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The Zambezi Society and The Biodiversity Foundation for Africa are working as partners within the African Wildlife Foundation's Four Corners TBNRM project. The Biodiversity Foundation for Africa is responsible for acquiring technical information on the biodiversity of the project area. The Zambezi Society will be interpreting this information into user-friendly formats for stakeholders in the Four Corners area, and then disseminating it to these stakeholders.

THE BIODIVERSITY FOUNDATION FOR AFRICA (BFA is a non-profit making Trust, formed in Bulawayo in 1992 by a group of concerned scientists and environmentalists. Individual BFA members have expertise in biological groups including plants, vegetation, mammals, birds, reptiles, fish, insects, aquatic invertebrates and ecosystems. The major objective of the BFA is to undertake biological research into the biodiversity of sub-Saharan Africa, and to make the resulting information more accessible. Towards this end it provides technical, ecological and biosystematic expertise.

THE ZAMBEZI SOCIETY was established in 1982. Its goals include the conservation of biological diversity and wilderness in the Zambezi Basin through the application of sustainable, scientifically sound natural resource management strategies. Through its skills and experience in advocacy and information dissemination, it interprets biodiversity information collected by specialists like the Biodiversity Foundation for Africa and uses it to provide a technically sound basis for the implementation of conservation projects within the Zambezi Basin.

THE PARTNERSHIP between these two agencies was formed in 1996 as a result of mutual recognition of their complementarity. They have previously worked together on several major projects, including the biodiversity component of IUCN's Zambezi Basin Wetland project and the evaluation of biodiversity in Tete province described in detail in the first Four Corners TBNRM Biodiversity Information Package.

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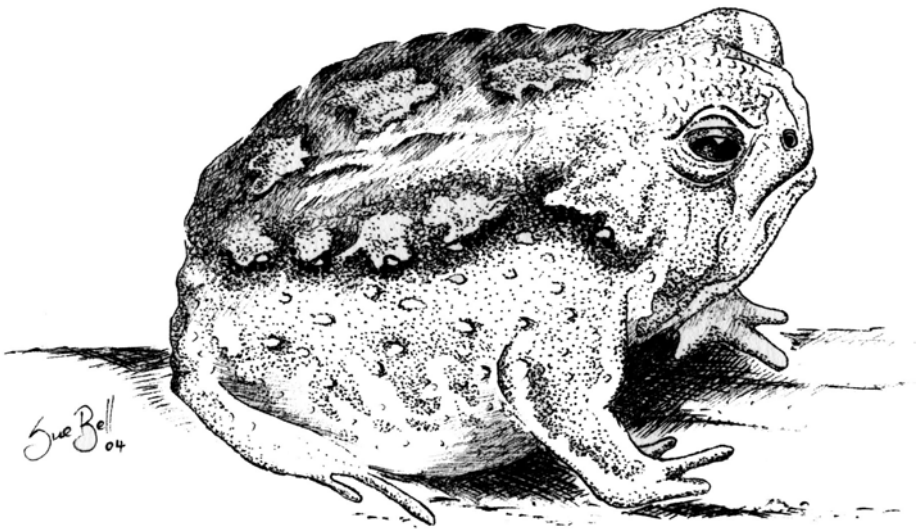


Breviceps adspersus, Sandveld Rain Frog

CHAPTER 8. HERPETOFAUNA OF THE FOUR CORNERS AREA

Donald G. Broadley

8.1 INTRODUCTION

This review looks at available literature on the reptiles (including terrapins, tortoises, lizards, amphisbaenians, crocodiles) and amphibians of the Four Corners trans-frontier area, which covers both wetland and dryland habitats. The zoogeography of these groups is outlined. This is followed by an annotated list of the 178 species recorded to date. Particular species ands sites of conservation interest are briefly outlined. The herpetofauna of the Four Corners area is a comparatively well studied group, although the Hwange District in northwestern Zimbabwe has received the most attention.

The only strict endemics are a rupicolous gecko, *Pachydactylus tsodiloensis*, on the Tsodilo Hills, a terrestrial agama, *Agama makarikarika*, on the margins of the Makgadikgadi Pans, an amphisbaenian, *Dalophia longicauda*, in the Caprivi and Hwange District, and a sedge frog, *Hyperolius rhodesianus*, along the Matetsi River. There are also several near-endemics - a terrapin, *Pelusios bechuanicus*, a semi-aquatic snake, *Crotaphopeltis barotseensis*, and two frogs, *Ptychadena mapacha* and *Hyperolius aposematicus*.

The only reptile whose distribution seems to coincide with *Baikiaea* woodland is the amphisbaenian *Dalophia longicauda*, which perhaps indicates a greater depth of Kalahari sand in these areas.

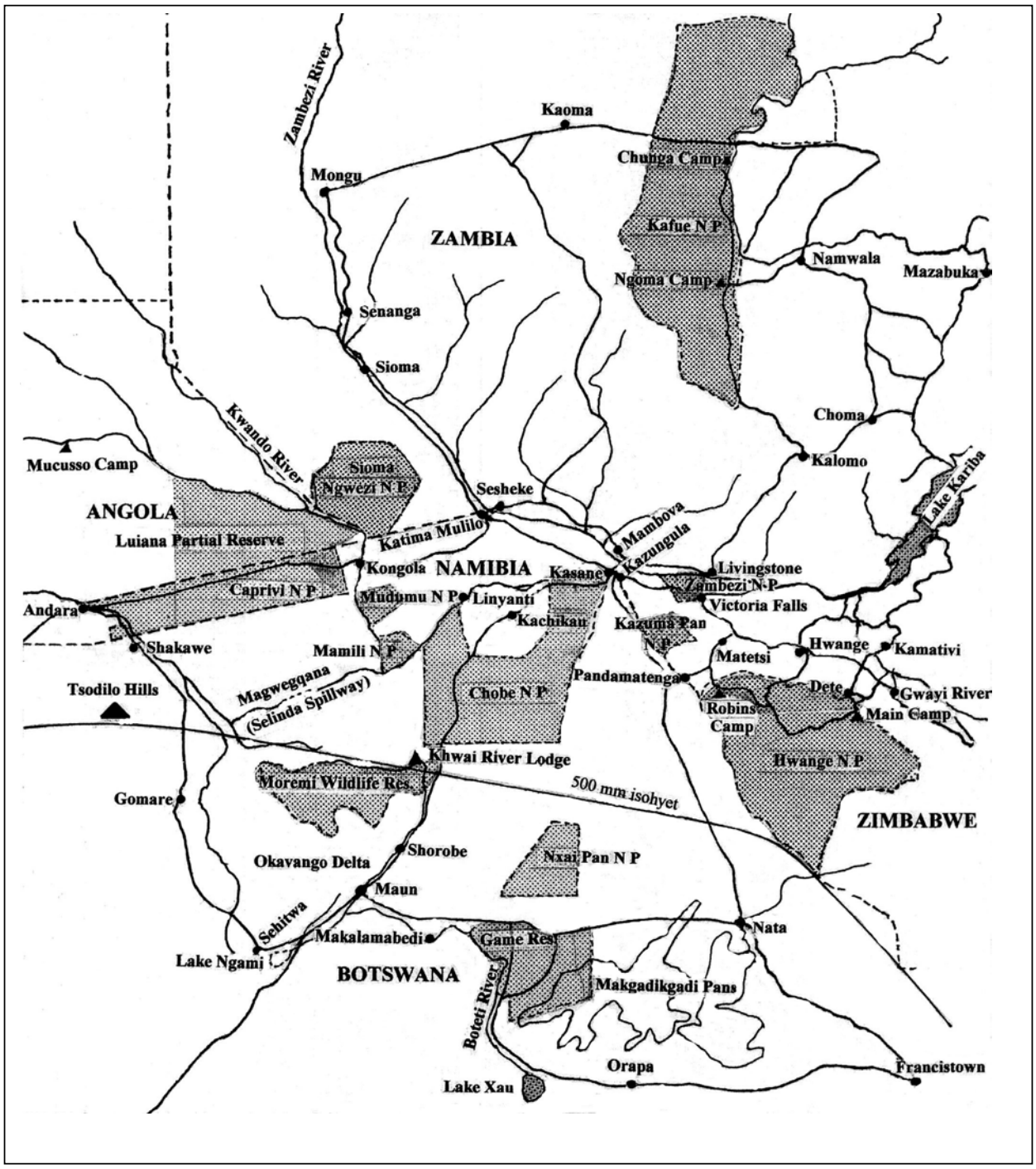
8.2 BACKGROUND AND HISTORY

The first major collection from the Four Corners area was made by V. FitzSimons (1932, 1935) while with the Vernay-Lang Kalahari Expedition of 1930, the material being divided between the Transvaal Museum and the Field Museum of Natural History. Broadley (1962) has reported on material collected in the Hwange District of Zimbabwe during 1958-61, and covered specimens collected in SW Zambia, mainly by B.L. Mitchell, in an annotated checklist for Zambia (Broadley 1971). Important collections were made along the Caprivi/Zambia border west of Katima Mulilo by R.G. Japp during 1969-70 and deposited in the Natural History Museum of Zimbabwe. Distribution records for the amphibians and reptiles of Botswana were published by Auerbach (1987).

The Natural History Museum of Zimbabwe has mounted expeditions to all the National Parks and Safari Areas in Hwange District, while M. Griffin has stimulated collecting in the Caprivi and deposited the material in the National Museum of Namibia in Windhoek. Additional material has been collected in the Caprivi and northern Botswana by W.D. Haacke and deposited in the Transvaal Museum. The herpetofauna of the Zambezi Basin wetlands was reviewed previously (Broadley 2000a).

Revision of the taxonomy of reptiles and amphibians has, as far as possible, used the theoretical Evolutionary Species Concept (Mayden 1997, 1999), with the Phylogenetic Species Concept as the primary operational concept. A phylogenetic species is defined as “the smallest population or group of populations within which there is a parental pattern of ancestry and descent and which is diagnosable by unique combinations of character states” (e.g. Cracraft 1997). In practice this requires careful re-examination of previously recognised subspecies to determine which are good evolutionary species and which are simply variants or segments of clines.

Figure 8.1: Four Corners Transfrontier Area and places referred to in this review.



8.3 ECOLOGY

The Four Corners region is mainly inhabited by widespread adaptable savanna forms, most of the terrestrial and fossorial ones inhabiting Kalahari sand areas, the exceptions being some rupicolous lizards on rock outcrops in Hwange District and a gecko on the Tsodilo Hills. The arboreal lizards and snakes are usually found in all types of woodland. Most reed frogs (*Hyperolius*) require reed beds or papyrus as breeding sites and some frogs and toads breed in streams, but many amphibians breed in ephemeral pans and pools**,** where their tadpoles are largely free of predators.

8.4 ZOOGEOGRAPHY

The distribution of the herpetofauna in the Four Corners region is very complex due to the evolution of the drainage systems since the breakup of Gondwanaland (Moore & Larkin 2001), which is why a trans-frontier approach to its conservation is so important. The region is covered with a mantle of Kalahari sand, except for some small outcrops of dolomites and quartzites of the Damara Sequence in the southwest, Karoo lavas exposed by the Zambezi and its tributaries, Karoo sediments (coalfields) and gneiss outcrops in the Hwange District of Zimbabwe, and exposures of granite, Karoo sediments and the Kundelungu System in the Kafue National Park. Haacke (1984) recognised a "Southern Kalahari Domain" with an average annual rainfall below 300 mm, including the southwestern dune area. For zoogeographical purposes it seems best to recognise the Central Kalahari as the area with a mean annual rainfall of more than 300 mm but less than 500 mm, which includes the swamps and floodplains of the Okavango Delta and the saline Makgadikgadi Pans (Figure 8.1). The Northern Kalahari then extends to north of the Equator and has a mean annual rainfall of 500 to1000 mm within the Four Corners area. Each of these segments of the Kalahari Basin has its own distinctive herpetofauna**,** although there is considerable overlapping. In addition there is a Palaeo-Upper Zambezi fauna of mostly aquatic forms which link the Okavango Delta with the Upper Zambezi and Kafue Rivers and Lake Bangweulu. There are a few Tsodilo Hills, Caprivi and Kafue endemics and near-endemics, but the rest of the herpetofauna consists of widespread savanna forms which converge from different directions.

