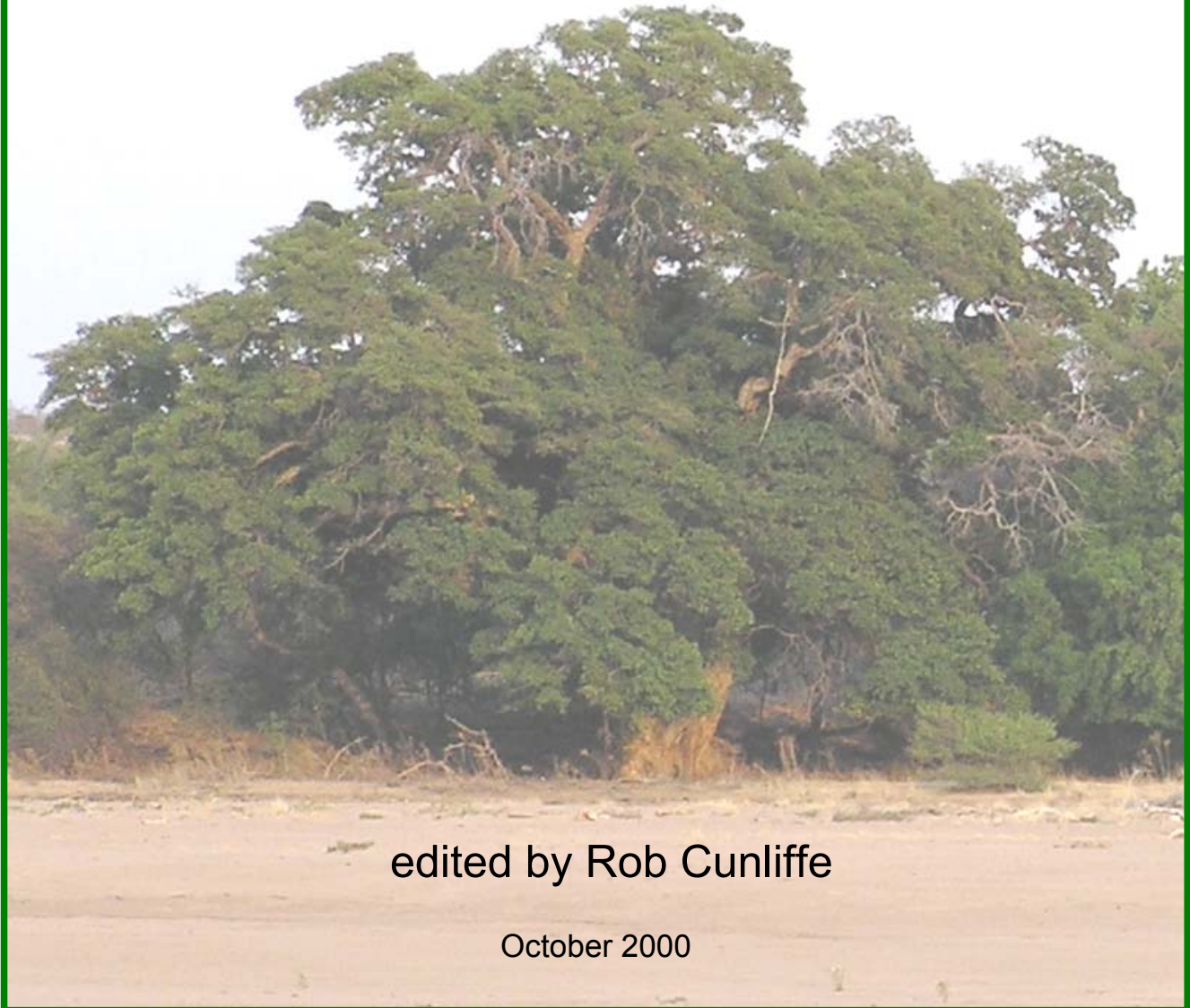




**SPECIES and SITES
of CONSERVATION INTEREST for the
CESVI PROJECT AREA, SOUTHERN
ZIMBABWE**



edited by Rob Cunliffe

October 2000

Occasional Publications in Biodiversity No. 7

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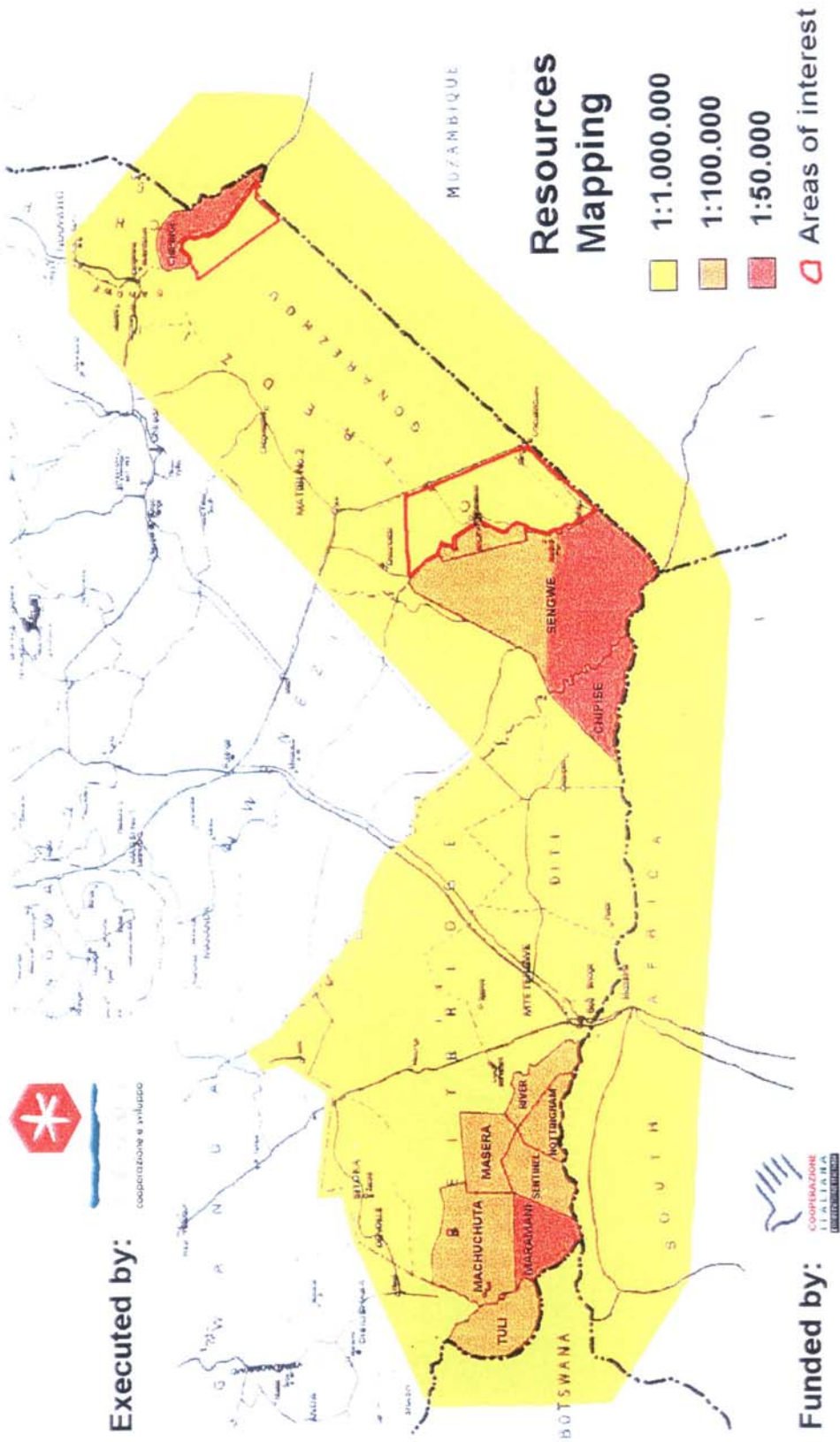
Biodiversity Foundation for Africa
P.O. Box FM730, Famona, Bulawayo, Zimbabwe

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Map 1. Map of CESVI project area in the southern lowveld of Zimbabwe.

Sustainable Development and Natural Resources Management in Southern Zimbabwe



1. INTRODUCTION

The CESVI Project comprises a joint initiative, funded by the Italian Ministry of Foreign Affairs, coordinated and executed by CESVI (an Italian NGO), and implemented in conjunction with the Biodiversity Foundation for Africa (Bulawayo), the Institute of Environmental Studies (University of Zimbabwe), and the Beitbridge, Chiredzi and Chipinge Rural District Councils. The overall objective of the project is to improve the standard of living of the people and the status of natural resources of selected communal lands within the three districts (CESVI 1999).

One of the principal activities during the initial phase of the project has been natural resource inventories and mapping. This has entailed surveys of vegetation (Timberlake & Mapaure 1999; Mapaure & Chapano, 1999), large mammals (Ferguson 1999), gamebirds (Hartley 1999a,b) and redbilled quelea (Hartley 1999c,d).

The present study concerns the identification of species and sites of conservation interest. It provides an additional contribution towards developing an overall understanding of the biological resources of the project area. It should also serve as a basis for designing future biodiversity conservation interventions.

2. APPROACH

Reviews of seven taxa (arachnids, butterflies, fish, herpetofauna, birds, mammals and plants) were commissioned from experts within each of these fields. The area of interest for these studies was taken to comprise the western (Maramani) and central (Sengwe - Beitbridge East) "target areas" of the CESVI project (CESVI 1999), but to exclude the eastern Mahenye Target Area (Map 1). The following people were contracted:

Arachnids	Moira Fitzpatrick
Butterflies	Alan Gardiner
Fish	John Minshull
Herpetofauna	Don Broadley
Birds	Kit Hustler (species list)
Birds	Ron Hartley (species/sites of interest)
Mammals	Woody Cotterill
Plants	Bob Drummond (species of interest only)

For each taxa, the relevant person was tasked with providing a species list for the project area (except for plants), and then identifying species and sites of particular conservation interest. The surveys were confined to existing knowledge, in the form of reviews of museum and herbarium records, and relevant published information, together with personal field experience. No provision was made for any new field work. The very limited time available for each study must be emphasized (1-2 days only).

The present document provides a synthesis of the individual reports (Broadley 1999; Cotterill 1999; Drummond 2000; FitzPatrick 1999; Gardiner 1999; Hartley 1999e; Hustler 1999, Minshull 1999), which are included as appendices to this study.

3. SPECIES LISTS

Species lists were obtained for six groups, namely: arachnids, butterflies, fish, herpetofauna, birds and mammals, but not for plants. Ideally, it would have been desirable to synthesize the plant species lists obtained from the two vegetation surveys (Mapaure & Chapano 1999, Timberlake & Mapaure 1999), and incorporate data from herbarium records, as well as from a number of earlier surveys. However, the limited resources made available for this component of the project were insufficient to attempt this.

Individual authors related existing species records to the project area in different ways, such that the species lists have been produced in various forms. The products obtained include a single list for the entire area (fish and mammals); a single list, but with specific localities for each taxa (arachnids); separate lists for the western Maramani and eastern Sengwe areas (butterflies and herpetofauna); and for birds, individual lists for each of the eight half degree squares covering the study area and intervening portion. Some lists are based on actual records (arachnids, fish, birds), whilst others present a mixture of confirmed records and likely occurrences (butterflies, herpetofauna and mammals).

Actual numbers of species listed for the entire area vary from 48 fish to 472 birds (Table 1). Each of these lists appears to provide a reliable and accurate synthesis of existing records and knowledge, although the intensity of collection varies amongst taxa. All authors report a relative paucity of records, particularly so for arachnids and butterflies. The group for which the most comprehensive information is available appears to be birds.

3.1 Patterns of Diversity

Several authors (Cotterill 1999, Hustler 1999) draw attention to the fact that the project area includes a mix of species adapted to arid and desert conditions, and others adapted to low altitude forest environments. The study area provides one of the few places where such taxa occur in immediate proximity to one another.

From a broader biogeographic perspective, the western Maramani portion appears to be more influenced by taxa adapted to arid conditions, the distributions of which typically extend to the west and are centred on the arid interior of the continent. On the other hand, there are a number of taxa with affinities to the east African coastal lowlands, which extend into the study area from the east, and thus are more marked for the eastern Sengwe portion than to the west.

Other factors mentioned as possibly influencing species diversity include the relatively varied geology found to the east (Broadley 1999); a gradient of increasing rainfall from west to east (Hustler 1999); and decreasing development of riparian woodlands from the east to west (Hartley 1999e, Hustler 1999). These factors all suggest that there should be a gradient of increasing diversity from west to east. However, this is not supported by the data in Table 1. For the four taxa for which records can be broken down into east and west components, more species of arachnids and birds have been recorded from the west than the east, whilst the situation is the opposite for butterflies and herpetofauna. The results for arachnids and birds may be influenced by differing intensities of collecting, but on the other hand the lists of butterflies and herpetofauna both contain a high proportion of possible occurrences in relation to actual records.

4. SPECIES OF INTEREST

Species of interest were identified for all seven groups. Numbers for each group ranged from three fish species to 71 plant species (Table 2). For herpetofauna, the number of species of interest represents a particularly high proportion (36%) of the overall species complement (126 species). This result appears to be due, largely, to an effort to highlight the need to carry out additional survey work, particularly within Sengwe Communal Land. Thus, a high proportion of the herpetofaunal species are identified as being of interest purely on the basis that they "may occur in Sengwe" (Table 3).

An overall listing of the species of interest is given in Table 3, together with a brief comment as to why each species has been included. The various authors have taken different approaches to the identification of species of interest. Only for birds have the criteria used been explicitly stated (Hartley 1999e). For all other taxa, species have typically been identified on the basis of factors such as rarity; restricted range; endemism; only records for Zimbabwe, or possible occurrence within the project area.

5. SITES OF INTEREST

Within the constraints of this study, sites of interest proved to be even more difficult to identify than species of interest. Specific sites were listed only for birds (Hartley 1999e), and this was only possible due to extensive fieldwork carried out under a previous component of the project (Hartley 1999a,b, c,d). Sites of botanical interest had already been identified under the vegetation surveys carried out by Timberlake & Mapaure (1999) and Mapaure & Chapano (1999).

The 16 bird and plant sites identified as being of particular interest (eight of each) are summarized in Table 4. For both groups, the eight sites are split equally between the western and eastern sections, and there is a high degree of overlap. The common areas are, to the west: the Tuli Circle riparian, the Shashe riparian, and Sentinel Ranch; and to the east: the Limpopo riparian, Pesu gorge and Manjinji Pan. Additional areas include, to the west: the Zhove Dam and neighbouring riparian vegetation (birds), and a small portion of Maramani Communal Land (plants); and to the east: Malapati Safari Area (birds) and mopane-*Guibourtia* woodlands north of Crooks Corner (plants).

Although other authors were not able to identify precise sites of interest, some did indicate the types of habitat that they considered to be important. These include: for fish, permanent pools in rivers and, to the east, seasonal pans (Minshull 1999); for birds, riparian areas, sandstone hills, cliffs and gorges and palm thickets (Hustler 1999); and, for mammals, transition areas between riparian and sandstone communities (Cotterill 1999). Several authors also draw attention to areas which appear to have high habitat diversity within a relatively confined area. Examples include the riparian/forest sandstone transition along the Limpopo River on Maramani, Sentinel and Nottingham; and to the east the Chikwarakwara - Malapati area, where there is marked geological variation (Cotterill 1999; Broadley 1999).

Within the overall project area there are a number of areas that already enjoy some form of protection. These include, to the west: the Tuli Safari Area and, within this, three small Botanical Reserves, and, to the east: Manjinji Pan Sanctuary and Malapati Safari Area. In addition, the portion of Sengwe Communal Land between Crooks Corner and Malapati Safari Area (c. 70,000 ha) has previously been identified as one of 20 Important Bird Areas for Zimbabwe (Childes & Mundy 1998). Both Gonarezhou National Park and Kruger National Park abut onto the eastern portion of

the study area. This study reaffirms the importance of all these existing conservation areas, but also indicates a number of additional sites that currently do not enjoy any form of protection (Table 4).

6. FURTHER WORK REQUIRED

Each author was asked to identify, if possible, any further work required as regards their particular group, for the purposes of better identifying species and sites of conservation interest. The responses received are summarized in Table 5. The general consensus, other than the fact that more work needs to be done, is that this should mainly be focused on the eastern areas. This probably reflects the fact that these areas are less well known than the western Maramani portion. It may also be due to the occurrence of high geological, and thus high habitat, diversity within this portion. A particularly strong case is put forward for a future herpetofaunal survey within Sengwe Communal Land (Broadley 1999). For plants, there is an obvious need to generate overall species lists for the western and eastern sections.

7. DISCUSSION

This work has been confined to a desk study, with no provision for any field work. The products obtained appear to provide good coverage of the records that do exist for each of the groups examined, particularly given the very limited time available for each review.

Overall, the project area appears to be relatively poorly collected, although some portions and groups are better known than others. The suggestions put forward for additional field research deserve serious consideration.

7.1 Sites of Conservation Interest

Two additional steps need to be carried out for the sites of interest that have already been identified. The work that has been done to date comprises an initial but very preliminary exercise. To begin with, there is a need to have a more detailed look at each of the suggested areas, and to try and define these more precisely. This should include plotting their locations and extent on maps and aerial photographs, and assessing their current status on the ground. This work should provide sufficient data in order to classify the sites into broad priorities, in terms of the urgency required for the implementation of conservation measures. As part of this exercise, an attempt should be made to identify additional sites, comprising examples of those habitat types (such as permanent pools, pans and palm thickets) that have been identified as being of conservation importance, but for which it was not possible to define any precise areas during this study.

The second activity concerns the initiation of practical, community based, conservation measures for each site. This will require a good deal of community work, starting at the council level and gradually proceeding to the village or community level. This is necessary in order to build up a social understanding for each site, as to who the adjacent community comprises, how these people are organized, how they currently use the area of interest, and what demands can be anticipated to be placed on this land in the future. This information is essential to identifying potential conservation measures.

Over the last few years, the BFA, in conjunction with the Zambezi Society, have been working on a similar initiative to conserve sites of botanical interest within the communal lands of the Zambezi Valley (Timberlake & Cunliffe 1997, Cunliffe 1998, 1999). Much of the experience gained under this project will be directly applicable to working with the sites of interest identified under the

current CESVI Project. One of the principal lessons learned is that the implementation of conservation measures can not be achieved through a single rapid intervention, but requires a much slower and lengthier process, including capturing the interest of and establishing a relationship of trust with the relevant adjacent communities.

7.2 The Need for a Broader Overview

The selection of the CESVI project area as several disparate portions on one side of the Limpopo Valley, necessarily raises limitations as regards the identification and prioritization of sites (and to a lesser extent species) of conservation interest. To, effectively, achieve this a much broader overview is required, in this case of the larger area that makes up the whole of the central Limpopo Valley region. For example, when trying to establish conservation priorities, one of the first questions to be asked is "to what extent are species or habitats of interest already adequately covered under existing conservation areas, either within Zimbabwe or the adjacent countries?" In the absence of any overview one cannot answer such questions. This comprises a limitation of the project as a whole, rather than for this particular exercise.

8. ACKNOWLEDGEMENTS

I thank the seven specialists: Moira FitzPatrick, Alan Gardiner, John Minshull, Don Broadley, Kit Hustler, Ron Hartley and Bob Drummond, who provided the information that forms the basis for this synthesis and, particularly, for the willing manner in which they contributed considerably more of their time than it was possible to remunerate them for, in the interest of doing a good job. I also thank Jonathan Timberlake for his continued interest in this exercise, and to which his discussions and comments have contributed substantially.

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10. TABLES

Table 1. Numbers of species of various taxa listed for the western (Maramani) and eastern (Sengwe) portions of the CESVI project area. (Sources: Broadley 1999, Cotterill 1999, Fitzpatrick 1999, Gardiner 1999, Hustler 1999, Minshull 1999).

Taxa	West	East	Total
Arachnids	61	25	68
Butterflies	201	236	241
Fish *	-	-	48
Herpetofauna	97	118	126
Birds	427	416	472
Mammals *	-	-	129

* Unable to disaggregate overall list into western and eastern sectors

Table 2. Numbers of species of various taxa identified as being of particular conservation interest for the western (Maramani) and eastern (Sengwe) portions of the CESVI project area. (Sources: Broadley 1999, Cotterill 1999, Drummond 2000, Fitzpatrick 1999, Gardiner 1999, Hartley 1999e, Hustler 1999, Minshull 1999).

Taxa	West	East	Total	Total as % of total species
Arachnids	2	2	4	6
Butterflies	3	5	7	3
Fish	0	3	3	6
Herpetofauna	20	40	45	36
Birds	13	18	21	5
Mammals	9	12	20	16
Plants	49	35	71	-

Table 3. Species identified as being of particular conservation interest for the western (Maramani) and eastern (Sengwe) portions of the CESVI project area. (Sources: Broadley 1999, Cotterill 1999, Drummond 2000, Fitzpatrick 1999, Gardiner 1999, Hartley 1999e, Hustler 1999, Minshull 1999).

Taxa	Comments and Distribution
ARACHNIDS	
<i>Ceratogyrus brachycephalus</i> Baboon Spider	Tuli, Limited distribution in southern Africa
<i>Ceratogyrus dolichocephalus</i> Baboon Spider	Sengwe and E of Beitnridge, uncommon spider recorded only from Zimbabwe
<i>Peucetia madalene</i> Plant Wanderer	Only record in country is from Malapati
<i>Menemerus zimbabwensis</i> Plant Wanderer	Described from specimens collected on Sentinel
BUTTERFLIES	
<i>Acraea machequena</i> Machequena Acraea	One of the rarer Southern African butterflies; likely to occur to E
<i>Acraea stenobea</i> Suffused Acraea	Extremely rare in Zimbabwe, may occur to W
<i>Aloedus plowesi</i> Plowes's Copper	Zimbabwe endemic, localized, may occur to E
<i>Lepidochyrsops letsea</i> Free State Blue	Rare, may occur to both W and E
<i>Lepidochyrsops vansoni</i> Van Son's Blue	Rare, may occur to W
<i>Dixea leucophanes</i> Spotless Black-veined White	Rare, may occur to E
<i>Eagris nottoana</i> Rufous-winged Elfin	Localized and rare in Zimbabwe, may occur to E
FISH	
<i>Protopterus annectens</i> Lungfish	Gonarezhou, may occur in study area to E
<i>Notobranchius furzeri</i> Turquoise Killifish	Gonarezhou, may occur in study area to E
<i>Notobranchius orthonotus</i> Spotted Killifish	Gonarezhou, may occur in study area to E
HERPETOFAUNA	
<i>Pelusios subniger</i> Pan Hinged Terrapin	Gonarezhou and Kruger NP; should occur in Sengwe
<i>Kinixys belliana</i> Hinged Tortoise	Gonarezhou, should occur in Sengwe
<i>Kinixys spekii</i> Hinged Tortoise	Gonarezhou, should occur in Sengwe
<i>Ptenopus garrulus</i> Common Barking Gecko	Sentinel and Nottingham are only Zimbabwe records
<i>Afroedura langi</i> subsp.? Lang's Flat Gecko	N Kruger NP; may occur in Sengwe
<i>Pachydactylus capensis</i> Cape Thick-toed Gecko	N of Soutpansberg at Waterpoort; may occur in study area
<i>Pachydactylus vansoni</i> Van Son's Thick-toed Gecko	Gonarezhou, may occur in Sengwe
<i>Colopus wahlbergii</i> Kalahari Ground Gecko	N of Soutpansberg at Mopane; may occur in study area
<i>Lygodactylus stvensoni</i> Stevenson's Dwarf Gecko	Tuli to Nottingham, also extreme N of Kruger NP so may occur in Sengwe
<i>Lygodactylus bradfieldi</i> Bradfield's Dwarf Gecko	Eastern-most record is on Nottingham
<i>Homopholis mulleri</i> Muller's Velvet Gecko	Rare species, endemic to South Africa between Limpopo and Soutpansberg; may occur in the study area
<i>Hemidactylus platycephalus</i> Baobab Gecko	Gonarezhou; may occur in Sengwe
<i>Scelotes limpopoensis</i> Limpopo Dwarf Burrowing Skink	Sentinel, also N Kruger NP so may occur in Sengwe
<i>Mabuya variegata punctulata</i> Variegated Skink	Kalahari sand species; occurs in Northern Province of South Africa so may occur in study area

