*	Knysna dwarf chameleon	Null	Null
Chamaeleonidae	*Bradypodion gutturale*	Robertson dwarf chameleon	Null	Null
Chamaeleonidae	*Bradypodion karrooicum*	Karoo dwarf chameleon	Null	Null
Chamaeleonidae	*Bradypodion occidentale*	Namaqua dwarf chameleon	Null	Null
Chamaeleonidae	*Bradypodion pumilum*	Cape dwarf chameleon	Null	Null
Chamaeleonidae	*Bradypodion ventrale*	southern dwarf chameleon	Null	Null
Chamaeleonidae	*Chamaeleo namaquensis*	Namaqua chameleon	Null	Null
Cheloniidae	*Caretta caretta*	loggerhead turtle	Vulnerable	Endangered (A1abd)
Cheloniidae	*Chelonia mydas*	green turtle	Vulnerable	Endangered (A2bd)
Cheloniidae	*Eretmochelys imbricata*	hawksbill sea turtle	Vulnerable	Critically Endangered (A1bd)
Cheloniidae	*Lepidochelys olivacea*	olive ridley turtle	Vulnerable	Endangered (A1abd)
Colubridae	*Amplorhinus multimaculatus*	many-spotted snake	Null	Null
Colubridae	*Crotaphopeltis hotamboeia*	herald snake	Null	Null
Colubridae	*Dasypeltis scabra*	common egg eater	Null	Null
Colubridae	*Dipsina multimaculata*	dwarf beaked snake	Null	Null
Colubridae	*Dispholidus typus typus*	boomslang	Null	Null
Colubridae	*Duberria lutrix lutrix*	common slug eater	Null	Null
Colubridae	*Lamprophis aurora*	Aurora house snake	Null	Null
Colubridae	*Lamprophis capensis*	Brown House Snake	Null	Null
Colubridae	*Lamprophis fiskii*	Fisk's house snake	Rare	VULNERABLE (A2cd, B1+2c)
Colubridae	*Lamprophis fuscus*	yellow-bellied house snake	Rare	LOWER RISK (Near Threatened)
Colubridae	*Lamprophis guttatus*	spotted house snake	Null	Null
Colubridae	*Lamprophis inornatus*	olive house snake	Null	Null
Colubridae	*Lycodonomorphus rufulus*	common brown water snake	Null	Null
Colubridae	*Lycophidion capense capense*	Cape wolf snake	Null	Null
Colubridae	*Philothamnus hoplogaster*	green water snake	Null	Null
Colubridae	*Philothamnus natalensis occidentalis*	eastern green snake	Null	Null
Colubridae	*Prosymna sundevallii sundevallii*	Sundevall's shovel-snout	Null	Null
Colubridae	*Psammophis crucifer*	cross-marked grass snake	Null	Null

Family	Scientific name	English name	SARDB Status	IUCN Status
Colubridae	*Psammophis leightoni*	forkmarked sand snake	Null	Null
Colubridae	*Psammophis namibensis*	Namib Sand Snake	Null	Null
Colubridae	*Psammophis notostictus*	Karoo Whip Snake	Null	Null
Colubridae	*Psammophylax rhombeatus rhombeatus*	spotted skaapsteker	Null	Null
Colubridae	*Pseudaspis cana*	mole snake	Null	Null
Colubridae	*Telescopus beetzii*	Namib tiger snake	Null	Null
Cordylidae	*Chamaesaura anguina anguina*	Cape grass lizard	Null	Null
Cordylidae	*Cordylus aridus*	Dwarf Karoo Girdled Lizard	Null	Null
Cordylidae	*Cordylus cataphractus*	armadillo girdled lizard	Vulnerable	Vulnerable (A2d)
Cordylidae	*Cordylus coeruleopunctatus*	blue-spotted girdled lizard	Null	Null
Cordylidae	*Cordylus cordylus*	Cape girdled lizard	Null	Null
Cordylidae	*Cordylus macropholis*	large-scaled girdled lizard	Null	Null
Cordylidae	*Cordylus mclachlani*	McLachlan's girdled lizard	Restricted	VULNERABLE (D2)
Cordylidae	*Cordylus minor*	dwarf girdled lizard	Null	Null
Cordylidae	*Cordylus niger*	black girdled lizard	Null	Null
Cordylidae	*Cordylus oelofseni*	Oelofsen's Girdled Lizard	Null	Null
Cordylidae	*Cordylus peersi*	Peers's girdled lizard	Null	Null
Cordylidae	*Cordylus polyzonus*	Karoo girdled lizard	Null	Null
Cordylidae	*Pseudocordylus capensis*	graceful crag lizard	Null	Null