The investigation of the biodiversity of the area has to take cognisance of the palaeogeography of the Zambezi Basin. The deposition of the Kalahari sands during the Tertiary and their subsequent erosion was responsible for the evolution and dispersal of amphisbaenians and various other burrowing reptiles. The palaeo-Upper Zambezi originally had a major tributary rising in northeastern Zambia, incorporating the present Chambeshi and Kafue rivers upstream of the Kafue Flats. This then joined the palaeo-Upper Zambezi via the present Nanzhila and Sichifula rivers. The palaeo-Upper Zambezi was originally linked to the Limpopo Basin via the Motloutse River (Thomas & Shaw 1988, 1991; Moore & Larkin 2001), but the tectonic uplift of the Zimbabwe-Kalahari axis broke this connection and resulted in the formation of palaeo-Lake Makgadikgadi during the Pliocene (Nugent 1990) and palaeo-Lake Caprivi during the Pleistocene (Shaw & Thomas 1988). Lake levels fluctuated throughout the Pleistocene, eventually leaving only the saline Makgadikgadi Pans and ephemeral lakes like Ngami in Botswana and Liambezi.in the E Caprivi (Schlettwein *et al.* 1991).

The basic approach to this zoogeographical study of the herpetofauna of the Four Corners area is that used by Poynton and Broadley (1991) in dealing with the amphibians of the Zambesiaca area. This requires the identification of discrete clusterings of species ranges using a quarter-degree grid (c. 27 km on a side) for plotting distributions. Although the distributional data is now comprehensive enough to permit the general application of an evolutionary species concept

(Mayden 1997, 1999) in some 'difficult' groups, e.g. the *Elapsoidea sundevallii* and *Aspidelaps scutatus* complexes, it is useful to retain the subspecies category pending the availability of molecular data. Many 'subspecies' are either geographically well isolated or show very limited hybridisation where they are in contact, consequently these are now recognised as full species.

8.4.1 Central Kalahari Fauna (CKAL)

The Kalahari sands covered by *Acacia - Baikiaea* woodland are typically inhabited by many fossorial species and terrestrial ones that live in burrows, the only arboreal species being the small dwarf gecko *Lygodactylus bradfieldi* commonly found on dead *Acacia* trees. There are 27 species: the tortoise *Psammobates oculiferus*; 13 lizards - *Agama aculeata, A. makarikarika, Ptenopus garrulus, Pachydactylus capensis, Colopus w. wahlbergii, Lygodactylus bradfieldi, Trachylepis punctulata, Typhlosaurus lineatus, Gerrhosaurus auritus*, *Heliobolus lugubris, Pedioplanis namaquensis, P. lineoocellata* and *Nucras intertexta*; four amphisbaenians - *Zygaspis quadrifrons, Monopeltis leonhardi, M. mauricei* and *Dalophia pistillum*; five snakes - *Bitis caudalis, Xenocalamus bicolor, Elapsoidea sundevallii fitzsimonsi, Aspidelaps s. scutatus* and *Psammophis trinasalis,* and three amphibians - *Bufo poweri*, *Breviceps adspersus* and *Tomopterna krugerensis*.

8.4.2 Northern Kalahari Fauna (NKAL)

This higher rainfall area, largely under *Baikiaea* woodland, has a rather different complement of fossorial species. Most taxa in this group do not extend as far south as the Four Corners area. Of the seven that do, there is one skink, *Typhlacontias rohani,* an amphisbaenian, *Zygaspis nigra*; four snakes, *Causus bilineatus, Amblyodipsas ventrimaculatus, Xenocalamus mechowii* and *Naja anchietae*, and one amphibian, *Hyperolius angolensis*.

8.4.3 Tsodilo Hills Endemic (TSO)

The gecko *Pachydactylus tsodiloensis* is endemic to the Tsodilo Hills in northwestern Botswana. The nearest suitable rock outcrops in the Aha Hills and in the vicinity of the Popa Falls (on the Kavango River in the West Caprivi) have been thoroughly searched without success (M. Griffin, pers comm.).

8.4.4 Caprivi Near-endemics (CAP)

The rivers and lakes in the East Caprivi result in a higher water table and some changes in the herpetofauna. The lacertid lizard *Ichnotropis grandiceps* was described from the Botswana/West Caprivi border and has only subsequently been collected a little further west in Namibia. The large amphisbaenian *Dalophia longicauda* has a restricted distribution centred on the Kalahari sands of the Caprivi Strip. It appears to be a sister species of *D. pistillum*, but the two forms are parapatric in the Caprivi and the Hwange District of Zimbabwe. *Ptychadena mapacha* is only known from the Katima Mulilo area.

8.4.5 Kafue Endemics (KAF)

The amphisbaenian *Zygaspis kafuensis* is only known from the margins of the Kafue Flats in the Kafue National Park) while the frog *Hyperolius pyrrhodictyon* is endemic to this general area.

8.4.6 Palaeo-Upper Zambezi Fauna (PUZ)

An arboreal dwarf gecko, *Lygodactylus chobiensis*, is widespread in the Upper Zambezi area, but has extended its range into the middle Zambezi valley and its tributaries, reaching the eastern limit of its range at Tete. Two terrapins, *Pelusios bechuanicus* and *P. rhodesianus,* and two aquatic snakes, *Limnophis bangweolicus* and *Crotaphopeltis barotseensis* occur throughout the swamps and river systems. Three amphibians, *Bufo lemairii, B. kavangensis* and *Ptychadena subpunctata* breed on the floodplains.

8.4.7 Savanna Range Clusters

The next group of range clusters involves wide-ranging savanna species.

Pan-African South of the Sahara (PAN)
Seven species occur throughout both tropical and temperate savannas from West Africa often to the southwestern Cape: the terrapin *Pelomedusa subrufa* and tortoise *Geochelone pardalis*, the monitor lizard *Varanus niloticus,* and the snakes *Bitis arietans, Crotaphopeltis hotamboeia*, *Dispholidus typus* and *Dasypeltis scabra.* Five other reptiles do not occur in temperate regions - the snakes *Bitis gabonica* (forest/savanna mosaic), *Naja melanoleuca* (forest and savanna), *Dendroaspis polylepis, Philothamnus semivariegatus,* and the crocodile *Crocodylus niloticus*.

Northern Savanna (NS)
Nine species range from the Sudanese savanna of West Africa south to the Four Corners area - the snakes *Naja nigricollis, Natriciteres olivacea* and *Dromophis lineatus*, and the amphibians *Bufo maculatus, Ptychadena oxyrhynchus, P. mascareniensis*, *P. pumilio, Phrynobatrachus natalensis* and *Kassina senegalensis*.

Western Savanna (WS)
Eighteen species inhabit both lowland and plateau savannas of Angola and Namibia, with a subtraction margin eastwards. Many reach Malawi and to Tete in the western Mozambique pedicle. They are the lizards *Trachylepis wahlbergii* and *Gerrhosaurus nigrolineatus*, the amphisbaenian *Monopeltis anchietae*, 11 snakes (*Rhinotyphlops schlegelii* which reaches the south Mozambique plain and Maputaland, *Atractaspis congica, Elapsoidea guentheri, E. semiannulata, Lycophidion multimaculatum, Psammophis subtaeniatus, Prosymna bivittata, P. angolensis, Philothamnus ornatus*, *P. angolensis* and *Thelotornis capensis oatesii*), and four frogs (*Xenopus petersii, Phrynomantis affinis, Tomopterna cryptotis* and *Hyperolius angolensis*).

Southern Savanna (SS)
Six species have their centre of distribution in temperate South Africa, but have extensive subtraction margins in plateau areas to the north. These are two lizards (*Trachylepis capensis* and *Varanus a. albigularis*), two snakes (*Rhinotyphlops lalandei* and *Pseudaspis cana*), and the frogs *Xenopus laevis* and *Pyxicephalus adspersus*. The ranges of some of these taxa might contract due to global warming.

Central Plateau Savanna (CPS)
There are 31 taxa with distributions centred on the plateau and highland areas of central Africa: the tortoise *Kinixys spekii,* ten lizards (*Agama kirkii, Pachydactylus oshaughnessyi, Trachylepis lacertiformis, Lygosoma sundevallii, Eumecia anchietae*, *Panaspis maculicollis, Platysaurus rhodesianus, Nucras holubi, Ichnotropis capensis* and *I. squamulosa*), the amphisbaenian *Monopeltis rhodesiana,* four snakes (*Chilorhinophis gerardi, Lycophidion variegatum, Psammophylax variabilis* and *Psammophis jallae*), and 15 frogs (*Bufo f. fenoulheti, Breviceps poweri, Rana angolensis, Hylarana darlingi, Ptychadena porosissima, P. grandisonae, P. guibei, Phrynobatrachus parvulus, Cacosternum boettgeri, Leptopelis bocagii, Hyperolius marginatus, H. rhodesianus, H. aposematicus, Hemisus barotseensis* and *H. guineensis broadleyi*).

Eastern Savanna (ES)
Nearly one third of the taxa recorded from the Four Corners area belong to a relatively young fauna, which in many cases inhabits the coastal plain from southern Somalia to KwaZulu-Natal with a variable subtraction margin westwards. This consists of two terrapins (*Pelusios subniger* and *P. sinuatus*),14 lizards (*Acanthocercus atricollis, A. armata, Chamaeleo dilepis,*

Pachydactylus turneri, P. punctatus, Homopholis wahlbergii, Lygodactylus capensis, Hemidactylus mabouia, Trachylepis margaritifer, T. varia, Cordylus jonesii, Gerrhosaurus validus, G. major and *Nucras ornata*), 25 snakes (*Rhinotyphlops mucruso, Leptotyphlops longicaudus, L. scutifrons, L. incognitus, Python natalensis, Causus rhombeatus, C. defilippii, Amblyodipsas p. polylepis, Aparallactus lunulatus, A. capensis, Elapsoidea boulengeri, Naja mossambica, Lamprophis capensis, Mehelya capensis, M. nyassae, Lycophidion c. capense, Telescopus semiannulatus, Hemirhagerrhis nototaenia, Psammophylax tritaeniatus, Rhamphiophis rostratus, Psammophis mossambicus, P. angolensis, Meizodon s. semiornatus, Prosymna lineata* and *Philothamnus hoplogaster*) and 15 amphibians (*Xenopus muelleri, Bufo gutturalis, B. garmani, Schismaderma carens, Phrynomantis bifasciatus, Pyxicephalus edulis, Tomopterna marmorata, Hildebrandtia ornata, Ptychadena anchietae, P. mossambica, Phrynobatrachus mababiensis, Arthroleptis stenodactylus, Chiromantis xerampelina, Hyperolius nasutus* and *Hemisus marmoratum*). The ranges of some of these taxa might be expected to expand following global warming.

8.5 HERPETOFAUNA DESCRIPTIONS

Below are brief annotated accounts of the species recorded from the Four Corners area.

REPTILIA
TESTUDINES
PELOMEDUSIDAE

Pelomedusa subrufa (Bonnaterre 1789) Helmeted Terrapin
Occurs throughout sub-Saharan Africa and southwestern Arabia [PAN]. In South Africa it occurs in permanent rivers and grows to a large size, but throughout the rest of its range, due to competition with *Pelusios* spp., it is restricted to swamps and ephemeral pans, stunted in size and buries itself in the mud to aestivate. It is omnivorous, but feeds mainly on insects, tadpoles and frogs. The terrapin is commonly exploited for food by local people.

Pelusios subniger (Bonnaterre 1789) Pan Hinged Terrapin
An 'old' species which is represented by populations on Madagascar and a sister species on the Seychelles. It has a wide range in SE Africa, extending north to Burundi and Tanzania, south to northern KwaZulu-Natal and west to the Okavango Delta [ES]. In the Four Corners area, there are no records from Zambia or the Caprivi. Like *Pelomedusa*, this small species is an inhabitant of swamps and ephemeral pans.

Pelusios bechuanicus FitzSimons 1932 Okavango Hinged Terrapin
A large species endemic to the clear waters of the palaeo-Upper Zambezi system [PUZ], but with a sister species (*P. upembae*) just north of the present Zambezi-Congo watershed. In the Four Corners area it is common in the Zambezi River above Victoria Falls, extending southwest through the Caprivi to the Okavango Delta (Broadley 1981). The diet includes invertebrates and fish. It is exploited for food by local people.