Taxa	Comments and Distribution
<i>Panaspis wahlbergii</i> Wahlberg's Snake-eyed Skink	Northern Kruger NP; may occur in Sengwe
<i>Acontias occidentalis</i> Western Legless Skink	Nottingham, only record from the Limpopo basin
<i>Typhlosaurus aurantiacus</i> Golden Blind Legless Skink	Sengwe may provide a transition zone between typical form (found in Gonarezhou) and dwarf form (<i>T. a. fitzsimonsi</i>) found in Kruger NP
<i>Nucras caesicaudata</i> Blue-tailed Scrub Lizard	Gonarezhou and Kruger NP; may occur in Sengwe
<i>Pedioplanis lineocellata</i> Spotted Sand Lizard	S of Limpopo from Shashe-Limpopo confluence to E of Messina; should occur in study area
<i>Zygaspis vandami arenicola</i> Round-headed Worm Lizard	Gonarezhou; may occur in Sengwe
<i>Zygaspis quadrifrons</i> Round-headed Worm Lizard	Tuli-Sentinel area and N Kruger NP; may occur in Sengwe
<i>Chirindia langi</i> Lang's Round-headed Worm Lizard	Endemic to extreme N of Kruger NP, should occur in Sengwe
<i>Monopeltis infusata</i> Wedge-snouted Worm Lizard	Described recently from Nottingham
<i>Monopeltis leonhardi</i> Wedge-snouted Worm Lizard	Gonarezhou and extreme N of Kruger NP; may occur in Sengwe
<i>Monopeltis sphenorhynchus</i> Wedge-snouted Worm Lizard	Sentinel and Nottingham, also N Kruger NP; may occur in Sengwe
<i>Typhlops fornasinii</i> Fornasini's Blind Snake	Only Zimbabwe specimen is from Gonarezhou; may occur in Sengwe
<i>Rhinotyphlops schlegelii</i> Giant Blind Snake	NE South Africa so may occur in Sengwe, where it may be sympatric with <i>R. mucruso</i>
<i>Leptotyphlops incognitus</i> Incognito Worm Snake	Widely distributed in Northern Province of South Africa; may occur in study area
<i>Bitis caudalis</i> Horned Adder	Common from Tuli to Beitbridge; may also occur in Sengwe
<i>Amblyodipsas microphthalma</i> Eastern White-lipped Snake	N Kruger NP; may occur in Sengwe
<i>Amblyodipsas microphthalma nigra</i> Eastern White-lipped Snake	Rare, occurs on Soutpansberg; may occur in study area
<i>Xenocalamus sabiensis</i> Save Quill-snouted Snake	Southernmost record is from Sengwe
<i>Xenocalamus transvaalensis</i> Reticulate Quill-snouted Snake	Rare, occurs along S of Limpopo from E to Shashe confluence; not yet recorded from Zimbabwe
<i>Aspidelaps scutatus</i> Shield-nose Snake	Typical form occurs on Sentinel, large dark form (<i>A. s. fulafula</i>) in Gonarezhou, and <i>A. s. intermedius</i> in Kruger NP, so specimens from Sengwe would be of interest
<i>Lycodonomorphus obscuriventris</i> Floodplain Water Snake	Kruger NP; may occur in Sengwe
<i>Lycophidion variegatum</i> Variegated Wolf Snake	Rare species recorded from Umzingwane-Limpopo confluence
<i>Psammophis leightoni trinasalis</i> Fork-marked Sand Snake	Kalahari sand species but reaches eastern limit in NE Kruger NP, so may occur in study area
<i>Philothamnus natalensis</i> Natal Green Snake	N Kruger NP; may occur in Sengwe
<i>Arthroleptis stenodactylus</i> Bush Squeaker	Gonarezhou and Kruger NP; likely to occur in Sengwe
<i>Cacosternum boettgeri</i> Boettger's Dainty Frog	N Kruger NP; may occur in Sengwe
<i>Phrynobatrachus acridoides</i> Zanzibar Puddle Frog	At Save-Runde confluence; may occur along Mwenezi and Limpopo rivers

Taxa	Comments and Distribution
<i>Hyperolius tuberilinguis</i> Reed Frog	Save-Runde confluence, may occur along Mwenezi and Limpopo rivers
<i>Hyperolius argus</i> Reed Frog	Save-Runde confluence; may occur along Mwenezi and Limpopo rivers
<i>Afrixalus aureus</i> Golden Spiny Reed Frog	N Kruger NP; may occur in Sengwe
<i>Afrixalus crotalus</i> Golden Spiny Reed Frog	Save-Runde confluence; may occur along Mwenezi and Limpopo rivers
BIRDS	
<i>Struthio camelus</i> Ostrich	Facing reduction of range in the wild owing to economic importance; recorded from both west and east
<i>Gyps coprotheres</i> Cape Vulture	Globally Threatened, occasional visitor throughout
<i>Meliorax canorus</i> Pale Chanting Goshawk	Occurs to west; study area supports a significant portion of the national population
<i>Falco peregrinus minor</i> Peregrine Falcon	Rare, breeds in Homba Hills (west), also recorded to east along Limpopo river
<i>Pterocles namaqua</i> Namaqua Sandgrouse	Rare, occurs only in western portion, recently recorded from Zhove Dam
<i>Poicephalus cryptoxanthus</i> Brownheaded Parrot	Restricted Range, common in eastern portion, not recorded from the west
<i>Bubo capensis</i> Cape Eagle Owl	Occurs to west, subspecific form is uncertain and requires investigation
<i>Scotopelia peli</i> Pel's Fishing Owl	Limpopo River provides important habitat
<i>Telacanthura ussheri</i> Mottled Spinetail	Occurs to the east, poorly known
<i>Neafrapus boehmi</i> Batlike Spinetail	Occurs to the east, poorly known
<i>Turdus libonyana</i> Kurrichane Thrush	Restricted Range, occurs throughout in association with riparian areas
<i>Apalis thoracica</i> Barthroated Apalis	Anomalous sightings from both west and east, requires investigation
<i>Cisticola galactotes</i> Blackbacked Cisticola	Recorded from the east, status uncertain
<i>Laniarius ferrugineus</i> Southern Boubou	Occurs to the east, being the only records for Zimbabwe; status uncertain
<i>Telophorus quadricoloris</i> Gorgeous Bush Shrike	Restricted Range, eastern portion only; uncommon
<i>Telophorus olivaceus</i> Olive Bush Shrike	Restricted Range, to east only; rare
<i>Lamprotornis mavesii</i> Longtailed Starling	Restricted Range, common throughout
<i>Nectarinia talatala</i> Whitebellied Sunbird	Restricted Range, common throughout, in association with riparian areas
<i>Anthreptes reichenowi</i> Bluethroated Sunbird	Globally Near-Threatened, vagrant, recorded recently at Manjinji Pan
<i>Passer motitensis</i> Great Sparrow	Recorded from both west and east, localized; status uncertain
<i>Serinus citrinipectus</i> Lemonbreasted Canary	Restricted Range, near-endemic to southern Africa, occurs in both portions but more common to the east
MAMMALS	
<i>Suncus lixus</i> Greater Dwarf Shrew	S of Limpopo; may occur in study area
<i>Calcochloris obtusirostris</i> Yellow Golden Mole	Isolated population, in Zimbabwe centred on eastern portion of Limpopo valley

Taxa	Comments and Distribution
<i>Petrodomus tetradactylus</i> Four-toed Elephant Shrew	Low altitude forest species, within Zimbabwe occurs to extreme SE only
<i>Elephantulus intufi</i> Bushveld Elephant Shrew	Eastern Botswana, may occur in study area to west
<i>Taphozous perforatus rhodesiae</i> Egyptian Tomb Bat	First collected from Sentinel in 1960; also found in Save Valley
<i>Nycteris woodi</i> Wood's Slit-faced Bat	Reaches southernmost distribution in W Limpopo valley
<i>Pipistrellus anchietai</i> Anchieta's Pipistrelle	Rare species, first collected on Sentinel in 1992
<i>Kerivoula lanosa</i> Lesser Woolly Bat	Within Zimbabwe confined to extreme SE only
<i>Aonyx capensis</i> Clawless Otter	In study area known only from lower reaches of Shashi River
<i>Cynictis pencilata</i> Yellow Mongoose	E Botswana and N South Africa; may occur in adjacent portion of study area to west
<i>Cephalopus natalensis</i> Red Duiker	Neighbouring portions of Mozambique and South Africa, may occur in eastern portion of study area
<i>Ourebia ourebi</i> Oribi	Neighbouring portions of Mozambique and South Africa, may occur in eastern portion of study area
<i>Neotragus moschatus</i> Suni	Within Zimbabwe confined to the extreme SE only
<i>Oryx gazella</i> Gemsbuck	Recorded on Sentinel as a vagrant from the west
<i>Tragelaphus angasii</i> Nyala	Low altitude forest species, within Zimbabwe confined to the extreme SE only
<i>Paraxerus palliatus</i> Red Squirrel	Within Zimbabwe, confined to the extreme SE only
<i>Grammomys dolichurus</i> Woodland Mouse	S of Limpopo; may occur in study area to the east
<i>Desmodillus auricularis</i> Short-tailed Gerbil	E Botswana; may occur in study area to the west
<i>Gerbillurus paeba</i> Hairy-footed Gerbil	Isolated population; in Zimbabwe centred on E portion of Limpopo Valley
<i>Lepus capensis</i> Cape Hare	Isolated population; in Zimbabwe centred on E portion of Limpopo Valley
PLANTS	
Taxa endemic to the Limpopo Valley (Tr = Transvaal, Bot = Botswana)	
<i>Anisotes rogersii</i>	Sengwe, Sentinel, Maramani. Tr, Bot
<i>Megalochlamys revoluta</i> subsp. <i>cognata</i>	Sentinel. Tr, Bot
<i>Peristrophe gillilandiorum</i>	Sentinel. Tr
<i>Cleome oxyphylla</i> var. <i>robusta</i>	Worth specific rank, new record from Zimbabwe. Sentinel/ Nottingham. Tr
<i>Cucumis quintanilhae</i>	Beitbridge. Tr
<i>Kedrostis limpompensis</i>	Sengwe, Umzingwane. Tr
<i>Jatropha loristipula</i>	Zimbabwe endemic. Just N of Beitbridge
<i>Abutilon</i> sp.	Probably an undescribed species. Sentinel, Dongola. Tr
<i>Hibiscus coddii</i>	Umzingwane, Dongola. Tr
<i>Hibiscus gwandensis</i>	Only recorded three times, possible Zimbabwe endemic, occurrence in RSA uncertain. Marangudzi, Umzingwane
<i>Pavonia dentata</i>	Single record for Zimbabwe. Umzingwane. Tr

Taxa	Comments and Distribution
Taxa relatively widespread in the region, but within Zimbabwe occur only in the Sengwe to Maramani area (Bot = Botswana, Moz = Mozambique, Nam = Namibia, Swaz = Swaziland and Tr = Transvaal)	
<i>Selaginella nivea</i>	near Tshiturapadzi. Moz, Bot
<i>Nerine laticoma</i>	Mtetengwe, N limit. Tr, Bot
<i>Triceratella drummondii</i>	Very rare. Tshiturapadzi (not seen since 1963). Not yet found in RSA, but recently found N of Quelimane in N Moz
<i>Najas marina</i> subsp. <i>armata</i>	Reservoir at Beitbridge. Natal, Moz, Tr, Bot, Cape
<i>Sartidia angolensis</i>	Sengwe, Umzingwane & single record from Umgusa spur N of Bulawayo. Apparently unrecorded for RSA & Bot, but occurs in Nam, Angola and Zambia
<i>Trichoneura</i> sp.nr. <i>T. eleusinoides</i>	Recorded from Umzingwane, Sentinel. Tr, between Limpopo & Soutspansberg. May be a form of <i>T. eleusinoides</i> which occurs in Nam.
<i>Barleria crossandriiformis</i>	Sengwe. Natal, Swaz, Tr
<i>Barleria elegans</i>	Sengwe. Natal, Swaz, Tr
<i>Ecbolium clarkei</i> var. <i>puberulum</i>	Sengwe. Natal, Tr
<i>Petalidium aromaticum</i>	Sengwe. Tr
<i>Rhinacanthus xerophilus</i>	Mateke Hills. Tr
<i>Ruellia bignoniiflora</i>	Mateke Hills. Natal, Tr
<i>Trianthema salsoloides</i> var. <i>stenophylla</i>	Brackish pans, Maramani. Tr
<i>Trianthema salsoloides</i> var. <i>transvaalensis</i>	Brackish pans, Maramani. Tr
<i>Hermbstaedtia fleckii</i>	Maramani. Tr, Bot, Nam
<i>Carissa tetramera</i>	Tshiturapadzi. Natal, Swaz, Tr
<i>Hoodia lugardii</i>	Sentinel, Maramani. Bot, Nam
<i>Huernia procumbens</i>	Sengwe. Tr
<i>Tavaresia barklyi</i>	Sentinel, Maramani, also Hwange NP. Tr, Bot, Cape, Nam
<i>Dicoma galpinii</i>	Only three records from Zimbabwe, Mahenya, Mushandike, Umzingwane. Moz, Tr
<i>Flaveria bidentis</i>	Introduced, common weed along Limpopo. Moz, Tr, Bot?
<i>Geigeria acaulis</i>	Maramani, recent record from Gutu. Tr, Bot, Nam
<i>Verbesina encelioides</i>	Common weed along Limpopo. Tr, Bot, Cape, Nam
<i>Vernonia cinerascens</i>	Beitbridge, Sentinel, Maramani. Tr, Bot, Nam, Angola, E & NE Africa, India
<i>Heliotropium rariflorum</i> subsp. <i>hereroense</i>	Sentinel. Nam, E Africa. Likely to occur Tr & Bot, but apparently not recorded as yet
<i>Commiphora tenuipetiolata</i>	Gonarezhou NP, Malapati, Beitbridge, Umzingwane, Maramani, Tuli Circle. Tr, Bot, Nam, Angola
<i>Boscia foetida</i> subsp. <i>rehmanniana</i>	Sengwe, Maramani. Tr, Bot, Cape, Nam
<i>Cadaba aphylla</i>	Sengwe, Maramani. Tr, Bot, Cape, Nam
<i>Ipomoea albinervia</i>	Marungudzi, Mateke Hills. Natal, Moz, Swaz, Tr

Taxa	Comments and Distribution
<i>Ipomoea hackeliana</i>	Tshitshurapadzi. Tr, Bot, Cape, Nam
<i>Euclea natalensis</i> subs. <i>angustifolia</i>	Tuli. Tr, Bot
<i>Tragia dioica</i>	Single record from Beitbridge. Tr, Bot, Cape, Nam
<i>Jatropha schlechteri</i> subsp. <i>setifera</i>	Tapora, Hwali. Tr, Bot
<i>Euphorbia rowlandii</i>	Single record from Sengwe. Tr
<i>Crotalaria schinzii</i>	Beitbridge. Tr, Bot
<i>Cullen obtusifolia</i>	Tuli Circle. OFS, Tr, Bot, Nam
<i>Cyamopsis dentata</i>	Nuli Range (E of Beitbridge). Tr, Bot, Nam
<i>Indigofera circinnata</i>	Maramani. Tr, Bot
<i>Tephrosia euchroa</i>	Tshitshurapadzi, Umzingwane. Tr
<i>Tephrosia zoutpansbergensis</i>	Tshitshurapadzi. Tr
<i>Acacia permixta</i>	Tuli Circle (also West Nicholson). Tr. Bot
<i>Acacia stuhlmannii</i>	Sentinel, Beitbridge. Tr, Bot, E Africa
<i>Albizia petersiana</i> subsp. <i>evansii</i>	Gonarezhou, Sengwe, Tshitshurapadzi. Natal, Moz, Tr
<i>Galpinia transvaalica</i>	Gonarezhou, Mateke Hills. Swaz, Tr
<i>Abutilon fruticosum</i>	Sengwe, Beitbridge, Sentinel, Maramani. Tr, Bot, Nam
<i>Abutilon rehmannii</i>	Beitbridge to Maramani. Tr, Nam. E & N Africa
<i>Limeum aethiopicum</i> var. <i>aethiopicum</i>	Maramani. Tr to Cape
<i>Limeum dinteri</i>	Beitbridge. Moz, Tr, Cape, Nam
<i>Boerhavia repens</i>	Bubi to Beitbridge. Tr, Bot, Cape, Nam, Tropical Africa & Asia
<i>Commicarpus pilosus</i>	Beitbridge to west. Natal, Tr, Bot, Cape, Nam
<i>Adenia spinosa</i>	Mateke Hills, Sengwe, Umzingwane, Sentinel, Maramani. Tr
<i>Harpagophytum procumbens</i> subsp. <i>transvaalense</i>	Beitbridge to Sentinel. Tr
<i>Sesamothamnus lugardii</i>	Beitbridge, Maramani, also N of Bulawayo. Tr, Bot
<i>Polygala senensis</i>	Sengwe. Moz, Tr
<i>Melhania rehmannii</i>	Sengwe to Maramani. Swaz, Tr, Bot, Cape, Nam
<i>Grewia hexamita</i>	Mateke Hills, Sengwe. Moz, Tr, Tanzania
<i>Grewia tenax</i>	Umzingwane, Sentinel, Maramani. Tr, Bot, Nam, E & W Africa
<i>Piriqueta capensis</i>	Maramani. Natal, Moz, Tr
<i>Cyphostemma schlechteri</i>	Sengwe. Moz, Tr, Bot
<i>Tribulus zeyheri</i>	Abundant between Limpopo & Bubi rivers. Tr, Bot, Cape, Nam

Table 4. Summary of sites identified as being of particular conservation interest for the CESVI project area. (Sources: Broadley 1999, Cotterill 1999, Fitzpatrick 1999, Gardiner 1999, Hartley 1999e, Hustler 1999, Minshull 1999).

Taxa	Sites / Comments
Arachnids	Not possible to identify sites
Butterflies	Not possible to identify sites
Fish	No sites identified, but permanent pools and, to the east seasonal pans, mentioned as being of particular importance
Herpetofauna	No sites identified, but eastern portion considered likely to have high diversity due to varied geology
Birds: Western Maramani portion (Hartley 1999e)	<ol style="list-style-type: none"> 1. Zhove Dam and riparian of Zhove and Umzingwane Rivers (2500 ha) 2. Shashe-Limpopo junction and riparian to Shashe irrigation scheme (600 ha) 3. Tuli Circle riparian 4. Sentinel Ranch (32,000 ha)
Birds: Eastern Sengwe portion (Hartley 1999e)	<ol style="list-style-type: none"> 5. Manjinji Pan (300 ha) 6. Malipati Safari Area (4,400 ha) 7. Limpopo riparian, including floodplain below and gorge above Chikwarakwara 8. Pesu gorge (30 ha)
Birds (Hustler 1999)	No sites identified, but riparian forests and palm thickets are considered to be of particular interest, especially to the east
Mammals	No sites identified but, to the west, Sentinel Ranch and the Tuli-Shashi area and, to the east, the Chikwarakwara-Malapati area, are broadly indicated as being of particular importance
Vegetation types: Western Maramani portion	<ol style="list-style-type: none"> 9. A number of alluvial woodland patches within the Tuli Circle and on the eastern bank too 10. Shashe River alluvial woodland to the Limpopo confluence 11. Forest sandstone patches on Sentinel, Nottingham and River Ranch 12. Maramani alluvium/sandstone mix (few ha)
Vegetation types: Eastern Sengwe portion	<ol style="list-style-type: none"> 13. Limpopo riparian from Chikwarakwara to Crooks Corner 14. <i>Androstachys</i> thicket on sandstone hills from Chiturupasi to Chilomwe Hill, including the Pesu gorge 15. Manjinji pan and associated alluvial woodland, and ephemeral pans north of Gezani Business Centre 16. Mopane-<i>Guibourtia</i> woodland north of Crooks Corner

Table 5. Further work required for various taxa as regards the better identification of species and sites of conservation interest for the CESVI project area. (Sources: Broadley 1999, Cotterill 1999, Drummond 2000, Fitzpatrick 1999, Gardiner 1999, Hartley 1999e, Hustler 1999, Minshull 1999).

Taxa	Further Work Required
Arachnids	Additional collecting to both east and west
Butterflies	Not identified
Fish	Exploration of pans around Malapati, Crooks Corner and the Limpopo-Bubi confluence
Herpetofauna	Exploration of Sengwe CL at beginning of the rains to cover full range of habitats (including the Pesu gorge). To the west, further work on the Limpopo alluvium
Birds	Pesu gorge and Limpopo riparian areas, particularly to the east
Mammals	Mateke Hills, and the southeast portion of Sengwe CL, from Chikwarakwara extending east towards Mozambique
Plants	Species lists for western and eastern sections; additional collecting for eastern portion

APPENDIX 1. ARACHNIDA

SITES AND SPECIES OF INTEREST: ARACHNIDA (Moirá Fitzpatrick, August 1999)

1. Introduction

The CESVI project comprises the following lowveld areas: Tuli Safari Area, Maramani Communal Land, Machuchuta Communal Land, Masera Communal Land, Sentinel, Nottingham and River Ranch in south western Zimbabwe as well as Chipise Communal Land, Sengwe Communal Land and Malapati Safari Area in the south east.

The following species list is compiled from specimens in the Arachnida collection of the Natural History Museum, Bulawayo. Little collecting has been carried out in these areas. Three collecting trips to Sentinel have taken place: 1990 and 1992 were joint Natural History Museum and Falcon College Expeditions, and 1991 by Mrs J. Minshull of the Natural History Museum. In the Chipise Communal Lands and Malapati Safari Area only one collecting trip was conducted in 1994 and sporadic collecting in 1996. During these trips specimens were collected by hand (ground and plant searching and over turning rocks) or using a sweepnet or beating trays for grass and low shrubs.

The lack of taxonomic research in southern Africa within certain spider families has made identification of some genera and species impossible, while in some families immature specimens further hamper identification. These families include Araneidae (orbweavers), Theridiidae (comb footed spiders), Deinopidae (net-casting spiders), Dictynidae (meshweb spiders), Oxyopidae (lynx spiders), Palpimanidae (palp footed spiders), Lycosidae (wolf spiders), and Salticidae (jumping spiders).

2. Species of Interest

2.1 Spiders

Most spiders live in a defined environment determined by physical conditions such as temperature, wind and light intensity, as well as biological factors such as type of vegetation, food supply, and predators (Foelix 1996). Spiders may be divided into three broad groups: ground wanderers, plant wanderers and web builders.

Ground Wanderers

These are either nocturnal or diurnal, and when not active are usually found sheltering beneath rocks, stones or other debris. Gnaphosidae, Lycosidae, and Salticidae are the more common families, and *Zelotes* have been recorded in association with termites. *Diores* and *Ammoxenus* are specialized termite feeders, the latter feeding on harvester termites. *Ammoxenus* and *Sicarius* shelter themselves beneath the soil surface. *Ammoxenus* are extremely fast runners and dive headfirst into soft soil while *Sicarius*, which are able to remain beneath sand for extended periods, use their legs to throw sand over their bodies. *Sicarius* is more common in the arid regions of southern Africa and other records for Zimbabwe include Great Zimbabwe, Hwange National Park and Mavuradonha. Bites from *Sicarius* are potentially lethal. *Loxosceles spinulosa* are common nocturnal spiders and bites from these can cause huge ulcerating sores.

Ceratogyrus species (Baboon spiders) are the largest spiders in Zimbabwe and can live up to 20 years, taking eight to ten years to reach sexual maturity. They live in silk lined holes in the ground and once removed from their burrows cannot easily re-establish new ones and will subsequently die. The burrows are used for feeding, moulting, mating and rearing of young. Spiderlings are also unable to survive without maternal care and hence any such break in the life cycle is species threatening. *C. bechuanicus* is a common widespread species while *C. brachycephalus* has a limited distribution in southern Africa and *C. dolichocephalus* is an uncommon spider only recorded in Zimbabwe (de Wet & Dippenaar-Schoeman 1991a). Due to their long life span they are popular as pets. Indiscriminate collecting of baboon spiders could pose a serious threat to their very existence and are classified as commercially threatened in the IUCN system and should be given conservation priority (de Wet & Dippenaar-Schoeman 1991b).

Web Builders

Some of the more common families of web builders associated with plants are the Araneidae, Theridiidae, Dictynidae and Tetragnathidae. The large *Nephila senegalensis* (golden orb) are very common throughout Zimbabwe. Bites from the common *Latrodectus cinctus* (black widow) can be lethal to small children and adults suffering from a heart condition.

Plant Wanderers

Thomisidae, Phidromidae, Oxyopidae and Salticidae are very common free running plant wandering species. *Rucinia flavida* and *Tibellus minor* are found on grass, *Thomisus* and *Heriaeus* species on flowers and *Tmarus* on bark. Other free running spiders found on bark (and rocks) are Hersilids and Selenopids. *Platyoides alpha* is found under the bark of trees.

Cheiracanthium species (sac-spiders) play an important role in agroecosystems throughout the world. They are wandering spiders and aggressive feeders and as a result often bite humans. The venom is cytotoxic causing small lesions.

Menemerus zimbabwensis is described from specimens collected only from the Sentinel area. It is not known at this time whether this species has a much wider distribution than what is presently recorded.

The specimen of *Peucetia madalene* collected from Maliapati is the only record in the country. It has only previously being recorded from Mozambique, Kwazulu-Natal and Kruger National Park (Van Niekerk & Dippenaar-Schoeman 1994).

2.2 Scorpions

All scorpions listed below are common in these areas and throughout southern Zimbabwe and therefore do not need special conservation attention. Stings from *Parabuthus transvaalicus* and to a lesser extent *P. mossambicensis* are common and of great medical importance as death may occur in 3-4 hours (Bergman 1997).

