A PLANT ECOLOGICAL STUDY OF THE RIETVLEI NATURE RESERVE, GAUTENG PROVINCE

By

RIAAN MARAIS

Submitted in fulfilment of the
requirements for the degree

Magister Agriculturae
(Wildlife Management)

In the Faculty of Natural & Agricultural Sciences
Department of Animal, Wildlife and Grassland Sciences
University of the Free State
Bloemfontein
South Africa

Promoter: Prof. G. N. Smit
Co-promoter: Dr. P. J. du Preez

November 2004

DECLERATION

I declare the dissertation hereby submitted by me for the partial fulfilment of the requirements of the degree M. Agric. (Wildlife Management) at the University of the Free State is my own independent work and has not previously been submitted by me at another university / faculty. I furthermore cede copyright of the dissertation in favour of the University of the Free State.

RIAAN MARAIS

CONTENTS

LIST OF TABLES:

LIST OF FIGURES:

LIST OF APPENDICES:

CHAPTER ONE

1. INTRODUCTION

Rietvlei Nature Reserve belongs to the City of Tshwane Metropolitan Municipality and came into existence because of a water scheme to supply drinking water for the city of Pretoria. Since the main function of the area is to provide water, the catchment area needs to be conserved and the water needs to be accumulated and distributed. For this reason the dam was built in the Six Mile Spruit or River and the Rietvlei Nature Reserve (3 870 ha) was proclaimed (Rietvlei Nature Reserve, Undated).

The main aims of the Reserve are:

- To supply the city with clean drinking water;
- To protect and conserve a sample of the natural environment around the city in a relatively pristine state;
- To conserve genetic diversity and prevent the loss of animal and plant species;
- To make live game available for relocation when available;
- To give local and foreign visitors the opportunity to visit the reserve and participate in outdoor activities; and
- To supply facilities and opportunities for environmental education, research and monitoring (Rietvlei Nature Reserve, Undated).

At the time of the proclamation of the reserve, the minimum size of land needed for the declaration of a game reserve on the Bankenveld veldtype in the previous Transvaal Province was 1 000 ha according to the policy of the Provincial Nature and Environmental Conservation Directorate. An economic farming unit in this area was considered to be 300 ha. The reserve is therefore equal to thirteen farming units with a combined carrying capacity of 1 200 to 2 000 head of game or 486 LSU (large stock units), depending on factors such as species of game or the carrying capacity of the veld. The entire reserve falls within the municipal boundaries of the City of Tshwane. The Rietvlei Nature Reserve is therefore a fairly large nature reserve in an urban setting.

Sound nature conservation principles are adhered to in the management of the reserve and one of the first goals was to re-establish species of game indigenous to the area. As these game species evolved in this area and management kept their numbers within the grazing capacity of the reserve, sufficient grazing is always available to them to ensure their continued existence. Nevertheless, it is necessary to provide additional salt and mineral licks in winter and to implement a system of rotational grazing in the available space of the fenced-in reserve (Rietvlei Nature Reserve, Undated).

The Rietvlei Nature Reserve has survived as a conservation area since 1929, but despite this long existence no annual plant monitoring program has ever been undertaken. The only deliberate veld management program that took place was an annual burning program and that created a rotational grazing system. Many different *ad hoc* and unpublished studies were done on the reserve (mainly short student projects) but no quantitative management units or data exist that can be compared from one year to the next. No data on changes in plant composition or species diversity over time or trends of veld condition are available. This means that the management of the reserve don't know if the veld condition has remained the same, improved or deteriorated over time.

The only available and published data that were collected during this entire period was that of a thesis done by Du Plessis (1968) on the Blesbok (*Damaliscus dorcas phillipsi*) and some work that was done on the plant communities in the reserve. Seven main plant communities were identified and *Brachiaria serrata* was used to divide the communities into two main groups. Venter *et al*. (2003) did a baseline vegetation survey of rehabilitated peatland on Rietvlei Nature Reserve.

Van Riet (1994) examined the effect of development on the future of the Rietvlei Dam as a nature reserve. There were 72 grass species identified but only two grassland types, namely *Andropogon* and *Setaria* grasslands. Quantitative data that may indicate whether the applied management principles and actions had the correct results do not exist. It is not known if the burning program that is being applied, delivers the desired effects or not and it is up to the personnel of the reserve to resort to their training and experience to make a subjective visual evaluation of the success of these management actions.

As far as the grazing capacity of the reserve is concerned, the recommendations of the Department of Agriculture are used for this veld type, which is described by Acocks (1988) as Bankenveld (Acocks no 61). Annual changes caused by fire or variable rainfall on the plant species composition or basal cover, were never taken into account. The managers again had to rely on their personal experience.

The grazing and browsing capacity are species inherent characteristics of the habitat but are also influenced by the specific grazer and browser species (Bothma, 1988). It is important to take the game species composition and number of each species into account. Different species have different habitat requirements and will make use of different niches.

Van Wyk (1997) in a talk to the Friends of Rietvlei, stated that in grassland like Rietvlei Nature Reserve, as many as 82 plant species per 1 000 m² can be found, but that more than 60% of grasslands have already been changed or destroyed and that only 2.4% of grasslands fall within conservation areas. Bredenkamp & Van Rooyen (1996) stated that ± 65% of Rocky Highveld Grassland have been transformed and only 1.38% is being conserved. These statistics serve as a warning that natural grasslands are disappearing fast and should be conserved at all cost, especially in existing conservation areas. It was stated that grasslands can be revegetated, but can never be completely rehabilitated.

Ehrenfeld (2000) stated that restorations carried out to meet goals of conserving species, or providing specific services, or revegetating extremely damaged lands, are both appropriate and necessary. He stated that these restorations should be recognized for what they are, without the pretence that they result in a replica of the original, “natural” system, or that they are, by definition, superior to or inferior to community- or ecosystem-based restoration. These restorations with specific goals are appropriate under certain sets of conditions. Restoration thus has limitations and these should be realistically recognised.

Bakker & Berendse (1999) discussed the constraints in the restoration of ecological diversity in grassland communities and made the statement that the European nature reserves are, at present, to small to conserve these communities. For restoration purposes the conservation areas need to be as big as possible.

At present, formal protection of grasslands is minimal. Transformation of grasslands (both current and predicted), degradation from overgrazing, invasion by alien vegetation and high levels of fragmentation, all point to the crucial need for a conservation strategy for the remaining semi-pristine grassland areas (Neke & Du Plessis, 2004).

Ecological studies are a prerequisite for the appropriate management of all renewable natural resources – both domesticated and wild (Thomson, 1992). Rational pro-active renewable natural resource management, therefore, is not possible without ecological studies. In other words, if you do not know what you have and how it functions, you will not be able to manage it properly. Subsequently this study was undertaken with the objective to identify and quantify different homogeneous management units on the Rietvlei Nature Reserve to facilitate more effective management as far as grazing utilization, burning and monitoring are concerned.

The different management units identified in this study will then provide management an opportunity to decide how much of each unit should be burned and whether different units should be burned in the same year. More objective management of the numbers of certain animal species and the creation or improvement of habitat can address specific aspects such as increased species diversity of the reserve.

CHAPTER TWO

2. STUDY AREA

2.1 Location

The Rietvlei Nature Reserve surrounds and includes the Rietvlei dam (Figure 2.1) and is situated south east of Pretoria, in the Gauteng Province of South Africa, between the R21 highway (Johannesburg International Airport highway) on the western side and the R50 (Delmas / Babsfontein) road on the north-east (Figure 2.2). The site lies in the quarter degree grid square 2528CD (Rietvlei Dam), between 25º50'S and 25º56'S latitude and 28º15'E and 28º19'E longitude (Rietvlei Nature Reserve, Undated). The mean elevation above sea level is approximately 1 525 metres, with the highest point at 1 542 m and the lowest point at 1 473 m (at the dam's outflow). The reserve covers a surface area of approximately 3 870 ha or 38 km² and a network of roads crosses the entire area, which makes the reserve accessible to visitors and management (Figure 2.3).

Figure 2.1: A View of Rietvlei Nature Reserve.

2.2 Geology and soils

The geological map of Rietvlei Nature Reserve (Figure 2.4) shows the geological composition of the reserve from the Geological survey map of the South-African Republic, Department of Mines (Rietvleidam 2528CD, 1:50 000 Geological Series, 1973).

Rietvlei Nature Reserve forms part of the Transvaal System. Towards the southern parts of the reserve are two small Series that form part of the Karoo System. In the Transvaal System two Series, namely the Pretoria and Dolomite Series are present and the Daspoort Stage forms the most prominent part of Rietvlei (Rietvleidam 2528CD, 1:50 000 Geological Series of the Department of Mines, 1973).

The most important geological formation is lava, which extends in a broad band from north to south through the reserve (See Figure 2.4: Geology Map). This gives rise to heavy red loam soil suitable for producing grass for grazing. Belts of shale and quartzite run on either side of the andesitic lava, which give rise to grey loamy soil (See Figure 2.5: Soil Forms). The eastern part consists of dolomite covered by shale and chert. Sandy red loam soils are found there. Dolomite is a sedimentary limestone formation, which gives rise to caves with stalactites and stalagmites. Sinkholes or dolines occur when the roof of a subterranean chamber collapses (Kearey, 2001). Groundwater that accumulates in large subterranean chambers is supplemented annually by rainwater. The overflow of subterranean water then appears as dolomite springs, which sometimes produce a strong flow of water. The shale and quartzite form ridges that run from north to south across the reserve on the western and central side (Rietvleidam 2528CD, 1:50 000 Geological Series, 1973).

The specific soils of an area can differ dramatically as far as water retention is concerned. The ground water potential is mainly a function of soil matrix potential, osmotic potential and gravitational potential (MacVicar, *et al*., 1977). The organic layer on top of the soil also plays a very important part in ground water retention and water loss to the atmosphere. The depth of the soil also influences the growth forms of plants and the amount of water the soil profile can store. All of these factors will have an influence on the plants and plant species composition of an area.

Plant communities play an important role as far as soil formation is concerned, by supplying organic material to the system and the influence that community has on the weathering possesses (Tainton, 1988). Organic material, together with the mineral clay fraction, plays an important role in controlling many of the properties concerned with soil productivity such as water absorption, absorption of mineral nutrients and acting as cementing agents (Tainton, 1988).

The importance of soil as a determinant of plant species composition and structure is demonstrated by Fraser *et al*., (1987) who showed that there were correlations between certain tree communities and different soils in the Kruger National Park. Palmer *et al*. (1988) also investigated the interactions between plant communities and soils. Eight soil variables that have an influence on plants were identified, namely: moisture content, organic matter content, conductivity, pH, Ca, Mg, K and Na concentrations. The soils in the bush clumps contained more minerals and organic material than in the grasslands. Soils with different characteristics will be able to sustain different plant communities, but often certain soil conditions, such as soil nutrient status, are a direct consequence of the plants that grow there. Even though both these studies were done in other veld types than what are found at Rietvlei Nature Reserve with the climatic conditions and rainfall that are also different, the assumption can still be made that different soils on Rietvlei will also sustain different plant communities. The following soil forms occur on Rietvlei namely: Avalon, Rensburg, Hutton, Mispah and Dundee (MacVicar *et al*., 1977; Patterson, 1999).