Pelusios rhodesianus Hewitt 1927 Zambian Hinged Terrapin
The distribution of this moderate-sized species seems to be centred on the southern rim of the Congo Basin, but extends north to Uganda and south to E Zimbabwe [PUZ]. There are relict populations in Maputaland and on Durban Bluff, evidence for the ancient link between the palaeo-Upper Zambezi and the Limpopo systems (Broadley 1981). There are isolated records in the Four Corners area from the Linyanti swamps and Okavango Delta. It inhabits swamps and weed-choked lakes and is exploited for food by local people.

Pelusios sinuatus (A. Smith 1838) Serrated Hinged Terrapin
The largest species of the genus, it has a wide range in E Africa from Somalia south to KwaZulu-Natal and west to the rift valley (Broadley 1981) [ES]. It is common in the Middle and Lower Zambezi and tributaries, but above Victoria Falls it seems to be restricted to muddy backwaters, while *P. bechuanicus* occurs in the mainstream Zambezi. It is not known upstream from Kazungula. This species feeds mainly on snails and molluscs, and is preyed upon by crocodiles and exploited for food by local people (Broadley 1962).

TESTUDINIDAE
Kinixys spekii Gray 1863 Speke's Hinged Tortoise
Has a wide range on the central African plateau from southern Kenya south to the northern provinces of South Africa (Broadley 1992) [CPS]. In the Four Corners area it occurs in the moister northern areas, but has not been found in the Okavango-Makgadikgadi area. It has a depressed shell, which enables it to take shelter in rock crevices. Its catholic diet consists largely of millipedes, snails and carrion. It is exploited for food by local people.

Psammobates oculiferus (Kuhl 1820) Serrated Tortoise
A small tortoise that is a typical inhabitant of the Kalahari [CKAL], found on the periphery of the Makgadikgadi Pans and the Okavango Delta, and also in the Western Caprivi (Brown & Jones 1994). It feeds on small succulent plants and grasses, together with herbivore droppings, and is exploited for food by local people.

Geochelone pardalis (Bell 1828) Leopard Tortoise
A large tortoise that is widely distributed in savanna areas south of the Sahara [PAN]. Although common in northern Botswana, the Caprivi and NW Zimbabwe, there are few records from SW Zambia. It feeds on grasses and succulent plants and gnaws bones to obtain calcium. It is exploited for food by local people.

SQUAMATA
AGAMIDAE
Acanthocercus atricollis (A. Smith 1849) Southern Tree Agama
A large arboreal agama with a wide range throughout the East African savannas from Ethiopia south to KwaZulu-Natal [ES]. In the Four Corners area most records are from NW Zimbabwe and the northern and eastern margins of the Makgadikgadi Pans. The usual microhabitat is the trunks of large trees. Its diet includes a wide range of insects and its habit of descending to the ground to feed on alate termites makes it vulnerable to predators.

Agama kirkii Boulenger 1885 Kirk's Rock Agama
A rupicolous agama that is common on rock outcrops from Zimbabwe east to N Mozambique [CPS]. In the Four Corners area it is restricted to gneiss and sandstone outcrops in Hwange District. It feeds largely on ants, but also takes other insects.

Agama aculeata Merrem 1820 Kalahari Spiny Agama
A typical Kalahari species [CKAL] that is found on the western and southern margins of the Okavango Delta and around the Makgadikgadi Pans. Mostly terrestrial, it is largely insectivorous, taking harvester termites and ants.

Agama armata (Peters 1854) Eastern Spiny Agama
This small, terrestrial agama inhabits savannas from Tanzania south to KwaZulu-Natal and west to Zambia, the Caprivi and E Botswana [ES]. It replaces the previous species north and east of

the Okavango/Makgadikgadi. Being cryptically coloured it is easily overlooked unless it moves, and takes refuge in burrows.

Agama makarikarika FitzSimons 1932 Makgadikgadi Spiny Agama
A small terrestrial agama endemic to the northeastern edge of the Makgadikgadi pans [CKAL], where it lives in burrows beneath small salt bushes. It appears to feed almost entirely on small tenebrionid beetles.

CHAMAELEONIDAE
Chamaeleo dilepis Leach 1819 Flap-necked Chameleon
This common chameleon has an enormous range throughout East Africa, south to N Namibia, Botswana and northern parts of South Africa [ES]. The main habitat is savanna woodland, where it feeds on grasshoppers and other insects, but it also moves into reedbeds and papyrus. It is heavily preyed upon by raptorial birds and snakes. Females lay an average clutch of 35 eggs which take about a year to hatch.

GEKKONIDAE
Ptenopus garrulus (A. Smith 1849) Common Barking Gecko
A small burrowing gecko with strongly fringed claws for traction on sand. It is common in the Kalahari [CKAL] as far north as the borders of the Makgadikgadi Pans and to the southwest of the Okavango Delta. It feeds on termites, ants and small beetles.

Pachydactylus turneri (Gray 1864) Turner's Thick-toed Gecko
A large gecko with a wide range in southeastern Africa [ES]. It is very common in the Kalahari, the Caprivi and Hwange National Park, but there are no records from NE Botswana and only a single specimen from the Zambia/Angola border. It is found under loose bark, in rock crevices and on house walls. The diet consists of insects and a few smaller lizards.

Pachydactylus punctatus Peters 1854 Speckled Thick-toed Gecko
A small terrestrial gecko widespread in SE Africa and Namibia [ES]. It is common in NW Zimbabwe and along the southern and eastern margins of the Makgadikgadi Pans, but has not yet been recorded from NE Botswana, the Caprivi or adjacent Zambia. It is nocturnal.

Pachydactylus tsodiloensis Haacke 1966 Tsodilo Thick-toed Gecko
A flattened rupicolous gecko that is endemic to the Tsodilo Hills in northwest Botswana [TSO] (Haacke 1966). It appears to be related to the western species of the *P. weberi* group, and is found on rocks at night where it feeds on ants and other small insects.

Pachydactylus capensis A. Smith 1846 Cape Thick-toed Gecko
A terrestrial gecko with a distribution centred on the Kalahari (Bauer & Lamb 2002) extending as far as the southwestern edge of the Okavango Delta, the northeastern edge of the Makgadikgadi Pans and the W Caprivi (Brown & Jones 1994) [CKAL]. This species also ranges south into the Karoo, west through much of Namibia. There are isolated records from the Nyanga mountains in eastern Zimbabwe and the Liuwa Plain in N Barotseland. It is often found under calcrete blocks around pans and emerges at night to feed on small insects.

Pachydactylus oshaughnessyi Boulenger 1885 O'Shaughnessy's Banded Gecko
This attractive slow-moving gecko is found in Zambia, Zimbabwe and southern Malawi [CPS]. Widespread in Hwange District, it is usually found under logs or boulders (Broadley 1962). There are no other records from the Four Corners area. There is a sister species, *P. katanganus*, north of the present Zambezi-Congo watershed in the Upemba National Park.

Colopus wahlbergii wahlbergii Peters 1869 Kalahari Ground Gecko
A small burrowing gecko with a wide range in Kalahari sand areas [CKAL], although it is rarely seen as it only emerges from its burrow at night after rain. Haacke (1998) has recorded it from widely separated localities throughout N Botswana and also from just west of the Kwando River in the Caprivi. In Zimbabwe it has been recorded from Victoria Falls (Broadley & Spawls 1991) and Hwange National Park (Broadley & Rasmussen 1995a), and there is a recent record from SW Zambia (Broadley & Van Daele, in press).

Homopholis wahlbergii (A. Smith 1849) Wahlberg's Velvet Gecko
A large gecko with a wide range in SE Africa [ES], although the only locality within the study area is at Main Camp, Hwange National Park, where it is common on rest hut walls (Broadley 1962). It is possible that the species has been accidentally introduced by man. Active by day and night, this gecko feeds mainly on large insects, but also on smaller lizards.

Lygodactylus capensis (A. Smith 1849) Cape Dwarf Gecko
This is the common species of diurnal dwarf gecko throughout most of SE Africa (Pasteur 1964) and its range is constantly being expanded by accidental transportation in the form of eggs stuck in crevices of crates, etc. [ES]. Basically arboreal, it may also be found in reed beds and on house walls.

Lygodactylus bradfieldi Hewitt 1932 Bradfield's Dwarf Gecko
A small diurnal gecko widespread in arid regions of Namibia and the Kalahari [CKAL], it is found on the southern margins of the Okavango Delta and Makgadikgadi Pans. Common on dead trees and bushes.

Lygodactylus chobiensis FitzSimons 1932 Chobe Dwarf Gecko
A relatively robust dwarf gecko which is common on trees and house walls in the Okavango Basin, NW Zimbabwe (Broadley 1962) and along the Zambezi from Barotseland to Tete [PUZ]. It is the southernmost species of the *L. picturatus* complex and appears to be a sister species of *L. gutturalis*.

Hemidactylus mabouia (Jonnés 1818) Tropical House-Gecko
A moderate-sized arboreal gecko with a cosmopolitan distribution covering most of East Africa, Madagascar and the east coast of C and S America [ES]. Because it has become a common commensal of man it is rapidly expanding its range through accidental transportation of eggs. It emerges at night onto house walls to feed on insects.

SCINCIDAE
Typhlacontias rohani Angel 1923 Kalahari Burrowing Skink
A small limbless skink that lives beneath leaf litter in Kalahari sand [NKAL], including the whole of the Four Corners area (Haacke 1997). This sand-swimmer forages just below the surface of the sand at night when it is relatively cool, feeding mainly on termites and beetle larvae.

The following six species were formerly included in the New World genus *Mabuya,* but following the partition of that genus they are now correctly assigned to the genus *Trachylepis* (Bauer 2003).

Trachylepis ***capensis*** (Gray 1830) Cape Skink
A large robust skink with a wide range in South Africa and the Kalahari as far north as the margins of the Makgadikgadi Pans [SS]. It lives in burrows and feeds on large insects.

Trachylepis ***margaritifer*** (Peters 1854) Rainbow Rock Skink
A large rupicolous species widespread in SE Africa (Broadley & Bauer 1998) [ES], but in the Four Corners area it only occurs on gneiss and sandstone outcrops in the Hwange District of Zimbabwe (Broadley 1962).

Trachylepis ***punctulata*** (Bocage 1872) Speckled Skink
A small terrestrial skink with a distribution centred on the Kalahari, but extending west across Namibia to SW Angola, north to W Zambia and east through the Limpopo Basin to S Mozambique [CKAL]. In Hwange District it may have burrows at the bases of bushes or take refuge under logs (Broadley 1962), while in other parts of its range it is rupicolous (Broadley 1975).

Trachylepis ***lacertiformis*** (Peters 1854) Bronze Rock Skink
A small rupicolous skink ranging from S Malawi and W Mozambique west to the Hwange District in Zimbabwe, where it occurs on gneiss and sandstone outcrops (Broadley 1975) [CPS].

Trachylepis ***varia*** (Peters 1867) Variable Skink
A moderate-sized terrestrial skink with a wide range from the Sudan south to the E Cape Province and west to Namibia [ES]. It is common from sea level to mountain top and takes refuge under rocks and logs or in thick vegetation.

Trachylepis ***wahlbergii*** (Peters 1869) Wahlberg's Skink
A medium-sized arboreal skink that is a western member of the *M. striata* complex. Its range includes the whole of the Four Corners area (Broadley 1977) [WS]. It is particularly common on mopane trees, but also moves onto buildings and rock outcrops.

Lygosoma sundevallii (A. Smith 1849) Sundevall's Writhing Skink
The distribution of this moderate-sized skink seems to be centred on the Kalahari, extending west to S Angola and N Namibia, east to W Mozambique and north to Kenya [CPS]. Common in the south of the study area, although there are few records from SW Zambia. It shelters under rocks, logs and elephant dung on sandy soils, feeding on small insects.

Eumecia anchietae Bocage 1870 Anchieta's Serpentiform Skink
A large elongate skink with a range extending from the Angolan highlands around the southern rim of the Congo Basin to W Kenya [CPS]. Recorded from Senanga on the northern margin of the Four Corners area. It uses serpentine locomotion to traverse its swamp or dambo habitat.