3. Sites of Interest

Spider species richness is strongly determined by the spatial structure and microclimate of the environment and any changes in the land use alter the structural diversity of the spider fauna. Unfortunately very little is known about the life histories of many of Zimbabwe's spiders and those collected within the CESVI project have no habitat data recorded other than that which may be deduced from the method of collection. Pitfall traps, which are an excellent collecting method in such instances, have not been used. It is therefore impossible to name any particular sites of interest without further and more detailed collecting being carried out in any of these areas.

4. References

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Foelix, R.F. (1996). *Biology of Spiders* (second edition). Oxford University Press, New York.

Van Niekerk, P. & Dippenaar-Schoeman, A.S. (1994). A revision of the Afrotropical species of *Peucetia* (Araneae:Oxyopidae). *Entomology Memoirs* No .**89**: 1-50. Department of Agriculture, South Africa.

5. Gazetteer

Baobab Spring	2129C3
Chaluvimbi River Bridge	22°13' S 30°10' E
Chilomwe	22°09' S 31°04' E
Chikwarakwara	22°20' S 31°05' E
Chipise School	22°17' S 30°56' E
Crooks Corner	22°24' S 31°18' E
Hunter Camp, Sentinel	22°10' S 27°25' E
Hunter Camp Butchery	22°10' S 29°27' E
Machena	21°06' S 30°17' E
Malapati	22°04' S 31°25' E
Mapai Dip	22°11' S 30°05' E
Nottingham Estate	22°07' S 29°38' E
nr National Parks Camp, Tuli	21°56' S 29°12' E
Pande Mine	22°18' S 30°16' E
Puzani School	22°08' S 31°09' E
Pazhi River Bridge	22°09' S 29°32' E
Pioneer Cemetery	21°56' S 29°10' E
Shashi Wilderness Camp	21°55' S 29°12' E
Swift Cave, Sentinel	2229A2
Tangamuchema Pool, Burale River	2229A1
Tomgani Dam, Sentinel Ranch	2229B1
West Boundary, Sentinel Ranch	22°11' S 29°25' E

6. Species List: Arachnida

Family/Species	Date	Locality
Idiopidae		
Idiops	9.iv.1990	Pioneer Cemetery
	11.ii.1994	Chipise School
Theraphosidae		
Ceratogyrus brachycephalus	9.iv.1990	Pioneer Cemetery
	8-19.iv.1990	Shashi Wilderness Camp
Ceratogyrus dolichocephalus	10.ii.1994	Chaluvimbi River bridge
	13.ii.1994	Chilomwe
Ceratogyrus bechuanicus	16.xii.1996	Maliapati
Sicariidae		
Loxosceles spinulosa	10.iv.1990	nr. National Parks Camp
	9.iv.1990	Pioneer Cemetery
	11-14.iv.1990	Baobab spring
	15-17.iv.1990	Hunters camp, Sentinel
	5-6.iv.1992	Hunters camp, Sentinel
	7.iv.1992	W. boundary, Sentinel
	9.ii.1994	Mapai Dip
	9.ii.1994	Pande Mine
	11.ii.1994	Chipise School
	12.ii.1994	Chikwarakwara
	13.ii.1994	Chilomwe
Sicarius	15-17.iv.1990	Hunters camp, Sentinel
	5-6.iv.1992	Hunters camp, Sentinel
	9.ii.1994	Pande Mine
Scytodidae		
Scytodes	11-14.iv.1990	Baobab spring

Pholicidae

Smeringopus lesnei	10.iv.1990	nr. National Parks Camp
	9.iv.1990	Pioneer Cemetery
	11-14.iv.1990	Baobab spring
	12.iv.1990	Tangamuchema Pool
	15-17.iv.1990	Hunters camp, Sentinel
	9.ii.1994	Mapai Dip

Caponidae

Caponus	21.i.1991	Hunters camp Butchery
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Hersilidae

Hersilia arborea	8-19.iv.1990	Shashi Wilderness Camp
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Uloboridae

Ulborus	20.1.1991	Hunters camp, Sentinel
	10.iv.1990	nr. National Parks Camp
	11-19.iv.1990	Shashi Wilderness Camp
	5.iv.1992	Sentinel Ranch homestead
	11.ii.1994	Chipise School
Miagrammopes	11-19.iv.1990	Shashi Wilderness Camp

Theridiidae

Latrodectus cinctus	15-17.iv.1990	Hunters camp, Sentinel
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Tetragnathidae

Nephila senegalensis	10.iv.1990	nr. National Parks Camp
	9.iv.1990	Pioneer Cemetery
	12.iv.1990	Tangamuchema Pool
	8-19.iv.1990	Shashi Wilderness Camp
	13.ii.1994	Chilomwe
Nephila pilipes	8-19.iv.1990	Shashi Wilderness Camp

Pisauridae

Thalassius margaritatus	20.1.1991	Hunters camp, Sentinel
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Oxyopidae

Peucetia madalene	16.xii.1996	Malipati
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Miturigidae

Cheiracanthium furculatum	20.i.1991	Hunters camp, Sentinel
Cheiracanthium vansoni	16-17.iv.1990	Hunters camp, Sentinel
	9.iv.1992	Pazhi bridge
	8.iv.1992	Tomgani Dam
Cheiracanthium aculeutum	15-17.iv.1990	Hunters camp, Sentinel
Cheiracanthium furculatum	11.ii.1994	Chipise School
Cheiracanthium schenkeli	15-17.iv.1992	Hunters camp, Sentinel

Zodariididae

Capheris	11-19.iv.1990	Shashi Wilderness Camp
Diores rectus	8-19.iv.1990	Shashi Wilderness Camp
Diores auricula	8-19.iv.1990	Shashi Wilderness Camp

Ammoxenidae

Ammoxenus psammmodromus	8-19.iv.1990	Shashi Wilderness Camp
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Trochanteridae

Platyoides alpha	21.i.1991	Hunters camp butchery
	12.iv.1990	Tangamuchema Pool
	8-19.iv.1990	Shashi Wilderness Camp
	15-17.iv.1990	Hunters camp, Sentinel

Gnaphosidae

Zelotes tuckeri	10.iv.1990	nr. National Parks Camp
	9.iv.1990	Pioneer Cemetery
	11-14.iv.1990	Baobab spring
	8-19.iv.1990	Shashi Wilderness Camp

	15-17.iv.1990	Hunters camp, Sentinel
	5-6.iv.1992	Hunters camp, Sentinel
Asemesthes	14.iv.1990	Baobab Spring
	8-19.iv.1990	Shashi Wilderness Camp
	15-17.iv.1990	Hunters camp
Xerophaeus	11-19.iv.1990	Shashi Wilderness Camp
	11-14.iv.1990	Baobab spring
	15-17.iv.1990	Hunters camp, Sentinel
	7.vi.1992	W. boundary, Sentinel
	13.vi.1992	Tomgani Dam
"Setaphis"	9.iv.1990	Pioneer Cemetery
Echemus eratus	9.iv.1990	Pioneer Cemetery
Prodidomidae		
Theuma fusca	10.iv.1990	nr. National Parks Camp
	9.iv.1990	Pioneer Cemetery
	11-14.iv.1990	Baobab Spring
	15-17.iv.1990	Hunters camp, Sentinel
	5.iv.1992	Hunters camp, Sentinel
Theuma fovelata	11.ii.1994	Chipise School
Selenopidae		
Selenops radiatus	10.iv.1990	nr. National Parks Camp
	12.iv.1990	Tangamuchema Pool
	11.ii.1994	Chipise School
	5.iv.1992	Hunters camp, Sentinel
	7.iv.1992	W. boundary, Sentinel
Heteropodidae		
Pseudomicrommata vittigera	9.ii.1994	Mapai Dip
Philodromidae		
Hirrius	20.i.1991	Hunters camp, Sentinel
Philodromus	22.i.1991	Swift Cave, Sentinel
	14.iv.1990	Shashi Wilderness Camp
Tibellus minor	16-17.iv.1990	Hunters camp, Sentinel
Thomisidae		
Thomisus scrupeus	20.1.1991	Hunters camp, Sentinel
Thomisus citrinellus	22.i.1991	Swift Cave, Sentinel
Thomisus congoensis	22.i.1991	Swift Cave, Sentinel
	9.ii.1994	Mapai Dip
	9.ii.1994	Pande Mine
	11.ii.1994	Chipise School
Thomisus daradiodes	11-19.iv.1990	Shashi Wilderness Camp
	11-14.iv.1990	Baobab Spring
	15-17.iv.1990	Hunters camp, Sentinel
	8.iv.1992	Hunters camp, Sentinel
	11.ii.1994	Chipise School
Thomisus scrupeus	11-14.iv.1990	Baobab Spring
Thomisus granulatus	15-17.iv.1990	Hunters camp, Sentinel
Tmarus africanus	22.i.1991	Swift Cave, Sentinel
	10.iv.1990	nr. National Parks Camp
	11-19.iv.1990	Shashi Wilderness Camp
	11-14.iv.1990	Baobab Spring
	12.iv.1990	Tangamuchema Pool
	15-17.iv.1990	Hunters camp, Sentinel
	5-6.iv.1992	Hunters camp, Sentinel
	8.iv.1992	Sentinel Ranch homestead
	13.iv.1992	Tomgani Dam

	9.iv.1992	Pazhi bridge
	9.ii.1994	Pande Mine
	11.ii.1994	Chipise School
<i>Tmarus camelliformis</i>	22.i.1991	Swift Cave, Sentinel
	11-19.iv.1990	Shashi Wilderness Camp
	12.iv.1990	Tangamuchema Pool
	11-14.iv.1990	Baobab Spring
	15-17.iv.1990	Hunters camp, Sentinel
	5-6.iv.1992	Hunters camp, Sentinel
<i>Camaricus</i>	22.i.1991	Swift Cave, Sentinel
	10.iv.1990	nr. National Parks Camp
	11-14.iv.1990	Baobab Spring
	15-17.iv.1990	Hunters camp, Sentinel
	9.ii.1994	Pande Mine
<i>Dieta</i>	10.iv.1990	nr. National Parks Camp
	15-17.iv.1990	Hunters camp, Sentinel
	13.iv.1992	Tomgani Dam
<i>Simorcus</i>	11-19.iv.1990	Shashi Wilderness Camp
	12.iv.1990	Tangamuchema Pool
	15-17.iv.1990	Hunters camp, Sentinel
	6.iv.1992	Hunters camp, Sentinel
<i>Hariaeus</i>	5.iv.1992	Hunters camp, Sentinel
<i>Synema</i>	11-19.iv.1990	Shashi Wilderness Camp
	11-14.iv.1990	Baobab Spring
	12.iv.1990	Tangamuchema Pool
	15-17.iv.1990	Hunters camp, Sentinel
	9.iv.1992	Pazhi bridge
	11.ii.1994	Chipise School
<i>Misumenops rubrodecorata</i>	11-14.iv.1990	Baobab Spring
	15-17.iv.1990	Hunters camp, Sentinel
<i>Runcinia flavida</i>	11-14.iv.1990	Baobab Spring
	9.iv.1990	Pioneer Cemetery
	15-17.iv.1990	Hunters camp, Sentinel
Salticidae		
<i>Menemerus minshullae</i>	21.i.1991	Hunters camp butchery
<i>Menemerus zimbabwensis</i>	10.iv.1990	nr. National Parks Camp
<i>Menemerus ignotus</i>	12.iv.1990	Tangamuchema Pool
SCORPIONS		
Buthidae		
<i>Hottentotta trilineatus</i>	14.iv.1992	Nottingham Estate
	13.ii.1994	Chilomwe
	11.ii.1994	Chipise School
	10.ii.1994	Pande Mine
	9.ii.1994	Mapai Dip
	12.ii.1994	Chikwarakwara
	22.xii.1996	Malipati
	18.xii.1996	Crooks Corner
<i>Parabuthus mossambicensis</i>	21.i.1991	Hunters camp, Sentinel
	19.iv.1990	Shashi Wilderness Camp
	5-6.iv.1992	Hunters camp, Sentinel
	8.v.1995	Malipati
<i>Parabuthus transvaalicus</i>	30.xi.1990	Puzani School
	11.iv.1992	Shashi Wilderness Camp
	8-14.iv.1990	Shashi Wilderness Camp

	10.iv.1990	nr. National Parks Camp, Tuli
	17.iv.1990	Hunters camp, Sentinel
	5-6.iv.1992	Hunters camp, Sentinel
	13.ii.1994	Chilomwe
	11.ii.1994	Chipise School
	10.ii.1994	Pande Mine
	15.ii.1994	Machena
	9.ii.1994	Mapai Dip
	12.ii.1994	Chikwarakwara
<i>Uroplectes chubbi</i>	5-6.iv.1992	Hunters camp, Sentinel
	15.ii.1994	Machena
<i>Uroplectes flavoviridis</i>	13.ii.1994	Chilomwe
	11.ii.1994	Chipise School
	15.ii.1994	Machena
<i>Uroplectes plainmanus</i>	21.i.1991	Hunters camp, Sentinel
	16.v.1990	Hunters camp, Sentinel
	9.iv.1992	Shashi Wilderness Camp
	14.iv.1990	Shashi Wilderness Camp
	10.iv.1990	nr. National Parks Camp, Tuli
	12.iv.1990	Tangamuchema Pool
	5-6.iv.1992	Hunters camp, Sentinel
	11.ii.1994	Chipise School
	10.ii.1994	Pande Mine
	22.xii.1996	Malipati
<i>Uroplectes vittatus</i>	5-6.iv.1992	Hunters camp, Sentinel
Ischurinidae		
<i>Hadogenes troglodytes</i>	21.i.1991	Hunters camp, Sentinel
	17.iv.1990	Hunters camp, Sentinel
	30.xi.1990	Puzani School
	18.iv.1990	Shashi Wilderness Camp
	10.iv.1990	nr. National Parks Camp, Tuli
	12.iv.1990	Tangamuchema Pool
	14.iv.1990	Baobab Spring
	5-6.iv.1992	Hunters camp, Sentinel
	9.iv.1992	Pazhi River bridge
	13.ii.1994	Chilomwe
	11.ii.1994	Chipise School
	10.ii.1994	Pande Mine
	15.ii.1994	Machena
	9.ii.1994	Mapai Dip
	12.ii.1994	Chikwarakwara
	22.xii.1996	Malipati
	18.xii.1996	Crooks Corner
<i>Opisthacanthus asper</i>	5.ii.1991	Shashi Wilderness Camp
	8.iv.1990	Shashi Wilderness Camp
Scorpionidae		
<i>Opisthophthalmus boehmi</i>	21.i.1991	Hunters camp, Sentinel
	18.iv.1990	Hunters camp, Sentinel
<i>Opisthophthalmus glabrifrons</i>	30.xi.1990	Puzani School

APPENDIX 2. BUTTERFLIES

BUTTERFLIES (PAPILIONOIDEA AND HESPEROIDEA) (Alan Gardiner, September 1999)

1. Introduction

A list has been compiled of the species likely to be found in the two portions of the study area (Table 1). This list is based on all known butterfly records from Zimbabwe, the authors knowledge of Lepidoptera in Zimbabwe and records from the most comprehensive works on Zimbabwe butterflies (Pennington's Butterflies of Southern Africa and Carcasson's Butterflies of Africa).

2. Species of Interest

The species of interest that are likely to be found in the study sites are given below. Their Zimbabwe and African distribution is given together with any remarks on identification or reasons for them being of interest. The foodplants where known are given. Those species with a question mark are less likely to be found in the study area.

2.1 Eastern Sengwe Portion

Acraea machequena Grose-Smith, 1887
Aloedes plowesi ? Tite & Dickson, 1973
Lepidochrysops letsea ?? (Trimen), 1870
Dixea leucophanes Vari, 1976
Eagris nottoana (Wallengren), 1857

2.2 Western Maramani Portion

Acraea stenobea Wallengren, 1860
Lepidochrysops letsea ? (Trimen), 1870
Lepidochrysops vansoni (Swanepoel) 1949

2.3 Species Notes

Acraea machequena

Zimbabwe distribution: Eastern Districts, Rutenga, lower Save Valley and a few records from Harare and Bulawayo.

African distribution outside Zimbabwe: A few records from Eshowe and N Transvaal, Maronga Forest and the Dondo area of Mozambique, Malawi and SE Tanzania.

Remarks: This rare *Acraea* is likely to be found in the eastern part of the study area. It is one of the rarer Southern African butterflies, although in certain years it may be quite common in its more favoured habitats. It is likely to be found in riverine bush along the larger rivers.

Foodplant: Not known.

Aloedes plowesi

Zimbabwe distribution: Although it has been taken at a number of localities in Zimbabwe it is rather local, known localities are Harare, Bulawayo, Mvurwi, Chimanimani, Rusape and Nyanga.

Remarks: This Zimbabwe endemic is closely related to *A. taikosoma* and generally similar in appearance, this insect can be separated by means of the relative position of the pale submarginal spots nearest the costa on the forewing upperside of the male. These are always present and placed slightly more distad than the corresponding marking in *taikosoma*. It may be found on the wing in most months of the year.

Foodplant: not known.

Lepidochrysops letsea

Zimbabwe distribution: This species has only been recorded from Montrose in Bulawayo and Tshabalala Game Reserve just outside Bulawayo.

African distribution outside Zimbabwe: NE Cape, Lesotho, the E Orange Free State and Pretoria in the Transvaal.

Remarks: The distribution of this rare butterfly suggests it may be found in the western part of the study area. The bright yellow-orange lunule above the black spot in area 2 of the hindwing upperside is a characteristic feature. With a rapid flight it flies close to the ground in dry grassy veld, frequently visiting flowers. It is found on the wing from October-January.

Foodplant: *Hemizygia pretoriae*

Dixea leucophanes

Zimbabwe distribution: Hot Springs, Birchenough Bridge, Odzi, Rekomitjie and near Mushumbi Pools.

African distribution outside Zimbabwe: Gogoi in Mozambique.

Remarks: This rare white is likely to be found in the eastern part of the study site. It flies in dry thickets together with *Dixea doxo*. Its' main distinguishing feature is the absence of any black spot on the discocellulars of the fore- and hindwing underside.

Foodplant: not known.

Eagris nottoana

Zimbabwe distribution: Birchenough Bridge, Eastern Districts, Mutare through to Harare.

African distribution outside Zimbabwe: Eastern Afrotropical Region (from George in South Africa northwards) up to Ethiopia.

Remarks: This species although widespread is local and can be considered rare in Zimbabwe. It is a sexually dimorphic species, the underside hindwing of the male is a red-brown, while the female has a mostly white hindwing underside.

Foodplant: In South Africa recorded on *Grewia occidentalis*, *Dombeya cymosa* and *Scutia myrtina*.

Acraea stenobea

Zimbabwe distribution: Extreme W Zimbabwe (as far east as Bulawayo).

African distribution outside Zimbabwe: NW Cape, Orange Free State, Transvaal, Namibia, Botswana and SW Zambia.

Remarks: The real home of this insect is Namibia, and is extremely rare in Zimbabwe only a few having been taken in the western portion. It is an inhabitant of dry open bushveld and is likely to be found in the western portion of the study area. It flies slowly normally amongst thorn bushes and *Terminalia* trees, however, if disturbed it can fly extremely fast.

Foodplant: Not known.

Lepidochrysops vansoni

Zimbabwe distribution: Recorded from near Rochester Motel in Nyamandhlovu.

African distribution outside Zimbabwe: N & NW Transvaal, N and C Namibia and a few scattered localities in Botswana.

Remarks: A small *Lepidochrysops* with light blue upperwings. It flies slowly near the ground in dry thorn or bush veld, often stopping to visit flowers.

Foodplants: *Lantana rugosa*; *Becium grandiflorum*; *Ocimum canum*.

3. Species Likely to be Found in the Eastern (E) and Western (W) Parts of the CESVI Study Area

Species numbers as given in Pennington's Butterflies (Pen) are provided. Species of interest are marked in bold.

Species	Author	Common name	Pen	East	West
Nymphalidae					
Danainae					
Danaus (Anosia) chrysippus	(Linnaeus), 1758	Plain Tiger or African Monarch	1	X	X
Amaura (Amaura) ochlea	(De Boisduval), 1847	Novice Friar/Novice	5	X	
Amaura (Amaura) echeria	(Stoll), 1790	Chief Friar	7	?X	
Satyrinae					
Melanitis leda	(Linnaeus), 1758	Common Evening Brown/Twilight Brown	8	X	X

Species	Author	Common name	Pen	East	West
<i>Bicyclus safitza</i>	(Westwood), 1850	Common Bush Brown	11	X	X
<i>Bicyclus angulosa</i>	(Butler), 1868	Startled Bush Brown	12	X	X
<i>Bicyclus ena</i>	(Hewitson), 1877	Grizzled Bush Brown	13	X	X
<i>Bicyclus anynana</i>	(Butler), 1879	Squinting Bush Brown	14	X	X
<i>Henotesia perspicua</i>	(Trimen), 1873	Eyed Bush Brown/Marsh Patroller	18	X	X
<i>Henotesia simonsii</i>	(Butler), 1877	Pale Bush Brown	19	X	X
<i>Physcaeneura panda</i>	(De Boisduval), 1847	Dark Webbed Ringlet	45	?X	
<i>Neita extensa</i>	(Butler), 1898	Savanna Brown	52	X	X
<i>Coenyropsis natalii</i>	(De Boisduval), 1847	Natal Brown	53	X	X
<i>Ypthima impura</i>	Elwes & Edwards, 1983	Bushveld Ringlet	81	X	X
<i>Ypthima asterope</i>	(Klug), 1832	African Ringlet	85	X	X
<i>Ypthima antennata</i>	Van Son, 1955	Clubbed Ringlet	87	?X	
<i>Ypthimomorpha itonia</i>	(Hewitson), 1865	Marsh Ringlet	88	X	X
Acraeinae					
<i>Bematistes aganice</i>	(Hewitson), 1852	Common Wanderer/Wanderer	90	?X	
<i>Acraea (Acraea) neobule</i>	Doubleday, 1847	Wondering Donkey Acraea	93	X	X
<i>Acraea (Acraea) machequena</i>	Grose-Smith, 1887	Machequena Acraea	95	X	
<i>Hyalites (Hyalites) obeira</i>	Hewitson, 1863	Pale-yellow Acraea	103	X	X
<i>Hyalites (Hyalites) eponina</i>	(Cramer), 1780	Dancing Acraea/Small Orange Acraea	110	X	X
<i>Hyalites (Hyalites) encedon</i>	(Linnaeus), 1758	White-barred Acraea	115	X	X
<i>Acraea (Stephenie) axina</i>	Westwood, 1881	Little Acraea	123		X
<i>Acraea (Stephenie) natalica</i>	De Boisduval, 1847	Natal Acraea	117	X	X
<i>Acraea (Stephenie) caldarena</i>	Hewitson, 1877	Black-tipped Acraea	119	X	X
<i>Acraea (Stephenie) stenobeia</i>	Wallengren, 1860	Suffused Acraea	120		?X
<i>Acraea (Stephenie) lygus</i>	Druce, 1875	Lygus Acraea	121	X	X
<i>Acraea (Stephenie) oncaea</i>	Hopffer, 1855	Window Acraea/Rooibok Acraea	122	X	X
<i>Acraea (Stephenie) aglaonice</i>	Westwood, 1881	Clear-spotted Acraea	124	X	X
<i>Acraea (Acraea) acara</i>	Hewitson, 1865	Acara Acraea	128	X	X
<i>Pardopsidini punctatissima</i>	(De Boisduval), 1833	Polka Dot	139	?X	
Charaxinae					
<i>Charaxes varanes</i>	(Cramer), 1777	Pearl Charaxes	140	X	X
<i>Charaxes candiope</i>	(Godart), 1824	Green-veined Charaxes	142	X	X
<i>Charaxes guderiana</i>	(Dewitz), 1879	Blue-Spangled Charaxes	160	?X	
<i>Charaxes protoclea</i>	Feisthamel, 1850	Flame-bordered Charaxes	143	?X	
<i>Charaxes jasius</i>	(Linnaeus), 1767	Foxy Charaxes/Koppie Charaxes	146	X	X
<i>Charaxes brutus</i>	(Cramer), 1779	White-barred Charaxes	148	X	X
<i>Charaxes zoolina</i>	(Westwood), 1850	Club-tailed Charaxes	155	X	X
<i>Charaxes jahluca</i>	(Trimen), 1862	Pearl-spotted Charaxes	156	X	X
<i>Charaxes achaemenes</i>	C & R Felder, 1867	Bushveld Charaxes	161	X	X
<i>Charaxes baumanni</i>	Rogenhofer, 1891	Little Charaxes	162	X	X
<i>Charaxes phaeus</i>	Hewitson, 1877	Dusky Charaxes/Demon Charaxes	168	X	X
<i>Euxanthe wakefieldi</i>	(Ward), 1873	Forest Queen	177	?X	
Limenitinae					
<i>Hamanumida daedalus</i>	(Fabricius), 1775	Guinea-fowl	187	X	X
<i>Aterica galene</i>	(Brown), 1776	Forest-glade Nymph	188	?X	
<i>Pseudacraea boisduvalii</i>	(Doubleday), 1845	Boisduval's False Acraea	190	?X	
<i>Pseudacraea lucretia</i>	(Cramer), 1775	False Chief/Pied False Acraea	192	?X	