One of the most important features of the soils on Rietvlei Nature Reserve is the fact that most of it is very shallow. Where a B-horizon can be found, it is very shallow and layered. The limiting material is mostly lava, quartzite, diabase and dolerite. The soils are highly erodible but this is only a problem where the gravel roads are graded. There are soils with a high clay and organic material composition in the wetlands and surroundings that are periodically flooded (Rietvlei Nature Reserve, Undated).

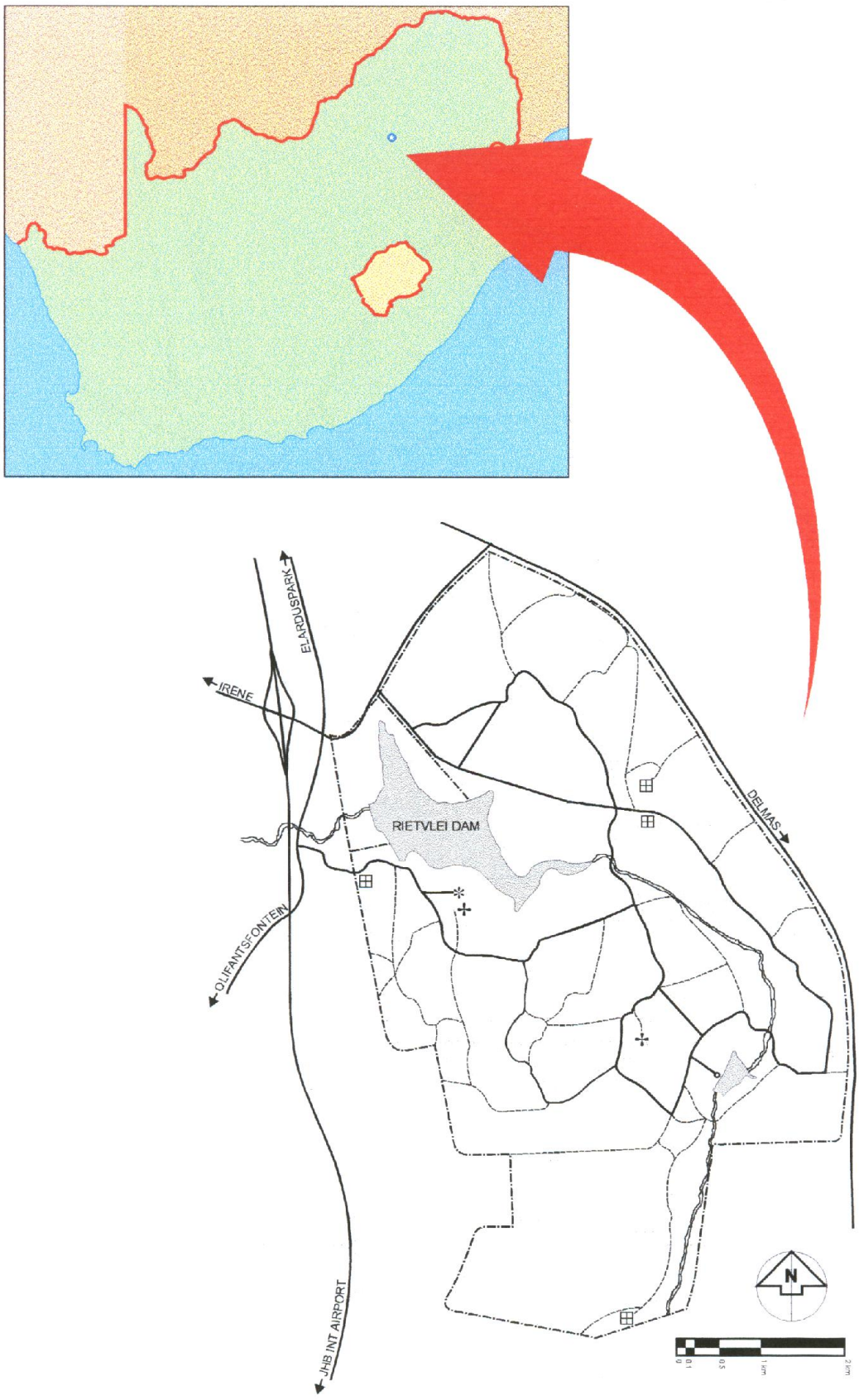

Figure 2.2: Location of Rietvlei Nature Reserve.

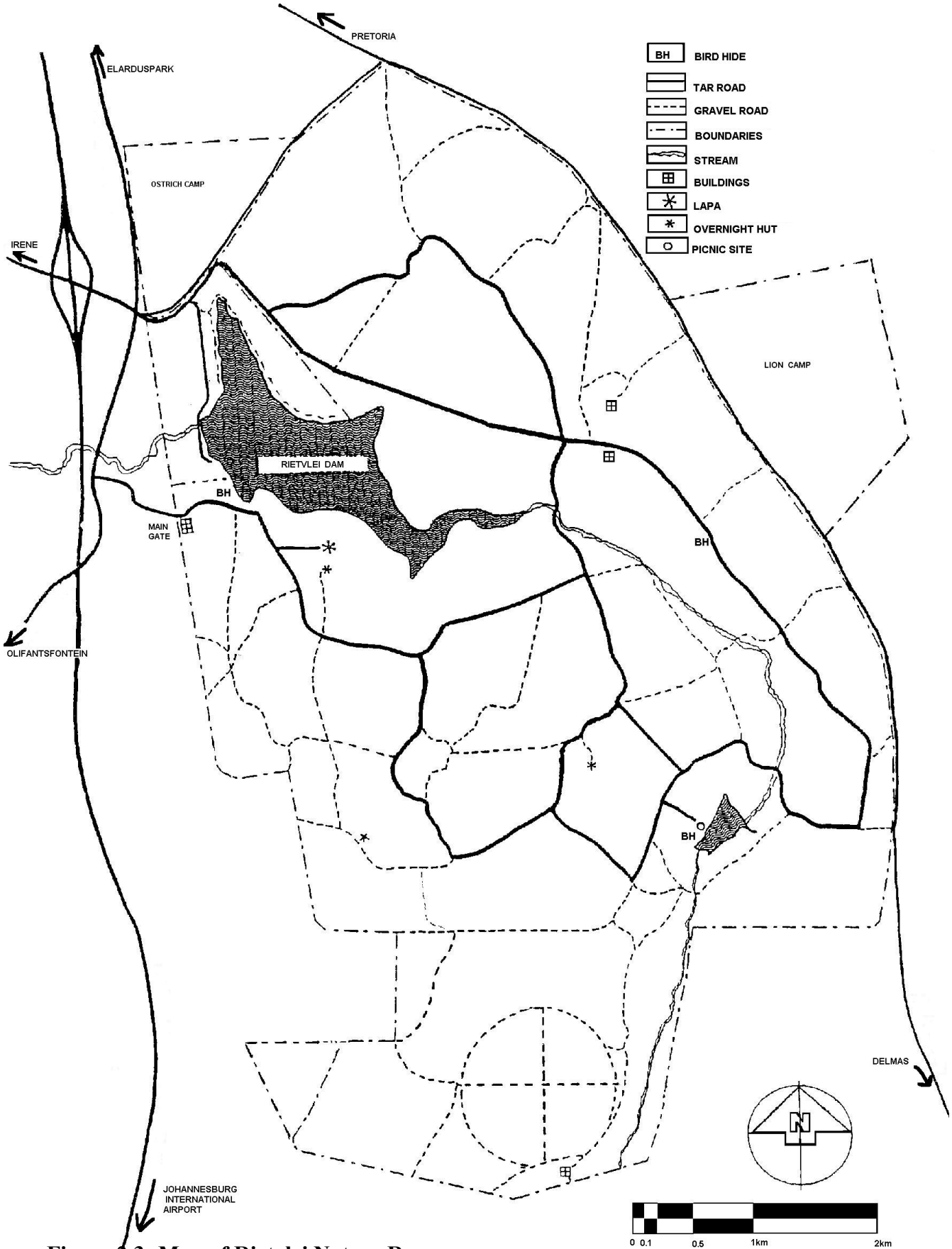

Figure 2.3: Map of Rietvlei Nature Reserve.

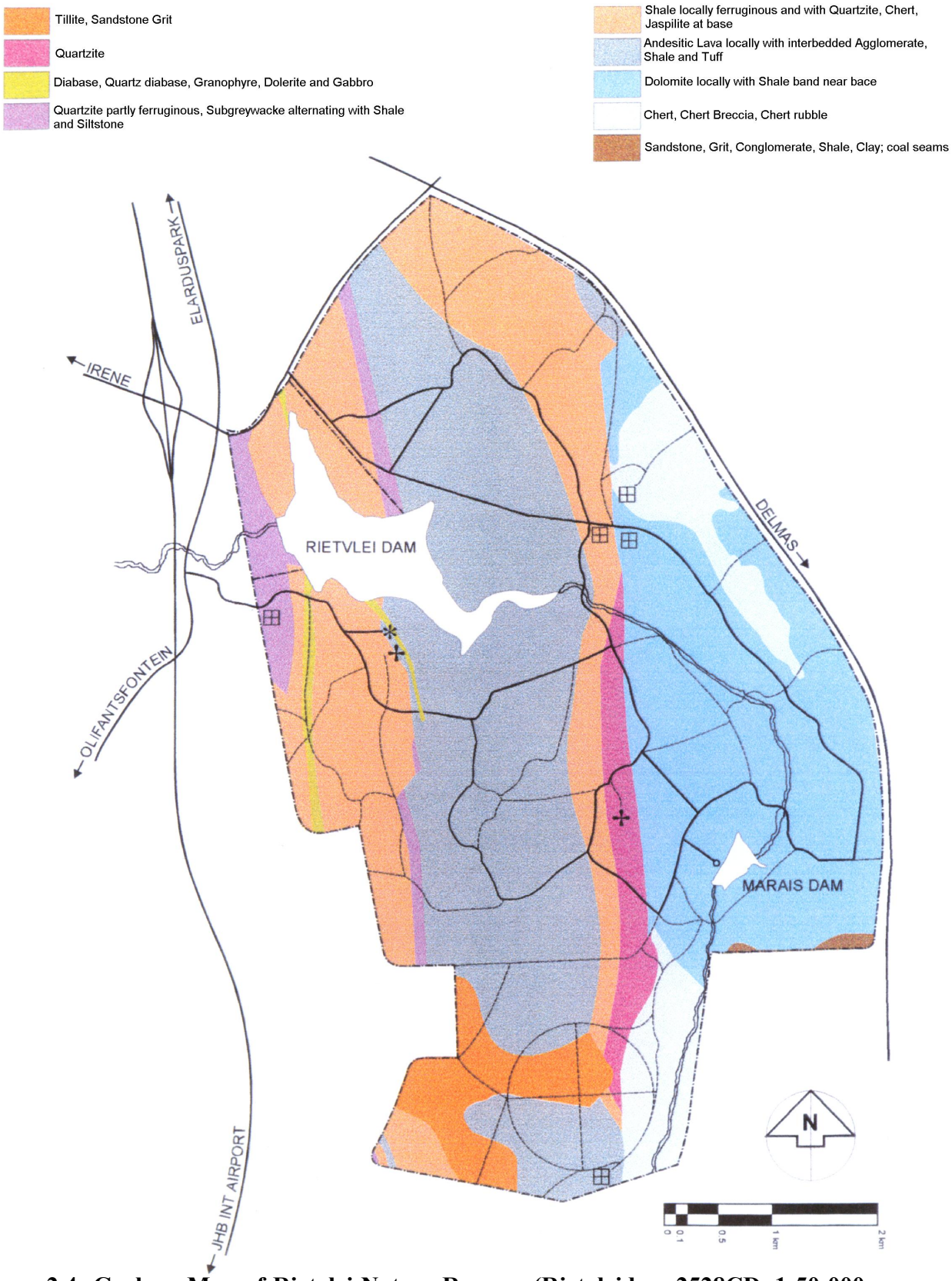

Figure 2.4: Geology Map of Rietvlei Nature Reserve (Rietvleidam 2528CD, 1:50 000 Geological Series, 1973).