Panaspis maculicollis Jacobsen & Broadley 2000 Spotted-neck Snake-eyed Skink
A very small skink found throughout W Mozambique, most of Zimbabwe, Botswana, the Caprivi and W Zambia [CPS]. It usually inhabits dry savanna under rocks and logs or in leaf litter, and feeds largely on termites.

Typhlosaurus lineatus Boulenger 1887 Striped Blind Legless Skink
A small legless sand-swimmer with a wide range in the Kalahari as far north as the southern and western margins of the Okavango Delta and Makgadikgadi Pans (Broadley 1968a) [CKAL]. There is a vicariant species, *T. jappi*, in Barotseland. It lives beneath leaf litter and feeds on termites.

CORDYLIDAE
Cordylus jonesii (Boulenger 1891) Jones' Girdled Lizard
A small rough-scaled lizard with a wide range in the Limpopo Basin [ES], just entering the Four

Corners area at the southeastern corner of the Makgadikgadi Pans. It lives in hollow trees and under loose bark and feeds largely on termites.

Platysaurus rhodesianus FitzSimons 1943 Zimbabwe Flat-Lizard
A flattened rupicolous lizard with a wide range in central and southern Zimbabwe [CPS], and relict populations in the Hwange District. It lives in narrow crevices in gneiss outcrops. Oviparous.

GERRHOSAURIDAE
Gerrhosaurus validus A. Smith 1849 Giant Plated Lizard
A large and robust rupicolous lizard widely distributed across SE Africa [ES]. It is largely vegetarian, but also feeds on insects, scorpions, millipedes and small lizards.

Gerrhosaurus major Duméril 1851 Tawny Plated-Lizard
A large robust lizard ranging from S Ethiopia south to KwaZulu-Natal and west to Hwange District in Zimbabwe [ES]. It takes refuge in burrows, derelict termitaria or rock crevices (Broadley 1962). Omnivorous, the diet includes soft fruits and flowers, insects, millipedes and smaller lizards.

Gerrhosaurus nigrolineatus Hallowell 1857 Black-lined Plated-Lizard
A larger, but more slender, species ranging from Gabon south to N Namibia and eastwards to Uganda, Kenya, Tanzania, Malawi, W Mozambique, Zimbabwe and the northeastern provinces of South Africa [WS]. This big lizard takes refuge in rodent burrows or termitaria. The diet consists largely of grasshoppers, beetles and millipedes.

Gerrhosaurus auritus Boettger 1887 Kalahari Plated-Lizard
A large species inhabiting the Kalahari, extending west into N Namibia, east to Hwange National Park (Broadley & Rasmussen 1995b) and north to Barotseland [CKAL]. Ecology is similar to the previous species.

LACERTIDAE
Heliobolus lugubris (A. Smith 1838) Black and Yellow Sand Lizard
A widely distributed lizard in the Kalahari and adjacent arid regions [CKAL], extending as far north as the Caprivi, but not recorded from Zambia or adjacent Angola. In NW Zimbabwe it extends as far east as Binga on Lake Kariba. The diet consists of termites and other small insects.

Pedioplanis namaquensis (Duméril & Bibron 1839) Namaqua Sand Lizard
A small fast-moving lizard with a wide range in the arid western regions of southern Africa, extending through the Kalahari to the margins of the Makgadikgadi Pans (Broadley 1967a) and the southern border of the Okavango Delta [CKAL]. It frequents the hard ground of dry watercourses.

Pedioplanis lineoocellata (Duméril & Bibron 1839) Ocellated Sand Lizard
A sand lizard with a wide range in arid SW Africa, ranging north through the Kalahari to the margins of the Okavango/Makgadikgadi (Broadley 1967a) [CKAL]. It tends to inhabit sandier substrates than the previous species.

Nucras intertexta (A. Smith 1838) Spotted Scrub Lizard
A large sandveld lizard found in the southern Kalahari, extending northwest across Namibia and east through the Limpopo Basin [CKAL]. One specimen collected from just south of dry Lake

Ngami (Broadley 1972a), while a second specimen was collected in Dete vlei in Hwange District (Broadley & Rasmussen 1997).

Nucras holubi (Steindachner 1882) Holub's Scrub Lizard
A small lizard found on the central plateau regions [CPS], just entering the Four Corners area at Nata on the northeastern edge of the Makgadikgadi Pans (Broadley 1972a). It feeds largely on termites.

Nucras ornata (Gray 1864) Ornate Scrub Lizard
A large lizard inhabiting moist savanna of SE Africa [ES], reaching its western limits in NW Zimbabwe and adjacent Zambia (Broadley 1972a). It feeds on large insects and scorpions.

Ichnotropis capensis (A. Smith 1838) Cape Rough-scaled Sand Lizard
A common medium-sized sand lizard found from S Angola and NE Namibia to Zambia, southern DRC, Botswana, Zimbabwe, northeastern parts of South Africa and S Mozambique [CPS]. It is an 'annual' species, eggs being laid in November/December and hatching in January/March. Few adults survive into their second year (Broadley 1967b, 1974)

Ichnotropis grandiceps Broadley 1967 Caprivi Rough-scaled Sand Lizard
A species with a relatively large head**,** known only from a small border area between Botswana and the W Caprivi (Broadley 1967a) [CAP], extending west into NE Namibia (Haacke 1970).

Ichnotropis squamulosa Peters 1854 Common Rough-scaled Lizard
This wide-ranging species [CPS] occurs throughout the Four Corners area. It is another 'annual' species, with the adults dying off in June-July (Broadley 1967b, 1974). Its ecology is similar to that of *I. capensis*, with which it is often sympatric; its staggered breeding cycles prevent competition for food.

VARANIDAE
Varanus niloticus (Linnaeus 1766) Nile Monitor
The largest African lizard that is ubiquitous throughout the savannas [PAN]. An aquatic species, its diet consists largely of crabs and mussels, but also includes insects, millipedes and any vertebrate that it can catch, together with the eggs of crocodiles and terrapins which are dug out of the nests.

Varanus albigularis albigularis (Daudin 1802) Southern Savanna Monitor
A very large robust lizard that has a wide range in southern and eastern Africa [SS], including the whole of the Four Corners area. It is relatively slow-moving and feeds largely on millipedes, snails, large insects and carrion.

AMPHISBAENIA
These blind burrowing reptiles construct burrow systems in sandy soils and feed on small invertebrates that fall into them.

AMPHISBAENIDAE
Zygaspis kafuensis Broadley & Broadley 1997 Kafue Round-snouted Worm-Lizard
A moderate-sized species known only from the margins of the Kafue Flats [KAF] on the eastern boundary of the Kafue National Park, where it is sympatric with *Z. quadrifrons*.

Zygaspis nigra Broadley & Gans 1969 Black Round-snouted Worm-Lizard
A large and robust species found in E Angola, Zambia west of the Zambezi and E Caprivi

[NKAL] in Klahari sand, but is not known south or east of the Caprivi. It is sympatric with several other amphisbaenians, including *Z. quadrifrons* (Broadley & Broadley 1997).

Zygaspis quadrifrons (Peters 1873) Kalahari Round-snouted Worm-Lizard
A small species ranging from Namibia eastwards through Botswana, Zambia and Zimbabwe to C Mozambique (Broadley & Broadley 1997) [CKAL]. It feeds largely on termites.

Monopeltis anchietae (Bocage 1873) Angolan Spade-snouted Worm Lizard
A large, robust western species [WS] reaching its eastern limit at Katima Mulilo on the Caprivi /Zambia border (Broadley *et al.* 1976).

Monopeltis leonhardi Werner 1910 Kalahari Spade-snouted Worm Lizard
A Kalahari species extending into NW Zimbabwe (Broadley *et al.* 1976), although not yet recorded from the Caprivi or Zambia [CKAL].

Monopeltis rhodesiana Broadley, Gans & Visser 1976 Zimbabwe Spade-snouted Worm Lizard
An amphisbaenian with a wide range in Zimbabwe, extending west to Hwange National Park (Broadley 1997) [CPS]. The diet consists largely of termites, supplemented by ants, beetles and solifuges.

Monopeltis mauricei Parker 1935 Maurice's Spade-snouted Worm-Lizard
A very slender species endemic to the Kalahari, extending north to the Kafue National Park and east into Hwange District in Zimbabwe (Broadley *et al.* 1976) [CKAL]. The diet includes termites, ants and beetles.

Dalophia pistillum (Boettger 1895) Zambezi Pestle-tailed Worm-Lizard
A large species with a wide but patchy distribution from the extreme south of Angola and NE Namibia east through Botswana, Zambia and Zimbabwe to Mozambique, with isolated records from northern regions of South Africa (Broadley *et al.* 1976) [CKAL]. Although inhabiting Kalahari sand regions, it also tolerates harder substrates. The diet includes adult and larval beetles, termites, ant larvae and pupae.

Dalophia longicauda (Werner 1915) Long-tailed Pestle-tailed Worm-Lizard
An elongate species with a very restricted distribution in the Caprivi Strip and Hwange District in Zimbabwe, with isolated records from the Okavango River and delta (Broadley *et al.* 1976) [CAP]. It seems to be at least parapatric with the very similar *D. pistillum* throughout its range. The diet includes beetle larvae, ant larvae and cocoons.

SERPENTES

TYPHLOPIDAE

Rhinotyphlops lalandei (Schlegel 1844) Delalande's Blind Snake
A small species with a wide range in southern Africa [SS], extending into the study area on the southern border of the Makgadikgadi Pans and in Hwange National Park.

Rhinotyphlops schlegelii (Bianconi 1850) Schlegel's Blind-Snake
A large, robust, species extending from S Angola and NE Namibia through Botswana and northeastern parts of South Africa to Swaziland and S Mozambique [WS]. It has been recorded from Orapa, the N Okavango Delta and Katima Mulilo.

Rhinotyphlops mucruso (Peters 1854) Zambezi Blind-Snake
The largest blind snake in the world, attaining a length of 95 cm. Its range extends from coastal Kenya south to C Mozambique, west to SE DRC, Zambia, Zimbabwe and E Botswana [ES]. The diet consists largely of ant brood.

LEPTOTYPHLOPIDAE
Leptotyphlops longicaudus (Peters 1854) Long-tailed Worm Snake
A species with a wide distribution in SE Africa [ES], reaching its western limit at Katombora Rapids on the upper Zambezi (Broadley & Broadley 1999).

Leptotyphlops incognitus Broadley & Watson 1976 Incognito Worm Snake
A species with a wide distribution in SE Africa [ES], reaching its western limit in Hwange District in Zimbabwe and adjacent Zambia (Broadley & Broadley 1999).

Leptotyphlops scutifrons (Peters 1854) Peters' Black Worm-Snake
A species with a wide range in E Africa, extending west to Angola and Namibia (Broadley & Broadley 1999) [ES], although not recorded from W Zambia.

PYTHONIDAE
Python natalensis A. Smith 1840 Southern African Python
Africa's second largest snake, this species ranges from C Kenya south to the Eastern Cape Province and west to Angola and Namibia (Broadley 1984) [ES]. It is frequently eaten by man and has been locally exterminated in some areas. Particularly common in waterside habitats, where it can ambush waterfowl and mammals coming to drink. Juveniles will take fish caught in nets or fish traps.

VIPERIDAE
Causus rhombeatus (Lichtenstein 1823) Rhombic Night-Adder
A large species with a huge range in East Africa from the Sudan to the southern coastal strip of South Africa [ES]. In the study area it seems to be common only in the Okavango Delta, but also occurs in the Caprivi (Griffin 2003). It inhabits moist savanna and feeds mainly on toads.

Causus bilineatus Boulenger 1905 Lined Night-Adder
A smaller species occuring in Angola, SE DRC and N Zambia [ANG]; in the study area it is known only from the Kafue National Park, where it inhabits moist miombo woodland.

Causus defilippii (Jan 1862) Snouted Night-Adder
A small species occuring in East African savannas from Tanzania south to KwaZulu-Natal, extending west to the Hwange District of Zimbabwe [ES].

VIPERINAE
Bitis caudalis (A. Smith 1839) Horned Adder
A small side-winding adder with a wide range in the arid areas of SW Africa [CKAL]. In Botswana it reaches its northern limit at Orapa, just south of the Makgadikgadi Pans. The diet consists largely of lizards, with a few amphibians and small rodents (Broadley 1972b).