Species	Author	Common name	Pen	East	West
<i>Neptis saclava</i>	De Boisduval, 1833	Spotted Sailer	195	X	
<i>Neptis laeta</i>	Overlaet, 1955	Common Sailer	199	X	X
<i>Neptis alta</i>	Overlaet, 1955	Old Sailer	200	X	X
<i>Cyrestis (Azania) pantheus</i>	(Drury), 1781	African Map Butterfly/African Porcelain	205	X	
<i>Sallya boisduvali</i>	(Wallengren), 1857	Boisduval's Tree Nymph	209	X	
<i>Sallya natalensis</i>	(De Boisduval), 1847	Natal Tree Nymph	210	X	
<i>Byblia anvatara</i>	(De Boisduval), 1833	Common Joker	212	X	X
<i>Byblia ilithyia</i>	(Drury), 1773	Spotted Joker	213	X	X
<i>Neptidopsis ophione</i>	(Cramer), 1777	Scalloped False Sailer	214	X	
<i>Eurytela hiarbus</i>	(Drury), 1782	Pied Piper	216	X	
<i>Eurytela dryope</i>	(Cramer), 1775	Golden Piper	217	X	
Nymphalinae					
<i>Hypolimnas misippus</i>	(Linnaeus), 1764	Common Diadem	219	X	
<i>Protogoniomorpha parhassus</i>	(Drury), 1782	Common Mother-of-Pearl	222	X	
<i>Catacroptera cloanthe</i>	(Stoll), 1781	Pirate	225	X	X
<i>Precis (Precis) octavia</i>	(Cramer), 1777	Gaudy Commodore	226	X	X
<i>Precis (Precis) antilope</i>	(Feisthamel), 1850	Darker Commodore	227	X	X
<i>Precis (Precis) archesia</i>	(Cramer), 1779	Garden Commodore/Garden Inspector	231	X	X
<i>Precis (Junonia) terea</i>	(Drury), 1773	Soldier Pansy	233	?X	
<i>Precis (Junonia) natalica</i>	C & R Felder, 1860	Brown Pansy	234	X	X
<i>Precis (Junonia) hierta</i>	(Fabricius), 1798	Yellow Pansy	235	X	X
<i>Precis (Junonia) oenone</i>	(Linnaeus), 1758	Blue Pansy	236	X	X
<i>Precis (Junonia) orithya</i>	(Linnaeus), 1758	Eyed Pansy	237	X	X
<i>Vanessa (Cardui) cardui</i>	(Linnaeus), 1758	Painted Lady	240	X	X
<i>Phalanta phalantha</i>	(Drury), 1773	African/Common Leopard	245	X	X
Lycaenidae					
<i>Alaena amazoula</i>	(De Boisduval), 1847	Yellow Zulu	249	X	X
<i>Alaena nyassa</i>	Hewitson, 1877	Pied Zulu	252	?X	
<i>Baliochila aslanga</i>	(Trimen), 1873	Common Buff	268	?X	?X
<i>Baliochila singularis</i>	Stempffer & Bennett, 1953	Lannin's Buff	272	X	X
<i>Cnodontes pallida</i>	(Trimen), 1898	Pale Buff	273	X	X
<i>Lachnocnema bibulus</i>	(Fabricius), 1793	Common Woolly Legs	284	X	X
<i>Lachnocnema durbani</i>	Trimen & Bowker, 1887	D'Urban's Woolly Legs	285	X	X
<i>Iolaus (Stugeta) bowkeri</i>	Trimen, 1864	Bowker's Sapphire	314	X	X
<i>Iolaus (Argiolaus) silarus</i>	Druce, 1885	Straight-line Sapphire	319	X	X
<i>Iolaus (Iolophilus) trimeni</i>	Wallengren, 1875	Trimen's Sapphire	321	X	X
<i>Iolaus (Aphniolaus) pallene</i>	(Wallengren), 1857	Saffron Sapphire	322	X	X
<i>Iolaus (Epamera) sidus</i>	Trimen, 1864	Red-line Sapphire	323	X	
<i>Iolaus (Epamera) mimosae</i>	Trimen, 1874	Mimosa Sapphire	325	X	X
<i>Iolaus (Epamera) nasisii</i>	Riley, 1928	Zimbabwe Yellow-banded Sapphire	328	?X	?X
<i>Iolaus (Epamera) alienus</i>	Trimen, 1898	Brown-line Sapphire	332	?X	?X
<i>Hypolycaena (Hypolycaena) philippus</i>	(Fabricius), 1793	Purple-Brown Hairstreak	335	X	X
<i>Hypolycaena (Hemiolaus) caeculus</i>	(Hopffer), 1855	Azure Hairstreak	339	X	X
<i>Leptomyrina (Leptomyrina) hirundo</i>	(Wallengren), 1857	Tailed Black-eye	340	X	X

Species	Author	Common name	Pen	East	West
Leptomyrina (Gonatomyrina) henningi	Dickson, 1976	Henning's Black-eye	342	X	X
Leptomyrina (Gonatomyrina) gorgias	(Stoll), 1790	Common Black-eye	343	X	X
Deudorix (Virachola) dinochares	Grose-Smith, 1887	Apricot Playboy	354	X	X
Deudorix (Virachola) antalus	(Hopffer), 1855	Brown Playboy	355	X	X
Myrina silenus	(Fabricius), 1775	Common Fig-tree Blue	359	X	X
Myrina dermaptera	(Wallengren), 1857	Lesser Fig-tree Blue	360	X	X
Aphnaeus (Paraphnaeus) hutchinsonii	Trimen & Bowker, 1887	Hutchinson's Highflier	363	?X	?X
Spindasis natalensis	(Westwood), 1851	Natal Bar	364	X	X
Spindasis phanes	(Trimen), 1873	Silvery Bar	368	X	X
Spindasis ella	(Hewitson), 1865	Ella's Bar	369	X	X
Chloroselas pseudozeritis	(Trimen), 1873	Brilliant Gem	375	X	X
Desmolycaena mazoensis	Trimen, 1898	Purple Gem	377	?X	?X
Axiocerses tjoane	Wallengren, 1857	Common Scarlet	379	X	X
Axiocerses amanga	(Westwood), 1881	Bush Scarlet	380	X	X
Aloeides taikosama	(Wallengren), 1857	Dusky Copper	433	?X	
Aloeides plowesi	Tite & Dickson, 1973	Plowes's Copper	434	?X	
Aloeides damarensis	(Trimen), 1891	Damara Copper	437	X	X
Crudaria leroma	(Wallengren), 1857	Silver-spotted Grey	503	X	X
Anthene definita	(Butler), 1899	Common Hairtail	509	X	X
Anthene amarah	(Guerin-Meneville), 1849	Black-striped Hairtail	518	X	X
Anthene butleri	(Oberthur), 1880	Pale Hairtail	520	X	X
Anthene lunulata	(Trimen), 1894	Red Spot Hairtail	542		?X
Anthene princeps	(Butler), 1876	Cupreous Hairtail	523	X	X
Anthene otacilia	(Trimen), 1868	Otacilia Hairtail	527	X	X
Anthene contrastata	(Ungemach), 1932	Mashuna Hairtail	528	X	X
Anthene talboti	Stempffer, 1936	Talbot's Hairtail	529	X	X
Uranothauma poggei	(Dewitz), 1879	Striped Heart	535	?X	
Cacyreus lingeus	(Stoll), 1782	Bush Bronze	538	X	X
Cacyreus virilis	Stempffer, 1936	Mocker Bronze/Blue	539	X	X
Cacyreus marshalli	Butler, 1898	Common Geranium Bronze/Blue	541	X	X
Zintha hintza	(Trimen), 1864	Hintza Blue	543	X	X
Tuxentius calice	(Hopffer), 1855	White Pie/White Pied Blue	544	X	X
Tuxentius melaena	(Trimen & Bowker), 1887	Black Pie/Black Pied Blue	545	X	X
Leptotes piriouthous	(Linnaeus), 1767	Common Blue	547	X	X
Leptotes brevidentatus	(Tite), 1958	Short-toothed Blue	548	X	X
Leptotes jeanneli	(Stempffer), 1935	Jeannel's Blue	549	X	X
Leptotes babaulti	(Stempffer), 1935	Babault's Blue	550	X	X
Lampides boeticus	(Linnaeus), 1767	Lucerne/Long-tailed Blue	552	X	X
Tarucus sybaris	(Hopffer), 1855	Dotted Blue	553	X	X
Pseudonacaduba sichela	(Wallengren), 1857	Dusky Blue	559	X	X
Lepidochrysops letsea	(Trimen), 1870	Free State Blue	575	?X	?X
Lepidochrysops vansoni	(Swanepoel), 1949	Van Son's Blue	582		?X
Lepidochrysops solwezii	(Bethune-Baker), 1923	Roseate Blue	585	X	X
Lepidochrysops plebeia	(Butler), 1898	Twin-spot Blue	607	X	X

Species	Author	Common name	Pen	East	West
<i>Lepidochrysops glauca</i>	(Trimen & Bowker), 1887	Silvery Blue	610	X	X
<i>Lepidochrysops peculiaris</i>	(Rogenhofer), 1891	Peculiar Blue	620	X	X
<i>Euchrysops osiris</i>	(Hopffer), 1855	Osiris Smoky Blue	632	X	X
<i>Euchrysops barkeri</i>	(Trimen), 1893	Barker's Smoky Blue	633	X	X
<i>Euchrysops malathana</i>	(De Boisduval), 1833	Common Smoky Blue	634	X	X
<i>Euchrysops subpallida</i>	Bethune-Baker, 1923	Ashen Smoky Blue	636	X	X
<i>Eicochrysops hippocrates</i>	(Fabricius), 1793	White-tipped Blue	639	?X	X
<i>Eicochrysops messapus mahallakoaena</i>	(Wallengren), 1857	Cupreus blue	637		X
<i>Cupidopsis jobates</i>	(Hopffer), 1855	Tailed Meadow Blue	641	?X	X
<i>Actizera lucida</i>	(Trimen), 1883	Rayed Blue	644	X	X
<i>Zizeeria knysna</i>	(Trimen), 1862	Sooty Blue	646	X	X
<i>Zizina anatanossa</i>	(Mabille), 1877	Clover Blue	647	X	X
<i>Brephidium metophis</i>	(Wallengren), 1860	Tinkinkie Blue	648	?X	?X
<i>Oraidium barberae</i>	(Trimen), 1868	Dwarf Blue	649	?X	?X
<i>Azanus ubaldus</i>	(Stoll), 1782	Velvet-spotted Blue	650	X	X
<i>Azanus jesous</i>	(Guerin-Meneville), 1849	Topaz-spotted Blue	651	X	X
<i>Azanus natalensis</i>	(Trimen & Bowker), 1887	Natal Spotted Blue	652	X	X
<i>Azanus moriqua</i>	(Wallengren), 1857	Thorn-tree Blue	653	X	X
<i>Azanus mirza</i>	(Plotz), 1880	Mirza Blue	654	X	X
<i>Freyeria trochylus</i>	(Freyer), 1843	Grass Jewel Blue	655	X	X
<i>Zizula hylax</i>	(Fabricius), 1775	Gaika Blue	656	X	X
Pieridae					
<i>Pinacopteryx eriphia</i>	(Godart), 1819	Zebra White	657	X	X
<i>Colias electo</i>	(Linnaeus), 1763	African Clouded Yellow/Lucerne Butterfly	658	X	X
<i>Catopsilia florella</i>	(Fabricius), 1775	African Migrant/Vagrant	659	X	X
<i>Eurema (Terias) hecabe</i>	(Linnaeus), 1758	Common Grass Yellow	660	X	X
<i>Eurema (Maiva) brigitta</i>	(Stoll), 1780	Broad-bordered Grass Yellow	661	X	X
<i>Eurema (Maiva) desjardinsii</i>	(De Boisduval), 1833	Angled Grass Yellow	663	X	
<i>Eronia leda</i>	(De Boisduval), 1847	Autumn-leaf Vagrant	666	X	X
<i>Nepheronia buquetii</i>	(De Boisduval), 1836	Buquet's Vagrant/White	668	X	X
<i>Nepheronia thalassina</i>	(De Boisduval), 1836	Cambridge Vagrant	669	X	?X
<i>Colotis (Colotis) amata</i>	(Fabricius), 1775	Topaz Tip/Arab	670	X	?X
<i>Colotis (Colotis) vesta</i>	(Reiche), 1850	Veined Orange/Tip	672	X	X
<i>Colotis (Colotis) celimene</i>	(Lucas), 1852	Lilac Tip	673	X	X
<i>Colotis (Colotis) ione</i>	(Godart), 1819	Bushveld Purple Tip/Purple Tip	675	X	X
<i>Colotis (Colotis) regina</i>	(Trimen), 1863	Queen Purple Tip	676	?X	?X
<i>Colotis (Colotis) danae</i>	(Fabricius), 1775	Scarlet Tip	678	X	X
<i>Colotis (Colotis) auxo</i>	(Lucas), 1852	Sulphur Orange Tip	679	X	X
<i>Colotis (Colotis) antevippe</i>	(De Boisduval), 1836	Red Tip	680	X	X
<i>Colotis (Colotis) evenina</i>	(Wallengren), 1857	Common Orange Tip	681	X	X
<i>Colotis (Colotis) euipe</i>	(Linnaeus), 1758	Smoky Orange Tip	682	X	X
<i>Colotis (Colotis) pallene</i>	(Hopffer), 1855	Bushveld Orange Tip	683	X	X
<i>Colotis (Colotis) agoye</i>	(Wallengren), 1857	Speckled Sulphur Tip	685	X	X
<i>Colotis (Colotis) evagore</i>	(Klug), 1829	Small Orange Tip	686	X	X

Species	Author	Common name	Pen	East	West
Colotis (Teracolus) eris	(Klug), 1829	Banded Gold Tip	687	X	X
Colotis (Teracolus) subfasciatus	(Swainson), 1833	Lemon Traveller/Lemon Tip	688	X	X
Belenois (Belenois) thysa	(Hopffer), 1855	False Dotted Border	689	X	
Belenois (Anaphaeis) aurota	(Fabricius), 1793	Brown-veined White	691	X	X
Belenois (Anaphaeis) creona	(Cramer), 1776	African Common White	692	X	X
Belenois (Anaphaeis) gidica	(Godart), 1819	African Veined White	693	X	X
Dixeia doxo	(Godart), 1819	Black-veined White	695	X	X
Dixeia leucophanes	Vari, 1976	Spotless Black-veined White	696	?X	
Dixeia spilleri	(Spiller), 1884	Spiller's Sulphur Yellow	698	X	
Appias epaphia	(Cramer), 1779	Diverse White	700	X	X
Leptosia alcesta	(Stoll), 1781	African Wood White	702	X	X
Mylothris rueppelii	(Koch), 1865	Twin Dotted Border	706	X	X
Mylothris agathina	(Cramer), 1779	Common Dotted Border	707	X	X
Papilionidae					
Papilio constantinus	Ward, 1871	Constantine's Swallowtail	714	X	
Papilio demodocus	Esper, 1798	Citrus Swallowtail/Orange Dog	715	X	X
Papilio nireus	Linnaeus, 1758	Green-banded Swallowtail	716	X	X
Graphium (Arisbe) angolanus	(Goeze), 1779	Angola White Lady Swordtail	718	X	X
Graphium (Arisbe) morania	(Angas), 1849	White Lady/Small White-lady Swordtail	719	?X	
Graphium (Arisbe) leonidas	(Fabricius), 1793	Veined Swordtail	721	X	X
Graphium (Arisbe) antheus	(Cramer), 1779	Large Striped Swordtail	722	X	X
Graphium (Arisbe) porthaon	(Hewitson), 1865	Cream Striped Swordtail	726	X	X
Hesperiidae					
Coeliades libeon	(Druce), 1875	Spotless Policeman	729	?X	
Coeliades forestan	(Stoll), 1782	Striped Policeman	730	X	X
Coeliades pisistratus	(Fabricius), 1793	Two-pip Policeman	731	X	X
Tagiades flesus	(Fabricius), 1781	Clouded Flat/Clouded Skipper	737	X	X
Eagris nottoana	(Wallengren), 1857	Rufous-winged Elfin	738	?X	
Eretis umbra	(Trimen), 1862	Small Marbled Elf	743	X	X
Sarangesa phidyle	(Walker), 1870	Small Elfin	746	X	X
Sarangesa seineri	Strand, 1909	Dark Elfin	747	X	X
Sarangesa motozi	(Wallengren), 1857	Forest Elfin	748	X	X
Sarangesa ruona	Evans, 1937	Ruona Elfin	749	?X	
Caprona pillaana	Wallengren, 1857	Ragged Skipper	753	X	X
Leucochitonea levubu	Wallengren, 1857	White-cloaked Skipper	755	X	X
Abantis tettensis	Hopffer, 1855	Spotted Velvet Skipper	756	X	X
Abantis paradisea	(Butler), 1870	Paradise Skipper	760	X	X
Abantis venosa	Trimen & Bowker, 1889	Veined Skipper	761	X	X
Spialia delagoae	(Trimen), 1898	Delagoa Sandman	763	X	X
Spialia colotes	(Druce), 1875	Bushveld Sandman	768	X	X
Spialia diomus	(Hopffer), 1855	Common Sandman	772	X	X
Spialia dromus	(Plotz), 1884	Forest Sandman	771	X	X
Spialia spio	(Linnaeus), 1764	Mountain Sandman	773	X	X
Spialia mafa	(Trimen), 1870	Mafa Sandman	774	?X	?X
Spialia paula	(Higgins), 1924	Mite Sandman	775	?X	?X
Gomalia elma	(Trimen), 1862	Green-marbled Skipper/Sandman	776	X	X
Metisella willemi	(Wallengren), 1857	Netted Sylph	783	X	X

Species	Author	Common name	Pen	East	West
<i>Ampittia capenas</i>	(Hewitson), 1868	Riverine Ranger	792	X	X
<i>Kedestes macomo</i>	(Trimen), 1862	Macomo Ranger	805	?X	
<i>Kedestes marshalli</i>	Aurivillius, 1925	Marshall's Ranger	806	X	X
<i>Kedestes callicles</i>	(Hewitson), 1868	Pale Ranger	807	X	X
<i>Acleros mackenii</i>	(Trimen), 1868	Macken's Dart	815	?X	
<i>Andronymus neander</i>	(Plotz), 1884	Common/Nomad Dart	818	X	X
<i>Andronymus caesar</i>	(Fabricius), 1793	White Dart	819	X	X
<i>Zophopetes dysmephila</i>	(Trimen), 1868	Palm-tree Nightfighter	822	X	?X
<i>Platylesches robustus</i>	Neave, 1910	Robust Hopper	830	?X	?X
<i>Platylesches moritili</i>	(Wallengren), 1857	Honey Hopper	832	X	X
<i>Zenonia zeno</i>	(Trimen), 1864	Orange-spotted Hopper/Skipper	836	X	X
<i>Pelopidas mathias</i>	(Fabricius), 1798	Black-banded Swift	837	X	X
<i>Pelopidas thrax</i>	(Hubner), 1821	White-banded Swift	838	X	X
<i>Borbo fallax</i>	(Gaede), 1916	False Swift	841	X	X
<i>Borbo borbonica</i>	(De Boisduval), 1833	Olive-haired Swift	847	X	X
<i>Borbo gemella</i>	(Mabille), 1884	Twin Swift	848	X	X
<i>Borbo holtzii</i>	(Plotz), 1883	Variable Swift	849	X	X
<i>Gegenes pumilio</i>	(Hoffmansegg), 1804	Dark Hottentot Skipper	851	X	
<i>Gegenes niso</i>	(Linnaeus), 1764	Common Hottentot Skipper	852	X	X

APPENDIX 3. FISH

THE FISHES OF THE LIMPOPO RIVER SYSTEM IN THE ZIMBABWE LOWVELD

(J.L. Minshull, August 1999)

1. Introduction

The CESVI Project zone considered in this paper lies within Zimbabwe Hydrological Zone B. It incorporates five large Zimbabwe rivers and parts of their drainage system. These rivers are tributaries of the Limpopo River which forms the southern border between Zimbabwe and South Africa. They are the Shashe, Thuli, Mzingwane, Bubi and Mwenezi rivers.

Large collections of fish species from these rivers have been made by National Parks Fisheries Officers and Natural History Museum ichthyologists over the past 60 years. All these specimens have been accessioned and are housed in the Ichthyology Department of the Natural History Museum of Zimbabwe in Bulawayo.

There are 48 species of fish in the CESVI project zone of the Limpopo River system, comprising 10 groups. The most numerous species are found in the Cyprinidae (21 spp), Cichlidae (8 spp) and Siluforms (7 spp). Twelve species are shared between the remaining seven families - see Appendix A. What is known of the habitat requirements and biology of these species will be found in Bell-Cross & Minshull (1988).

2. Water Use

In Zimbabwe less than 10% of the rainfall appears as flow in the river systems; the rest being lost to evapotranspiration, evaporation, and the replenishment of underground water. Hydrological Zone B has the lowest mean annual runoff (Table 1).

Table 1. Surface water resources in cubic metres (millions) (source: Sayce 1987, p.401).

Zone	B
Mean annual runoff	1,157
Potential storage	2,314
Potential yield	529
Present storage	687
Present use	213
Present use (%)	40

Most of the present water use in Zimbabwe occurs in Zone B (Matabeleland South), where potential water resources are scarce and in Zone E, where large-scale irrigation occurs, i.e. the sugar estates.

In Zone B, the river most affected by water utilization is the Mzingwane, with two catchment areas near Bulawayo over 100% utilized and the remaining six 80-100% utilized (see p.33, Sayce 1987). The Shashe, Thuli, Bubi, and Mwenezi rivers are mostly 0-20% and 20-40% utilized.

The above-mentioned rivers and the Limpopo are known as sand-bank rivers, often drying up along many stretches during the dry winters. There is evidence to show from books published last century that this is the normal flow regime found in drought-prone Matabeleland, although the position today has been much exacerbated by mans development of towns, agriculture and mining. Water flows have been reduced and severe erosion is silting up the rivers resulting in a reduction of habitable areas for fish (Minshull 1993).

3. Sand River Ecology

During good summer rains the vleis, which cover at least 1.3 million ha of Zimbabwe, fill up with water and feed the numerous small streams which flow into the tributaries of rivers such as the Mzingwane and

Mwenezi. The whole system becomes charged with flowing water. The fish move upstream, out of their water pools and recolonize the rivers. The adults of many Cyprinids and the Sharptooth Catfish move out of the main rivers and tributaries into the flowing streams and enter the flooded vleis. Spawning takes place amongst the drowned terrestrial grasses; eggs adhering to the stems. The adult fish leave the vleis and return downstream as soon as possible. Eggs hatch in 24-36 hours and the larvae enjoy a relatively protected environment. In a few days yolk reserves are used up and larvae have developed into fry which feed on the numerous algal diatoms and zooplankton on and around the tangled grass. The nutrients which are the base of this transitory aquatic habitat, are in part, derived from the dung of grazing mammals.

Many adult fish such as the Gobies and Cichlids spawn on the sandbanks of the main rivers and tributaries even before the rains begin. However, they will move upstream when possible and spawn again in new sandy areas. Other species such as the Large-scale Yellowfish, Papermouth, Brown Squeaker and Sawfin Rock Catlet spawn in the rocky rapids.

Spawning and quick growth of fish takes place in summer, from September - March/April. Some spawn in early summer, some are multiple spawners throughout summer and others spawn at the end of summer. As rainfall continues fry move out of the vleis and into the streams and rivers. Thus a river system can rapidly be recolonised after the rains fall by millions of fingerlings.

During winter, the vleis gradually dry out, but might support a few pools and springs for some months. The streams dry up and tributaries and rivers are reduced to a staggered series of pools. These are refuge areas for fish and are particularly abundant in rocky areas.

Water continues to flow under the sandy river bed thus the pools have a flow through them and do not become stagnant. As the pools decrease in size predators cull the larger fish but leave the small ones. If a pool dries up, all the fish die. I have dug up the sand in dried pools and not found any fish. They do not dig into the sand. Large fish, the future spawners, survive in the large deep pools. Many of these are known as permanent and have never been known to dry up. Weirs on rivers have extended the number of permanent refuges.

If rains are poor, as Matabeleland South has experienced over the last decade, the situation is worsened. Refuge pools decrease in number and the rivers silt up with sand. The reason for this lies in flash floods which occur from a few catchments only. The flood passes by a given point for a few hours and quickly subsides. Sand is deposited along the river, filling up old pools. There is no continuous flow to sweep the sand down to the sea. One feature of a flash flood, is that it can trap fish within the sand because of the rapid subsidence of the water. Many fish which are trapped below the water level will survive under the sand until the next rains send down a flood (Donnelly 1978).