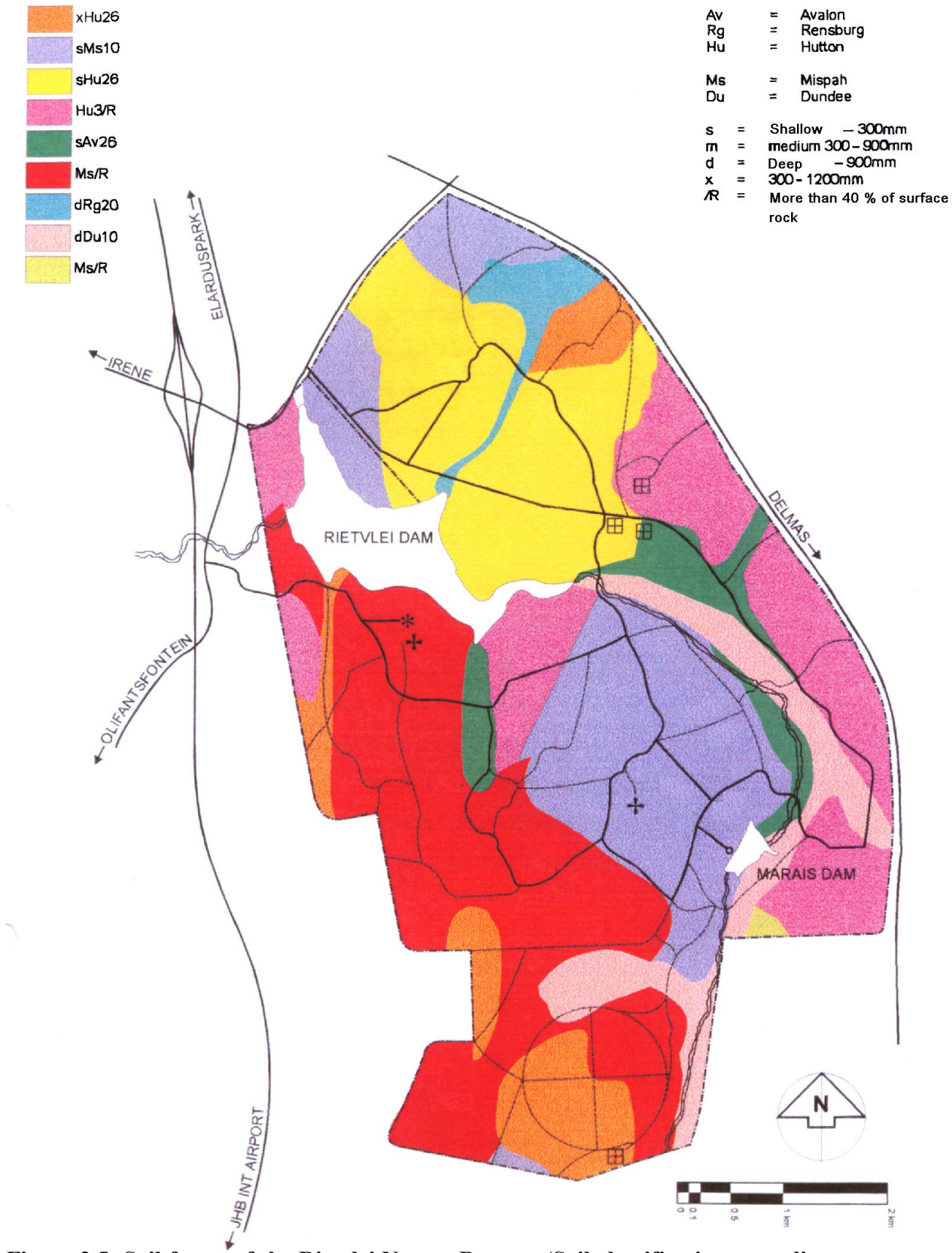

Figure 2.5: Soil forms of the Rietvlei Nature Reserve (Soil classification according to MacVicar, *et al.*, 1977).

2.3 Climate

Water and temperature represent the most important environmental factors (Rutherford & Westfall, 1986). Water is essential for all life, including plants. Temperature influences metabolic processes and water loss (evaporation and transpiration), and the higher the temperatures, the higher the quantity of water lost to the atmosphere.

Rainfall quantity, frequency of showers, soil type as well as plant cover all have an effect on the groundwater status and consequently the vegetation. The dates of first and last frost will determine the growth period for grasses. Frost is one of the major limiting factors for plants on Rietvlei and has a big influence on tree and shrub species and their distribution.

The Rietvlei Nature Reserve falls in the summer rainfall region of South Africa and has an average seasonal (July to June) rainfall of 724 mm (1970-1999). The rainfall for Rietvlei Nature Reserve for the period 1995/96 to 2003/4 as measured on the reserve, is illustrated in Figure 2.6. The summer temperatures can be as high as 34 °C and during the dry winter months the temperatures can be as low as -2 °C with regular frost at night (Rietvlei Nature Reserve, Undated).

From approximately 11 000 B.P. to 6 330 B.P. the climatic conditions in the Rietvlei area were not markedly different from those of the present day (Scott & Vogel, 1983). Slightly drier conditions followed, while the vegetation remained essentially open grassland. A temporary expansion of the bushveld elements over the northern parts of the highveld plateau occurred around 6 580 ± 70 B.P. and can probably be attributed to relatively warm temperatures and favourable moisture conditions (Scott & Vogel, 1983).

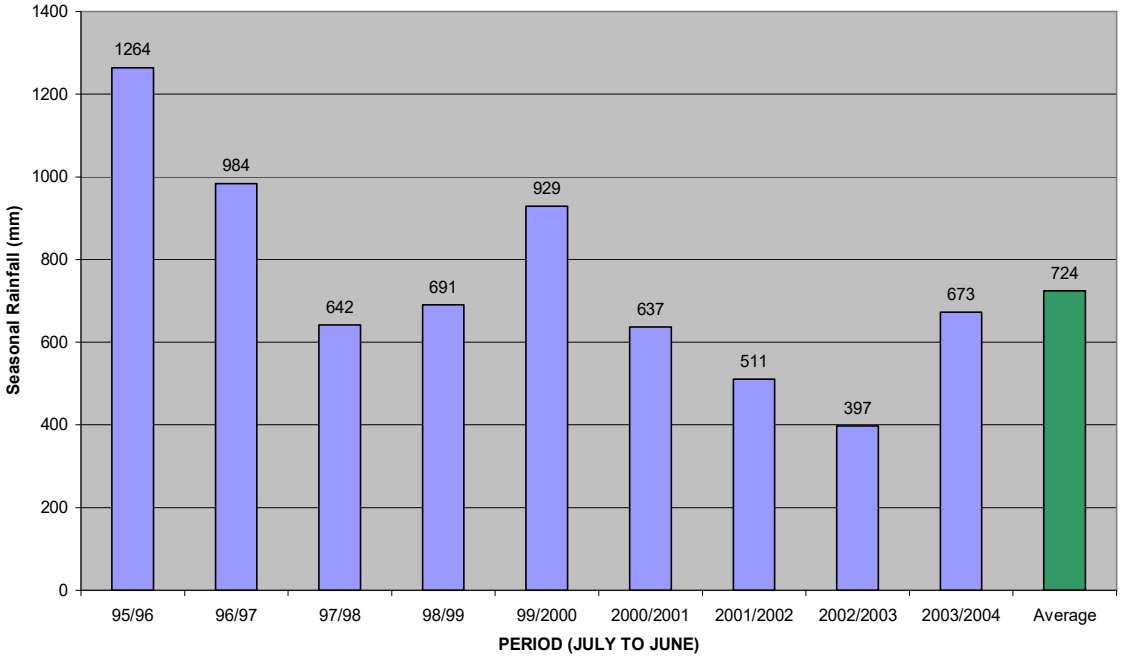

Figure 2.6: Rainfall for Rietvlei Nature Reserve 1995 – 2004.

2.4 History

When the City Council of Pretoria acquired the farm in 1929, it was not open to the public. However, biological and infrastructural planning of the area continued and game (67 Blesbuck from General Jan Smuts' nearby farm to the east) was introduced by Mr A. Weyers in August 1938 (Fauna and Flora, 1950). This was done by herding the animals from his farm Doornkloof onto the reserve with horses. Subsequently, a nature reserve was proclaimed. The reserve had a small herd of 12 springbuck and other small game species like oribi, grey duiker, steenbok, mountain reedbuck, etc.

In 1935 the reserve, which covered an area of about 3 500 ha, was known as the Rietvlei Reserve. In an Administrator's Notice of 1937, the reserve was declared a game reserve and was subsequently known as the Rietvlei Game Reserve. In terms of Administrator's Notice 205, on the 1st September 1948 it was proclaimed a reserve for indigenous flora, and for the next six years it was called the Rietvlei Reserve for Game and Indigenous Flora (City Council of Pretoria, 1997).

Certain areas of the reserve were lost or seperated from the larger reserve because of newly built roads. Re-proclamation of the present nature reserve (west of the Delmas Road) as the Maria van Riebeeck Nature Reserve was published in the Provincial Gazette on 24 November 1954. In 1992 the name was again changed to Rietvlei Nature Reserve (City Council of Pretoria, 1997).

The Rietvlei Dam, built during the Great Depression, was completed in 1934. Manual labour was mainly used for constructing the dam wall and surrounding brickwork. During those difficult years of the depression, labourers were only too grateful to receive a fixed income of four shillings a day. Mule carts were used to move the soil on the site where the dam was built (City Council of Pretoria, 1997).

Three types of recreational sport are exercised at the Rietvlei Dam namely: yachting, canoeing and angling. The clubhouse of the Sailing Yacht club is located northwest of the Rietvlei Dam and the angling area is on the northern and western shores. The angling area was officially opened to the public on 13 October 1951 by the Mayor Mr. J.H. Visser (The Star, 1951). The Pretoria Yacht Club, formed in July 1959 under the name of the Pretoria Postal Sailing Club, was the only sailing club in Pretoria, which provincial and national yacht clubs recognised at the time. Since 19 December 1963, the City Council has leased a portion of Rietvlei Dam to the Yacht club (Rietvlei Nature Reserve, Undated).

Because the dam is an important source of water for Pretoria and the area surrounding the dam is a proclaimed nature reserve, the Council at that time thought it proper to grant only 400 ft (in those days) of the shore to the sailing club. Motorboats are not allowed as the noise disturbs anglers, birds and game and also causes an oil pollution threat to drinking water (Rietvlei Nature Reserve, Undated).