Bitis arietans arietans (Merrem 1820) Puffadder
A heavily built viper with a pan-African distribution, being absent only from deserts, rainforests and high mountains [PAN]. It is very common in savannas, relying on its cryptic colouration to escape observation as it lies in wait for rodents, consequently it is responsible for many snake bites on humans.

Bitis gabonica (Duméril & Bibron 1854) Gaboon Viper
A large and massive viper with a wide range in Africa, inhabiting areas of forest/savanna mosaic [PAN]. It apparently enters the Four Corners region only in the Kafue National Park, where it occurs in thickets on Kalahari sand. There are also reports from SE Angola. It spends the day buried in leaf litter at the forest edge and moves into more open areas at night to feed mainly on rodents. The diet includes mammals up to the size of a monkey; birds and amphibians are also taken.

ATRACTASPIDIDAE
Atractaspis bibronii A. Smith 1849 Bibron's Stiletto Snake
A small snake with a wide range in southern and eastern Africa [ES], but in SE Angola and SW Zambia it may be replaced by the next species. It appears above ground at night after rain and investigates small burrows to find suitable prey, mainly lizards, small snakes and nestling rodents.

Atractaspis congica Peters 1877 Congo Stiletto Snake
This species occurs from the Lower Congo east to N Zambia, reaching its southern limit at Katima Mulilo in the E Caprivi (Broadley 1983) [WS].

Amblyodipsas polylepis polylepis (Bocage 1873) Common Purple-glossed Snake
A large back-fanged snake with a wide range in East Africa, extending west to Angola and N Namibia [ES]. It moves around on the surface at night during wet weather (Broadley 1971b).

Amblyodipsas ventrimaculata (Roux 1907) Kalahari Purple-glossed Snake
A small fossorial species with a distribution limited to the Kalahari sand regions of N Namibia, N Botswana, W Zambia and NW Zimbabwe [NKAL]. The diet includes small amphisbaenians and limbless skinks (Broadley 1971b).

Xenocalamus bicolor Günther 1868 Bicoloured Quill-snouted Snake
A slender species with a distribution covering Namibia, Botswana, NW South Africa, N Zimbabwe and C Mozambique [CKAL].

Xenocalamus mechowii Nieden 1913 Elongate Quill-snouted Snake
A large, slender species ranging from the Congo Basin south to E Angola, N Namibia, W Zambia and NW Zimbabwe, being confined to Kalahari sand regions [NKAL].

Aparallactus lunulatus (Peters 1854) Reticulate Centipede-eater
A small fossorial snake with an enormous range from Ghana west to Ethiopia and south to S Mozambique [ES]. In the Four Corners area it has only been recorded from NW Zimbabwe. It is a specialist feeder on centipedes.

Aparallactus capensis A. Smith 1849 Cape Centipede-eater
A small species with a wide range from Kenya to South Africa and west to Angola and Namibia [ES]. In the Four Corners area it has only been recorded from NW Zimbabwe and E Caprivi. Usually found under logs and stones in savanna, it also extends onto floodplains.

Chilorhinophis gerardi (Boulenger 1913) Gerard's Black and Yellow Burrowing Snake
A small slender snake found from the southern DRC south through Zambia to N Zimbabwe [CPS]. In the Four Corners area it is known only from Lukosi in Hwange District. The diet consists mainly of small worm lizards and smaller snakes.

ELAPIDAE

Elapsoidea guentheri (Bocage 1866) Günther's Garter Snake
A small fossorial snake with a wide range from the lower Congo region to the miombo woodlands of south-central Africa [WS], extending south to Zimbabwe. In the Four Corners area it has only been recorded from Katanda, south of the Kafue National Park (Broadley 1971a).

Elapsoidea semiannulata semiannulata Bocage1882 Angolan Garter-Snake
A fossorial species occurring in the Angola highlands, extending into N Namibia and W Zambia [WS]. It is sympatric with *E. boulengeri* in the E Caprivi.

Elapsoidea boulengeri Boettger 1895 Zambezi Garter-Snake
A nocturnal species found widely in SE Africa, west to Zambia, Botswana and N Namibia (Broadley 1998) [ES]. It occurs in savanna from sea level to 1500 m and is often associated with floodplains or mopane woodland.

Elapsoidea sundevallii fitzsimonsi Loveridge Kalahari Garter-Snake
A species widely distributed across the Kalahari and Namibia (Broadley 1971) [CKAL]. The only record from the Four Corners area is from near Katima Mulilo in the E Caprivi, where it is parapatric with the previous two species (Broadley 1998).

Aspidelaps scutatus scutatus A. Smith 1849 Western Shield Snake
A small fossorial elapid with a wide range from Namibia to W Zimbabwe (KAL), although it is not known from north of Katima Mulilo in the E Caprivi (Broadley 1983). It emerges at night after rain to feed on lizards and small rodents.

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Naja anchietae Bocage 1879 Anchieta's Cobra
A large species closely related to the Snouted Cobra (*Naja annulifera*). It inhabits moist savanna in Angola, NE Namibia, N Botswana, SW Zambia and NW Zimbabwe (Broadley 1983) [ANG]. In the eastern part of its range it seems to be restricted to Kalahari sands. It is active by day and night and feeds on a variety of vertebrate prey, mostly rodents, birds and reptiles to toads.

Naja melanoleuca Hallowell 1857 Forest Cobra
A large cobra with a wide range in the forested areas of west, central and eastern Africa. It enters the Four Corners area only at the northern end of the Kafue National Park [PAN]. The snake climbs and swims well and is expert at catching fish.

Naja nigricollis Reinhardt 1843 Black-necked Spitting Cobra
A big cobra with a wide range in moist savannas as far south as Angola and Zambia [NS]. In the Four Corners area there is one record from Katima Mulilo (Broadley 1983). The ecology is similar to that of Anchieta's Cobra.

Naja mossambica Peters 1854 Mozambique Spitting Cobra
A relatively small cobra with a wide range from Tanzania south to KwaZulu-Natal, west to N Namibia and S Angola [ES]. Its ecology resembles that of *N. nigricollis*.

Dendroaspis polylepis (Günther 1864) Black Mamba
The largest African elapid, it has a wide range in savanna areas of sub-Saharan Africa [PAN] and is found throughout the Four Corners area. It lives on rock outcrops or in thick bush, feeding largely on squirrels and other small mammals.

COLUBRIDAE

Lamprophis capensis (Duméril & Bibron 1854) Brown House Snake
A harmless nocturnal constrictor with a wide range in southern and eastern Africa [ES]. Juveniles feed on lizards, but adults take rats.

Mehelya capensis (A. Smith 1847) Southern File Snake
A large nocturnal constrictor with a wide range in SE Africa [ES], but nowhere common. The diet consists largely of toads and smaller snakes.

Mehelya nyassae (Günther 1888) Nyassa File Snake
A small species with a similar range to the previous species [ES].

Lycophidion variegatum Broadley 1969 Variegated Wolf Snake
A rare small constrictor found throughout Zimbabwe and the eastern parts of South Africa [CPS]. In the Four Corners area it has been recorded from Hwange District, with one specimen from Livingstone.

Lycophidion multimaculatum Boettger 1888 Blotched Wolf-Snake
A small species ranging from Gabon south through Angola to the Caprivi, east through S DRC and N Zambia to the extreme west of Tanzania (Broadley 1996a) [WS]. It is sympatric with *L. capense* near Katima Mulilo in the East Caprivi.

Lycophidion capense capense (A. Smith 1831) Cape Wolf Snake
This small snake has a wide range in savannas from the SW Cape north to Namibia, S Zambia, Malawi and Tanzania [ES]. It is a nocturnal constrictor that feeds mainly on sleeping skinks, finding shelter under rocks or logs during the day.

Pseudaspis cana (Linnaeus 1754) Mole Snake
A robust and powerful constrictor that has a wide range in southern Africa [SS] and throughout the Four Corners area. It spends most of its time below ground feeding on mole rats and other rodents.

Crotaphopeltis hotamboeia (Laurenti 1768) Herald Snake
A very common small nocturnal snake with a wide range throughout the savannas of sub-Saharan Africa [PAN]. It feeds largely on toads.

Crotaphopeltis barotseensis Broadley 1968 Barotse Water-Snake
So far recorded only from Kalabo on the Barotse floodplain, the Selinda Spillway and the Okavango Delta [PUZ]. It seems to replace the previous species in papyrus and *Phragmites* swamps and is more aquatic (Auerbach 1987). The diet includes a variety of frogs.

Telescopus semiannulatus (A. Smith 1849) Eastern Tiger Snake
A nocturnal snake with a wide range across the savannas of southern and eastern Africa [ES]. It is semi-arboreal and feeds to a large extent on sleeping chameleons and geckos, together with a few birds and small rodents.

Natriciteres olivacea (Peters 1854) Olive Marsh-Snake
A small snake with a huge range from Guinea east to the Sudan and then south to Mozambique and west to Angola [NS]. It is common in the wetlands of the Four Corners area. The diet includes frogs, tadpoles and small fish.

Limnophis bangweolicus (Mertens 1936) Bangweulu Striped Swamp-Snake
This water snake ranges from the swamps of Mweru Wantipa and Lake Bangweulu along the southern rim of the Congo Basin into Angola, and south along the Upper Zambezi to the Okavango swamps [PUZ]. It catches a variety of small fish.

Hemirhagerrhis nototaenia (Günther 1864) Common Bark Snake
A small back-fanged snake with a wide range in SE Africa, including the whole of the Four Corners area (Broadley & Hughes 2000) [ES].

Psammophylax tritaeniatus (Günther 1868) Three-lined Grass-Snake
This diurnal snake has a distribution extending from S Tanzania south to the central plateau areas of South Africa and west to Angola and Namibia [ES]. Within the Four Corners area it has not yet been recorded from the Caprivi or SW Zambia. It inhabits open grassland and feeds on lizards, frogs and mice.

Psammophylax variabilis Günther 1893 Grey-bellied Grass-Snake
This species inhabits montane grasslands from Rwanda, Burundi, SE DRC and SW Tanzania south to S Malawi. It occurs on floodplains in W Zambia and the E Caprivi, entering Botswana at Kasane [CPS].

Rhamphiophis rostratus Peters 1854 Rufous Beaked-Snake
A large species with a wide range at low altitudes in East Africa, extending from the Sudan south to Mozambique and west to Botswana and the Caprivi [ES]. It spends much of its time underground in rodent burrows.

Dromophis lineatus (Dumèril & Bibron 1854) Lined Olympic-Snake
This species ranges from Guinea to the Sudan, south to Zambia and the E Caprivi, just entering Botswana at Kasane; the only Zimbabwe specimen was collected on the banks of the Zambezi at Nampini [NS]. It inhabits swamps and dambos.

Psammophis trinasalis Werner 1902 Kalahari Sand Snake
Although its range seems to be centred on the central and southern Kalahari [CKAL], this fast-moving snake extends across the Namibian plateau and into the northern provinces of South Africa. In the Four Corners area it extends as far north as Moremi Game Reserve, but there are no records from eastern Botswana or Zimbabwe.

Psammophis jallae Peracca 1896 Jalla's Sand Snake
This sand snake has a restricted range from Zimbabwe west to Namibia (Broadley 2002) [CPS]. In the Four Corners area it is found in SW Angola, Ngamiland, Ntwetwe Pan (Broadley 1962) and in Hwange District. Its diet consists mainly of lizards.

Psammophis subtaeniatus (Peters 1882) Western Stripe-bellied Sand Snake
A common species ranging from S Angola to W Mozambique (Broadley 2002), inhabiting dry savanna [WS]. The diet consists mainly of lizards and frogs.

Psammophis mossambicus Peters 1882 Olive Grass-Snake
A common large species ranging from the Sudan south to KwaZulu-Natal and west to Angola and northern Namibia (Broadley 2002) [ES]. Its preferred habitat is thick grass and reed beds where it preys upon rodents, lizards and frogs.

Psammophis angolensis (Bocage 1872) Dwarf Sand Snake
A very small species with a wide range in E Africa [ES], extending west to the Four Corners area, N Namibia and Angola (Broadley 2002).

Meizodon semiornatus semiornatus (Peters 1854) Semiornate Snake
A small species ranging from Kenya and Uganda south to KwaZulu-Natal, reaching its western limit on the Zimbabwe/Botswana border around the Kazuma depression [ES]. It usually occurs along drainage lines and lives in hollow trees or under loose bark.