Another feature of short duration, small flash floods is the deposition of silt against or behind obstructions such as reed beds. The water flow is not strong enough to cull the reeds and sweep sand and silt out of the river bed. The result is the proliferation of *Phragmites* reed beds which can completely block rivers. Prolonged drought years coupled with poor farming practices causing excessive soil erosion, means a rapid filling up of river beds with sand, silt and reed beds with ever decreasing habitats for fish. Eventually, rivers may overflow their banks and flood the veld in low lying areas, as is now the case in India.

Ferrar (1989, p.106), points out that riverine vegetation needs floods (disturbance), drought (water stress) and soil saturation (anaerobiosis). These are all fundamental determinants to successful species biodiversity of vegetation and aquatic animals. It is the water flow, varying over the years in velocity, duration, frequency and magnitude, which is the key to sand river ecology and the maintenance of biodiversity.

4. Conservation

The vleis, which become waterlogged and act as sponges, slowly releasing water to streams and rivers must be preserved with their grass cover undisturbed. This is possible in National Parks and Safari Areas but not in the commercial and peasant farming areas where overgrazing is rife. To make matters worse expatriate NGO's are encouraging the farming of vleis. The Natural Resources Act, which comprehensively provides

protection to Zimbabwe's environment, includes vleis on its list of resources. There is conflict here which needs to be sorted out by round table discussions with the Natural Resources Board.

Erosion is high in commercial areas at 3-15 tonnes/ha/year, and much higher in communal farmlands at 50-75 t/ha/year (Minshull 1993). These figures must be reduced by preventing overgrazing, stream bank cultivation, vlei cultivation and the illegal digging up of river beds and banks by gold miners.

The proliferation of dams within our river systems means reduced river flows, especially in the lowveld areas. River systems must be managed as a whole, with the co-ordination of dam water release to ensure strong flow through river sections in summer. This may be possible during an excellent rainy season but not in a poor one. A series of droughts complicates the issue.

5. Species of Interest

The conservation of fish species within our rivers lies with the above factors. Some species thrive in dams but many are riverine in habit. There are three species, however, which require special protection. They are the two Killifishes and Lungfish which occur in ephemeral pans in the Mwenezi catchment area within the Gonarezhou National Park, marked as an area of interest. They are protected from exploitation by National Parks but it is possible that they may occur in pans in the areas around Malapati, Palfrey's Store, Crooks Corner and the Bubi/Limpopo confluence. Exploration of these areas by the Natural History Museum is essential.

6. Conclusion

The rapid rainfall run-off and corresponding siltation within the catchment areas, coupled with human over-population and the series of droughts, threaten the future of Matabeleland South's rivers and aquatic biodiversity. Only by a multidisciplinary approach to these problems can we ever hope to stabilize the situation.

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8. Checklist of the fishes of the Zimbabwe Limpopo system (exotic = introduced species).

PROTOPTERIDAE

- | | | |
|----|------------------------------|----------|
| 1. | <i>Protopterus annectens</i> | Lungfish |
|----|------------------------------|----------|

ANGUILLIDAE

- | | | |
|----|----------------------------------|---------------------|
| 2. | <i>Anguilla mossambica</i> | Longfin Eel |
| 3. | <i>Anguilla nebulosa labiata</i> | African Mottled Eel |

MORMYRIDAE

- | | | |
|----|-----------------------------------|---------|
| 4. | <i>Marcusenius macrolepidosus</i> | Bulldog |
|----|-----------------------------------|---------|

CHARACIDAE

- | | | |
|----|------------------------------|---------------|
| 5. | <i>Hydrocynus vittatus</i> | Tigerfish |
| 6. | <i>Alestes imberi</i> | Imberi |
| 7. | <i>Micralestes acutidens</i> | Silver Robber |

CYPRINIDAE

- | | | |
|-----|------------------------------|-----------------------|
| 8. | <i>Barbus afrohamiltoni</i> | Hamilton's Barb |
| 9. | <i>Barbus annectens</i> | Broadstripe Barb |
| 10. | <i>Barbus eutaenia</i> | Orangefin Barb |
| 11. | <i>Barbus lineomaculatus</i> | Linespotted Barb |
| 12. | <i>Barbus marequensis</i> | Largescale Yellowfish |
| 13. | <i>Barbus mattozi</i> | Papermouth |
| 14. | <i>Barbus paludinosus</i> | Straightfin Barb |
| 15. | <i>Barbus radiatus</i> | Beira Barb |
| 16. | <i>Barbus toppini</i> | East Coast Barb |
| 17. | <i>Barbus trimaculatus</i> | Threespot Barb |
| 18. | <i>Barbus unitaeniatus</i> | Longbeard Barb |
| 19. | <i>Barbus viviparus</i> | Bowstripe Barb |
| 20. | <i>Mesobola brevianalis</i> | River Sardine |
| 21. | <i>Labeo cylindricus</i> | Redeye Labeo |
| 22. | <i>Labeo molybdinus</i> | Leaden Labeo |
| 23. | <i>Labeo rosea</i> | Rednose Labeo |
| 24. | <i>Labeo rubropunctatus</i> | Redspotted Labeo |
| 25. | <i>Labeo ruddi</i> | Silver Labeo |
| 26. | <i>Varicorhinus nasutus</i> | Chiselmouth |
| 27. | <i>Opsaridium zambezense</i> | Barred Minnow |
| 28. | <i>Cyprinus carpio</i> | Carp (exotic) |

CENTRARCHIDAE

- | | | |
|-----|------------------------------|--------------------------|
| 29. | <i>Micropterus salmoides</i> | Largemouth Bass (exotic) |
|-----|------------------------------|--------------------------|

SILURIFORMES

- | | | |
|-----|-------------------------------|----------------------------|
| 30. | <i>Clarias gariepinus</i> | Sharptooth Catfish |
| 31. | <i>Chiloglanis paratus</i> | Sawfin Rock Catlet |
| 32. | <i>Chiloglanis pretoriae</i> | Limpopo Rock Catlet |
| 33. | <i>Chiloglanis swierstrai</i> | Bearded Sand Catlet |
| 34. | <i>Schilbe mystus</i> | Silver Catfish |
| 35. | <i>Amphilius uranoscopus</i> | Stargazer Mountain Catfish |

GOBIIDAE

- | | | |
|-----|--------------------------------|-----------------|
| 36. | <i>Chonophorus aeneofuscus</i> | Freshwater Goby |
| 37. | <i>Glossogobius giurus</i> | Tank Goby |

CICHLIDAE

- | | | |
|-----|------------------------------------|-----------------------|
| 38. | <i>Astatotilapia flaviventris</i> | Canary Largemouth |
| 39. | <i>Pseudocrenilabrus philander</i> | Southern Mouthbrooder |
| 40. | <i>Oreochromis macrochir</i> | Greenhead Tilapia |
| 41. | <i>Oreochromis mossambicus</i> | Mozambique Tilapia |
| 42. | <i>Oreochromis niloticus</i> | Nile Tilapia (exotic) |
| 43. | <i>Serranochromis robustus</i> | Nembwe |
| 44. | <i>Serranochromis thumbergi</i> | Brownspot Largemouth |
| 45. | <i>Tilapia rendalli</i> | Redbreast Tilapia |
| 46. | <i>Tilapia sparrmanii</i> | Banded Tilapia |

APLOCHEILIDAE

- | | | |
|-----|---------------------------------|---------------------|
| 47. | <i>Notobranchius furzeri</i> | Turquoise Killifish |
| 48. | <i>Notobranchius orthonotus</i> | Spotted Killifish |

APPENDIX 4. HERPETOFAUNA

SITES AND SPECIES OF CONSERVATION INTEREST IN THE CESVI PROJECT AREA: HERPETOFAUNA (Donald G. Broadley, August 1999)

1. Introduction

Checklists of the herpetofauna are provided for four areas (Section 5):

(a) The western area comprising Tuli Safari Area, Maramani CL, Machuchuta CL, Masera CL, Sentinel, Nottingham and River Ranches. This area has been quite well collected by Museum/Schools Exploration Society or Falcon College Expeditions (Tuli - May 1959 & April 1990; Maramani - May 1967; Sentinel - May 1960 & April 1992). All herpetological material is deposited in the Natural History Museum in Bulawayo. However, all these expeditions were in the field at the beginning of the dry season, when the thick vegetation provides good cover for reptiles, the fossorial species have gone deep, and the amphibians have long finished breeding and have dispersed.

(b) The eastern area comprising part of Chipise CL, Sengwe CL and Malapati SA. This area has not been well collected, although some material has been collected by Museum/Schools Exploration Society Expeditions (Buffalo Bend - April 1961; Siyanje - April/May 1968). Museum Expeditions have also visited Manjinji Pan and Chikwarakwara.

(c) Gonarezhou National Park. This was covered by two Schools Exploration Society Expeditions and four Umtali Museum expeditions in the period 1962-1974.

(d) The northern Kruger National Park. Distribution records are taken from The Reptiles of the Kruger National Park (Pienaar, Haacke & Jacobsen 1983), A herpetological survey of the Transvaal (Jacobsen 1989) and Amphibia Zambesiaca (Poynton & Broadley 1985-91). Much of the material is deposited in the Transvaal Museum. I examined many of the reptile specimens held in the Kruger Park Museum during the course of generic revisions and some of these were transferred to the Natural History Museum of Zimbabwe.

2. Species of Interest

TESTUDINES

Pelusios subniger (Pan Hinged Terrapin) has a wide distribution in East Africa, extending to south Mozambique. There are many records from pans in the Gonarezhou NP and it has been found in a few pans in the Nyandu sandveld on the northeastern border of the Kruger NP. It should occur in the Sengwe CL.

Kinixys (Hinged Tortoises). *K. belliana* occurs on the East African coastal plain from Somalia to KwaZulu Natal and is the only species recorded from the Gonarezhou NP. *K. spekii* has a very wide range on the central African plateau and in the Northern Province of South Africa it is found in the Limpopo basin and the Kruger NP. The two species may be sympatric in the Sengwe CL., as there is a sight record of *K. belliana* from Malapati (Brain 1961), while *K. spekii* has been recorded from 4.5 km NW of Malapati School (2231A2: Lambiris 1993).

SAURIA

Ptenopus garrulus (Common Barking Gecko) is only found in arid areas where there is a Kalahari sand substrate. The only Zimbabwean records are from the Falcon College Expedition of 1992 at Sentinel (12/4 - 2229B1) and Nottingham Ranch (11/4 - 2229B1), but this species may occur further east, as it has been found at Tshipise hot springs south of the Limpopo.

Afroedura langi subsp. ? (Lang's Flat Gecko). A gecko of uncertain status has been recorded from the northern Kruger N. P. at Shinokwenfontein, between the Luvuvhu and Limpopo rivers (2231A3), living in crevices on a sandstone outcrop. It might occur in the Cave Sandstone in the Sengwe CL.

Pachydactylus capensis (Cape Thick-toed Gecko) is a Kalahari species that has relict populations as far east as Waterpoort, just north of the Soutpansberg. It may yet be found on the Zimbabwean side of the Limpopo.

Pachydactylus vansonii (Van Son's Thick-toed Gecko) reaches the northern limit of its range in the Gonarezhou NP, but has not yet been recorded from the Sengwe CL.

Colopus wahlbergii (Kalahari Ground Gecko) is a secretive species with a wide range in the Kalahari, extending east to the Victoria Falls and Hwange NP. There are also relict populations north of the Soutpansberg at Langjan Nature Reserve and near Mopane, so there may be additional relict populations on the Zimbabwe side of the Limpopo.

Lygodactylus stvensoni (Stevenson's Dwarf Gecko) is usually associated with rock-cracker fig trees (*Ficus abutilifolia*) growing on granite or sandstone outcrops. In the west it has been found from Tuli to Nottingham Ranch (11/4/92: 2229B1), but it should be looked for further east, as it has been collected in the extreme north of the Kruger NP (Mabyeni Hill on the south bank of the Limpopo opposite Chikwarakwara).

Lygodactylus bradfieldi (Bradfield's Dwarf Gecko) is usually found under the loose bark of dead trees in dry savanna. Its distribution is centred on the Kalahari and it has been found as far east as Nottingham Ranch (10/4/92: 2229B2).

Homopholis mulleri (Muller's Velvet Gecko) is a rare species so far known only from a restricted area north of the Soutpansberg and south of the Limpopo, extending as far east as Tshipise (2230C1). It is found under loose bark and holes in marula (*Sclerocarya birrea*) and knob-thorn (*Acacia nigrescens*) trees and should be searched for on the Zimbabwe side of the Limpopo.

Hemidactylus platycephalus (Baobab Gecko) is a large species usually found living on baobabs and other big trees at low altitudes throughout East Africa. In Zimbabwe it appears to reach its southern limit in the Gonarezhou NP, but it should be looked for along the Mwenezi and Limpopo Rivers in Sengwe CL.

Scelotes limpopoensis (Limpopo Dwarf Burrowing Skink) is a slender species with degenerate limbs, having three toes on the forelimb and four on the hindlimb. In Zimbabwe it has been recorded at Sentinel and Beitbridge, but as it occurs in the extreme north of the Kruger NP, it should be looked for in the Sengwe CL. It has been recorded as far north as the Buby River bridge on the main Beitbridge- Masvingo road (Broadley, Haagner & Lambiris 1997).

Mabuya variegata punctulata (Variegated Skink) is a small species found in Kalahari sand regions and also in arid areas in the Northern Province of South Africa (Jacobsen 1989) and in S Mozambique centred on the Banhine NP (Broadley 1975). At present the only Zimbabwean records are from the Hwange National Park, but it should be looked for in the CESVI study areas north of the Limpopo.

Panaspis wahlbergii (Wahlberg's Snake-eyed Skink) is sympatric with *Panaspis maculicollis* in the northern Kruger NP. So far only the latter species has been recorded from the northern side of the Limpopo basin, but *P. wahlbergii* should be looked for in the Sengwe CL.

Acontias occidentalis (Western Legless Skink) has a wide range in Namibia and Botswana, extending into western Matabeleland. A single specimen from Nottingham Ranch (W. Howells 24/10/81: 2229B1) is the only record from the Limpopo basin. It should be looked for in the Sengwe CL.

Typhlosaurus aurantiacus (Golden Blind Legless Skink). I have collected the typical form in *Androstachys* thickets on the Ntabambomvu Hills in the Gonarezhou NP and it has also been recorded from Malapati (Brain 1961: 23/4/61: 22.01S, 31.26E). The dwarfed race *T. a. fitzsimonsi* is common in the Nyandu sandveld on the northeastern boundary of the Kruger NP. It would be interesting to see specimens from further south in the Sengwe CL.

Nucras caesicaudata (Blue-tailed Scrub Lizard) has a distribution centred on the Banhine National Park in southern Mozambique, extending west into the Gonarezhou NP (type locality) and the Nyandu sandveld on the northeastern border of the Kruger NP., it is usually sympatric with *Nucras intertexta* (Broadley 1972). It should be looked for in the Sengwe CL.

Pedioplanis lineocellata (Spotted Sand Lizard) is widely distributed along the south bank of the Limpopo from the Shashe-Limpopo confluence to east of Messina (Jacobsen 1989), but the only Zimbabwe record is from Mashava! It should be searched for along the north bank of the Limpopo.

AMPHISBAENIA

Zygaspis (Round-headed Worm Lizards). *Z. vandami arenicola* occurs in the Gonarezhou NP, while the Kalahari species *Z. quadrifrons* has been recorded from the Tuli-Sentinel area and the northern Kruger NP. Either or both may occur in the Sengwe CL.

Chirindia langi (Lang's Round-headed Worm-Lizard) is endemic to *Androstachys* and mopane woodland in the extreme north of the Kruger NP. It should be searched for in the Sengwe CL.

Monopeltis (Wedge-snouted Worm Lizards). *M. infuscata* was recently described from Nottingham Ranch (Howells 18/6/81: 2229B2) and has a patchy distribution to the west and south. It is replaced in the Gonarezhou and Kruger National Parks and Sengwe CL by *M. decosteri* of southern Mozambique, but it is not known what happens in the intervening area. The Kalahari species *M. leonhardi* has also been recorded from Malugwe Pan in the Gonarezhou NP (Broadley 11/12/66: 2131D2) and the extreme north of Kruger NP, while the slender Mozambique species *M. sphenorhynchus* occurs in the northern Kruger NP and along the Limpopo River to the Shashe confluence. On the north bank it has been recorded from Sentinel (Bristow 8/93: 2229B1 & Cotterill 12/12/93: 2229B1) and Nottingham Ranch (Howells 17/11/81: 2229B1). Both species should occur in Sengwe CL.

SERPENTES

Typhlops fornasinii (Fornasini's Blind Snake) inhabits the coastal plain from Mozambique Island south to northern KwaZulu-Natal. I collected the only Zimbabwe specimen at Malugwe Pan in the Gonarezhou NP (2131D2), close to the Mozambique border, so it should be looked for in the Sengwe CL in the red sand areas.

Rhinotyphlops spp. (Giant Blind Snakes). No specimens have been collected along the north bank of the Limpopo in Zimbabwe, but two species may occur. *R. schlegelii* inhabits south Mozambique, Swaziland and the northeastern provinces of South Africa, extending to the north bank of the Save River in Mozambique. *R. mucruso* is found throughout Zimbabwe and central Mozambique, but there are a few scattered records south of the Limpopo. I have collected *R. mucruso* at Marhumbeni in a stand of *Androstachys* on top of the Chilojo cliffs in the Gonarezhou NP (2132A4). These sister species could well prove to be sympatric in the Sengwe CL.

Leptotyphlops incognitus (Incognito Worm Snake) is widely distributed in the northern Province of South Africa and the Eastern Highlands of Zimbabwe, but it has not so far been recorded on the Zimbabwe side of the Limpopo basin.

Bitis caudalis (Horned Adder) is quite common in the Tuli- Beitbridge area, but there are only two records from further east, one from Boli School in Matibi No. 2 CL (A.M. Wilson 17/12/76: 21.24S, 31.28E) and the other from Mabyeni hill on the south bank of the Limpopo opposite Chikwarakwara. This widespread species of the southwest arid biome could reach its eastern limit in the Sengwe CL.

Amblyodipsas microphthalma (Eastern White-lipped Snake) inhabits alluvium of the southern Mozambique plain from the Bazaruto archipelago south to Lake St. Lucia. It penetrates inland to the northern end of the Kruger NP, from where a melanistic subspecies *A. m. nigra* extends westwards along the lower slopes of the Soutpansberg to due north of Louis Trichardt and is found under rocks. This small rare snake is probably a specialist feeder on small amphisbaenians (worm lizards) and should be searched for in the Sengwe CL. As the two subspecies occupy different habitats, they may prove to be good species.

Xenocalamus sabiensis (Save Quill-snouted Snake) has a wide distribution in the Save-Runde catchment. The southernmost record is from mopane bush on basalt in the Sengwe CL 6 km N of Pafuri (Lambiris, 1993: 2231A4), but it is replaced in the Gonarezhou and Kruger National Parks by the Lined Quill-snout *X. lineatus*. These snakes feed on the larger worm-lizards of the genus *Monopeltis*.

Xenocalamus transvaalensis (Reticulate Quill-snouted Snake) inhabits the Mozambique plain from the Bazaruto archipelago south to northern KwaZulu-Natal and extends up the Limpopo to the Shashe confluence. This rare snake has not yet been collected on the Zimbabwe side of the river.

Aspidelaps scutatus (Shield-nose Snake) belongs to the cobra family, but it is a small fossorial species. The populations in the Limpopo basin are very divergent, with the typical form in the west (Sentinel 2229B2-NMZB 14306), the large dark Mozambican subspecies *A. s. fulafula* in the Gonarezhou NP as far south as Sango (22.03S, 31.39E- NMZB-UM 27355) and the subspecies *A. s. intermedius* in the Kruger NP. This interesting species should be searched for in the Sengwe CL.

Lycodonomorphus obscuriventris (Floodplain Water Snake) inhabits floodplains from southern Malawi south to the SE Kruger NP and N KwaZulu-Natal. It has been collected around small pans near the Save-Runde Confluence and should occur along the Mwenezi and Limpopo rivers.

Lycophidion variegatum (Variegated Wolf Snake) is a rare species which has been recorded from the Umzingwane- Limpopo confluence (22.10S, 29.55E- TM 22777) and Messina, but seems to be replaced by the Common Wolf Snake *L. capense* at the Save-Runde confluence and in the Kruger NP. Although it occurs on Kalahari sand in Hwange District, in the southeastern part of its range it inhabits rocky areas. It should be sought in the Sengwe CL.

Psammodromus leightoni trinasalis (Fork-marked Sand Snake) is a Kalahari species which apparently reaches the eastern limit of its range in the Nyandu sandveld on the northeastern border of the Kruger NP. At present there are no records from the Limpopo basin.

Philothamnus natalensis (Natal Green Snake) usually inhabits forested areas from central Mozambique to KwaZulu-Natal. It has been recorded from riparian forest at the Save-Runde confluence and the Luvuvhu-Limpopo confluence (N Kruger NP, 22.10S, 31.18E), so it should occur in the Sengwe CL.

AMPHIBIA

Arthroleptis stenodactylus (Bush Squeaker) has been recorded from the Gonarezhou and Kruger National Parks, but not from any of the CESVI project areas along the north bank of the Limpopo. It is likely to occur in the Sengwe CL in the leaf litter of riparian woodland.

Cacosternum boettgeri (Boettger's Dainty Frog) occurs in the northern Kruger NP, but has not been recorded from the Zimbabwe side of the Limpopo basin, although widespread on the plateau.

Phrynobatrachus acridoides (Zanzibar Puddle Frog) is a common species in the East African lowlands from Somalia to KwaZulu-Natal. Two reed frogs, *Hyperolius tuberilinguis* and *H. argus*, have similar ranges. All three species extend inland to the area of the Save-Runde confluence (2132A4) and should be looked for along the Mwenezi and Limpopo rivers.

Afrixalus spp. (Golden Spiny Reed-frogs). *A. crotalus* is known from as far south as the Save-Runde confluence, whereas *A. aureus* extends north to the Kruger NP. At present there are no records of any of these tiny reed frogs from the Limpopo basin, so they should be looked for along the Mwenezi and Limpopo rivers.

3. Sites of Interest

The more interesting CESVI project area is the eastern one, because of its complex geology. The red sands, which cover almost the whole of the Gonarezhou National Park, extend southwards along the Mozambique border, interrupted by the alluvium along the Mwenezi River. West of this river extensive areas of rhyolite and basalt are exposed, with intrusive granite and granophyre, forming the Mateke Hills to the west. In the

Chilomwe Hills and west of the Buby River are outcrops of Karoo cave sandstones, grits and mudstones, replaced by gneiss still further west. The Pesu Gorge appears to be a particularly promising site in the cave sandstone. Outcrops of dolerite also occur west of the Buby River (Tyndale-Biscoe 1961, Robertson 1968). The vegetation types are largely correlated with the substrate (Boughey 1961, Timberlake & Mapaure 1999) and these can be summarized as follows:

1. *Acacia/Faidherbia* riparian woodland on alluvium.
2. *Colophospermum/Terminalia prunioides* low open woodland on basalt.
3. *Colophospermum/Terminalia prunioides* open woodland on sandstone, gneiss, etc.
4. *Albizia/Combretaceae* mixed woodland on Cave Sandstone outcrops (+ *Ficus abutilifolia*).
5. Mixed woodland on Cretaceous sandstone plateaux.
6. *Androstachys johnstoni* thicket on broken rock (Boughey 1961).

The variety of substrates encountered in this poorly known area will result in high biodiversity with regard to rupicolous and fossorial reptiles. Consequently intensive field work is required at the beginning of the rains (November-December), when the first rains have brought the fossorial reptiles to the surface, but the vegetation is still scanty. Only a thorough herpetofaunal survey of two to three weeks duration will permit the identification of precise sites of conservation interest. Ploughing is a good source of burrowing animals and the irrigation schemes at Chikwarakwara and Malapati are obvious target areas. Otherwise collecting will involve the use of arrays of pitfall traps with drift fences in the alluvium and red sands, routine turning of rocks and logs, stripping loose bark off dead trees and inspection of rock crevices.

Although the Tuli-Maramani-Sentinel area has been relatively well collected, the fossorial forms from the Limpopo alluvium are still poorly sampled and these are most likely to be turned up by ploughing.