In 1957 the Blesbuck numbers on the reserve were reduced by 334 animals. In 1958 there were 281 animals shot or sold on the market, 431 were caught alive and sold and about 133 were killed as a result of casualties (Pretoria News, 1958). These animals reportedly died for various reasons and were then eaten by vultures.

Among the historical sights in the Reserve is an old farmhouse and outbuildings that remained and were restored in the late 1980's (see Appendix F). There is also a stone rampart where British forces are said to have either installed a cannon during the second occupation of Pretoria or laid the foundation of a Zink Blockhouse (Van Vollenhoven, 2004). There are also three groups of graves, on which some of the epitaphs are still legible. Amongst those buried there, is a Voortrekker woman, Cecilia Moodie, of the Moodie trek and Michiel Christiaan Elardus Erasmus (see Appendix E).

2.5 Infrastructure

Roads in the reserve have been carefully planned and have a multi-purpose function. They are used by the visitors to view game, to patrol the reserve, to carry out maintenance and they also serve as firebreaks (see Figure 2.3). The boundary fence patrol road or firebreak is 35 km long. Altogether there are 91 km of roads in the reserve. The offices, workshops, vehicle garages, slaughtering facilities and storerooms are all located at the main gate on the periphery of the reserve in accordance with the zoning plan for the reserve (Rietvlei Nature Reserve, Undated).

On the boundary of the reserve is a 1.2 metre high cattle fence consisting of single strands. Approximately 4 meters inside this cattle fence is a 2.4 metre high game fence. The lower 1.8 m of this fence is covered with mesh, with another 4 single strands of barbed wire on top. On the inside of this game fence is an electric fence system with 3 live wires that receive their power from 4 energizers at different intervals along the fence (Rietvlei Nature Reserve, Undated).

A small section of the northern shore of the dam is also fenced off with a game fence for anglers. The purpose of this fence is to restrict the movement of the anglers and to keep dangerous game such as rhinoceros and buffalo out of the area (Rietvlei Nature Reserve, Undated).

This angling area, the sailing club and property to the west thereof are zoned for higher impact visitor's activities (Rietvlei Nature Reserve, Undated).

2.6 Fauna and Flora

Biomes are defined as the largest land community unit, which is convenient to recognize and in a given biome the life form of the climax vegetation is uniform (Odum, 1971). Thus, the climax vegetation of the grassland biome is grass (Odum, 1971). The absolute annual moisture levels, sometimes associated with edaphic factors, appear to form an appropriate basis for the major subdivision of biomes. These moisture levels were used by Rutherford & Westfall (1986) to describe the biomes of South Africa as Savanna, Nama-Karoo, Succulent Karoo, Fynbos, Desert, Forest and the Grassland biome. The later biome is applicable to Rietvlei Nature Reserve. The primary defining determinants include climate, soil, topography, and other environmental factors. These factors can normally not be altered by man and are thus a given.

A veld type can be described as a unit of vegetation of which the range of variation is small enough to permit the whole of it to have the same farming potential (Trollope *et al*., 1990 and Acocks, 1988). The Rietvlei Nature Reserve's plant composition is typical of the Highveld Grassland and is generally in a very good condition. The vegetation type can be described as the central Variation of Bankenveld A.61b (Acocks, 1988). It is also described by Bredenkamp & Van Rooyen (1996) as 'Rocky Highveld Grassland' (34), which is part of the grassland biome. A study of the pollen content of the clay and peat on Rietvlei Nature Reserve by Scott & Vogel (1983) shows that the vegetation of the early phase, which is either of a Holocene or of a Late Glacial age (11 000 B.P.), corresponds to open grassland, although the composition is different from that of the present.

Indigenous trees occur in small groups on the reserve. These trees are typical of the highveld where the average annual rainfall is 724 mm and dry winters with fire and frost are the limiting factors. Coetzee *et al*. (1995) states that Bankenveld vegetation has a mixed origin and that the complex mosaic of Bushveld and Grassland is a consequence of its transitional geographical position. Woodland communities occur on relatively warm sites in sheltered valleys and on slopes, while grassland communities occur on relatively cold, exposed high altitude plateaux and plains (Bredenkamp & Brown, 2003).

Woody species are often associated with rock walls of archaeological sites, where they are better protected against fire and harsh climatic conditions, while these sites are also more moist than rock less plains (Bredenkamp & Brown, 2003).

Apart from the grasses (Table 2.3) occurring on the reserve there are also many other herbaceous plant species. They become particularly noticeable just before the summer rains, where game has grazed the grass short or where it was burned. All the indigenous and exotic plant species recorded on Rietvlei Nature Reserve to date are listed in Appendix C.

All of these plants have adapted to the main limiting factors on the reserve, namely fire and frost. For this reason most of the plants have underground structures to protect them under the soil in winter. In a good year an average of 2 000 kg of grass and 1 300 kg of other herbaceous plants (dry weight) are produced per hectare. The reserve staff has calculated this over a number of years by cutting, drying and weighing 1m² of plant material above ground level, in different areas and then extrapolating it to one hectare (Rietvlei Nature Reserve, Undated).

Because of previous farming activities, which disturbed the soil, several exotic plants occur in the reserve. Invader trees such as the black wattle (*Acacia mearnsii*) represent a serious threat. Imported from Australia, they locally have no natural enemies and seed can remain viable in the soil for up to fifty years (Bromilow, 1996). The exotics are controlled mechanically and chemically by the reserve staff. Burning stimulates germination and can be used to deplete the seed store (Henderson *et al*., 1987). Appendix C also lists all the Category 1 invasive plant species (Henderson, 2001) recorded on Rietvlei Nature Reserve to date (Rietvlei Nature Reserve, Undated).

This small urban reserve has a bird species list of more than 270 confirmed species (see Appendix A. This is mainly due to the fact that the reserve has open grasslands, indigenous bush clumps, open water and vlei or marshy areas. Because of the proximity of the reserve to a city, many species of so-called garden birds also frequents the area (Rietvlei Nature Reserve, Undated). Bird names used in Appendix A are according to Maclean (1993).

Appendix D lists all the Herpetofauna species recorded on Rietvlei Nature Reserve to date, including the African Giant Bullfrog (*Pyxicephalus adspersus*). The reserve is one of the few breeding sites of the African Giant Bullfrog that has a proclaimed conservation status in Gauteng (Rietvlei Nature Reserve, Undated).

Rotational grazing is achieved with the provision of additional salt and mineral licks in winter and the use of a controlled burning program. The condition of the game in winter is one of the ways of evaluating the accuracy of the calculated grazing capacity of the veld. The aim is to keep the game numbers just below the number that the veld can support without degradation (Rietvlei Nature Reserve, Undated).

A number of total game counts are done annually in February by vehicle after which a helicopter count is also done. The game numbers are consolidated and game reduction proposals are made if necessary. The reduction of animals is also done in a three-year cycle, if needed and they are mostly caught alive and relocated to other conservation areas (sold or exchanged for other species). By also monitoring the sex ratio of the various game species it is possible to decide how many rams or bulls should be culled. The reserve staff does the culling and the carcases are sold or hunters are given the opportunity to hunt these surplus animals under guidance of the reserve staff (Rietvlei Nature Reserve, Undated).

The numbers of larger grazing mammals on Rietvlei as on September 2004 are listed in Table 2.1. A comprehensive list of the mammals found on the reserve is attached in Appendix B. A substantial number of red data mammal species (according to Smithers, 1986) has been recorded for Rietvlei and listed in Appendix B (Rietvlei Nature Reserve, Undated). The Blesbuck and Black Wildebeest are endemics to the Southern African Highveld regions. The Reserve, geographically, also borders other vegetation types from east to west and north to south. This is why the veld type can also be called a “transitional veld type” linking true grassland and true bushveld. The Blesbuck and Black Wildebeest never naturally occurred north of the Magaliesberg Mountains (Smithers, 1983). The Springbuck never naturally occurred further east than Rietvlei Nature Reserve for very long periods and avoided mountains and rocky areas and areas with tall grasses and thickets (Smithers, 1983).

Other species like the Suricate and Bat-eared Fox are also found on the reserve even though they are more common towards the drier west (Smithers, 1983). Both these species prefer short grasslands (Smithers, 1983).

Table 2.1: Larger Grazing Mammals found on Rietvlei Nature Reserve and their numbers.

Common Name	Scientific name	Number (September 2004)
Blesbuck	*Damaliscus pygargys phillipsi*	393
Bushpig	*Potamochoerus larvatus*	* (14)
Buffalo	*Syncerus caffer*	31
Grey Duiker	*Sylvicapra grimmia*	* (20)
Eland	*Taurotragus oryx*	123
Oribi	*Ourebia ourebi*	* (10)
Reedbuck	*Redunca arundinum*	60
Common Hartebeest	*Alcelaphus buselaphus*	69
Mountain Reedbuck	*Redunca fulvorufula*	* (15)
Hippopotamus	*Hippopotamus amphibius*	4
Springbok	*Antidorcas marsupialis*	76
Steenbok	*Raphicerus campestris*	* (20)
Black Wildebeest	*Connochaetes gnou*	210
Waterbuck	*Kobus ellipsiprymnus*	64
White Rhinoceros	*Ceratothherium simum*	8
Burchell's Zebra	*Equus burchelli*	91

* Numbers unknown, possible numbers in brackets (Rietvlei Nature Reserve, Undated).

Table 2.2: Feeding preferences of the larger mammal species found on Rietvlei Nature Reserve (Smithers, 1983; Smit *et al*, 2000; Bothma *et al*., 2002).

Species	A	B	C	D	E	F	G
Blesbuck	X			X		X	
Bushpig		X					X
Buffalo		X			X		
Grey Duiker			X				X
Eland			X				
Oribi	X				X		X
Reedbuck	X				X		X
Common Hartebeest	X		X	X		X	
Mountain Reedbuck	X		X		X		X
Hippopotamus		X		X			
Steenbok			X		X		X
Springbok	X		X	X			X
Black Wildebeest	X			X			
Zebra		X		X	X	X	X
Ostrich		X		X			X
Waterbuck	X		X		X		
White Rhinoceros		X		X		X	

A: Selective grass B: Nonselective grass C: Mixed graze and browse

D: Short grass E: Tall grass F: Roughage and bulk

G: Selective patch feeding.

Table 2.3: The major grass species found on Rietvlei Nature Reserve and their ecological classifications.