Prosymna lineata (Peters 1871) Lined Shovel-snout
A savanna species widespread in SE Africa [ES], extending west to Hwange District, with a single record from NE Botswana but none from Zambia or the Caprivi. Shovel-snouts are found under rocks and logs and their diet consists of reptile eggs (Broadley 1979,1980). They are often found inside hollow logs.

Prosymna bivittata Werner 1903 Two-striped Shovel-snout
A western species extending from Namibia east to S Zimbabwe and NE South Africa (Broadley 1980) [WS]. The only record from the Four Corners area is from north of the Makgadikgadi Pans.

Prosymna angolensis Boulenger 1915 Angola Shovel-snout
This species occurs from Angola and N Namibia east to W Zambia and W Zimbabwe (Broadley 1995) [WS]. In the Four Corners area it has been recorded from Katima Mulilo, northeast of the Okavango Delta) and from Malindi siding in Hwange District.

Philothamnus hoplogaster (Günther 1863) Southeastern Green-Snake
A small snake with a wide range in the East African savannas from Kenya south to the coast of the Eastern Cape Province in South Africa, and west to Zambia and the E Caprivi [ES]. Its preferred habitat is open grassy vleis and dambos, where it feeds mainly on frogs.

Philothamnus ornatus Bocage 1872 Ornate Green-Snake
This species has a patchy distribution from Angola east through Zambia to Lake Malawi, south into N Botswana and Zimbabwe along the Harare-Nyanga watershed [WS]. The only records from the Four Corners area are from the Okavango River south of Shakawe and in the E Caprivi. It is usually found along small streams or vleis in open grassland with patches of rushes and sedges.

Philothamnus angolensis Bocage 1882 Angolan Green-Snake
A large arboreal snake with a range extending from Angola and N Namibia westwards to S Tanzania and Mozambique and south to KwaZulu-Natal [WS]. Abundant in the Four Corners area, it inhabits extensive beds of reeds and papyrus, but also occurs in overhanging trees along river courses.

Philothamnus semivariegatus (A. Smith 1840) Variegated Bush-Snake
A long slender species occuring throughout the tropical savannas of sub-Saharan Africa [PAN]. It is strongly arboreal and feeds largely on geckos and other lizards.

Dispholidus typus (A. Smith 1829) Boomslang
A large tree-snake with an extensive distribution throughout the savannas of sub-Saharan Africa [PAN]. Its preys largely on chameleons, but also takes nestling birds and frogs.

Thelotornis capensis oatesii (Günther 1881) Oates' Savanna Vine-Snake
A slender arboreal snake with a wide range from S Angola and N Namibia, east to Zambia, Malawi, Zimbabwe and W Mozambique [WS]. Vine snakes have excellent eyesight and having spotted a suitable frog, lizard or small snake, they descend to the ground and slowly stalk their prey before seizing it after a short rush.

Dasypeltis scabra (Linnaeus 1758) Common Egg-eater
A nocturnal species with a pan-African savannas distribution [PAN]. It is particularly common and reaches a large size in swamps.

CROCODYLIA
CROCODYLIDAE
Crocodylus niloticus Laurenti 1768 Nile Crocodile
This species is ubiquitous in suitable water bodies throughout tropical sub-Saharan Africa [PAN], except where exterminated in heavily populated areas.Blake & Loveridge (1975) give an account of crocodile rearing in Zimbabwe for commercial farming and conservation purposes.

AMPHIBIA
PIPIDAE
Xenopus laevis (Daudin 1802) Common Clawed-Frog or Platanna
A totally aquatic species of platanna occurring throughout well-watered parts of South Africa and north to Zimbabwe and S Malawi [SS], except where replaced by the following two species. In the Four Corners area it occurs in tributaries of the Middle Zambezi in Hwange District (Poynton & Broadley 1985a). The diet includes frogs, tadpoles, fish and aquatic insects.

Xenopus petersii Bocage 1895 Angolan Clawed-Frog or Platanna
This frog has a wide range on plateau areas from Angola and N Namibia through Zambia and N Botswana to S Tanzania [WS]. In the Four Corners area it occurs in the Upper Zambezi, its tributaries and the Okavango Delta (Poynton & Broadley 1985a). It seems to prefer clear water.

Xenopus muelleri (Peters 1844) Tropical Clawed-Frog or Platanna
This species has an enormous range at low altitudes from the Sudan south to KwaZulu-Natal and west to Ghana. It inhabits muddy lagoons bordering the Upper Zambezi and also occurs in the Okavango Delta and the Caprivi (Poynton & Broadley 1985a) [ES]. It is found in muddy backwaters which dry out, when it takes refuge at the bottom of cracks in the dried mud.

BUFONIDAE
Bufo fenoulheti fenoulheti Hewitt & Methuen 1913 Fenoulhet's Pygmy Toad
A small toad with a wide range in Zimbabwe [CPS], extending into Hwange District and Caprivi, with an isolated record from the Victoria Falls gorges in Zambia (Poynton & Broadley 1988). It occurs on or near rock outcrops, where it breeds in shallow pools.

Bufo gutturalis Power 1927 Guttural Toad
A common large toad that has a wide range in moist savannas from Kenya and Uganda south to the northern parts of South Africa [ES]. Common throughout the Four Corners area.

Bufo maculatus Hallowell 1854 Flat-back Toad
A moderate-sized toad occurring throughout the tropical savannas of sub-Saharan Africa [NS], including the Four Corners.

Bufo garmani Meek 1867 Olive Toad
This large toad has a patchy distribution in dry savannas from Somalia south to the northern parts of South Africa [ES]. In the Four Corners area it tends to occur on the harder substrates in NW Zimbabwe, being replaced on Kalahari sand by the next species.

Bufo poweri Hewitt 1935 Kalahari Toad
A very large toad found throughout the Kalahari, extending into NW Zimbabwe (Channing 1991) and north to the Barotse floodplains in Zambia [CKAL].

Bufo lemairii Boulenger 1901 Yellow Swamp Toad
An attractive toad with a limited range from the Okavango Swamps (Haacke 1982) along the floodplains of the Upper Zambezi to E Angola, S DRC and Lake Bangweulu (Poynton & Broadley 1988) [PUZ].

Bufo kavangensis Poynton & Broadley 1988 Kavango Dwarf Toad
A very small toad ranging from NE Namibia through N Botswana to NW Zimbabwe [PUZ].

Schismaderma carens (A. Smith 1848) Red Toad
A large toad with a wide range in SE Africa [ES]. In the Four Corners area it occurs in NW Zimbabwe, SW Zambia and the E Caprivi, but the only record for N Botswana is from Kasane (Poynton & Broadley 1988).

MICROHYLIDAE
Phrynomantis bifasciatus (A. Smith 1847) Red-banded Rubber-Frog
A fossorial species with a wide range in savannas from Kenya south to KwaZulu-Natal and west to N Namibia [ES]. It lives underground and feeds mainly on termites, emerging during the rains to breed in temporary pans.

Phrynomantis affinis (Boulenger 1901) Mweru Rubber-Frog
This poorly known frog has been recorded from NE Namibia (but not yet from the Caprivi), W Zambia, E Angola and SE Katanga (Lake Mweru) [WS].

Breviceps adspersus Peters 1882 Bushveld Rain Frog
A small bloated frog that is widely distributed in the Kalahari and environs [CKAL]. From Livingstone to Kafue National Park it is replaced by the next species. It spends most of the time underground, but emerges at night to call after heavy rain, when it also feeds heavily on alate termites.

Breviceps poweri Parker 1934 Power's Rain Frog
This species is sympatric with *B. adspersus* at Livingstone and then ranges through central and eastern Zambia to Malawi and N Mozambique (Poynton & Broadley 1985a) [CPS].

RANIDAE
Pyxicephalus adspersus Tschudi 1838 Giant Bullfrog
This very large frog ranges across the plateau areas of South Africa, Botswana and C Zimbabwe [SS]. In the Four Corners area it occurs on the southern margins of the Okavango Delta and the Makgadikgadi Pans, with a single record from the East Caprivi. It breeds in temporary pans, gorges itself on a wide range of invertebrates and small vertebrates, then spends the dry months underground in a cocoon.

Pyxicephalus edulis Peters 1854 Tropical Bullfrog
This smaller species occurs throughout the savanna lowlands of East Africa as far south as Maputaland and west to Nigeria [ES]. It is the common species in the Four Corners area.

Tomopterna cryptotis (Boulenger 1907) Kalahari Sand-Frog
A very common frog in Namibia, the Kalahari and dry savannas of Zimbabwe and W Mozambique [WS], breeding in ephemeral pans. There are few records from SW Zambia.

Tomopterna krugerensis Passmore & Carruthers 1975 Kruger Sand Frog
Most readily distinguished from the previous species on the basis of its call. It has a wide range in S Mozambique, Zimbabwe and Botswana as far north as pans between the Okavango Delta and Makgadikgadi Pans (Poynton & Broadley 1985b) [CKAL].

Tomopterna marmorata (Peters 1854) Marmorate Sand-Frog
This species has a more eastern distribution [ES] and is usually associated with sand rivers, burying itself in the damp sand of the river bed during the dry season. It occurs along the Zambezi downstream from Kazungula and along tributaries of the Zambezi in Hwange District (Poynton & Broadley 1985b).

Rana angolensis Bocage 1866 Common River-Frog
This frog has a wide distribution throughout the central plateau areas of Africa from Ethiopia south to South Africa [CPS], but is found only on the eastern periphery of the Four Corners area. It lives along well vegetated banks of streams and rivers.

Hylarana darlingi (Boulenger 1902) Golden-backed Frog
This species inhabits plateau areas from Angola through Zambia and Zimbabwe to S Malawi and W Mozambique [CPS]. In the Four Corners area there are a few records from the Livingstone District of Zambia in savanna (Poynton & Broadley 1985b).

Hildebrandtia ornata (Peters 1878) Ornate Burrowing Frog
Found from Kenya south to Mozambique and west to S Angola and N Namibia [ES], this frog is common in Hwange District and has been recorded from Livingstone, inhabiting open savanna and breeding in ephemeral pans (Poynton & Broadley 1985b).

Ptychadena subpunctata (Bocage 1866) Spot-bellied Grass-Frog
A large species with a wide range centred on the swamps and river backwaters of the Upper Zambezi and Okavango Delta, where it is common, extending into Angola and S DRC (Poynton & Broadley 1985b) [PUZ].

Ptychadena oxyrhynchus (A. Smith 1849) Sharp-snouted Grass-Frog
This frog ranges through moist savanna woodlands from Senegal to the Eastern Cape Province of South Africa [NS], with a few scattered records from the Four Corners are, but none from SW Zambia (Poynton & Broadley 1985b). It breeds in shallow pools along streams or on rock outcrops.

Ptychadena anchietae (Bocage 1867) Plain Grass-Frog
A species with a wide range through dry savannas from Ethiopia south to KwaZulu-Natal and west to Angola [ES]. Common in Hwange District, its usual habitat is the bare margins of sand rivers where it takes refuge under debris deposited by floodwaters.

Ptychadena mascareniensis (Dumèril & Bibron 1841) Mascarene Grass-Frog
A savanna species with a patchy distribution from Sierra Leone east to Egypt and south to Kwazulu-Natal [NS]. It also occurs on Madagascar, Mascarene and Seychelles Islands and is common along the upper Zambezi and in the Caprivi and Okavango swamps. It is restricted to swamps and marshes.

Ptychadena porosissima (Steindachner 1867) Striped Grass-Frog
A small species that inhabits uplands from Ethiopia and Uganda south to the Eastern Cape Province of South Africa and west to Angola [CPS]. There are a few records from the Zambezi between Kazungula and Victoria Falls (Poynton & Broadley 1985b). It inhabits open grasslands and dambos.

Ptychadena grandisonae Laurent 1954 Grandison's Grass-Frog
This species ranges from NE Angola through Zambia to E DRC and Rwanda [CPS]. In the Four Corners area it has only known from Senanga District (Poynton & Broadley 1985b).

Ptychadena pumilio (Boulenger 1920) Dwarf Grass-Frog
A small species with a patchy distribution in moist savanna from Senegal east to DRC and south to Maputaland [NS]. In the Four Corners region it is known from the margins of the Okavango Delta, the Caprivi and SW Zambia (Poynton & Broadley 1985b).