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5. Table of Herpetofauna from CESVI Study Area

Key

- TMS = Tuli, Maramani, Sentinel area
 CSM = Chipise, Sengwe, Malapati area
 GNP = Gonarezhou National Park
 KNP = Northern Kruger National Park, South Africa
 X = species present
 p = species probably present

Taxa	TMS	CSM	GNP	KNP
REPTILIA				
TESTUDINES				
PELOMEDUSIDAE (Terrapins)				
<i>Pelomedusa subrufa</i> (Bonnaterre)	p	p	X	X
<i>Pelusios subniger</i> (Bonnaterre)		p	X	X
<i>Pelusios sinuatus</i> (A. Smith)	X	X	X	X
TESTUDINIDAE (Tortoises)				
<i>Kinixys spekii</i> Gray		X		X
<i>Kinixys belliana belliana</i> Gray		p	X	
<i>Geochelone pardalis</i> (Bell)	X	p	X	X
TRIONYCHIDAE (Flapshell Turtles)				
<i>Cycloderma frenatum</i> (Peters)			X	
SAURIA				
AGAMIDAE (Agamid Lizards)				
<i>Acanthocercus atricollis</i> (A. Smith)	p	p	p	X
<i>Agama kirkii</i> Boulenger	X			
<i>Agama armata</i> Peters	X	X	X	X
CHAMAELEONIDAE (Chameleons)				
<i>Chamaeleo dilepis</i> Leach	p	X	X	X
GEKKONIDAE (Geckos)				
<i>Afroedura transvaalica</i> (Hewitt)	X	X	X	X
<i>Afroedura langi</i> subsp. ?				X
<i>Pachydactylus turneri</i> (Gray)	X	X	X	X
<i>Pachydactylus vansoni</i> FitzSimons		p	X	X
<i>Pachydactylus tigrinus</i> Van Dam		X	X	X
<i>Pachydactylus punctatus</i> Peters	X	p	X	X
<i>Ptenopus garrulus garrulus</i> (A. Smith)	X			
<i>Lygodactylus stevensoni</i> Hewitt	X			X
<i>Lygodactylus bradfieldi</i> Hewitt	X			
<i>Lygodactylus capensis</i> (A. Smith)	X	X	X	X
<i>Homopholis wahlbergii</i> (A. Smith)	X	p	X	X
<i>Hemidactylus mabouia</i> (Jonnes)	p	X	X	X
<i>Hemidactylus platycephalus</i> Peters	X		X	
SCINCIDAE (Skinks)				
<i>Scelotes limpopoensis limpopoensis</i> FitzSimons	X	p		X
<i>Scelotes bidigittatus</i> FitzSimons				X
<i>Mabuya depressa</i> (Peters)		X	X	X
<i>Mabuya margaritifera</i> (Peters)	X	X	X	X
<i>Mabuya varia</i> (Peters)	X	X	X	X
<i>Mabuya variegata punctulata</i> (Bocage)		p		
<i>Mabuya striata striata</i> (Peters)	X	X	X	X

Taxa	TMS	CSM	GNP	KNP
<i>Lygosoma sundevallii</i> (A. Smith)	X	X	X	X
<i>Panaspis wahlbergii</i> (A. Smith)				X
<i>Panaspis maculicollis</i> sp. nov.	X	X	X	X
<i>Acontias occidentalis</i> FitzSimons	X			
<i>Typhlosaurus aurantiacus aurantiacus</i> (Peters)		X	X	
<i>Typhlosaurus aurantiacus fitzsimonsi</i> Broadley				X
GERRHOSAURIDAE (Plated Lizards)				
<i>Gerrhosaurus validus validus</i> A. Smith	p	p	X	X
<i>Gerrhosaurus major major</i> Dumeril	p	p	X	X
<i>Gerrhosaurus nigrolineatus</i> Hallowell	p	p	X	X
<i>Gerrhosaurus flavigularis</i> Wiegmann	X	X	X	X
CORDYLIDAE (Girdled and Flat Lizards)				
<i>Cordylus depressus</i> FitzSimons				X
<i>Cordylus jonesii</i> (Boulenger)	X	p	X	X
<i>Platysaurus intermedius rhodesianus</i> FitzSimons	X	X	X	X
LACERTIDAE (Sand Lizards)				
<i>Nucras caesicaudata</i> Broadley		p	X	X
<i>Nucras holubi</i> (Steindachner)	X	p		X
<i>Nucras ornata</i> (Gray)	X	X	X	X
<i>Nucras intertexta</i> (A. Smith)		X	X	X
<i>Heliobolus lugubris</i> (A. Smith)	X	X	X	X
<i>Pedioplanis lineocellata</i> (Dumeril & Bibron)	p			
<i>Ichnotropis squamulosa</i> Peters	X	X	X	X
<i>Ichnotropis capensis</i> (A. Smith)		p	X	
VARANIDAE (Monitor Lizards)				
<i>Varanus niloticus</i> (Linnaeus)	X	p	X	X
<i>Varanus albigularis albigularis</i> (Daudin)	p	X	X	X
AMPHISBAENIA				
AMPHISBAENIDAE (Worm Lizards)				
<i>Zygaspis quadrifrons</i> (Peters)	X	p		X
<i>Zygaspis vandami arenicola</i> Broadley & Broadley		p	X	
<i>Chirindia langi langi</i> FitzSimons				X
<i>Monopeltis leonhardi</i> Werner		p	X	X
<i>Monopeltis infuscata</i> Broadley	X			
<i>Monopeltis decosteri</i> Boulenger		X	X	X
<i>Monopeltis rhodesiana</i> Broadley, Gans & Visser			X	
<i>Monopeltis sphenorhynchus</i> Peters	X	p		X
SERPENTES				
TYPHLOPIDAE (Blind Snakes)				
<i>Typhlops fornasinii</i> Bianconi		p	X	
<i>Rhinotyphlops lalandei</i> (Schlegel)	X	p	X	X
<i>Rhinotyphlops schlegelii</i> (Bianconi)	p	p		X
<i>Rhinotyphlops mucruso</i> (Peters)	p	p	X	
LEPTOTYPHLOPIDAE (Worm Snakes)				
<i>Leptotyphlops longicaudus</i> (Peters)	X	X	X	X
<i>Leptotyphlops incognitus</i> Broadley & Watson	p	p		X
<i>Leptotyphlops scutifrons scutifrons</i> (Peters)	X	X	X	X
PYTHONIDAE (Pythons)				
<i>Python natalensis</i> A. Smith	p	p	p	X

Taxa	TMS	CSM	GNP	KNP
VIPERIDAE (Vipers)				
<i>Causus rhombeatus</i> (Lichtenstein)			X	
<i>Causus defilippii</i> (Jan)			p	X
<i>Bitis caudalis</i> (A. Smith)	X	p		X
<i>Bitis arietans arietans</i> (Merrem)	X	X	X	X
ATRACTASPIDADAE (Stiletto Snakes and Allies)				
<i>Atractaspis bibronii</i> A. Smith	p	p	X	X
<i>Amblyodipsas polylepis</i> (Bocage)	X	p	p	X
<i>Amblyodipsas microphthalma microphthalma</i> (Bianconi)				X
<i>Xenocalamus sabiensis</i> Broadley		X		
<i>Xenocalamus transvaalensis</i> Methuen	X	P		
<i>Xenocalamus lineatus</i> Roux	X	X	X	X
<i>Aparallactus lunulatus</i> (Peters)	p	p	p	X
<i>Aparallactus capensis</i> A. Smith	X	p	X	X
ELAPIDAE (Cobras, Mambas and Allies)				
<i>Elapsoidae boulengeri</i> Boettger	X	X	X	X
<i>Elapsoidea sundevallii longicauda</i> Broadley	p	X	X	X
<i>Aspidelaps scutatus scutatus</i> (A. Smith)	X			
<i>Aspidelaps scutatus fulafula</i> (Bianconi)			X	
<i>Aspidelaps scutatus intermedius</i> Broadley				X
<i>Naja annulifera annulifera</i> Peters	X	X	X	X
<i>Naja mossambica</i> Peters	X	X	X	X
<i>Dendroaspis polylepis</i> (Gunther)	X	X	X	X
COLUBRIDAE (Typical Snakes)				
<i>Lycodonomorphus obscuriventris</i> FitzSimons			X	
<i>Lamphrophis capensis</i> (Dumeril & Bibron)	X	X	X	X
<i>Mehelya capensis capensis</i> (A. Smith)		P	P	X
<i>Mehelya nyassae</i> (Gunther)	P	P	X	P
<i>Lycophidion variegatum</i> Broadley	X	P		P
<i>Lycophidion capense capense</i> (A. Smith)		p	X	X
<i>Pseudaspis cana</i> (Linnaeus)	p	p	p	p
<i>Hemirhagerrhis nototaenia</i> (Gunther)	X	X	X	X
<i>Psammophylax tritaeniatus</i> (Gunther)	X	p	X	X
<i>Rhamphiophis rostratus</i> Peters	X	X	X	X
<i>Psammophis leightoni trinasalis</i> Werner		p		X
<i>Psammophis subtaeniatus</i> Peters	X	X	X	X
<i>Psammophis mossambicus</i> Peters	X	X	X	X
<i>Psammophis angolensis</i> (Bocage)	p	X	X	X
COLUBRINAE				
<i>Prosymna lineata</i> (Peters)	X	p	X	X
<i>Prosymna bivittata</i> Werner		p	p	X
<i>Prosymna stuhlmannii</i> (Pfeffer)	X	X	p	X
<i>Philothamnus hoplogaster</i> Gunther		p	X	X
<i>Philothamnus natalensis</i> (A. Smith)		X	X	X
<i>Philothamnus semivariegatus</i> A. Smith	X	X	X	X
<i>Dipsadoboa aulica</i> (Gunther)		X	X	X
<i>Crotaphopeltis hotamboeia</i> (Laurenti)	p	X	X	X
<i>Telescopus semiannulatus semiannulatus</i> A. Smith	p	X	X	X
<i>Dispholidus typus typus</i> (A. Smith)	p	p	X	X
<i>Thelotornis capensis capensis</i> A. Smith	X	p	X	X
<i>Dasypeltis scabra</i> (Linnaeus)	X	X	X	X

Taxa	TMS	CSM	GNP	KNP
CROCODYLIA				
CROCODYLIDAE (Crocodiles)				
<i>Crocodylus niloticus</i> Laurenti	X	X	X	X
AMPHIBIA				
PIPIDAE (Clawed Frogs or Platannas)				
<i>Xenopus muelleri</i> (Peters)	X	X	X	X
MICROHYLIDAE (Rain Frogs and Allies)				
<i>Breviceps adspersus</i> Peters	p	X	X	X
<i>Phrynomantis bifasciatus</i> (A. Smith)	p	X	X	X
BUFONIDAE (Toads)				
<i>Bufo maculatus</i> Hallowell	X	p	X	X
<i>Bufo garmani</i> Meek	X	X	X	X
<i>Bufo fenoulheti</i> Hewitt & Methuen	X	X	X	X
<i>Schismaderma carens</i> (A. Smith)		p	X	X
RANIDAE (Typical Frogs)				
<i>Pyxicephalus edulis</i> Peters	X	X	X	X
<i>Tomopterna cryptotis</i> (Boulenger)	X	p	X	X
<i>Tomopterna krugerensis</i> Passmore & Carruthers		P	X	X
<i>Tomopterna marmorata</i> (Peters)	X	X	X	X
<i>Hildebrandtia ornata</i> (Peters)		X	X	X
<i>Ptychadena anchietae</i> (Bocage)	X	X	X	X
<i>Ptychadena mossambica</i> (Peters)	X	X	X	X
<i>Phrynobatrachus acridoides</i> (Cope)			X	
<i>Phrynobatrachus natalensis</i> (A. Smith)	X	X	X	X
<i>Phrynobatrachus mababiensis</i> FitzSimons	X	X	X	X
<i>Cacosternum boettiger</i> (Boulenger)				X
ARTHROLEPTIDAE (Squeakers)				
<i>Arthroleptis stenodactylus</i> Pfeffer		p	X	X
RHACOPHORIDAE (Foam-Nest Frogs)				
<i>Chiromantis xerampelina</i> Peters	X	X	X	X
HYPEROLIIDAE (Reed Frogs and Allies)				
<i>Leptopelis mossambicus</i> Poynton		p	X	X
<i>Kassina maculata</i> (Dumeril)		X	X	X
<i>Kassina senegalensis</i> (Dumeril & Bibron)	X	X	X	X
<i>Afrivalus crotalus</i> Pickersgill			X	?
<i>Hyperolius tuberilinguis</i> A. Smith			X	
<i>Hyperolius argus</i> Peters			X	
<i>Hyperolius pusillus</i> (Cope)		p	X	X
<i>Hyperolius marmoratus taeniatus</i> Peters	p	X	X	X
HEMISIDAE (Shovel-Snouted Frogs)				
<i>Hemisis marmoratum</i> (Peters)	p	X	X	X

APPENDIX 5. BIRDS (SPECIES LIST)

SPECIES LISTS AND SITES OF SPECIAL CONSERVATION INTEREST FOR THE CESVI PROJECT AREA: BIRDS (Kit Hustler, September 1999)

1. Introduction

The species list of birds found in the western and eastern portions of the CESVI project area is given in Section 7. Nomenclature follows Maclean (1993). Scientific names have not been included but can be obtained through reference to Maclean (1993).

Data were obtained mainly from the Atlas of Southern African birds published in 1998 and where appropriate, have been included for both sides of the Limpopo river. Some of the species have not been recorded on one or other side, but this has not been a consideration for the exclusion of these birds from the list. They are likely to be recorded on the opposite side given time and the opportunity to search for them. I did two field trips into this area in the early 1990s and covered much of the ground between Beitbridge and Crooks Corner along the Limpopo on the one, and was based on Sentinel Ranch during the other trip. Most of the effort expended on these trips was obtaining data for the bird atlas.

There are a large number of specimens housed in the Bulawayo Natural History Museum from this area, particularly from the area close to Crooks Corner and between there and Chikwarakwara. These have not been examined due to time constraints and access problems but could be examined at some later date if the need arose.

2. Habitats and Avifauna

This is one of the few areas in Zimbabwe where it is possible to see true desert and forest birds within a couple of hundred metres of each other and this is because there is a general drying out of the vegetation as one moves from east to west along the Limpopo River. This is well reflected in the avifauna of the areas concerned. In the west, typical dry country species, like Ostrich, Pale Chanting Goshawk, Grey-backed Finchlark, Red-eyed Bulbul, Scaly-feathered Finch and Lark-like Bunting occur. The riparian fringing forest becomes less developed as one travels west, but even upstream of Beitbridge it provides suitable habitat for forest loving species like the Gorgeous Bush Shrike, which is typically found only in the eastern districts of the country. The riparian fringe is most extensive in the vicinity of Chikwarakwara and further downstream, and supports populations of typical forest birds like Crowned Eagle, Silvery-cheeked Hornbill, Scaly-throated Honeyguide, Sombre Bulbul, Dusky Flycatcher, Blue-mantled Flycatcher and Gorgeous, Olive and Black-fronted Bush Shrikes.

3. Species of Interest

Ostrich

This species has experienced a 40% reduction in its range in the country and there are very few, if any, wild birds left outside of the protected areas in the north-west of the country. Any potential wild birds left in this area are worthy of protection and monitoring.

Cape Vulture

Birds seen in the project are probably come from the breeding colonies in the Soutpansberg in South Africa, thus making the project area a potentially important feeding area for this threatened species.

Pale Chanting Goshawk

While widespread elsewhere in Africa, this area supports a fair proportion of the population which occurs in Zimbabwe.

Cape Eagle Owl

The owls occurring in the western portion of the study area are worth investigation. The form that occurs on the granite further north in Zimbabwe is a distinctive sub-species which is much larger than the form from

further south. It is possible that the sub-species that occurs here is the southern form but its exact status is uncertain.

Pel's Fishing Owl

The Limpopo River is an important area for this owl. It is highly localized when the river is not flowing and is restricted to suitably large pools which have reasonable populations of fish. It is probably vulnerable to over fishing of these pools at this time of year.

Mottled and Batlike Spinetails

Both these species are poorly known and occur in the eastern portion of the study area with some frequency. There are a large number of baobab trees and old mine shafts/caves in the area which are potential nest sites for both species respectively.

Barthroated Apalis

The status of this bird in the Limpopo Basin is in some doubt. There are no authenticated specimens at altitudes below 900 m on the Zimbabwe side of the river and yet there are a number of atlas sight records, particularly on the south bank of the river. It is a conspicuous species and the apalises have been well studied in Zimbabwe. These sightings are anomalies which are worth investigating, particularly as it is possible that the very similar Rudd's Apalis could occur in the eastern portion of the study area in the extensive riparian fringe there. Rudd's Apalis occurs within 50 km of the Limpopo river in the northern part of the Kruger National Park and normally occurs alongside the Yellow-breasted Apalis, which is plentiful in the riparian fringing forest in the vicinity of Chikwarakwara. It is confused with the Bar-throated Apalis in the field, but Bar-throated Apalis is normally restricted to higher altitudes and does not occur alongside the Yellow-breasted. Rudd's Apalis has a restricted distribution and occurs mainly on the southern Mozambican coastal plain and could wander up the riparian fringe of the Limpopo into Zimbabwe.

Blackbacked Cisticola

The exact status of this species in this area is unknown. It is restricted to large temporary wetlands with growths of reeds. It is thought to be threatened by reed cutting but it is poorly known and may be more widespread than current records indicate. It was found in only two localities during my field trip to the area.

Southern Boubou

Although there are no records for this species plotted for Zimbabwe in the Southern African Bird Atlas, this is erroneous. There are a number of specimen records from the area, most of which are from a distinct sub-species which occurs on the Mozambique coastal plain. The exact status and distribution of this bird in the study area is unknown.

Great Sparrow

A highly localized species throughout its range. It is nowhere common and localities where this bird can be seen regularly are unknown. It is possibly more widespread in the area, particularly in the west than records indicate, but its exact habitat requirements are unknown.

Lemon-breasted Canary

This is a near endemic to southern Africa and the centre of its distribution appears to be on the interior coastal plain of Mozambique. It inhabits palm savanna in dry woodland and riparian forest although its exact habitat requirements are unknown. Numbers are variable at the same locality at different times of the year suggesting some sort of movements but data are lacking. Only two nests have ever been found. It is listed as 'rare' in the South African Red Data book and as 'worthy of monitoring' in a continental source detailing threatened birds of Africa and its islands. It may be threatened by local damage to palm trees as a result of furniture and wine making.

Forest Birds

The status and distribution of all the forest species recorded in the riparian fringe along the Limpopo warrants determination. It is not known if their presence in this habitat is seasonal and part of a much larger movement onto the Mozambican coastal plain at certain times of the year, or if they are resident there. The species

involved would include Tambourine Dove, Blue-spotted Dove, Narina Trogon, Silvery-cheeked Hornbill, Scaly-throated Honeyguide, Black Saw-wing Swallow, Brown Robin, Sombre Bulbul, Yellow-spotted Nicator, Bar-throated Apalis, Bleating Warbler (green-backed form), Dusky Flycatcher, Blue-mantled Flycatcher, Gorgeous Bush Shrike, Olive Bush Shrike, Black-fronted Bush Shrike, Yellow-bellied Sunbird, Blue-billed Firefinch, and Black Widowfinch.

4. Sites of Interest

The riparian fringing forest, particularly towards the eastern portion of the study area is of particular interest. It is at quite a low altitude above sea level and supports reasonable populations of forest bird species, although there are no data available about densities of the species concerned. This is reflected in the number of species recorded in HDS 2231 A which has the largest number of species recorded along the Limpopo River and with the fewest number of visits by recorders. There is clearly potential for more species to be recorded in this area. The extent of the forest that is left undisturbed is unknown and when last visited, there were a large number of Mozambican refugees taking up residence in the area and they were clearing and cutting down the understory.

Pockets of ilala palms, particularly in the east, are probably important breeding areas for the highly localized and very little known Lemon-breasted Canary. A few flocks were located in the early 1990s during our expedition to the area and they were almost always in association with these palm thickets. One of the very few nests of the species ever found was located on the underside of an ilala palm leaf, further underlying the potential importance of this habitat type for this bird. The extent and locations of potentially important palm thickets is unknown.

5. Additional Notes

There are some interesting avifaunal anomalies in the area which could be elucidated with more fieldwork. For example, Blue-billed Firefinch appears to be widespread on the South African side of the river. In spite of intensive collecting on our side of the river, not a single Blue-billed Firefinch has been found. Similar situations prevail with Cape White-eyes and Brown Robin. Likewise, Yellow White-eye appears to be restricted to mainly on our side of the river. The exact range and size of the population of Southern Boubou and Lemon-breasted Canary which occur on the north bank of the river needs to be quantified. Lemon-breasted Canaries were encountered in fairly large flocks in the early 1990s in the vicinity of Chikwarakwara and also further east close to Malapati. This species is very poorly known and is thought to be a near endemic to the area. Plain-backed Pipits in Zimbabwe are restricted to flood plain grasslands along the Zambezi River and yet there are a number of records of this bird in the Limpopo Basin, but all from the South African side of the river. The specific status of the 'grassland' and 'floodplain' Plain-backed Pipits is in some doubt and this would be another avenue for investigation. A number of taxonomic issues could be tackled here. For example, it is one of the few places in Zimbabwe where the savanna and forest forms of the Bleating Warbler occur almost side by side.

6. References

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7. Species Lists of Birds from Half-Degree Squares along the Limpopo River

Taxa	Western portion				Eastern portion			
	2129C	2129D	2229A	2229B	2131C	2230B	2231A	2231B
Ostrich	1	1	1	1	1			
Black-necked Grebe				1				
Dabchick	1	1	1	1	1	1	1	
White Pelican		1		1				
Pink-backed Pelican		1		1				
White-breasted Cormorant	1	1	1	1		1	1	
Reed Cormorant	1	1	1	1	1		1	
Darter		1	1	1	1		1	
Grey Heron	1	1	1	1	1	1	1	
Black-headed Heron			1	1		1	1	
Goliath Heron	1	1	1	1	1		1	
Purple Heron	1	1		1				
Great White Egret	1	1	1	1	1	1	1	
Little Egret	1	1	1	1	1		1	
Yellow-billed Egret	1	1	1	1	1		1	
Black Egret		1		1			1	
Cattle Egret	1	1	1	1	1	1	1	1
Squacco Heron	1	1	1	1		1	1	
Green-backed Heron	1	1	1	1	1	1	1	1
Black-crowned Night Heron		1	1	1		1	1	
White-backed Night Heron			1			1	1	
Little Bittern		1		1		1	1	1
Dwarf Bittern		1	1	1	1		1	
Hamerkop	1	1	1	1	1	1	1	1
White Stork	1	1	1	1	1	1	1	
Black Stork	1	1	1	1	1	1	1	
Abdim's Stork	1	1	1	1		1	1	
Woolly-necked Stork			1	1	1	1	1	1
Open-billed Stork		1		1	1	1	1	
Saddle-billed Stork	1	1	1	1	1	1	1	
Marabou Stork	1	1	1	1	1		1	1
Yellow-billed Stork	1	1	1	1	1	1	1	
Sacred Ibis		1	1	1				
Glossy Ibis		1		1			1	
Hadeda Ibis	1	1	1	1	1	1	1	
African Spoonbill	1	1	1	1	1	1	1	
Greater Flamingo		1	1	1				
Lesser Flamingo	1	1		1				
Fulvous Duck			1	1				
White-faced Duck	1	1	1	1	1		1	
White-backed Duck		1		1			1	
Egyptian Goose	1	1	1	1	1	1	1	1
Yellow-billed Duck			1					
African Black Duck	1	1				1		
Hottentot Teal		1			1		1	
Red-billed Teal	1	1	1	1	1		1	

Taxa	Western portion				Eastern portion			
	2129C	2129D	2229A	2229B	2131C	2230B	2231A	2231B
Southern Pochard		1		1				
Pygmy Goose			1				1	
Knob-billed Duck	1	1	1	1	1	1	1	
Spur-winged Goose	1	1	1	1	1	1	1	
Secretarybird	1	1	1	1	1	1	1	
Hooded Vulture	1			1	1		1	1
Cape Vulture	1	1	1	1	1	1	1	1
White-backed Vulture	1	1	1	1	1	1	1	1
Lappet-faced Vulture	1	1	1	1	1	1	1	1
White-headed Vulture	1	1	1	1	1	1	1	1
Yellow-billed Kite	1	1	1	1	1	1	1	
Black Kite	1		1	1		1	1	
Black-shouldered Kite	1	1	1	1	1	1	1	
Cuckoo Hawk			1	1		1		
Bat Hawk				1	1	1	1	
Honey Buzzard			1					
Black Eagle	1	1	1	1	1	1	1	
Tawny Eagle	1	1	1	1	1	1	1	1
Steppe Eagle	1	1	1	1		1	1	
Lesser Spotted Eagle		1	1	1	1	1	1	1
Wahlberg's Eagle	1	1	1	1	1	1	1	1
Booted Eagle			1	1	1	1	1	
African Hawk Eagle	1	1	1	1	1	1	1	1
Ayre's Eagle		1			1		1	
Long-crested Eagle		1	1			1	1	
Martial Eagle	1	1	1	1	1	1	1	1
Crowned Eagle				1	1	1	1	
Brown Snake Eagle	1	1	1	1	1	1	1	
Black-breasted Snake Eagle	1	1	1	1	1	1	1	1
Bateleur	1	1	1	1	1	1	1	1
Palmnut Vulture			1	1				
African Fish Eagle	1	1	1	1	1	1	1	
Steppe Buzzard	1		1	1	1	1	1	
Jackal Buzzard			1					
Augur Buzzard	1							
Lizard Buzzard		1		1	1		1	
Ovambo Sparrowhawk		1	1	1	1		1	
Little Sparrowhawk	1	1	1	1	1	1	1	1
Black Sparrowhawk					1		1	
Little Banded Goshawk	1	1	1	1	1	1	1	1
African Goshawk		1	1			1	1	
Gabar Goshawk	1	1	1	1	1	1	1	1
Pale Chanting Goshawk		1	1	1				
Dark Chanting Goshawk	1	1	1	1	1	1	1	1
European Marsh Harrier				1				
African Marsh Harrier		1						
Pallid Harrier			1		1			
Montagu's Harrier		1		1				