Cordylidae	*Pseudocordylus capensis robertsi*	graceful crag lizard	Null	Null
Cordylidae	*Pseudocordylus microlepidotus microlepidotus*	Cape crag lizard	Null	Null
Cordylidae	*Pseudocordylus microlepidotus namaquensis*	Cape crag lizard	Null	Null
Cordylidae	*Pseudocordylus nebulosus*	Dwarf Crag Lizard	Null	Vulnerable (D2)
Crocodylidae	*Crocodylus niloticus*	Nile crocodile	Vulnerable	Null
Dermochelyidae	*Dermochelys coriacea*	leatherback sea turtle	Vulnerable	Critically Endangered (A1abd)
Elapidae	*Aspidelaps lubricus lubricus*	coral snake	Null	Null
Elapidae	*Hemachatus haemachatus*	Rinkhals	Null	Null
Elapidae	*Homoroselaps lacteus*	spotted harlequin snake	Null	Null
Elapidae	*Naja nivea*	Cape cobra	Null	Null
Elapidae	*Naja woodi*	black spitting cobra	Rare	NULL
Elapidae	*Pelamis platurus*	Yellow-bellied Sea Snake	Null	Null
Gekkonidae	*Afroedura hawequensis*	Hawequa flat gecko	Restricted	LOWER RISK (Near Threatened)
Gekkonidae	*Afrogecko porphyreus*	marbled leaf-toed gecko	Null	Null
Gekkonidae	*Afrogecko swartbergensis*	Swartberg African leaf-toed gecko	Null	Null
Gekkonidae	*Chondrodactylus angulifer angulifer*	giant ground gecko	Null	Null
Gekkonidae	*Chondrodactylus bibronii*	Bibron's gecko	Null	Null

Family	Scientific name	English name	SARDB Status	IUCN Status
Gekkonidae	*Goggia braacki*	Braack's Dwarf Leaf-toed Gecko	Null	Null
Gekkonidae	*Goggia hewitti*	Hewitt's Dwarf Leaf-toed Gecko	Null	Null
Gekkonidae	*Goggia hexapora*	Cedarberg Dwarf Leaf-toed Gecko	Null	Null
Gekkonidae	*Goggia lineata*	striped leaf-toed gecko	Null	Null
Gekkonidae	*Goggia microlepidota*	small-scaled leaf-toed gecko	Restricted	LOWER RISK (Near Threatened)
Gekkonidae	*Goggia rupicola*	Namaqualand Dwarf Leaf-toed Gecko	Null	Null
Gekkonidae	*Hemidactylus mabouia**	Tropical house gecko	Null	Null
Gekkonidae	*Lygodactylus capensis**	Cape dwarf gecko	Null	Null
Gekkonidae	*Pachydactylus austeni*	Austen's gecko	Null	Null
Gekkonidae	*Pachydactylus capensis*	Cape gecko	Null	Null
Gekkonidae	*Pachydactylus formosus*	NULL	Null	Null
Gekkonidae	*Pachydactylus geitje*	Ocellated gecko	Null	Null
Gekkonidae	*Pachydactylus kladaroderma*	Thin-skinned Thick-toed Gecko	Null	Null
Gekkonidae	*Pachydactylus labialis*	Western Cape gecko	Null	Null
Gekkonidae	*Pachydactylus maculatus*	spotted gecko	Null	Null
Gekkonidae	*Pachydactylus mariquensis mariquensis*	Marico gecko	Null	Null
Gekkonidae	*Pachydactylus oculatus*	golden spotted gecko	Null	Null
Gekkonidae	*Pachydactylus purcelli*	western spotted gecko	Null	Null
Gekkonidae	*Pachydactylus weberi*	Weber's gecko	Null	Null
Gekkonidae	*Ptenopus garrulus maculatus*	common barking gecko	Null	Null
Gerrhosauridae	*Cordylosaurus subtessellatus*	dwarf plated lizard	Null	Null
Gerrhosauridae	*Gerrhosaurus flavigularis*	yellow-throated plated lizard	Null	Null
Gerrhosauridae	*Gerrhosaurus typicus*	Namaqua plated lizard	Rare	LOWER RISK (Near Threatened)
Gerrhosauridae	*Tetradactylus seps*	short-legged seps	Null	Null
Gerrhosauridae	*Tetradactylus tetradactylus*	common long-tailed seps	Null	Null
Lacertidae	*Australolacerta australis*	southern rock lizard	Restricted	NULL
Lacertidae	*Meroles knoxii*	Knox's desert lizard	Null	Null
Lacertidae	*Meroles suborbitalis*	spotted desert lizard	Null	Null
Lacertidae	*Nucras lalandii*	Delalande's sandveld lizard	Null	Null
Lacertidae	*Nucras livida*	Karoo sandveld lizard	Null	Null
Lacertidae	*Nucras tesselata*	striped sandveld lizard	Null	Null