SPECIES LIST	ECOLOGICAL CLASSIFICATIONS *
Alloteropsis semialata	Increaser I
Andropogon appendiculatus	Decreaser
Andropogon schirensis	Increaser I
Aristida bipartita	Increaser II
Aristida canescens	Increaser II
Aristida congesta barbicollis	Increaser II
Aristida transvaalensis	Uncertain
Bewsia biflora	Uncertain
Bothriochloa radicans	Increaser II
Brachiaria serrata	Decreaser
Cloris virgata	Increaser II
Ctenium concinnum	Increaser I
Cymbopogon excavatus	Increaser I
Cynodon dactylon	Increaser II
Digitaria diagonalis	Increaser I
Digitaria eriantha	Decreaser
Digitaria monodactyla	Increaser II
Diheteropogon amplectens	Decreaser
Elionurus muticus	Increaser III possibly a Decreaser
Eragrostis chloromelas	Increaser II
Eragrostis curvula	Increaser II
Eragrostis gummiflua	Increaser II
Eragrostis nindensis	Increaser II
Eragrostis racemosa	Increaser II
Harpochloa falx	Increaser II
Heteropogon contortus	Increaser II
Hyparrhenia hirta	Increaser I possibly a Decreaser
Hyparrhenia tamba	Increaser I
Leersia hexandra	Possibly a Decreaser
Loudetia simplex	Increaser II
Melinis nerviglumis	Increaser I
Melinus repens	Increaser II
Microchloa caffra	Increaser II
Miscanthus capensis	Increaser I
Monocymbium ceresiiforme	Decreaser
Panicum natalense	Decreaser
Paspalum dilatatum	Uncertain
Paspalum scrobiculatum	Increaser II
Phragmites australis	Decreaser
Pogonarthria squarrosa	Increaser II
Schizachyrium sanguineum	Increaser I
Setaria spp.	Decreaser
Sporobolus fimbriatus	Decreaser
Sporobolus pectinatus	Uncertain
Themeda triandra	Decreaser
Trachypogon spicatus	Increaser I
Triraphis andropogonoides	Increaser I
Tristachya leucothrix	Increaser I
Urelytrum agropyroides	Increaser I
Urochloa panicoides	Increaser II

* From: Robinson (1996); Smit (1988); Van Oudtshoorn (1999).

2.7 Water supply and wetland aspects

The main reason for the Nature Reserve's existence is to supply drinking water to the city of Pretoria. Since the main function of the area is to provide water, the catchment area needs to be conserved and the water needs to be accumulated and distributed. For this reason the dam was built in the Six Mile Spruit and has a storing capacity of 12.024 million m^3 of water. The dam has a surface area of 204.13 ha when full. The dam wall is 32 metres high and 350 metres long. At the wall it is 16 metres deep. The overflow of the dam is 191 metres long and 101 metres wide (Rietvlei Nature Reserve, Undated).

The catchment area of the dam is 479 km^2 but the Rietvlei Nature Reserve only occupies 38.70 km^2 (3 870 ha). The inflow into the dam exceeds 20 million litres of water per day in the dry winter months. The stream first flows through the Marais dam that acts as a sludge or silt dam for the larger dam and joins the Grootvlei spruit that flows through the reserve into the larger Rietvlei Dam. The wetland running through the reserve is approximately eight kilometres long and at some places 600 meters wide (Rietvlei Nature Reserve, Undated).

Rietvlei Nature Reserve's wetlands were identified by Smuts (1997) as having the potential to sustain peatlands. A major part of the wetland system consists of peatlands. Peat is a natural organic resource presently being deposited in certain wetlands in South Africa. It forms an active part of the filter and storage capabilities of wetlands and plays a vital role as a water resource. Peat is formed when decaying organic matter accumulates in moist, reducing and low energy environments, as in swamps (Grundling *et al*., 1998). Peat is composed of humified organic matter, which, when dried, is a combustible material that can ignite spontaneously (Grundling *et al*., 1998).

The peatland in Rietvlei also acts as a natural filter and a sponge that stores vast quantities of water. Fifty percent of all the wetlands in the world are peatlands, and most of these are located in the Northern Hemisphere. Only one percent of all peatlands occur in Africa and South America, collectively. Peatlands such as the one in Rietvlei Nature Reserve are thus a rare feature in the southern African landscape (Grundling & Marneweck, 2000).

The Rietvlei wetland is a valley-bottom fen and the southern portion (the northern section of Witkoppies) is approximately 77 ha in extent and before mining commenced, contained up to 1 280 000 m³ of peat with an average thickness of 1.7 meters (Grundling, 2004). As much as 70-90 % of this southern peatland surface area was mined and portions of the northern peatland were destroyed by fire. The southern wetland was severely degraded by the peat mining (Grundling & Marneweck, 2000).

The Central wetland portion is located from the old Witkoppies boundary to just below the confluence of the Grootvlei tributaries and Sesmyl spruit and is approximately 85 ha in extent. It can be classified as a seasonal floodplain and seepage wetland. The Northern peatland stretches from the confluence of the two streams to the inflow of the Rietvlei Dam and is approximately 70 ha in extent. It has an average peat thickness of 0.75 meters and contained up to 525 000 m³ of peat before large portions were lost in a number of peat fires (Grundling, 2004). The City Of Tshwane, Friends of Rietvlei and the Working for Water project have already done extensive rehabilitation of the wetlands (Rietvlei Nature Reserve, Undated).

Venter (2003) identified three plant communities and six sub-communities during a baseline vegetation survey of rehabilitated peatland on Rietvlei Nature Reserve. It was noted that the majority of the pioneer plant species were exotic weeds but that the vegetation already started to change in the direction of the climax communities within a single year.

During 1988, a two-year programme was implemented to increase the height of the dam wall and to make other improvements. An additional supply of water comes from four natural springs within the Reserve, a spring on the adjacent private property and from five boreholes on the dolomite areas in the reserve. The overflow of subterranean water appears as dolomite springs, which sometimes produce a strong flow of water. The five boreholes on the reserve have, because of water extraction, unfortunately dropped the water table and only one of the springs is still supplying a strong flow. Today the Rietvlei Nature Reserve provides 15% of Pretoria’s water requirements, estimated at 41 million litres of water per day. The rest of the water used in the city is mainly bought from Rand

Water and the Vaal scheme. One of these pipelines for water supply runs through the reserve.

Natural watering holes or drinking areas for the game are spread evenly throughout the area (dams, streams and fountains), resulting in good use of the entire area by the game species. No man-made watering holes exist and the game cannot be rotated by opening and closing of watering holes (Rietvlei Nature Reserve, Undated).

2.8 Burning program

The internal road system divides the reserve into approximately 31 management blocks as far as the burning program is concerned. Rotational grazing is implemented by systematically burning these blocks according to a burning program (Rietvlei Nature Reserve, Undated). The game prefers new grass shoots on burnt veld and will concentrate on these areas. It is important not to burn too small an area as this will lead to overgrazing and trampling. Approximately a third of the reserve is burned every year and the entire reserve is thus burned in a three to four year cycle if enough dead organic material is available to sustain a fire (> 2 000 kg/ha). Figure 2.7 indicates the blocks that were burnt during the last few years.

A block is only burnt if it has more than 2 000 kg of dry organic material per hectare available, according to the reserve's management plan. The burning is mainly done at night and shortly after the first thunderstorms and rain of the season. The burning is done against the wind (back fire) and by setting a long fire front alight. These fires are then allowed to slowly burn the entire block or die out on its own in areas that are too wet or not able to sustain a fire. The burning of these blocks is done as quickly as possible but not all in the same night (Rietvlei Nature Reserve, Undated). This is so that monitoring can take place and when sudden changes in wind direction appear, the fire can be controlled not to spread out of the block.

All fires are kept out of the wetland and peat areas to ensure that the peat doesn't ignite and burn.

Accidental fires do occur and they are mainly extinguished if they are small enough to control. If they are too big, back burns are made and the entire block is burnt down, even if it was only scheduled for burning some time in the future (Rietvlei Nature Reserve, Undated).

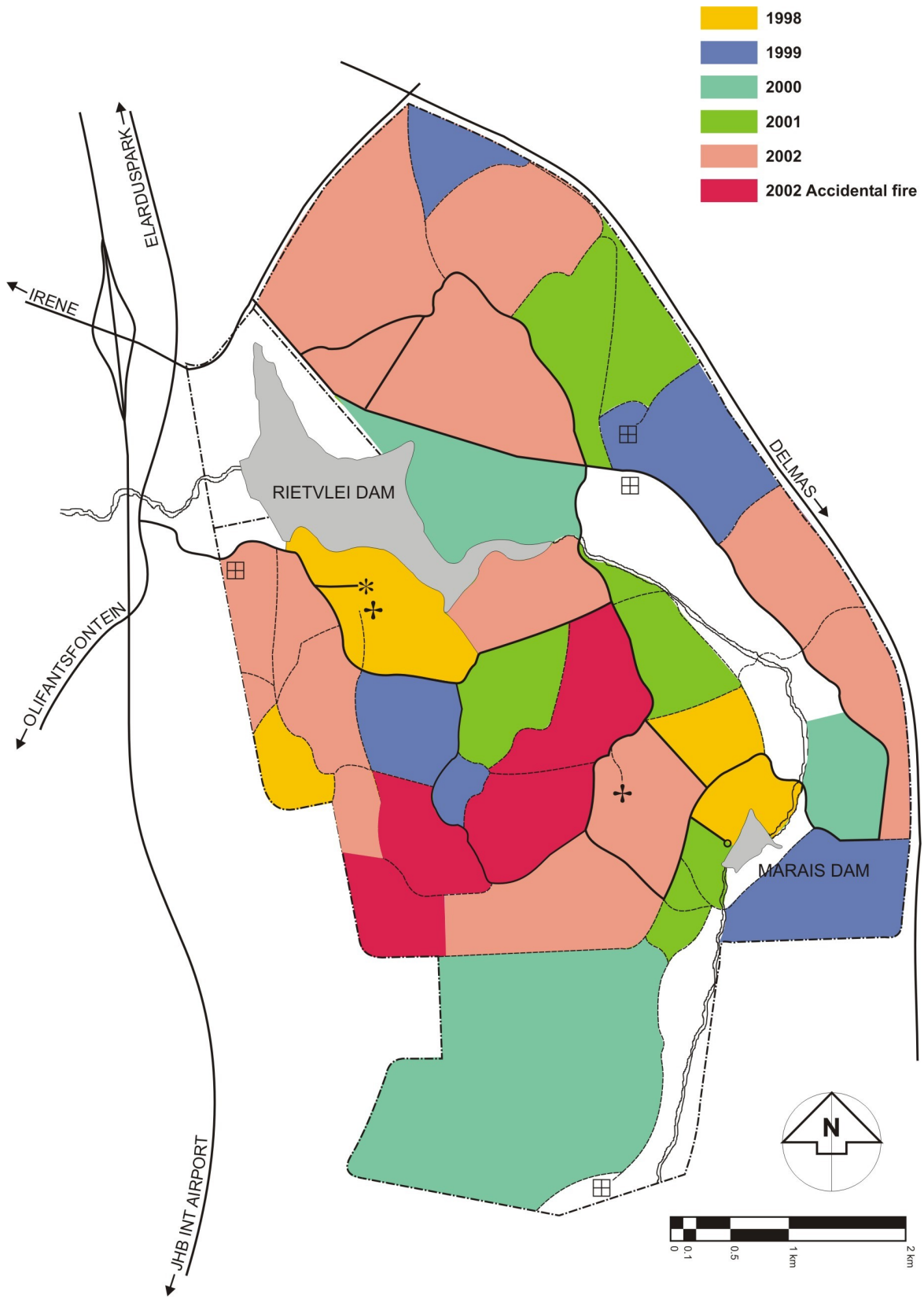

Figure 2.7: Burning program for Rietvlei Nature Reserve (1998 – 2002).

CHAPTER THREE

3. MATERIAL AND METHODS

Recent aerial photos of the Rietvlei Nature Reserve were used to identify visible geographical differences in plant species composition. A stereoscope was used to identify differences and possible boundaries of homogenous plant units. Kellman (1980) and Budd (1991) also discussed the use of aerial photos in terms of vegetation data collection.