Taxa	Western portion				Eastern portion			
	2129C	2129D	2229A	2229B	2131C	2230B	2231A	2231B
Gymnogene	1	1	1	1	1	1	1	
Osprey	1		1			1	1	
Peregrine Falcon	1	1		1		1	1	
Lanner Falcon		1	1	1		1	1	
Hobby Falcon			1	1			1	
African Hobby Falcon			1	1				
Sooty Falcon							1	
Western Red-footed Kestrel		1		1				
Eastern Red-footed Kestrel	1	1		1		1	1	
Rock Kestrel	1	1	1	1		1	1	
Greater Kestrel		1		1		1		
Lesser Kestrel		1	1	1	1			
Dickinson's Kestrel		1		1	1	1	1	
Coqui Francolin	1	1	1	1	1		1	1
Crested Francolin	1	1	1	1	1	1	1	
Shelley's Francolin						1	1	
Natal Francolin	1	1	1	1	1	1	1	
Red-necked Francolin					1			
Swainson's Francolin	1	1	1	1	1	1	1	1
Common Quail			1	1		1	1	
Harlequin Quail	1	1	1	1	1	1	1	1
Helmeted Guineafowl	1	1	1	1	1	1	1	1
Crested Guineafowl				1	1	1	1	
Kurrichane Buttonquail	1	1	1	1	1		1	1
Corncrake							1	
African Crake			1					
Black Crake	1	1	1	1		1	1	
Striped Crake	1							
Red-chested Flufftail		1	1					
Buff-spotted Flufftail				1				
Purple Gallinule				1				
Lesser Gallinule							1	
Moorhen	1	1	1	1			1	
Lesser Moorhen			1				1	
Red-knobbed Coot		1	1	1			1	
African Finfoot							1	
Kori Bustard			1	1		1	1	
Red-crested Korhaan	1	1	1	1	1	1	1	1
Black-bellied Korhaan					1	1	1	
African Jacana	1	1	1	1	1	1	1	
Lesser Jacana		1						
Painted Snipe	1	1	1	1	1	1	1	
Ringed Plover	1	1	1	1	1	1	1	
White-fronted Plover	1	1	1	1	1	1	1	
Chestnut-banded Plover	1		1	1				1
Kittlitz's Plover	1		1	1	1	1	1	
Three-banded Plover	1	1	1	1	1	1	1	1
Caspian Plover		1	1	1			1	

Taxa	Western portion				Eastern portion			
	2129C	2129D	2229A	2229B	2131C	2230B	2231A	2231B
Grey Plover		1						
Crowned Plover	1	1	1	1	1	1	1	1
Blacksmith Plover	1	1	1	1	1	1	1	1
White-crowned Plover	1		1	1	1	1	1	
Wattled Plover	1		1	1	1			
Lesser Blackwinged Plover			1				1	
Common Sandpiper	1	1	1	1	1	1	1	1
Green Sandpiper	1		1	1	1	1	1	
Wood Sandpiper	1	1	1	1	1	1	1	1
Marsh Sandpiper	1	1	1	1	1	1	1	1
Greenshank	1	1	1	1	1	1	1	1
Curlew Sandpiper	1	1	1	1		1	1	
Little Stint	1	1	1	1	1	1	1	
Ruff	1	1	1	1	1	1		1
Ethiopian Snipe			1					
Avocet		1	1	1		1	1	
Black-winged Stilt	1	1	1	1	1	1	1	
Spotted Dikkop	1	1	1	1	1	1	1	1
Water Dikkop	1	1	1	1	1	1	1	
Temminck's Courser	1	1	1	1	1	1	1	
Three-banded Courser	1	1	1	1	1		1	1
Bronze-winged Courser	1	1	1	1	1	1	1	1
Red-winged Pratincole			1					
Greyheaded Gull			1	1				
White-winged Tern		1	1	1		1	1	
Whiskered Tern			1	1				
Burchell's Sandgrouse			1					
Namaqua Sandgrouse		1	1					
Yellow-throated Sandgrouse			1					
Double-banded Sandgrouse	1	1	1	1	1	1	1	1
Feral Pigeon	1	1		1			1	
Rock Pigeon	1	1	1	1			1	
Rameron Pigeon							1	
Redeyed Dove	1	1	1	1	1	1	1	1
African Mourning Dove	1	1	1	1	1	1	1	1
Cape Turtle Dove	1	1	1	1	1	1	1	1
Laughing Dove	1	1	1	1	1	1	1	1
Namaqua Dove	1	1	1	1	1	1	1	1
Blue-spotted Dove					1		1	
Green-spotted Dove	1	1	1	1	1	1	1	1
Tambourine Dove						1	1	
Green Pigeon	1	1	1	1	1	1	1	1
Grey-headed Parrot	1				1	1	1	1
Brown-headed Parrot					1	1	1	1
Meyer's Parrot	1	1	1	1	1	1	1	1
Purple-crested Lourie					1	1	1	
Grey Lourie	1	1	1	1	1	1	1	1
European Cuckoo		1	1	1	1	1	1	

Taxa	Western portion				Eastern portion			
	2129C	2129D	2229A	2229B	2131C	2230B	2231A	2231B
Striped Kingfisher	1	1	1	1	1	1	1	
European Bee-eater	1	1	1	1	1	1	1	1
Blue-cheeked Bee-eater		1	1	1	1	1	1	1
Carmine Bee-eater	1	1	1	1	1	1	1	1
White-fronted Bee-eater	1	1	1	1	1	1	1	1
Swallow-tailed Bee-eater			1	1			1	
Little Bee-eater	1	1	1	1	1	1	1	1
European Roller	1	1	1	1	1	1	1	1
Racket-tailed Roller							1	
Lilac-breasted Roller	1	1	1	1	1	1	1	1
Purple Roller	1	1	1	1	1	1	1	1
Broad-billed Roller	1	1	1	1	1	1	1	1
Hoopoe	1	1	1	1	1	1	1	1
Red-billed Woodhoopoe	1	1	1	1	1	1	1	1
Scimitar-billed Woodhoopoe	1	1	1	1	1	1	1	1
Silvery-cheeked Hornbill							1	
Trumpeter Hornbill	1			1	1	1	1	
Grey Hornbill	1	1	1	1	1	1	1	1
Redbilled Hornbill	1	1	1	1	1	1	1	1
Southern Yellowbilled Hornbill	1	1	1	1	1	1	1	1
Crowned Hornbill		1		1	1	1	1	1
Ground Hornbill	1	1	1	1	1	1	1	1
Black-collared Barbet	1	1	1	1	1	1	1	
Pied Barbet	1	1	1	1		1	1	
Yellow-fronted Tinker Barbet	1	1	1	1	1	1	1	1
Crested Barbet	1	1	1	1	1	1	1	1
Greater Honeyguide	1	1	1	1	1	1	1	
Scaly-throated Honeyguide						1	1	
Lesser Honeyguide	1	1	1	1	1	1	1	
Sharp-billed Honeyguide			1	1		1	1	
Bennett's Woodpecker	1	1	1	1	1	1	1	1
Golden-tailed Woodpecker	1	1	1	1	1	1	1	1
Cardinal Woodpecker	1	1	1	1	1	1	1	1
Bearded Woodpecker	1	1	1	1	1	1	1	1
Monotonous Lark	1	1	1	1		1	1	1
Rufous-naped Lark	1	1	1	1		1	1	
Flappet Lark	1	1	1	1	1	1	1	
Fawn-coloured Lark		1	1		1		1	1
Sabota Lark	1	1	1	1	1	1	1	1
Dusky Lark	1	1	1	1		1	1	1
Red-capped Lark	1	1	1	1				
Chestnut-backed Finchlark	1	1	1	1	1	1	1	
Grey-backed Finchlark		1	1	1				
European Swallow	1	1	1	1	1	1	1	1
White-throated Swallow			1	1	1			
Wire-tailed Swallow			1	1	1	1	1	1
Pearl-breasted Swallow			1				1	
Red-breasted Swallow	1			1	1		1	

Taxa	Western portion				Eastern portion			
	2129C	2129D	2229A	2229B	2131C	2230B	2231A	2231B
Bearded Robin			1	1	1	1	1	
Garden Warbler		1	1	1		1	1	
Whitethroat			1	1		1		
Titbabbler	1	1	1	1			1	
Icterine Warbler	1	1	1	1		1	1	
Olive-tree Warbler			1	1		1	1	
Great Reed Warbler	1	1	1	1		1	1	
African Marsh Warbler		1	1	1		1	1	
European Marsh Warbler		1	1			1	1	
European Sedge Warbler			1	1			1	
Cape Reed Warbler			1	1		1	1	
African Sedge Warbler		1		1			1	
Yellow Warbler					1			
Willow Warbler	1	1	1	1	1	1	1	
Bar-throated Apalis			1	1	1	1	1	
Yellow-breasted Apalis	1		1		1	1	1	
Red-faced Crombec					1			
Long-billed Crombec	1	1	1	1	1	1	1	1
Yellow-bellied Eremomela	1	1	1	1		1	1	
Green-capped Eremomela	1		1	1	1	1	1	1
Burnt-necked Eremomela		1	1	1	1		1	
Bleating Warbler	1	1	1	1	1	1	1	1
Stierling's Barred Warbler					1	1	1	
Barred Warbler		1	1	1		1	1	
Fan-tailed Cisticola		1	1	1	1	1	1	
Desert Cisticola		1	1	1		1	1	
Tinkling Cisticola			1					
Rattling Cisticola	1	1	1	1	1	1	1	1
Red-faced Cisticola	1	1	1	1	1	1	1	
Black-backed Cisticola					1		1	
Lazy Cisticola						1		
Neddicky	1	1	1	1	1	1	1	
Tawny-flanked Prinia	1	1	1	1	1	1	1	1
Black-chested Prinia	1	1	1	1				
Spotted Flycatcher	1	1	1	1	1	1	1	
Dusky Flycatcher						1	1	1
Blue-grey Flycatcher	1	1	1	1	1	1	1	
Fan-tailed Flycatcher	1	1	1	1	1	1	1	
Black Flycatcher	1	1	1	1	1	1	1	1
Marico Flycatcher	1	1	1	1		1		
Pallid Flycatcher	1	1	1	1		1	1	
Fiscal Flycatcher			1	1				
Chin-spot Batis	1	1	1	1	1	1	1	1
Wattle-eyed Flycatcher					1	1	1	
Fairy Flycatcher			1					
Blue-mantled Flycatcher							1	
Paradise Flycatcher	1	1	1	1	1	1	1	1
African Pied Wagtail	1		1	1	1	1	1	

Taxa	Western portion				Eastern portion			
	2129C	2129D	2229A	2229B	2131C	2230B	2231A	2231B
Great Sparrow			1	1	1			
Cape Sparrow	1	1	1	1				
Grey-headed Sparrow	1	1	1	1	1	1	1	1
Yellow-throated Sparrow	1	1	1	1	1	1	1	1
Scaly-feathered Finch	1	1	1	1				
Thick-billed Weaver							1	
Spectacled Weaver	1	1	1	1	1	1	1	1
Spotted-backed Weaver	1	1	1	1	1	1	1	1
Masked Weaver	1	1	1	1	1	1	1	1
Lesser Masked Weaver	1	1	1	1	1	1	1	1
Golden Weaver			1				1	
Redheaded Weaver	1	1	1	1	1	1	1	1
Redbilled Quelea	1	1	1	1	1	1	1	1
Red Bishop	1	1	1	1	1	1	1	
White-winged Widow	1	1	1	1	1	1	1	1
Melba Finch	1	1	1	1	1	1	1	1
Blue-billed Firefinch						1	1	
Jameson's Firefinch	1	1	1	1	1	1	1	1
Red-billed Firefinch	1	1	1	1	1	1	1	1
Blue Waxbill	1	1	1	1	1	1	1	1
Violet-eared Waxbill	1	1	1	1		1	1	
Common Waxbill	1	1	1	1	1	1	1	
Black-cheeked Waxbill	1	1	1	1		1		
Quail Finch			1					
Cutthroat Finch	1	1	1	1	1	1	1	1
Redheaded Finch	1	1	1	1				
Cuckoo Finch			1				1	
Bronze Mannikin				1	1		1	1
Pintailed Whydah	1	1	1	1	1	1	1	1
Shaft-tailed Whydah	1	1	1	1	1	1	1	
Paradise Whydah	1	1	1	1	1	1	1	1
Purple Widowfinch	1	1	1	1		1	1	
Steel-blue Widowfinch	1	1	1	1	1	1	1	
Black Widowfinch						1	1	
Yellow-eyed Canary	1	1	1	1	1	1	1	1
Black-throated Canary	1	1	1	1	1			
Lemon-breasted Canary		1	1				1	
Yellow Canary			1					1
Streaky-headed Canary			1			1	1	
Golden-breasted Bunting	1	1	1	1	1	1	1	1
Rock Bunting	1	1	1	1	1	1	1	1
Lark-like Bunting	1		1	1				
Total Per Square	296	332	376	372	300	329	386	164
Total Western/Eastern	427				416			
Overall Total	472							

APPENDIX 6. BIRDS (SPECIES AND SITES OF INTEREST)

BIRD SPECIES AND SITES OF INTEREST FOR SENGWÉ AND MARAMANI COMMUNAL LANDS (R.R. Hartley, August 1999)

1. Definitions

Nomenclature follows Maclean (1993). Status codes for species of interest are defined as follows: Species particularly threatened/near-threatened (after Collar *et al.* 1994); unusual outlying population/restricted range relative to Zimbabwe (after Harrison *et al.* 1997 & Barnes 1998); rare occurrence (on regional basis after Maclean 1993, on Zimbabwe basis after Harrison *et al.* 1997).

2. Species of Interest

2.1 Western Area (Tuli Safari Area; Maramani, Machuchuta and Masera communal lands; Sentinel, Nottingham and River ranches)

Globally Threatened

Cape Vulture *Gyps coprotheres* is an occasional visitor

Restricted Range

Kurrichane Thrush *Turdus libonyana* (Harrison *et al.* 1997; pers.obs.) occurs in and near riparian areas. Longtailed Starling *Lamprotornis mavesii* is common (Harrison *et al.* 1997; pers.obs.) throughout. Whitebellied Sunbird *Nectarinia talatala* is common (Harrison *et al.* 1997), especially in and near riparian areas.

Rare

Peregrine Falcon *Falco peregrinus minor* (**r**) - breeds in Homba Hills (C. Bristow, pers.comm.). Namaqua Sandgrouse *Pterocles namaqua* (**Z**; Harrison *et al.* 1997; pers.obs.) - new Zhove Dam, below spillway (21° 49'S, 29° 40'E)

2.2 Eastern Area (Malapati Safari Area; Chipise and Sengwe Communal Lands)

Globally Threatened

Cape Vulture is an occasional visitor (Childes & Mundy 1998) - throughout.

Globally Near-Threatened

Bluethroated Sunbird is a vagrant (Childes & Mundy 1998, Harrison *et al.* 1997) and has been recorded recently at Manjinji Pan (Chiweshe 1998).

Restricted Range

Brownheaded Parrot *Poicephalus cryptoxanthus* is common (Childes & Mundy 1998) - throughout. Gorgeous Bush Shrike *Telophorus quadricolor* is uncommon (Harrison *et al.* 1997) - 2231A4. Olive Bush Shrike *Telophorus olivaceus* is rare (Harrison *et al.* 1997) - 2231A4. Long-tailed Starling is common (Harrison *et al.* 1997; pers.obs.) - throughout. White-bellied Sunbird is common (Harrison *et al.* 1997) - throughout. Bluethroated Sunbird *Anthreptes reichenowi* is rare (Childes & Mundy 1998) - Manjinji Pan. Lemon-breasted Canary *Serinus citrinipectus* is common (Childes & Mundy 1998) - Manjinji Pan & Mwenezi River.

Rare

Peregrine Falcon (**r**; pers.obs.) - over Limpopo at Strauss's camp (22° 20'S, 31° 05'E)

3. Sites of Interest

3.1 Western Maramani Area

1. New Zhove Dam (49°S, 29 40'E) - 2500 ha - and riparian of Zhove and Umzingwane rivers - 300 ha. At old and new Zhove dams waterfowl and waders. In February-April large flocks of Red-billed Quelea (*Quelea quelea*) breed nearby (Hartley 1999) and attract raptors (mainly Steppe (*Aquila nipalensis*) and Lesser Spotted (*A. pomarina*) Eagles, Gymnogone (*Polyboroides typus*) and Lanner Falcons (*F. biarmicus*) at breeding colonies and at key water points such as in the pools below the spillway to new Zhove Dam. Both Lanner and Peregrine Falcon were seen hunting queleas in April 1999 (pers.obs.). One of the few places in Zimbabwe where Namaqua Sandgrouse can be seen - at pools below spillway.
2. Shashe-Limpopo Junction (22 11'S, 29 23'E), pools (22 0 11'S, 29 0 25'E) and riparian strip to Shashe irrigation scheme (22 0 06'S, 29 0 17'E) - 600 ha. At pools, White-fronted Plover.
3. Tuli Circle (21 0 56'S, 29 0 11'E) riparian.
4. Sentinel Ranch (22 0 08'S, 29 0 31'E) - 32,000 ha. Cliff-dwelling raptors in hills here and on Nottingham Estate include Black Eagle and Lanner Falcon, but also Peregrine Falcon. Riparian area of the Limpopo River hosts Pel's Fishing Owl. *Acacia* savanna hosts huge breeding colonies of Red-billed Queleas and Wattled Starlings.

3.2 Eastern Sengwe Area

Limpopo-Mwenezi Pans

This is one of 20 designated globally Important Bird Areas in Zimbabwe (see Childes & Mundy 1998), and consists of 70,000 ha of unprotected land (Childes & Mundy 1998). The area includes the Mwenezi (boundary between Gonarezhou National Park and the Malapati Safari Area) and Limpopo River.

5. Manjinji Pan (22 0 06'S, 31 0 24'E; a Sanctuary under the Parks & Wild Life Act) - 300 ha. An important area for waterfowl, and two restricted range species (Lemon-breasted Canary and Blue-throated Sunbird).
6. Malipati Safari Area (22 0 03'S, 31 0 25'E) either side of the Mwenezi River - 4400 ha. Large vultures (Hooded, Cape, White-backed, Lappetfaced and White-headed) and eagles (Martial, Black, Tawny, African Hawk Eagle).
7. Limpopo riparian, floodplain below Chikwarakwara (22 0 20'S, 31 0 05'E) and gorge above (22 0 19'S, 31 0 01'E), which may host African Peregrine Falcon (pers.obs.) and Pel's Fishing Owl (*Scotopelia peli*) (C. Bristow pers.comm.).
8. Pesu Gorge (22 0 16'S, 31 0 12'E) - 30 ha. Black Eagles seen nearby in April 1999 (pers.obs.) and may breed here or in immediate area. Other cliff dwelling species may reside here, including swifts and falcon species This area needs investigation, especially as it provides a contrast of habitat probably a contrast of avifauna with the riparian and savanna habitats nearby.

4. Other Sources

Irwin (1968) summarized species seen in the riparian zone of the Limpopo system with a decreasing gradient of diversity upstream from the section near Crooks Corner and Chikwarakwara (38 species; also see Smithers 1958), Sentinel Ranch (23 species; also see Irwin & Donnelly 1960, Jackson 1967), Tuli (16 species; also see Hayes 1959) and Zhilo (10 species). This decrease in diversity matched the decline in width and richness of the riparian zone.

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APPENDIX 7. MAMMALS

MAMMAL FAUNA OF THE LIMPOPO VALLEY, ZIMBABWE (F.P.D. Cotterill, September 1999)

1. Introduction and Background

The occurrence at least 129 species of mammals in the Limpopo Valley of southern Zimbabwe is confirmed from museum specimens and reliable visual records. These records are based principally on Smithers & Wilson (1979) and Smithers (1983), and are listed in Section 6. They includes records from quarter degree squares immediately adjacent to Zimbabwe. These additional data (Smithers 1983, Skinner & Smithers 1990) have been collated mainly from intensive small mammal surveys of the Pafuri region of Kruger National Park which concentrated on bats (Rautenbach 1985, Rautenbach, Schlitter & Braack 1984, Rautenbach, Fenton & Braack 1985).

Through the 1980s and into the 1990s, several museum orientated expeditions and collecting of small mammals by interested individuals (including R.N. Cunliffe and D. Bristow) added important records of mammal distributions in the Limpopo Valley within Zimbabwe. This especially applies to the Chiroptera (Cotterill 1996a,b), and these continue to be augmented by a thorough appraisal of historical material to correct misidentifications. These recent surveys followed on no less than two expeditions by the Rhodesian Schools Exploration Society during the 1960s, and collecting by museum staff in the early 1970s. The latter collected some material from Chikwarakwara and Pesu River Gorge. Nevertheless, nearly all collecting has focussed on the Tuli Circle, Sentinel Ranch, the vicinity of the Mzingwane-Limpopo confluence, and Chikwarakwara area. More comprehensive surveys, especially in the Mateke Hills and Chikwarakwara, remain to be carried out for all small mammals, including carnivores, rodents and bats.

The broader placement of the CESVI project, although currently contained within Zimbabwe, is actually subsumed as a component of the Trans-frontier Peace Parks along the Limpopo Valley. These involve Botswana, northern South Africa and the Gaza Province of Mozambique, and lend support to the attention to data from adjacent territories. In this context, the possibility of occurrence of some species in Zimbabwe is discussed although data are not currently available.

The list (Section 6) needs to be considered in light of recent and burgeoning declines of large mammals from much of their former range due to human depredations and loss of habitat. Nomenclature follows Meester *et al.* (1986) and Wilson & Reeder (1993), except for the bat genera *Eptesicus* and *Pipistrellus* where Hill & Harrison (1987) are followed.

2. Overview of the Mammal Fauna

Against the caveat that existing knowledge of mammals in the Limpopo Valley is based on patchy samples, it is possible to evaluate the fauna in the context of larger scale influences. Its species richness has been influenced by at least two faunal elements. These are mammals adapted to deserts and arid savannas, and low altitude forest environments, respectively. Of equal relevance, the absence of mammals associated with rank grasslands of savannas of the higher rainfall on Zimbabwe's central watershed can be singled. This faunal deficiency is exemplified by absence of the Creek Rat, *Pelomys fallax*, Angoni vlei rat *Otomys angoniensis* and the Greater Cane Rat *Thyronomys swinderianus* among others which have not been collected in surveys in Tuli and Sentinel Ranch. This particular deficiency may be an artefact of incomplete surveys, as some of these species might occur in the Chikwarakwara and eastern areas of the valley. Alternatively, lack of suitable habitat and events of extreme aridity have extirpated peripheral populations from the region. Either lack of surveys or aridity must account for the apparently marginal occurrence of Clawless Otter *Aonyx capensis*; being known only from the lower reaches of the Shashi River.

Mammals typical of the south west arid zone includes Hairy-footed gerbil *Gerbillurus paeba*, Bat-eared fox *Otocyon megalotis*, Brown Hyaena *Hyaena brunnea* and peripherally the Gemsbok *Oryx gazella*. The latter only occurs as a vagrant in Sentinel Ranch. In this context, it is possible that certain other small mammals do occur in Zimbabwe north of the Limpopo. These including Greater Dwarf Shrew *Suncus lixus* and Woodland Mouse *Grammomys dolichurus* known from adjacent South Africa. These could occur in mesic

habitats. Three arid zone mammals, namely Yellow Mongoose *Cynictis pencilata*, Bushveld Elephant Shrew *Elephantulus intufi* and Short-tailed Gerbil *Desmodillus auricularis*, may also occur. They are known from records in eastern Botswana adjacent to Zimbabwe.

Mammals typical of the low altitude forests of the East African Coastal Mosaic include Red Squirrel *Paraxerus palliatus*, Suni *Neotragus moschatus*, Four-toed elephant shrew *Petrodomus tetradactylus* and Nyala *Tragelaphus angasii*. With the exception of the latter two species, the distributions of these forest species are restricted to riparian fringes in the extreme east of the Limpopo Valley adjacent to Pafuri, South Africa, and Mozambique; where these mammals are widespread. The distribution of *P. tetradactylus* is interesting - as this insectivore has been collected along the riparian fringe of the Limpopo as far west as Beitbridge. Its localized persistence so far west along the riparian fringe of the Limpopo River is reminiscent of the Greater Galago *Otolemur crassicaudatus*, which occurs in Sentinel Ranch; but only in riparian forest on the Limpopo banks. Similarly, as of the 1970s, nyala occurred far west along the Limpopo - and also along the Mzingwane river to 29° 22' E. It is uncertain whether this population persists so far west given the increasing aridity this region has experienced through the past two decades. Nyala were recently recorded along the Mwenezi River south of the main Masvingo road. Similarly to the arid zone mammals, Oribi *Ourebia ourebi* and Red Duiker *Cephalophus natalensis* could marginally enter Zimbabwe from Mozambique and South Africa. The riparian woodlands and thickets near Chikwarakwara could support *C. natalensis*; a possibility deserving of investigation.