Ptychadena guibei Laurent 1954 Guibe's Grass-Frog
A small species that has a patchy distribution from Angola east to C Mozambique and north to S DRC [CPS]. There are records from Victoria Falls, the East Caprivi, Okavango Delta and the eastern border of Kafue National Park (Poynton & Broadley 1985b). It inhabits moist grassland and savanna, especially dambos.

Ptychadena mossambica (Peters 1854) Mozambique Grass-Frog
This species occurs from Kenya and Uganda south to Maputaland, west to Zambia the East Caprivi and Botswana [ES]. It is common in NW Zimbabwe along sand rivers and on some floodplains.

Ptychadena mapacha Channing 1993 Mapacha Grass-Frog
This species was described from the East Caprivi near Katima Mulilo (Channing 1993), but has been recorded from the Ojmatako River west of the Caprivi (Haacke 1999) and is likely to occur in adjacent Zambia, Botswana and SE Angola [CAP].

Phrynobatrachus natalensis (A. Smith 1849) Snoring Puddle-Frog
This species occurs throughout most savanna areas south of the Sahara [NS]. Usually associated with permanent shallow water.

Phrynobatrachus mababiensis FitzSimons 1932 Mababe Dwarf Puddle-Frog
A very small species with a wide range in SE Africa [ES], it is usually sympatric with the previous one.

Phrynobatrachus parvulus (Boulenger 1905) Angola Dwarf Puddle-Frog
This little frog occurs in highland areas from Angola and DRC east to Tanzania, Malawi and E Zimbabwe [CPS]. In the Four Corners area it is only recorded from the Khwai River in the Okavango Delta and the Ngambwe Rapids on the Upper Zambezi (Poynton & Broadley 1985b). It inhabits moist savanna and margins of forest, being common at the margins of weed-choked pools.

Cacosternum boettgeri (Boulenger 1882) Boettger's Dainty Frog
This frog ranges from Ethiopia to South Africa, but avoids the tropical lowlands and mountain ranges [CPS]. In the Four Corners area it is common in the Kazuma Depression on the Botswana/Zimbabwe border; the only other records are from the W Caprivi (Channing & Griffin 1993), Livingstone and Bilibili Hot Springs in Zambia.(Poynton & Broadley 1985b).

ARTHROLEPTIDAE
Arthroleptis stenodactylus Pfeffer 1893 Shovel-footed Bush Squeaker
A small frog with a wide range in SE Africa [ES], although the only Four Corners records are from the eastern border of the Kafue National Park (Poynton & Broadley 1985a). Commonly found in the leaf litter of miombo woodland.

RHACOPHORIDAE
Chiromantis xerampelina Peters 1854 Southern Foam-nest Frog
A large tree frog occurring throughout the East African lowlands from coastal Kenya south to Maputaland and west to E Botswana and the E Caprivi [ES]. Particularly common in mopane woodland.

HYPEROLIIDAE
Leptopelis bocagii (Günther 1864) Bocage's Frog
This burrowing tree frog inhabits upland savannas from Ethiopia south to Zimbabwe [CPS]. It has been recorded from the western Caprivi, Westwood vlei in Hwange District and the Kafue National Park (Poynton & Broadley 1987). It spends the dry season underground.

Kassina senegalensis (Duméril & Bibron 1841) Senegal Running-Frog
A small species occurring throughout tropical savannas south of the Sahara [NS]. It breeds in shallow ephemeral pans and pools.

Hyperolius nasutus Günther 1864 Sharp-snouted Reed-Frog
A small species occurring throughout sub-Saharan tropical savannas [ES]. It is very common in the swamps of the Okavango and the Caprivi (Poynton & Broadley 1987).

Hyperolius marginatus Peters 1854 Margined Reed-Frog
This frog has a curious range from N Malawi and E Zambia through the W Mozambique pedicle and along the Middle Zambezi Valley and escarpment to the Botswana border in the Hwange National Park (Broadley & Rasmussen 1994b) [CPS].

Hyperolius rhodesianus Laurent 1947 Matetsi Reed Frog
This species is only known from reed beds along the Matetsi River in Hwange District (Poynton & Broadley 1987) [CPS].

Hyperolius pyrrhodictyon Laurent 1965 Kafue Reed Frog
This reed frog is restricted to the Kafue Flats and environs [KAF] (Laurent 1965).

Hyperolius aposematicus Laurent 1951 Aposematic Reed Frog
This frog is known from Lealui on the Upper Zambezi along the river downstream to Victoria Falls [CPS], and also from Lake Liambezi in the East Caprivi (Poynton & Broadley 1987).

Hyperolius angolensis Steindachner 1867 Angolan Reed Frog
This species ranges from E Angola and N Namibia into W Zambia and N Botswana [NKAL].

HEMISISOTIDAE

Hemisus marmoratus (Peters 1854) Mottled Shovel-snouted Frog
A small fossorial species with a wide range in East Africa from Somalia south to N KwaZulu-Natal and west to the E Caprivi [ES]. It spends most of its time underground, feeding on termites.

Hemisus barotseensis Channing & Broadley 2002 Barotse Shovel-snouted Frog
A small fossorial frog recently described from the Barotse floodplains, it has also been recorded from the Kafue National Park [CPS].

Hemisus guineensis microps Laurent 1972 Congo Shovel-snouted Frog
A large frog found from the lower DRC through Angola, W Zambia and the Caprivi to the Okavango Swamps (Poynton & Broadley 1985a) [WS].

Hemisus guineensis broadleyi Laurent 1972 Broadley's Shovel-snouted Frog
A large frog ranging from Hwange National Park in Zimbabwe east to Mozambique [CPS]. It may be sympatric with *H. marmoratus* (Poynton & Broadley 1985a).

8.6 CONSERVATION

8.6.1 Priority Areas for Investigation

The only parts of the Four Corners area for which the herpetofauna is reasonably well known are the Hwange District of Northwest Zimbabwe and the East Caprivi/Zambia border strip extending 65 km westwards from Katima Mulilo. The latter area has an incredible species richness, including the sympatric occurrence of six species of worm lizards or amphisbaenians. Other species pairs of interest are the snakes *Elapsoidea s. semiannulata/ E. boulengeri* and *Lycophidion multimaculata/L. c. capense.*

One priority area for investigation is the Sioma Ngwezi National Park in Southwest Zambia. Although some Northern Kalahari fossorial reptiles (*Typhlacontias rohani, Zygaspis nigra*) occur on the southern boundary, other Barotse endemics (*Typhlacontias gracilis, Typhlosaurus jappi, Dalophia ellenbergeri*) are absent, although there is no obvious change in substrate. In addition, there is need for investigation of the poorly known Western Caprivi, Mudumu and Mamili National Parks in Namibia, Chobe National Park in Botswana and the Luiana Reserve in Southeast Angola.

8.6.2 Species of Conservation Interest

No reptile or amphibian species from the Four Corners area appear on the 2002 IUCN Red List of Threatened Species, but all species in the lizard genus *Cordylus* and the Monitor lizard genus *Varanus*, in addition to *Python natalensis,* are listed on CITES Appendix 2.

Other species that are possibly under threat are:

Pachydactylus tsodiloensis (Tsodilo Thick-toed Gecko). This rupicolous gecko is restricted to the Tsodilo Hills and is therefore potentially vulnerable to climatic change.

Crotaphopeltis barotseensis (Barotse Water Snake). A small back-fanged snake that seems to be restricted to papyrus and *Phragmites* swamps of the Palaeo-Upper Zambezi system. Its status seems secure unless any way of removing papyrus on a large scale is developed.

Hyperolius pyrrhodictyon (Kafue Reed-Frog). A frog endemic to the Kafue Flats and environs. It could be at risk during the tadpole stage due to pollution from agricultural fertilisers and insecticides.

8.6.3 Sites of Conservation Interest

Two sites of conservation interest for their herpetofauna have been identified.

Tsodilo Hills: The rupicolous gecko *Pachydactylus tsodiloensis* is restricted to the Tsodilo Hills and is therefore potentially vulnerable to climatic change.

Zambia/Caprivi border west of Katima Mulilo: This area has an incredibly rich fossorial reptile fauna, including six species of amphisbaenians, probably the largest number of sympatric species recorded worldwide.

8.6.4 Potential Consequences of Climatic Change

Global warming will tend to restrict the ranges of species typical of the temperate southern savanna, while allowing tropical forms to extend their ranges. Higher temperatures and reduced and erratic rainfall will also adversely affect the breeding of amphibians.

8.6.5 Potential Consequences of Changes in Land Use

Being largely dependent on high Zambezi floods backing up into it, the Chobe-Linyanti floodplain system is very vulnerable to dessication and burning of the dry swamps by local people (Schlettwein *et al.* 1991). Floodplains are also threatened by overgrazing by cattle and wildlife. Amphibians are particularly vulnerable to the destruction of their breeding sites, so drying out or drainage of small pools can have a severe impact on populations.

8.7 MONITORING

Regular monitoring in sand regions, such as the Kalahari, is difficult because many reptiles and amphibians only appear above ground following rain, which is patchy and unpredictable in the Four Corners area. Species densities decline following a series of drought years, with reduced vegetation cover making reptiles more vulnerable to predators.

During the rains the herpetofauna can be sampled by using a system of pitfall traps (plastic buckets) linked by plastic drift fences.

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Appendix 8.1 Checklist of the reptiles and amphibians in the Four Corners Area (X = species recorded, 0 = species expected to occur).

Species	Common name	Ang	Bot	Cap	Zam	Zim
REPTILIA						
TESTUDINES						
Pelomedusidae						
Pelomedusa subrufa	Helmeted Terrapin	O	X	X	X	X
Pelusios subniger	Pan Hinged Terrapin	O	X	O	X	X
Pelusios bechuanicus	Okavango Hinged Terrapin	O	X	X	X	X
Pelusios rhodesianus	Zambian Hinged Terrapin	O	X	X	X	X
Pelusios sinuatus	Serrated Hinged Terrapin		X	O	X	X
Testudinidae						
Kinixys spekii	Speke's Hinged Tortoise		X	X	X	X
Psammobates oculiferus	Serrated Tortoise		X	X		
Geochelone pardalis	Leopard Tortoise	O	X	X	X	X
SQUAMATA						
Agamidae						
Acanthocercus atricollis	Southern Tree Agama	O	X	O	X	X
Agama kirkii	Kirk's Rock Agama					X
Agama aculeata	Western Spiny Agama		X			
Agama armata	Eastern Spiny Agama	O	X	X	X	X
Agama makarikarika	Makgadikgadi Spiny Agama		X			
Chamaeleonidae						
Chamaeleo dilepis	Common Flap-neck Chameleon	X	X	X	X	X
Gekkonidae						
Ptenopus garrulus garrulus	Common Barking Gecko		X			
Pachydactylus turneri	Turner's Thick-toed Gecko	O	X	X	X	X
Pachydactylus punctatus	Speckled Thick-toed Gecko		X	O	O	X
Pachydactylus tsodiloensis	Tsodilo Thick-toed Gecko		X			
Pachydactylus capensis	Cape Thick-toed Gecko	O	X	X	O	
Pachydactylus oshaughnessyi	O'Shaughnessy's Banded Gecko		O	O	O	X
Colopus wahlbergii wahlbergii	Kalahari Ground Gecko		X	O	X	X
Homopholis wahlbergii	Wahlberg's Velvet Gecko					X
Lygodactylus bradfieldi	Bradfield's Dwarf Gecko		X			
Lygodactylus capensis	Cape Dwarf Gecko	O	X	X	X	X
Lygodactylus chobiensis	Chobe Dwarf Gecko	O	X	O	X	X
Hemidactylus mabouia	Tropical House Gecko	O	X	X	X	X
Scincidae						
Mabuya (Trachylepis) capensis	Cape Skink		X			
Mabuya (Trachylepis) margaritifer	Rainbow Skink				X	X
Mabuya (Trachylepis) punctulata	Speckled Skink	O	O	O	O	X
Mabuya (Trachylepis) lacertiformis	Bronze Rock Skink					X
Mabuya (Trachylepis) varia	Variable Skink	O	X	X	X	X
Mabuya (Trachylepis) wahlbergii	Wahlberg's Skink	O	X	O	X	X
Lygosoma sundevallii	Sundevall's Writhing Skink	O	X	X	X	X
Eumecia anchietae	Anchieta's Serpentiform Skink				X	
Panaspis maculicollis	Spotted-neck Snake-eyed Skink	O	X	X	X	X