The 1:4 000 aerial photos of the City of Tshwane Metropolitan Municipality (City Council of Pretoria, 1996) were used as well as the 1:50 000 photos of the Surveyor General (1991). The South African Air force (JARIC) also supplied aerial photos of 1998. Broader communities such as grassland, wetland, old lands, exotic bush clumps and indigenous bush were identified. These visually identified homogenous plant units were then used as a basis for the random allocation of vegetation monitoring plots within each community.

The phytosociological method, namely the Zürich-Montpellier, or Braun-Blanquet method was used to classify the vegetation of the Rietvlei Nature Reserve. The Braun-Blanquet method is being described by Mueller-Dombois & Ellenberg (1974) as a simple, but not a superficial system for the analysis of vegetation data. The Braun-Blanquet method was first described in detail by Braun-Blanquet (1932), and further descriptions of this method was done by Becking (1957), Kershaw (1973), Werger (1974), Westhoff & Van der Maarel (1978), Barbour *et al.* (1987) and Kent & Coker (1992). This method is widely accepted and has been successfully used within the various biomes of South Africa by amongst others Werger (1973), Coetzee (1974), Bredenkamp (1975), Bredenkamp & Theron (1976), Bredenkamp & Theron (1978), Viljoen (1979), Bredenkamp & Theron (1980), Müller (1986), Van Wyk & Bredenkamp (1986), Behr & Bredenkamp (1988), Bezuidenhout (1988), Bredenkamp *et al.* (1989), Bezuidenhout & Bredenkamp (1990), Kooij *et al.* (1990a,b,c), Bezuidenhout & Bredenkamp (1991), Du Preez & Bredenkamp (1991), Matthews (1991), Du Preez & Venter (1992), Fuls *et al.* (1992), Eckhardt *et al*. (1993), Schulze *et al.* (1994), Smit *et al.* (1995), Brown *et al.* (1997), De Frey (1999),

Malan *et al*. (1999), Bredenkamp *et al*. (1999), Venter (2001), Janecke (2002), Müller (2002) and Botha (2003).

Sample plots of 4 x 4 meters were placed randomly in the identified broader homogenous plant units, except for the indigenous and exotic bush clumps where the sample plot size was increased to 10 x 10 meters (Bredenkamp & Theron, 1978). The sample site should be the smallest area that will adequately describe the vegetation. For this study, a total of 184 stratified randomly placed sample plots were surveyed, mainly during the summer months of 2002-2003. The exact location of the sample plots within the homogenous plant units was entirely non-random (Becking, 1957). These plots for vegetation description are thus deliberately and carefully selected as a representative area of a particular vegetation type and must reflect the species diversity of the immediate area. The study area should be uniform and homogeneous in terms of plant species composition and structure of the vegetation, also in terms of habitat.

The cover abundance scale (Table 3.1) was allocated according to the Braun-Blanquet scale for each species present in the sample plots surveyed. All other environmental and sampling data, such as the relevé number, date, GPS reference (Global Positioning System), locality, vegetation type, land type, altitude, aspect, slope, geology, soil, biotic influence, canopy cover were acquired and recorded for each sample plot on a data form (see Appendix G).

All the field data were tabulated into a matrix and the computer program TURBOVEG (Hennekens, 1996b) was used for the encoding of the data. The vegetation data were sorted into units with the MEGATAB program (Hennekens, 1996a). A table was obtained using TWINSPAN (Hill, 1979a) and this procedure was refined by using Braun-Blanquet measures which groups plots with similar species composition together. Differential species are species of medium to low constancy, which tend to occur together in a series of plots and can thus be used to characterise groups. These are recognized and sorted. The final phytosociological table displays the main synthetic characters of the community (Becking, 1957). The different vegetation groups were identified and by using species as a guideline, several physiognomic units could be interpreted (Kent & Coker, 1992; De Frey, 1999; Müller, 2002; Botha, 2003).

Once associations have been defined and recognized, a synoptic table can be produced summarising the data for each association. Each community type is represented by a column in which each characterising species of each association is indicated as a percentage or class value (Kent & Coker, 1992).

The arrangement of species and plots in the table leads to a comprehensive classification system of syntaxa. This can be used as a basis for further ecological studies. Species act as indicators for the habitat typical for the community and the Braun-Blanquet method determines that patterns in the floristic composition correspond with patterns in the environment (Werger, 1974b; Botha, 2003).

Ordination was done, using the detrended correspondence analysis (DECORANA) ordination algorithm for further analysis of the floristic data set to illustrate the floristic relationships between the various plant communities and environmental factors (Hill, 1979b; Botha, 2003).

The latest changes in plant taxon names were used for this study (Germishuizen *et al*., 2003).

Table 3.1: The Braun-Blanquet cover values used in this study.

Cover Values	**Description**	
r	Rare occurrence, single or a few individuals	
+	Cover less than 1 % of total plot area.	(< 1 %)
1	Cover less than 5 % of total plot area.	(1 % - 5 %)
2a *	Cover between 5 % – 12.5 % of total plot area.	(> 5 % – 12 %)
2b *	Cover between 12.5 % – 25 % of total plot area.	(> 12 % – 25 %)
3	Cover between 25 % – 50 % of total plot area.	(> 25 % – 50 %)
4	Cover between 50 % – 75 % of total plot area.	(> 50 % – 75 %)
5	Cover between 75 % – 100 % of total plot area.	(> 75 % – 100 %)

* After Bredenkamp *et al*., (1993); Botha, (2003).

CHAPTER FOUR

4. RESULTS

The vegetation of the Rietvlei Nature Reserve was divided into six main communities, each with a number of sub-communities, some with variants.

Identification of the vegetation communities was done using the tables attached in Appendix H, I, J and K. The six communities that were identified are: *Andropogon schirensis – Aristida congesta* Community, *Gladiolus crassifolius – Brachiaria serrata* Community, *Eragrostis chloromelas* - *Setaria sphacelata* var *sphacelata* Community, *Eragrostis chloromelas* - *Cynodon dactylon* Community, *Setaria verticillata – Phragmites australis* Community and *Arundinella nepalensis – Eleocharis dregeana* Community. These communities and the results from the synoptic table (Table 4.7 attached in Appendix L), where five vegetation units were described, were used to map the plant communities and the proposed management areas for the Rietvlei Nature Reserve (Figures 6.1 and 6.2).

A Detrended Correspondence Analysis (DECORANA) was done of the six communities identified. The detrended correspondence analysis revealed the discontinuity between the wetland and grassland communities further illustrating the floristic relationships between the various plant communities and environmental factors such as moisture. Axis 1 (Figure 4.1) represented a moisture gradient between the dry grassland and the deep flowing and standing wetlands. The homogeneous grassland communities with their slight differences are very evident in Figure 4.1. The Eigen values on Axis 1 were 0.83 and on Axis 3 it was 0.35. The length of Gradient for Axis 1 was 5.524 and for Axis 3 it was 4.361. No defining variation could be identified on Axis 3.

4.1 *Andropogon schirensis – Aristida congesta* Community

This community is located mainly on the Dolomite formations in the eastern portions of the reserve. From the classification of the dataset, the following results were obtained: four sub-communities and seven variants were identified (Table 4.1 attached in Appendix H). The differential species of this community is in Species group L. The *Andropogon schirensis – Aristida congesta* Community could be sub-divided into the following:

4.1.1. Xerophyta retinervis – Pellaea calomelanos Sub-community

- *A* *Buddleja salviifolia* Variant
- *B* *Tristachya leucothrix* Variant

4.1.2. Ctenium concinnum – Vernonia galpinii Sub-community

4.1.3. Dianthus mooiensis – Silene burchellii Sub-community

- *A* *Crinum graminicola* Variant
- *B* *Eragrostis capensis* Variant

4.1.4. Nemesia fruticans – Senecio affinis Sub-community

- *A* *Helichrysum nudifolium* Variant
- *B* *Indigofera comosa* Variant
- *C* *Schizachyrium sanguineum* Variant

4.1.1. *Xerophyta retinervis – Pellaea calomelanos* Sub-community

The *Xerophyta retinervis – Pellaea calomelanos* Sub-community was well defined by Species group C. *Xerophyta retinervis* (Species group C) is a good indicator species of this rocky sub-community and is mostly found on Rocky ridges such as quartzite.

A *Buddleja salviifolia* Variant

Buddleja salviifolia (Species group A) is a shrub that is usually associated with moist conditions. In this case it was located on top of a ridge where a shallow water table is present. The grass *Panicum natalense* (Species group T) is normally seen as an indicator of rocky habitat and has a high cover in this habitat.

B *Tristachya leucothrix* Variant

The grass *Urelytrum agropyroides* (Species group M) as well as the sedge *Bulbostylis burchellii* (Species group H) has high cover values in the sample plots that represent this variant. *Urelytrum agropyroides* (Species group M) is known to grow on well drained, often moist soils. *Bulbostylis burchellii* (Species group H) is very common on rocky ridges. The grass *Tristachya leucothrix* (Species group B) and the multi-stemmed shrublet *Protea welwitschii* (Species group B) are both indicator species of rocky habitats.

4.1.2. *Ctenium concinnum – Vernonia galpinii* Sub-community

Species group D defines the *Ctenium concinnum – Vernonia galpinii* Sub-community. The presence of dolomite as parent material plays an important role in this habitat. Sinkholes or dolines are common in this area and the typical soil formation is Mispah. The grasses *Ctenium concinnum* (Species group D) and *Diheteropogon amplectens* (Species group M) dominate in this area. *Ctenium concinnum* (Species group D) occurs mainly on dry, sandy soils and *Diheteropogon amplectens* (Species group M) prefers nutrient poor, rocky soils on an incline. *Vernonia galpinii* (Species group D), a perennial herb is usually found in rocky places. The absence of species from Species groups B, C and D is also notable and helps to characterise this sub-community.

4.1.3. *Dianthus mooiensis – Silene burchellii* Sub-community

The perennial herbs *Dianthus mooiensis* (Species group G) and *Silene burchellii* in Species group G are differential species for this sub-community. Both these species are typical grassland species and are common on rocky outcrops. Although the soil in the sample plots was very shallow, it was generally more moist than the soil of the *Gladiolus crassifolius – Brachiaria serrata* Communities. During this study the sample plots with the highest species richness, were found in this sub-community. Two variant communities could be distinguished in this sub-community.

A *Crinum graminicola* Variant

Crinum graminicola (Species group E), a bulbous plant, is a differential species of this variant. On the other hand, the grass *Eragrostis capensis* (Species group F) is almost completely absent from this variant.

B *Eragrostis capensis* Variant

Eragrostis capensis in Species group F was found in some of the sample plots and it defines this variant community. The absence of *Crinum graminicola* (Species group E) from this variant also characterises this variant. *Eragrostis capensis* (Species group F) is a grass that is normally found in areas where the soil is moist for the greater part of the year.

4.1.4. *Nemesia fruticans – Senecio affinis* Sub-community

No well defined Species group distinguishes this sub-community from the others, but the absence of species from Species groups F, G and H is noticeable. The grasses *Bewsia biflora* (Species group S) and *Urelytrum agropyroides* (Species group M) are well represented in the other sub-communities (*Andropogon schirensis – Aristida congesta* Communities) but are completely absent in all three variants of this sub-community. Both these grass species prefer rocky inclines. All the sample plots of the *Nemesia fruticans – Senecio affinis* Sub-community were located on fairly level surfaces. The herbs *Nemesia fruticans* (Species group L) and *Senecio affinis* (Species group S), as well as the grass *Aristida congesta* subsp. *congesta* (Species group L), were well represented in this sub-community.