Lastly, the distributions of at least three isolated populations centre on the eastern reaches of the Limpopo valley in Zimbabwe. These are Yellow Golden Mole *Calcochloris obtusirostrus* and Hairy-footed gerbil *Gerbillurus paeba*. Both occur on largely on sandy soils in Gonarezhou National Park- extending into the Pafuri region of Kruger National Park and adjacent Mozambique. The occurrence of Cape Hare *Lepus capensis* in south eastern Zimbabwe is also interesting; being part of an isolated population restricted to the north-eastern Gauteng Province of South Africa and neighbouring Mozambique.

3. Sites of Interest

It is difficult to identify sites of interest for mammals within the Limpopo Valley based on the current patchy knowledge constructed from incomplete surveys. Nonetheless, at least two sites can be singled out, with another suggestive of further inventories to establish their status.

Sentinel Ranch and Tuli-Shashi

The mammal fauna is comprised principally of savanna species but some arid-adapted carnivores (including *O. megalotis*) and ungulates (*O. gazella*) occur. The bat fauna has been comparatively well sampled, being one of the first localities where the rarely encountered *Pipistrellus anchietai* was collected in 1992. The nycterid *Nycteris woodi* also reaches the southern limit of its subtropical distribution in the western Limpopo valley, where a specimen was collected from Sentinel Ranch in 1992 (Cotterill 1996a). Karoo sandstone outcrops provide roosts for many cavernicolous bats, including *Taphozous rhodesiae*. The first specimens of this population were collected by a Rhodesian Schools Exploration Society Expedition to Sentinel Ranch in 1960. *T. rhodesiae* is currently regarded as a subspecies of *T. perforatus* (Meester *et al.* 1986). It appears to occur across the Limpopo Valley, being known from Lone Star Ranch (Malilangwe Conservation Trust) in the Save Valley. A total of 24 species of bats have been collected from Sentinel Ranch.

Of particular ecological significance is the abrupt habitat gradient that extends from mesic riparian forest and woodland into the arid scrub of the rocky hills (both basalt and Karoo sandstones). This accounts for a juxtapositioning of persistent forest species alongside an arid adapted fauna.

Chikwarakwara - Malipati

The abrupt juxtaposition of forest and desert biodiversity in the western reaches of the Limpopo valley are not so distinct in south eastern Zimbabwe. Several mammals with a peripheral occurrence in Zimbabwe have been recorded in the extreme south east of Zimbabwe, as judged from intensive surveys of the bat fauna in Pafuri (and earlier collecting in Pesu Gorge and Chikwarakwara in Zimbabwe). These include certain bats (*K. lanosa*) and rodents (*P. palliatus*) and antelopes (*T. angasii* and *N. moschatus*) with possibility of red duiker *C. natalensis*.

Apart from the mix of rocky outcrops, mopane woodland and riparian forest, habitat richness in this region is further increased by the sandy deposits where *C. obtusirostris* is restricted, and an isolated population of *G. paeba* occurs.

4. Further Surveys

A thorough survey totalling several months of inventories is required to ascertain the composition of any mammal fauna (for a region as large as the Limpopo Valley) with confidence. This should be structured according to the maps that have zoned physical features (geology and geomorphology), vegetation and climatic data. The important areas for particular attention are Mateke Hills and the south eastern section including Sengwe, Chikwarakwara and extending eastwards into Mozambique.

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6. List of Species Occurring in the Limpopo Valley

Localities of a species' localized occurrence or extra-limital data are noted.

Order Insectivora (Insectivores)

Lesser Red Musk Shrew

Crocidura hirta

Reddish-grey Musk Shrew

Crocidura cyanea

Tiny Musk Shrew

Crocidura fuscomurina

Southern African Hedgehog

Atelerix frontalis

Yellow Golden Mole	<i>Calcochloris obtusirostris</i>	
Order Chiroptera (Bats)		
Peters's Epauletted Fruit Bat	<i>Epomophorus crypturus</i>	
Wahlberg's Epauletted Fruit Bat	<i>Epomophorus wahlbergi</i>	
Egyptian Fruit Bat	<i>Rousettus aegyptiacus</i>	
Mauritian Tomb Bat	<i>Taphozous mauritanus</i>	
Egyptian Tomb Bat	<i>Taphozous perforatus</i>	
Wood's Slit-faced Bat	<i>Nycteris woodi</i>	
Egyptian Slit-faced Bat	<i>Nycteris thebaica</i>	
Hildebrandt's Horseshoe Bat	<i>Rhinolophus hildebrandti</i>	
Ruppell's Horseshoe Bat	<i>Rhinolophus fumigatus</i>	
Darling's Horseshoe Bat	<i>Rhinolophus darlingi</i>	
Geoffroy's Horseshoe Bat	<i>Rhinolophus clivosus</i>	Pafuri
Lander's Horseshoe Bat	<i>Rhinolophus landeri</i>	
Bushveld Horseshoe Bat	<i>Rhinolophus simulator</i>	
Swinny's Horseshoe Bat	<i>Rhinolophus swinnyi</i>	
Commerson's leaf-nosed bat	<i>Hipposideros commersoni</i>	Pafuri
Sundevall's leaf-nosed bat	<i>Hipposideros caffer</i>	
Schreiber's Long-fingered bat	<i>Miniopterus schreibersi</i>	
Welwitsch's Hairy Bat	<i>Myotis welwitschii</i>	Pafuri
Temminck's Hairy Bat	<i>Myotis tricolor</i>	Pafuri
Rufous Hairy Bat	<i>Myotis bocagei</i>	Pafuri
Ruppell's Bat	<i>Pipistrellus rueppelli</i>	
Kuhl's Pipistrelle	<i>Pipistrellus kuhli</i>	
Anchieta's Pipistrelle	<i>Pipistrellus anchietai</i>	
Rusty Bat	<i>Pipistrellus rusticus</i>	
Banana Bat	<i>Pipistrellus nanus</i>	
Cape Pipistrelle	<i>Pipistrellus capensis</i>	
Somali Pipistrelle	<i>Pipistrellus somalicus</i>	
Long-tailed Serotine Bat	<i>Eptesicus hottentotus</i>	
Botswana Long-eared Bat	<i>Laephotis botswanae</i>	Pafuri
Butterfly Bat	<i>Glauconycteris variegata</i>	
Yellow House Bat	<i>Scotophilus dinganii</i>	
Lesser House Bat	<i>Scotophilus borbonicus</i>	
Schlieffen's Bat	<i>Nycticeinops schlieffenii</i>	
Damara Woolly Bat	<i>Kerivoula argentata</i>	Pafuri
Lesser Woolly Bat	<i>Kerivoula lanosa</i>	Pafuri
Flat-headed Free-tailed Bat	<i>Sauromys petrophilus</i>	
Midas Free-tailed Bat	<i>Mops midas</i>	
Angola Free-tailed Bat	<i>Mops condylura</i>	
Ansorge's Free-tailed Bat	<i>Chaerephon ansorgei</i>	
Little Free-tailed Bat	<i>Chaerephon pumila</i>	
Egyptian Free-tailed Bat	<i>Tadarida aegyptiacus</i>	
Madagascar Large Free-tailed Bat	<i>Tadarida fulminans</i>	Pafuri
Order Primata (Primates)		
Greater Bushbaby	<i>Otolemur crassicaudatus</i>	
Lesser Nightape	<i>Galagoides moholi</i>	
Chacma Baboon	<i>Papio ursinus</i>	
Vervet Monkey	<i>Cercopithecus aethiops</i>	
Order Pholidota (Pangolins)		
Pangolin	<i>Manis temmincki</i>	

Order Carnivora (Carnivores)

Aardwolf	<i>Proteles cristatus</i>	
Brown Hyaena	<i>Hyaena brunnea</i>	
Spotted Hyaena	<i>Crocuta crocuta</i>	
Cheetah	<i>Acinonyx jubatus</i>	
Leopard	<i>Panthera pardus</i>	
Lion	<i>Panthera leo</i>	
Caracal	<i>Felis caracal</i>	
Serval	<i>Felis serval</i>	
African Wild Cat	<i>Felis libyca</i>	
Bat-eared Fox	<i>Otocyon megalotis</i>	
Painted Wolf	<i>Lycaon pictus</i>	
Side-striped Jackal	<i>Canis adustus</i>	
Black-backed Jackal	<i>Canis mesomelas</i>	
Clawless Otter	<i>Aonyx capensis</i>	Shashi
Honey Badger	<i>Mellivora capensis</i>	
Striped Polecat	<i>Ictonyx striatus</i>	
African Civet	<i>Civettictis civetta</i>	
Common Genet	<i>Genetta genetta</i>	
Rusty-Spotted Genet	<i>Genetta tigrina</i>	
Selous' Mongoose	<i>Paracynictis selousi</i>	
Slender Mongoose	<i>Galerella sanguineus</i>	
White-tailed Mongoose	<i>Ichneumia albinucha</i>	N Gonarezhou
Water Mongoose	<i>Atilax paludinosus</i>	
Banded Mongoose	<i>Mungos mungo</i>	
Dwarf Mongoose	<i>Helogale parvula</i>	

Order Tubulidentata (Antbears)

Antbear	<i>Orycteropus afer</i>	
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Order Proboscidea (Elephants)

African Elephant	<i>Loxodonta africana</i>	
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Order Hyracoidea (Hyraxes)

Rock Hyrax	<i>Procavia capensis</i>	
Yellow-spotted Hyrax	<i>Heterohyrax brucei</i>	

Order Perissodactyla (Odd-Toed Ungulates)

Black Rhino	<i>Diceros bicornis</i>	Extinct
Burchell's Zebra	<i>Equus burchelli</i>	

Order Artiodactyla

Bushpig	<i>Potamochoerus porcus</i>	
Warthog	<i>Phacochoerus aethiopicus</i>	
Hippopotamus	<i>Hippopotamus amphibius</i>	
Giraffe	<i>Giraffa camelopardalis</i>	
Blue Wildebeest	<i>Connochaetes taurinus</i>	
Common Duiker	<i>Sylvicapra grimmia</i>	
Klipspringer	<i>Oreotragus oreotragus</i>	
Sharpe's Grysbeek	<i>Raphicerus sharpei</i>	
Stenbuck	<i>Raphicerus campestris</i>	
Suni	<i>Neotragus moschatus</i>	
Impala	<i>Aepyceros melampus</i>	
Roan Antelope	<i>Hippotragus equinus</i>	
Sable Antelope	<i>Hippotragus niger</i>	

Gemsbuck	<i>Oryx gazella</i>	Sentinel Ranch
Buffalo	<i>Syncerus caffer</i>	
Greater Kudu	<i>Tragelaphus strepsiceros</i>	
Bushbuck	<i>Tragelaphus scriptus</i>	
Nyala	<i>Tragelaphus angasi</i>	
Eland	<i>Taurotragus oryx</i>	
Waterbuck	<i>Kobus ellipsiprymnus</i>	
Order Rodentia (Rodents)		
Matabele molerat	<i>Cryptomys nimrodi?</i>	
Cape Porcupine	<i>Hystrix africaeaustralis</i>	
Springhare	<i>Pedetes capensis</i>	
Woodland Dormouse	<i>Graphiurus murinus</i>	
Rock Dormouse	<i>Graphiurus platyops</i>	
Red Squirrel	<i>Paraxerus palliatus</i>	
Bush Squirrel	<i>Paraxerus cepapi</i>	
Common Spiny Mouse	<i>Acomys spinosissimus</i>	
Striped Mouse	<i>Rhabdomys pumilo</i>	
Pygmy Mouse	<i>Mus minutoides</i>	
Natal Multimammate Mouse	<i>Mastomys natalensis</i>	
Multimammate Mouse	<i>Mastomys coucha</i>	
Tree Rat	<i>Thallomys paedulus</i>	
Red Veld Rat	<i>Aethomys chrysophilus</i>	
Namaqua Rock Rat	<i>Aethomys namaquensis</i>	
Hairy-footed gerbil	<i>Gerbillurus paeba</i>	
Bushveld Gerbil	<i>Tatera leucogaster</i>	
Pouched Mouse	<i>Saccostomus campestris</i>	
Grey Climbing Mouse	<i>Dendromus melanotis</i>	
Fat Mouse	<i>Steatomys pratensis</i>	
Order Lagomorpha (Hares and Rabbits)		
Scrub Hare	<i>Lepus saxatilis</i>	
Cape Hare	<i>Lepus capensis</i>	
Jameson's Red Rock-Rabbit	<i>Pronolagus randensis</i>	
Order Macroscelidea (Elephant Shrews)		
Four-Toed Elephant Shrew	<i>Petrodomus tetradactylus</i>	
Short-snouted Elephant Shrew	<i>Elephantulus brachyrhynchus</i>	
Rock Elephant Shrew	<i>Elephantulus myurus</i>	
Possible occurrence		
Greater Dwarf Shrew	<i>Suncus lixus</i>	South Africa
Yellow Mongoose	<i>Cynictis pencilata</i>	W Botswana, RSA
Oribi	<i>Ourebia ourebi</i>	Mozambique
Woodland Mouse	<i>Grammomys dolichurus</i>	South Africa
Bushveld Elephant Shrew	<i>Elephantulus intufi</i>	W Botswana
Short-tailed Gerbil	<i>Desmodillus auricularis</i>	W Botswana

APPENDIX 7. PLANTS**PLANT SPECIES OF CONSERVATION INTEREST TULI / MARAMANI TO SENGWE**
(R.B. Drummond, September 2000)**Taxa Endemic to the Limpopo Valley** (Bot = Botswana, Tr = Transvaal)

Family / Species	Comments and Distribution
DICOTYLEDONS	
Acanthaceae	
<i>Anisotes rogersii</i> <i>S.Moore</i>	Sengwe, Sentinel, Maramani. Tr, Bot
<i>Megalochlamys revoluta</i> (<i>Lindau</i>) <i>Vollesen</i> subsp. <i>cognata</i> (<i>N.E.Br.</i>) <i>Vollesen</i>	Sentinel. Tr, Bot
<i>Peristrophe gillilandiorum</i> <i>Balkwill</i>	Sentinel. Tr
Capparaceae	
<i>Cleome oxyphylla</i> <i>Burch.</i> var. <i>robusta</i> <i>Kers</i>	Worth specific rank, new record from Zimbabwe. Sentinel/ Nottingham. Tr
Cucurbitaceae	
<i>Cucumis quintanilhae</i> <i>R. & A.Fern.</i>	Beitbridge. Tr
<i>Kedrostis limpompensis</i> <i>C.Jeffrey</i>	Sengwe, Umzingwane. Tr
Euphorbiaceae	
<i>Jatropha loristipula</i> <i>Radcl.-Sm.</i>	Zimbabwe endemic. Just N of Beitbridge
Malvaceae	
<i>Abutilon</i> sp.	Probably an undescribed species. Sentinel, Dongola. Tr
<i>Hibiscus coddii</i> <i>Exell</i>	Umzingwane, Dongola. Tr
<i>Hibiscus gwandensis</i> <i>Exell</i>	Only recorded three times, possible Zimbabwe endemic, occurrence in RSA uncertain. Marangudzi, Umzingwane.
<i>Pavonia dentata</i> <i>Burt Davy</i>	Single record for Zimbabwe. Umzingwane. Tr

Taxa Relatively Widespread in the Region, but within Zimbabwe only occur in the Sengwe to Maramani Area (Bot = Botswana, Moz = Mozambique, Nam = Namibia, Swaz = Swaziland and Tr = Transvaal)

Family / Species	Comments and Distribution
PTERIDOPHYTES	
<i>Selaginella nivea</i> <i>Alston</i>	near Tshiturapadzi. Moz, Bot
MONOCOTYLEDONS	
Amaryllidaceae	
<i>Nerine laticoma</i> (<i>Ker Gawl.</i>) <i>T.Durand & Schinz</i>	Mtetengwe, N limit. Tr, Bot
Commelinaceae	
<i>Triceratella drummondii</i> <i>Brenan</i>	Very rare. Tshiturapadzi (not seen since 1963). Not yet found in RSA, but recently found N of Quelimane in N Moz

Family / Species	Comments and Distribution
Najadaceae	
<i>Najas marina</i> L. subsp. <i>armata</i> (Lindb.f.) H.Horn	Reservoir at Beitbridge. Natal, Moz, Tr, Bot, Cape
Poaceae	
<i>Sartidia angolensis</i> (C.E.Hubb.) De Winter	Sengwe, Umzingwane & single record from Umgusa spur N of Bulawayo. Apparently unrecorded for RSA & Bot, but occurs in Nam, Angola and Zambia
<i>Trichoneura</i> sp.nr. <i>T. eleusinoides</i> (Rendle) Ekman	Recorded from Umzingwane, Sentinel. Tr, between Limpopo & Soutspansberg. May be a form of <i>T. eleusinoides</i> which occurs in Nam.
DICOTYLEDONS	
Acanthaceae	
<i>Barleria crossandriiformis</i> C.B.Clarke	Sengwe. Natal, Swaz, Tr
<i>Barleria elegans</i> C.B.Clarke	Sengwe. Natal, Swaz, Tr
<i>Ecbolium clarkei</i> Hiern var. <i>puberulum</i> Vollesen	Sengwe. Natal, Tr
<i>Petalidium aromaticum</i> Oberm.	Sengwe. Tr
<i>Rhinacanthus xerophilus</i> A.Meeuse	Mateke Hills. Tr
<i>Ruellia bignoniiflora</i> S.Moore	Mateke Hills. Natal, Tr
Aizoaceae	
<i>Trianthema salsoloides</i> Oliv. var. <i>stenophylla</i> Adamson	Brackish pans, Maramani. Tr
<i>Trianthema salsoloides</i> Oliv. var. <i>transvaalensis</i> (Schinz) Adamson	Brackish pans, Maramani. Tr
Amaranthaceae	
<i>Hermestaedia fleckii</i> (Schinz) Baker & C.B.Clarke	Maramani. Tr, Bot, Nam
Apocynaceae: Apocynoideae	
<i>Carissa tetramera</i> (Sacleux) Stapf	Tshiturapadzi. Natal, Swaziland, Tr
Apocynaceae: Asclepiadoideae	
<i>Hoodia lugardii</i> N.E.Br.	Sentinel, Maramani. Bot, Nam
<i>Huernia procumbens</i> (R.A.Dyer) Leach	Sengwe. Tr
<i>Tavaresia barklyi</i> (Dyer) N.E.Br.	Sentinel, Maramani, also Hwange NP. Tr, Bot, Cape, Nam
Asteraceae	
<i>Dicoma galpinii</i> F.C.Wilson	Only three records from Zimbabwe, Mahenya, Mushandike, Umzingwane. Moz, Tr
<i>Flaveria bidentis</i> (L.) Kuntze	Introduced, common weed along Limpopo. Moz, Tr, Bot?
<i>Geigeria acaulis</i> Oliv. & Hiern	Maramani, recent record from Gutu. Tr, Bot, Nam
<i>Verbesina encelioides</i> (Cav.) A.Gray	Common weed along Limpopo. Tr, Bot, Cape, Nam
<i>Vernonia cinerascens</i> Sch.Bip.	Beitbridge, Sentinel, Maramani. Tr, Bot, Nam, Angola, E & NE Africa, India
Boraginaceae	

Family / Species	Comments and Distribution
<i>Heliotropium rariflorum</i> Stocks subsp. hereroense (Schinz) Verdc.	Sentinel. Nam, E Africa. Likley to occur Tr & Bot, but apparently not recorded as yet
Burseraceae	
<i>Commiphora tenuipetiolata</i> Engl.	Gonarezhou NP, Malapati, Beitbridge, Umzingwane, Maramani, Tuli Circle. Tr, Bot, Nam, Angola
Capparaceae	
<i>Boscia foetida</i> Schinz subsp. rehmanniana (Pest.) Tölken	Sengwe, Maramani. Tr, Bot, Cape, Nam
<i>Cadaba aphylla</i> (Thunb.) Wild	Sengwe, Maramani. Tr, Bot, Cape, Nam
Convolvulaceae	
<i>Ipomoea albinervia</i> (Lindl.) Sweet	Marungudzi, Mateke Hills. Natal, Moz, Swaz, Tr
<i>Ipomoea hackeliana</i> (Schinz) Hall.f.	Tshitshurapadzi. Tr, Bot, Cape, Nam
Ebenaceae	
<i>Euclea natalensis</i> A.DC. subs. angustifolia F.White	Tuli. Tr, Bot
Euphorbiaceae	
<i>Tragia dioica</i> Sond.	Single record from Beitbridge. Tr, Bot, Cape, Nam
<i>Jatropha schlechteri</i> Pax subsp. setifera (Hutch.) Radcl.-Sm.	Tapora, Hwali. Tr, Bot
<i>Euphorbia rowlandii</i> R.A.Dyer	Single record from Sengwe. Tr
Fabaceae: Papilionoideae	
<i>Crotalaria schinzii</i> Baker.f.	Beitbridge. Tr, Bot
<i>Cullen obtusifolia</i> (DC.) C.H.Stirt.	Tuli Circle. OFS, Tr, Bot, Nam
<i>Cyamopsis dentata</i> (N.E.Br.) Torr�	Nuli Range (E of Beitbridge). Tr, Bot, Nam
<i>Indigofera circinnata</i> Harv.	Maramani. Tr, Bot
<i>Tephrosia euchroa</i> I.Verd.	Tshitshurapadzi, Umzingwane. Tr
<i>Tephrosia zoutpansbergensis</i> Bremek.	Tshitshurapadzi. Tr
Fabaceae: Mimosoideae	
<i>Acacia permixta</i> Burt Davy	Tuli Circle (also West Nicholson). Tr. Bot
<i>Acacia stuhlmannii</i> Taub.	Sentinel, Beitbridge. Tr, Bot, E Africa
<i>Albizia petersiana</i> (Bolle) Oliv. subsp. evansii (Burt Davy) Brenan	Gonarezhou, Sengwe, Tshitshurapadzi. Natal, Moz, Tr
Lythraceae	
<i>Galpinia transvaalica</i> N.E.Br.	Gonarezhou, Mateke Hills. Swaz, Tr
Malvaceae	
<i>Abutilon fruticosum</i> Guill. & Perr.	Sengwe, Beitbridge, Sentinel, Maramani. Tr, Bot, Nam
<i>Abutilon rehmannii</i> Baker f.	Beitbridge to Maramani. Tr, Nam. E & N Africa
Molluginaceae	
<i>Limeum aethiopicum</i> Burm.f. var. aethiopicum	Maramani. Tr to Cape

Family / Species	Comments and Distribution
<i>Limeum dinteri Schellenb.</i>	Beitbridge. Moz, Tr, Cape, Nam
Nyctaginaceae	
<i>Boerhavia repens L.</i>	Bubi to Beitbridge. Tr, Bot, Cape, Nam, Tropical Africa & Asia
<i>Commicarpus pilosus (Heimerl) Meikle</i>	Beitbridge to west. Natal, Tr, Bot, Cape, Nam
Passifloraceae	
<i>Adenia spinosa Burt Davy</i>	Mateke Hills, Sengwe, Umzingwane, Sentinel, Maramani. Tr
Pedaliaceae	
<i>Harpagophytum procumbens DC.</i> subsp. <i>transvaalense Ihlerf.</i>	Beitbridge to Sentinel. Tr
<i>Sesamothamnus lugardii N.E.Br.</i>	Beitbridge, Maramani, also N of Bulawayo. Tr, Bot
Polygalaceae	
<i>Polygala senensis Klotzsch</i>	Sengwe. Moz, Tr
Sterculiaceae	
<i>Melhania rehmannii Szyszyl.</i>	Sengwe to Maramani. Swaz, Tr, Bot, Cape, Nam
Tiliaceae	
<i>Grewia hexamita Burret</i>	Mateke Hills, Sengwe. Moz, Tr, Moz, Tanzania
<i>Grewia tenax (Forssk.) Fiori</i>	Umzingwane, Sentinel, Maramani. Tr, Bot, Nam, E & W Africa
Turneraceae	
<i>Piriqueta capensis (Harv.) Urb.</i>	Maramani. Natal, Moz, Tr
Vitaceae	
<i>Cyphostemma schlechteri (Gilg & Brandt) Wild & R.B.Drumm.</i>	Sengwe. Moz, Tr, Bot
Zygophyllaceae	
<i>Tribulus zeyheri Sond.</i>	Abundant between Limpopo & Bubi rivers. Tr, Bot, Cape, Nam