Species	Common name	Ang	Bot	Cap	Zam	Zim
Typhlosaurus lineatus	Striped Blind Legless Skink		X			
Cordylidae						
Cordylus jonesii	Jones' Girdled Lizard		X			
Platysaurus rhodesianus	Zimbabwe Flat-Lizard					X
Gerrhosauridae						
Gerrhosaurus validus	Giant Plated Lizard					X
Gerrhosaurus major	Tawny Plated Lizard				X	X
Gerrhosaurus auritus	Kalahari Plated Lizard	O	X	X	O	X
Gerrhosaurus nigrolineatus	Black-lined Plated Lizard	O	X	O	X	X
Lacertidae						
Heliobolus lugubris	Black and Yellow Sand Lizard		X	X		X
Pedioplanis namaquensis	Namaqua Sand-Lizard		X			
Pedioplanis lineoocellata	Ocellated Sand-Lizard		X			
Nucras intertexta	Spotted Scrub Lizard		X			
Nucras holubi	Holub's Scrub Lizard		X			
Nucras ornata	Ornate Scrub Lizard				X	X
Ichnotropis capensis	Cape Rough-scaled Lizard	O	X	X	X	X
Ichnotropis grandiceps	Caprivi Rough-scaled Lizard		X	X		
Ichnotropis squamulosa	Common Rough-scaled Lizard	C	X	X	X	X
Varanidae						
Varanus niloticus	Nile Monitor	O	X	X	X	X
Varanus albigularis albigularis	Southern Savanna Monitor	O	X	X	X	X
Amphisbaenidae						
Zygaspis kafuensis	Kafue Round-snouted Worm-Lizard				X	
Zygaspis nigra	Black Round-snouted Worm-Lizard	O		X	X	
Zygaspis quadrifrons	Kalahari Round-snouted Worm-Lizard	O	X	X	X	X
Monopeltis anchietae	Anchieta's Spade-snouted Worm-Lizard	O	X	X	O	
Monopeltis leonhardi	Kalahari Spade-snouted Worm-Lizard		O			X
Monopeltis rhodesiana	Zimbabwe Spade-snouted Worm-Lizard					X
Monopeltis mauricei	Maurice's Spade-snouted Worm-Lizard	O	X	X	X	X
Dalophia pistillum	Pestle-tailed Worm-Lizard	O	X	X	X	X
Dalophia longicauda	Long-tailed Pestle-tailed Worm-Lizard	O	X	X	O	X
Typhlopidae						
Rhinotyphlops lalandei	Delalande's Beaked Blind-Snake		X			X
Rhinotyphlops schlegelii	Schlegel's Beaked Blind-Snake	O	X	X	O	
Rhinotyphlops mucruso	Zambezi Beaked Blind-Snake		O			X
Leptotyphlopidae						
Leptotyphlops longicaudus	Long-tailed Worm-Snake					X
Leptotyphlops incognitus	Incognito Worm-Snake					X
Leptotyphlops scutifrons	Peters' Black Worm-Snake	O	X	X	X	X

Species	Common name	Ang	Bot	Cap	Zam	Zim
Pythonidae						
Python natalensis	Southern African Python	O	X	X	X	X
Viperidae						
Causus rhombeatus	Rhombic Night-Adder	O	X	O	X	X
Causus bilineatus	Lined Night-Adder				X	
Causus defilippii	Snouted Night-Adder				X	X
Bitis caudalis	Horned Adder		X			
Bitis arietans arietans	Puffadder	O	X	X	X	X
Bitis gabonica	Gaboon Viper	O			X	
Atractaspididae						
Atractaspis bibronii	Bibron's Stiletto Snake	O	X	X	X	X
Atractaspis congica	Congo Stiletto Snake	O		X	X	
Amblyodipsas p. polylepis	Common Purple-glossed Snake	O	X	X	X	X
Amblyodipsas ventrimaculata	Kalahari Purple-glossed Snake	O	X	X	X	X
Xenocalamus bicolor	Bicoloured Quill-snouted Snake		X			
Xenocalamus mechowii	Elongate Quill-snouted Snake	O	X	X	X	X
Aparallactus lunulatus	Reticulate Centipede-eater					X
Aparallactus capensis	Cape Centipede-eater	O	X	X	X	X
Chilorhinophis gerardi	Gerard's Striped Burrowing Snake					X
Elapidae						
Elapsoidea guentheri	Guenther's Garter Snake				X	
Elapsoidea s. semiannulata	Half-banded Garter Snake	O		X	X	
Elapsoidea boulengeri	Zambezi Garter Snake		X	X	X	X
Elapsoidea sundevalli fitzsimonsi	Kalahari Garter Snake		X	X		
Aspidelaps scutatus scutatus	Western Shield Snake		X	X	O	X
Naja anchietae	Anchieta's Cobra	O	X	X	X	X
Naja melanoleuca	Forest Cobra				X	
Naja nigricollis	Black-necked Spitting Cobra	O		X	X	
Naja mossambica	Mozambique Spitting Cobra	O	X	X	X	X
Dendroaspis polylepis	Black Mamba	O	X	X	X	X
Colubridae						
Lamprophis capensis	Brown House Snake	O	X	X	X	X
Mehelya capensis	Southern File Snake	O	X	O	X	X
Mehelya nyassae	Nyassa File Snake	O	X	X	X	X
Lycophidion variegatum	Variegated Wolf Snake				X	X
Lycophidion multimaculatum	Blotched Wolf Snake	O		X	X	
Lycophidion capense	Cape Wolf Snake		X	X	X	X
Pseudaspis cana	Mole Snake	O	X	X	X	X
Crotaphopeltis hotamboeia	Herald Snake	O	X	X	X	X
Crotaphopeltis barotseensis	Barotse Water Snake	O	X	O	X	O
Telescopus semiannulatus	Eastern Tiger Snake	O	X	X	X	X
Natriciteres olivacea	Olive Marsh Snake	O	X	X	X	X
Limnophis bangweolicus	Bangweulu Water Snake	O	X	X	X	X
Hemirhagerrhis nototaenia	Common Bark Snake	O	X	X	X	X
Psammophylax tritaeniatus	Three-lined Grass Snake	O	X	O	X	X
Psammophylax variabilis	Grey-bellied Grass Snake	O	X	O	X	

Species	Common name	Ang	Bot	Cap	Zam	Zim
Rhamphiophis rostratus	Rufous Beaked Snake	O	X	X	X	X
Dromophis lineatus	Lined Olympic Snake	O	X	O	X	X
Psammophis trinasalis	Kalahari Sand Snake		X			
Psammophis jallae	Jalla's Sand Snake	X	X	O	X	X
Psammophis subtaeniatus	Western Stripe-bellied Sand Snake	O	X	X	X	X
Psammophis mossambicus	Olive Grass Snake	O	X	X	X	X
Psammophis angolensis	Dwarf Sand Snake	O	X	X	X	X
Meizodon s. semiornatus	Semiornate Snake	O	X	O	X	X
Prosymna lineata	Lined Shovel-snout					X
Prosymna bivittata	Two-striped Shovel-snout		X			
Prosymna angolensis	Angola Shovel-snout	O	X	X	X	X
Philothamnus hoplogaster	Southeastern Green Snake	O	O	X	X	X
Philothamnus ornatus	Ornate Green Snake	O	X	X	O	O
Philothamnus angolensis	Angola Green Snake	O	X	X	X	X
Philothamnus semivariegatus	Variegated Bush Snake	O	X	X	X	X
Dispholidus typus	Boomslang	O	X	X	X	X
Thelotornis capensis oatesii	Oates' Savanna Vine Snake	O	X	X	X	X
Dasypeltis scabra	Common Egg-eater	O	X	X	X	X
CROCODYLIA						
Crocodylidae						
Crocodylus niloticus	Nile Crocodile	X	X	X	X	X
AMPHIBIA - ANURA						
Pipidae						
Xenopus laevis	Common Clawed Frog / Platanna					X
Xenopus petersii	Peters' Clawed Frog / Platanna	X	X	X	X	X
Xenopus muelleri	Tropical Clawed Frog /Platanna	O	X	X	X	X
Bufonidae						
Bufo gutturalis	Guttural Toad	O	X	X	X	X
Bufo maculatus	Flat-back Toad	O	X	X	X	X
Bufo poweri	Kalahari Toad	O	X	X	X	X
Bufo garmani	Olive Toad				X	X
Bufo lemairii	Yellow Swamp Toad	O	X	X	X	X
Bufo f. fenoulheti	Fenoulhet's Pygmy Toad			X	X	X
Bufo kavangensis	Kavango Pygmy Toad	O	X	X	O	X
Schismaderma carens	Red Toad	O	X	X	X	X
Microhylidae						
Phrynomantis bifasciatus	Red-banded Rubber Frog	O	X	X	X	X
Breviceps adspersus	Bushveld Rain Frog	O	X	X	X	X
Breviceps poweri	Power's Rain Frog				X	
Ranidae						
Pyxicephalus adspersus	Giant Bullfrog		X			
Pyxicephalus edulis	Tropical Bullfrog	O	X	X	X	X
Tomopterna cryptotis	Kalahari Sand Frog	O	X	X	X	X
Tomopterna krugerensis	Kruger Sand Frog		X	O		

Species	Common name	Ang	Bot	Cap	Zam	Zim
Tomopterna marmorata	Marmorate Sand Frog	O	X	O	X	X
Rana angolensis	Angola River Frog				X	X
Hylarana darlingi	Golden-backed Frog	O	O	X	X	X
Hildebrandtia ornata	Ornate Burrowing Frog				X	X
Ptychadena subpunctata	Spot-bellied Grass Frog	O	X	X	X	X
Ptychadena oxyrhynchus	Sharp-snouted Grass Frog	O	X	X	X	X
Ptychadena anchietae	Plain Grass Frog	O	X	X	X	X
Ptychadena mascareniensis	Mascarene Grass Frog	O	X	X	X	O
Ptychadena porosissima	Striped Grass Frog				X	X
Ptychadena grandisonae	Grandison's Grass Frog				X	
Ptychadena pumilio	Three-striped Grass Frog		X	X	X	
Ptychadena guibei	Guibe's Grass Frog	O	X	X	X	X
Ptychadena mossambica	Mozambique Grass Frog	O	X	X	X	X
Ptychadena mapacha	Mapacha Grass Frog			X		
Phrynobatrachus natalensis	Snoring Puddle Frog	O	X	X	X	X
Phrynobatrachus mababiensis	Mababe Dwarf Puddle Frog	O	X	X	X	X
Phrynobatrachus parvulus	Angola Dwarf Puddle Frog		X			
Cacosternum boettgeri	Boettger's Dainty Frog	O	X	X	X	X
Arthroleptis stenodactylus	Shovel-footed Bush Squeaker				X	
Rhacophoridae						
Chiromantis xerampelina	Grey Foam-nest Tree Frog	O	X	X	X	X
Hyperoliidae						
Leptopelis bocagii	Bocage's Frog	O		X	X	X
Kassina senegalensis	Senegal Running Frog	O	X	X	X	X
Hyperolius nasutus	Sharp-snouted Reed Frog	O	X	X	X	X
Hyperolius marginatus	Margined Reed Frog		O			X
Hyperolius rhodesianus	Matetsi Reed Frog					X
Hyperolius pyrrhodictyon	Kafue Reed Frog				X	
Hyperolius aposematicus	Aposematic Reed Frog		X	X		X
Hyperolius angolensis	Angola Reed Frog	O	X	X	X	O
Hemisotidae						
Hemisus marmoratus	Mottled Shovel-snout Frog	O	X	X	X	X
Hemisus barotseensis	Barotse Shovel-snout Frog				X	
Hemisus guineensis broadleyi	Broadley's Shovel-snout Frog					X
Hemisus guineensis microps	Congo Shovel-snout Frog	O	X	X	X	
TOTAL		**106**	**135**	**122**	**135**	**133**

NB. Ang = Angola; Zam = Zambia; Cap = Caprivi; Bot = Botswana; Zim = Zimbabwe