A *Helichrysum nudifolium* Variant

The perennial herbs *Helichrysum nudifolium* (Species group J) and *Neorautanenia ficifolius* in Species group J define this variant. The perennial shrublet *Indigofera comosa* (Species group K) and the grass *Eragrostis lehmanniana* (Species group L) are absent from this variant community.

B *Indigofera comosa* Variant

No characteristic species group could be used to define this variant community. Two species namely the perennial shrublet *Indigofera comosa* (Species group K) and the grass *Eragrostis lehmanniana* (Species groups L) are present in this variant. *Eragrostis lehmanniana* (Species group L) often occurs on areas that have been disturbed previously. *Stoebe vulgaris* (Species group S) attained some high cover value in this variant. This is a perennial shrublet that is known to proliferate in overgrazed areas and can cause further degradation of the pasture.

C *Schizachyrium sanguineum* Variant

The grass *Schizachyrium sanguineum* (Species group S) grows in all soil forms but often in moist areas. This grass species, the herb *Justicia angalloides* (Species group S) and the grass *Eragrostis nindensis* in Species group S, define this variant community.

4.2 *Gladiolus crassifolius – Brachiaria serrata* Community

This community was found in a much drier habitat than the other undisturbed grassveld communities and was generally associated with rocky outcrops. Although *Brachiaria serrata* (Species group T) does have a high habitat tolerance, this grass and *Panicum natalense* (Species group T) can be regarded as indicators of rocky grassland in good condition. During the survey, termite damage was evident in a number of sample plots. The differential species of this community is in Species group P. From the classification of the dataset (Table 4.1 attached in Appendix H) two sub-communities can be distinguished, namely:

4.2.1 Dicoma zeyheri – Hypoxis interjecta Sub-community

4.2.2 Gerbera viridifolia – Solanum panduriforme Sub-community.

4.2.1. *Dicoma zeyheri – Hypoxis interjecta* Sub-community

The perennial herbs *Dicoma zeyheri* (Species group N) and bulbous plant *Hypoxis interjecta* (Species group N) were found to be the diagnostic species. The grass *Eragrostis chloromelas* (Species group S) was recorded to have a high cover value in many of the sample plots. Although the sample plots were scattered evenly throughout the reserve, they were all restricted to rocky areas with steep slopes.

4.2.2. *Gerbera viridifolia – Solanum panduriforme* Sub-community

This sub-community was well defined by Species group O that consisted of *Gerbera viridifolia, Nidorella anomala*, *Schistostephium crataegifolium*, *Indigofera zeyheri* and *Polygala amatymbica*. The absence of *Solanum panduriforme* (Species group S) and *Selago densiflora* (Species group S) distinguishes this sub-community from the *Nicoma zither – Hypoxias interject* Sub-community. *Seriphium plumosum* (Species group S), with its high cover values, is well represented in this sub-community and is also an indicator of degraded grassland.

4.3 *Eragrostis chloromelas - Setaria sphacelata* var *sphacelata* Community

This community was found mainly in the centre of the reserve on the Andesitic Lavas that dominate the substrate. Although the soils in the sample plots were found to be extremely shallow, the habitat was found to be more moist than that of the *Gladiolus crassifolius – Brachiaria serrata* Communities. The differential species of this community is in Species group J. From the classification of the dataset, four sub-communities and two variants were identified (Table 4.2 attached in Appendix I). The following *Eragrostis chloromelas - Setaria sphacelata* var *sphacelata* Sub-communities and variants were identified:

4.3.1. *Ledebouria ovatifolia – Hyparrhenia hirta* Sub-community

4.3.2. *Ipomoea oblongata – Crabbea angustifolia* Sub-community

A *Phyllanthus parvulus* Variant

B *Rhus discolor* Variant

4.3.3. *Rhus pyroides – Schistostephium crateagifolium* Sub-community

4.3.4. *Gladiolus crassifolius – Eragrostis chloromelas* Sub-community

4.3.1. *Ledebouria ovatifolia – Hyparrhenia hirta* Sub-community

The bulbous plant *Ledebouria ovatifolia* (Species group A) is the diagnostic species and *Hyparrhenia hirta* (Species group J) the diagnostic grass species in this sub-community. Other grass species that were found throughout this sub-community were *Setaria sphacelata* var *sphacelata* (Species group J) and *Digitaria diagonalis* (Species group E). *Peucadanum magalismontanum* (Species group J) is an erect perennial herb with a rootstock found in all the sample sites. The soils were very shallow (< 300 mm deep), and the Mispah soil form is very typical of the Andesitic Lava areas. Some of the sample sites showed signs of moderate trampling and grazing.

4.3.2. *Ipomoea oblongata – Crabbea angustifolia* Sub-community

Ipomoea oblongata (Species group D), a prostrate herb and *Crabbea angustifolia* (Species group I) were found to be the diagnostic herbaceous species of this community. Most of the sample sites were on shallow Andesitic Lava dominated soils. The grasses *Eragrostis chloromelas* (Species group J) and *Digitaria diagonalis* (Species group E) were found to be dominant on the majority of the sites. Two sample plots were located on Dolomite. Slope does not have an influence on these communities, since they were located on gently sloping east and west facing inclines. Two variant communities were found in this sub-community.

A *Phyllanthus parvulus* Variant

This variant community was mainly located in the northern portions of the reserve and *Rhus discolor* (Species group C) and *Ipomoea bathycolpos* (Species group C) were absent. *Phyllanthus parvulus* (Species group B), a small shrublet, characterises this variant.

B *Rhus discolor* Variant

Rhus discolor (Species group C), a sparsely branched shrublet, and the perennial forb *Ipomoea bathycolpos* (Species group C), characterise this variant. *Phyllanthus parvulus* (Species group B) is poorly represented in this variant. Large colonies of the shrublet *Ziziphus zeyheriana* (Species group J) were also very evident in these sample sites.

4.3.3. *Rhus pyroides – Schistostephium crateagifolium* Sub-community

The erect forb *Schistostephium crateagifolium* (Species group I), the shrub *Rhus pyroides* (Species group F) and the succulent *Aloe zebrine* (Species group F), occur in moist places on rocky outcrops. *Schistostephium crateagifolium* (Species group I) is a tufted perennial herb and *Rhus pyroides* (Species group F) a much-branched shrub or tree. *Aloe zebrina* (Species group F) has a low growth form and sometimes forms dense colonies. Large boulders (> 200 mm) cover about 35% of these sites. Many of these boulders are partially buried and the soils are relatively shallow.

4.3.4. *Gladiolus crassifolius – Eragrostis chloromelas* Sub-community

Gladiolus crassifolius in Species group H is the diagnostic bulbous species and *Eragrostis chloromelas* in Species group J is the differential grass species of this sub-community. Large colonies of *Ziziphus zeyheriana* (Species group J) are also very evident in these sample sites. Species group H, with *Gladiolus crassifolius, Sonchus dregeanus*, *Eragrostis lehmanniana*, *Raphionacme hirsute*, *Heteropogon contortus*, *Nemesia fruticans* and *Eragrostis plana,* defines this sub-community very well. Some signs of grazing were observed. The absence of plants from Species groups A to G is very conspicuous in this sub-community.

4.4 *Eragrostis chloromelas - Cynodon dactylon* Community

From the classification of the dataset, nine sub-communities and six variants were identified (Table 4.3 attached in Appendix J). *Eragrostis chloromelas* (Species group V) and *Cynodon dactylon* (Species group V) both recorded high cover values in many of the sample plots. The soil types and geology varied greatly in this community. Various levels of human and animal disturbance, ranging from fallow fields, planted pasture to overgrazed and trampled areas, occur in this community. *Campuloclinium macrocephalum* is a category 1 declared weed and was found extensively within this community. The differential species of this community is in Species group V. The following *Eragrostis chloromelas - Cynodon dactylon* Sub-communities and variants were identified:

4.4.1. *Setaria sphacelata* var *torta – Eragrostis chloromelas* Sub-community
- *A* *Eragrostis gummiflua* Variant
- *B* *Vernonia oligocephala* Variant

4.4.2. *Eragrostis lehmanniana - Heteropogon contortus* Sub-community

4.4.3. *Hemizigia pretoriae – Setaria spahcelata* var *sphacelata* Sub-community

4.4.4. *Cymbopogon excavatus – Cassia comosa* Sub-community
- *A* *Aristida bipartita* Variant
- *B* *Heteropogon contortus* Variant

4.4.5. *Acacia karroo – Asparagus transvaalensis* Sub-community

4.4.6. *Asparagus laricinus – Cynodon dactylon* Sub-community
- *A* *Rhus pyroides* Variant
- *B* *Diospyros lycioides* subsp. *guerkei* Variant

4.4.7. *Solanum elaeagnifolium – Cynodon dactylon* Sub-community

4.4.8. *Hyparrhenia tamba – Asparagus laricinus* Sub-community

4.4.9. *Digitaria eriantha - Hyparrhenia hirta* Sub-community

4.4.1. *Setaria sphacelata* var *torta – Eragrostis chloromelas* Sub-community

Two grass species, namely *Setaria sphacelata* var *torta* (Species group C) and *Eragrostis chloromelas* (Species group V) are the diagnostic species for this sub-community. The absence of species from Species groups K to Q is very conspicuous in this sub-community and helps to characterise it. Species group C is well represented in this sub-community.

A *Eragrostis gummiflua* Variant

This *Eragrostis gummiflua* variant is identified by the species in Species group A of which two species, namely *Eragrostis gummiflua* and *Nidorella anomala* are conspicuous. *Nidorella anomala* (Species group A) is often found in dense stands in wet environments and along roads, but in only 3 of these survey plots did this species cover between 1 and 5 % of the total plot area.

B *Vernonia oligocephala* Variant

Species group B defines the *Vernonia oligocephala* variant community with *Vernonia oligocephala, Pentanisia angustifolia*, *Elephantorrhiza elephantine*, *Rhynchosia totta* and *Vernonia natalensis*. *Vernonia oligocephala* (Species group B) did not record very high cover scores, but is a conspicuous perennial herb of up to 1 metre high with a woody rootstock.

4.4.2. *Eragrostis lehmanniana - Heteropogon contortus* Sub-community

Eragrostis lehmanniana is well represented in this sub-community (Species group D). The majority of the sample plots in this sub-community were heavily grazed and trampled. The grasses *Eragrostis chloromelas* (Species group V) and *Cynodon dactylon* (Species group V) both recorded high cover values in some of the survey plots.

4.4.3. *Hemizigia pretoriae – Setaria spahcelata* var *sphacelata* Sub-community

Species group F defines this sub-community through *Hemizigia pretoriae* and *Dicoma anomala*. *Setaria spahcelata* var *sphacelata* (Species group G) was found to be the differential grass species in this sub-community.

4.4.4. *Cymbopogon excavatus – Cassia comosa* Sub-community

This sub-community does not have a well defined species group and many of these were also recorded in several of the other species groups. *Cymbopogon excavatus* (Species group J) and *Cassia comosa* (Species group Q) are the differential species with relatively high constancy and cover values. Two variants were found in this sub-community.