Lacertidae	*Pedioplanis burchelli*	Burchell's sand lizard	Null	Null
Lacertidae	*Pedioplanis laticeps*	Cape sand lizard	Null	Null
Lacertidae	*Pedioplanis lineoocellata pulchella*	spotted sand lizard	Null	Null
Lacertidae	*Pedioplanis namaquensis*	Namaqua sand lizard	Null	Null

Family	Scientific name	English name	SARDB Status	IUCN Status
Lacertidae	*Tropidosaura gularis*	Cape mountain lizard	Null	Null
Lacertidae	*Tropidosaura montana montana*	common mountain lizard	Null	Null
Leptotyphlopidae	*Leptotyphlops gracilior*	slender thread snake	Null	Null
Leptotyphlopidae	*Leptotyphlops nigricans*	black thread snake	Null	Null
Leptotyphlopidae	*Rhamphotyphlops braminus**	flowerpot snake	Null	Null
Pelomedusidae	*Pelomedusa subrufa*	marsh terrapin	Null	Null
Scincidae	*Acontias lineatus grayi*	striped legless skink	Null	Null
Scincidae	*Acontias lineatus lineatus*	striped legless skink	Null	Null
Scincidae	*Acontias litoralis*	coastal legless skink	Null	Null
Scincidae	*Acontias meleagris meleagris*	Cape legless skink	Null	Null
Scincidae	*Scelotes bipes*	silvery dwarf burrowing skink	Null	Null
Scincidae	*Scelotes caffer*	Cape dwarf burrowing skink	Null	Null
Scincidae	*Scelotes gronovii*	Gronovi's dwarf burrowing skink	Restricted	LOWER RISK (Near Threatened)
Scincidae	*Scelotes kasneri*	Kasner's dwarf burrowing skink	Restricted	VULNERABLE (A2c)
Scincidae	*Scelotes montispectus*	NULL	Null	Null
Scincidae	*Scelotes sexlineatus*	striped dwarf burrowing skink	Null	Null
Scincidae	*Trachylepis capensis*	Cape skink	Null	Null
Scincidae	*Trachylepis homalocephala*	red-sided skink	Null	Null
Scincidae	*Trachylepis occidentalis*	western three-striped skink	Null	Null
Scincidae	*Trachylepis sulcata sulcata*	western rock skink	Null	Null
Scincidae	*Trachylepis variegata variegata*	variegated skink	Null	Null
Scincidae	*Typhlosaurus caecus*	Cuvier's blind legless skink	Null	Null
Testudinidae	*Chersina angulata*	angulate tortoise	Null	Null
Testudinidae	*Geochelone pardalis*	leopard tortoise	Null	Null
Testudinidae	*Homopus areolatus*	parrot-beaked tortoise	Null	Null
Testudinidae	*Homopus boulengeri*	Karoo padloper	Null	Null
Testudinidae	*Homopus femoralis*	greater padloper	Null	Null
Testudinidae	*Homopus signatus cafer*	southern speckled padloper	Restricted	LOWER RISK (Near Threatened)
Testudinidae	*Homopus signatus signatus*	Namaqua speckled padloper	Null	Lower Risk (Near Threatened)
Testudinidae	*Psammobates geometricus*	geometric tortoise	Endangered	Endangered (A1ac, B1+2c)
Testudinidae	*Psammobates tentorius tentorius*	tent tortoise	Null	Null
Testudinidae	*Psammobates tentorius trimeni*	Namaqua tent tortoise	Null	Null
Testudinidae	*Psammobates tentorius verroxii*	Bushmanland tent tortoise	Null	Null
Typhlopidae	*Rhinotyphlops lalandei*	Delalande's Beaked Blind Snake	Null	Null
Varanidae	*Varanus albigularis albigularis*	Rock Monitor	Null	Null
Viperidae	*Bitis arietans arietans*	puff adder	Null	Null

Family	Scientific name	English name	SARDB Status	IUCN Status
Viperidae	*Bitis armata*	Southern Adder	Null	Null
Viperidae	*Bitis atropos*	berg adder	Null	Null
Viperidae	*Bitis caudalis*	horned adder	Null	Null
Viperidae	*Bitis cornuta*	many-horned adder	Null	Null
Viperidae	*Bitis rubida*	Red Adder	Null	Null
Viperidae	*Bitis schneideri*	Namaqua dwarf adder	Vulnerable	Vulnerable (A2cd)
Viperidae	*Causus rhombeatus*	common night adder	Null	Null