A *Aristida bipartita* Variant

The grass *Aristida bipartita* (Species group H) was recorded in all the sample sites and may be an indicator of overgrazing. It is regularly found in moist places but will also grow in disturbed areas. Shrub forms of the tree species *Acacia karroo* (Species group K) were present in all the plots and showed signs of browse impacts. This species is known to encroach in areas where competition from grasses is diminished by heavy grazing, for example.

B *Heteropogon contortus* Variant

In this variant *Heteropogon contortus* (Species group S) and *Eragrostis chloromelas* (Species group V) are grasses with very high cover values in most of the survey plots. *Heteropogon contortus* (Species group S) can be an indicator of disturbed areas. *Cassia comosa* (Species group Q) was found in some of the plots of this variant community.

4.4.5. *Acacia karroo – Asparagus transvaalensis* Sub-community

Species group K defines this sub-community through *Acacia karroo*, *Asparagus transvaalensis* and *Gymnosporia heterophylla*. *Rhus pyroides* (Species group L) was also strongly represented. The majority of tree species showed signs of being browsed with a distinctive browse line and broken branches. *Bidens pilosa* (Species group O), a cosmopolitan weed, (possibly a native of America) as well as *Zinnia peruviana* (Species group O) from South America, were both found in this sub-community. These two species are often found in disturbed places and in the shade of bush clumps.

4.4.6. *Asparagus laricinus – Cynodon dactylon* Sub-community

In this sub-community two variant communities were found. This sub-community can either be described as being disturbed, in a rocky area or totally under utilized. No well-defined species group characterises this sub-community. The two exotic *Verbena* species, namely *V. bonariensis* and *V. brasilliensis, Eragrostis chloromelas* and *Cynodon dactylon,* dominate this sub-community (all from Species group V).

A *Rhus pyroides* Variant

Rhus pyroides (Species group L) characterises this variant. None of the species of Species group K are present. *Rhus pyroides* (Species group L) showed signs of being browsed by eland. Old stone kraals, probably dating back to the Iron Age, are present in this variant. These stone kraals could be the initial cause for the development of this variant at this site. The rocks and boulders that were used to build these kraals, created a sheltered environment (protection from fire and browsing) for shrub seedlings.

B *Diospyros lycioides* subsp. *guerkei* Variant

Diospyros lycioides subsp. *guerkei* (Species group M) and *Asparagus laricinus* (Species group M) are the two differential species of herbaceous plants found in this variant. *Asparagus laricinus* forms dense, impenetrable bushes reaching 2 meters in height. The sharp curved thorns (from these the name Cat bush) further contribute to making the area unsuitable for most of the larger mammals. The grasses *Eragrostis chloromelas* (Species group V) and *Cynodon dactylon* (Species group V) are dominating the open areas.

4.4.7. *Solanum elaeagnifolium – Cynodon dactylon* Sub-community

The *Solanum elaeagnifolium – Cynodon dactylon* sub-community (Species group N) is disturbed grassland. The following species had very high cover values in most of the survey plots: *Cynodon dactylon, Eragrostis chloromelas, Hyparrhenia hirta* and *Helichrysum rugulosum* (all from Species group V). *Helichrysum rugulosum* (Species group V) was occasionally found in dense groups. *Solanum elaeagnifolium* is a category 1 declared weed.

4.4.8. *Hyparrhenia tamba – Asparagus laricinus* Sub-community

Hyparrhenia tamba (Species group P) and *Asparagus laricinus* (Species group M) were strongly represented. All these sample plots, except two, were in wetland blocks defined by the road network. The plant material was dense and almost no signs of grazing or trampling could be found. *Hyparrhenia tamba* (Species group P) is a grass that is normally associated with moist soils next to rivers and wetlands. It is also known to encroach into moist disturbed areas.

4.4.9. *Digitaria eriantha* - *Hyparrhenia hirta* Sub-community

All the sample plots within the old agricultural lands on the southern portion of the reserve were found to contain this sub-community. Species group U defines this sub-community, through the grasses *Digitaria eriantha, Urochloa panicoides* and *Chloris virgata.* *Hyparrhenia hirta* (Species group V) was strongly represented. Almost no herbaceous species were encountered.

4.5 *Setaria verticillata – Phragmites australis* Community

From the classification of the dataset, only one plant community was identified (Table 4.4 attached in Appendix K): *Setaria verticillata – Phragmites australis* Community. The differential species of this community is in Species group A.

Species group A defines this sub-community in the form of the grass *Setaria verticillata* and the herbs *Amaranthus hybridus*, *Persicaria hydropiper* and *Physalis angulata.* *Setaria verticillata* (Species group A) is known to occur in wet, disturbed areas, especially in the shade of other plants such as trees. The common reed, *Phragmites australis* (Species group B) is a very diagnostic species that is always associated with wet or moist soils and very seldom found far from watercourses. *Phragmites australis* (Species group B) recorded high cover values in many of the sample plots. *Persicaria hydropiper* (Species group A) is an exotic weed associated with damp areas. The alien invader, *Cirsium vulgare* (Species group B) is a category 1 declared weed.

4.6 *Arundinella nepalensis – Eleocharis dregeana* Community

From the classification of the dataset, the following results were obtained: two sub-communities (Table 4.4 attached in Appendix K). The following species had very high cover values in most of the survey plots: *Arundinella nepalensis, Eleocharis dregeana* and the rush *Mariscus congestus* (all in Species group E). The sedge *Eleocharis dregeana* (Species group E) as well as *Arundinella nepalensis* (Species group E) known as River Grass, are most often found in wetlands. The differential species of this community is in Species group E. The following *Arundinella nepalensis – Eleocharis dregeana* Sub-communities were identified:

4.6.1. Hyparrhenia tamba – Phragmites australis Sub-community

4.6.2. Hemarthria altissima – Eleocharis dregeana Sub-community

4.6.1. *Hyparrhenia tamba – Phragmites australis* Sub-community

The grass *Hyparrhenia tamba* (Species group C) and all the species in Species group C define this sub-community. The strong presence of species from Species group B (including *Phragmites australis*) helps to define this sub-community even further. The near absence of species from Species group D also helps with the identification of this sub-community. *Hyparrhenia tamba* (Species group C) is a grass that is normally associated with moist soils next to rivers and wetlands. This sub-community can be described as being a Reedbed with an associated wet grassland community. *Phragmites australis* (Species group B) recorded high cover values in many of the sample plots. The alien invader, *Cirsium vulgare* (Species group B) is a category 1 declared weed and was found within this Sub-community.

4.6.2. *Hemarthria altissima – Eleocharis dregeana* Sub-community

Species group D and the near absence of species from Species group C and B define this sub-community. The grass *Hemarthria altissima* (Species group D) is associated with wetlands and riverbanks and also helps with the identification of this sub-community. This sub-community can be described as being a wet grassland community.

4.7 Description of Vegetation units from the Synoptic Table

The synoptic table was used to describe five vegetation units for the Rietvlei Nature Reserve (Table 4.7 attached in Appendix L). From the classification of the dataset the following results were obtained:

4.7.1. *Xerophyta retinervis – Panicum natalense* Rocky Ridges Unit

The grass *Panicum natalense* (Species group K) and all the species in Species group A, B, K and LL help to define this vegetation unit. *Xerophyta retinervis* (Species group B) is a good indicator species for rocky areas and is mostly found on Rocky ridges and slopes. This vegetation unit is made more obvious because of the absence of species, rather than the presence of defining species. Only the species of Species Groups A, B, K and LL were present and all the other species groups were conspicuously absent.

4.7.2. *Diheteropogon amplectens – Panicum natalense* Rocky Grassland Unit

Species Group J defines this Rocky Grassland Unit. The strong presence of *Panicum natalense* (Species group K) helps to define this vegetation unit even further. The slope varies greatly but the unique feature of this vegetation unit is the rocky outcrops. Many of the species found here prefer moist rocky soils on a slope.

4.7.3. *Tephrosia capensis – Cymbopogon excavatus* Grassland Unit

Species Group Q with *Tephrosia capensis*, *Aster harveyanus* and *Corchorus confusus* defines this Grassland Unit. Species groups L to P are almost exclusively found in this Grassland Unit. This Unit represents the undisturbed, drier grasslands.

4.7.4. *Eragrostis chloromelas– Themeda triandra* Grassland Unit

This Grassland unit only has a weak definition in Species group EE. This species group also indicates a level of disturbance in this unit. A number of species groups are only found in this unit (Species groups T, V, X, Y, AA, BB, CC and DD). *Eragrostis chloromelas* (Species group NN) and *Themeda triandra* (Species group HH) were both strongly represented. Most of the tree and shrub species are found in this unit.

4.7.5. *Cirsium vulgare – Phragmites australis* Wetland Unit

This wetland unit has an element of disturbed veld in it, as indicated by the number of species found in this unit that are indicators of disturbance. Species groups OO to TT are almost exclusively found in this Wetland Unit. Not one Species group stands out as the defining cluster.

4.8 The Vegetation map and Management units of Rietvlei Nature Reserve

A vegetation map (Figure 6.1) of the reserve and new data on species lists are now available for the Rietvlei Nature Reserve. Not all the plant communities identified were marked in Figure 6.1, as the determinations of the boundaries of these often small areas, were impossible. In Figure 6.1 only the communities that were visually different and where the boundaries could be clearly distinguished, were marked. The wetland communities were indicated as: 1. *Setaria verticillata – Phragmites australis* Wetland Community and 2. *Arundinella nepalensis – Eleocharis dregeana* Wet-grassland Community. The grassland communities were categorized under: 3. Grassland Communities on Dolomite or 4. Low-lying Grassland Communities and Grassland Communities on Andesitic lava.

The Sub-communities listed on Figure 6.1 are those where the boundaries were clearly visible and were they could be obviously mapped. Where small portions of well defined communities are cut off from the rest by a road these areas were incorporated into the larger Management Units. A good example here is where the *Setaria verticillata – Phragmites australis* Wetland Community around the Rietvlei dam were incorporated into the Lava and Shale Management Unit. The area next to the dam is too small to manage as a separate entity as far as burning and game rotation is concerned.

The four different management units described in Figure 6.2 were defined by the existing roads and the identified Communities. The existing roads were used to delineate the management units and in areas where for example grassland and wetlands were found, the community that distinguished the area, was used to categorise it. The Wetland Management Unit mainly consists of the *Setaria verticillata – Phragmites australis* Community (4.5) and the *Arundinella nepalensis – Eleocharis dregeana* Community (4.6). The Dolomitic Grassland Management Unit mainly consists of the *Andropogon schirensis – Aristida congesta* Community (4.1). The Lava and Shale Management Unit mainly consists of the *Eragrostis chloromelas - Setaria sphacelata* var *sphacelata* Community (4.3).

The *Gladiolus crassifolius – Brachiaria serrata* Community (4.2) and the *Eragrostis chloromelas* - *Cynodon dactylon* Community (4.4) were located within the Dolomitic Grassland Management Unit and the Lava and Shale Management Unit and no clear boundaries could be found.

The different management units described (Figure 6.2), can be used as a basis for the effective ecological management of the Rietvlei Nature Reserve, especially with the burning program and when putting out game licks or mineral supplements.

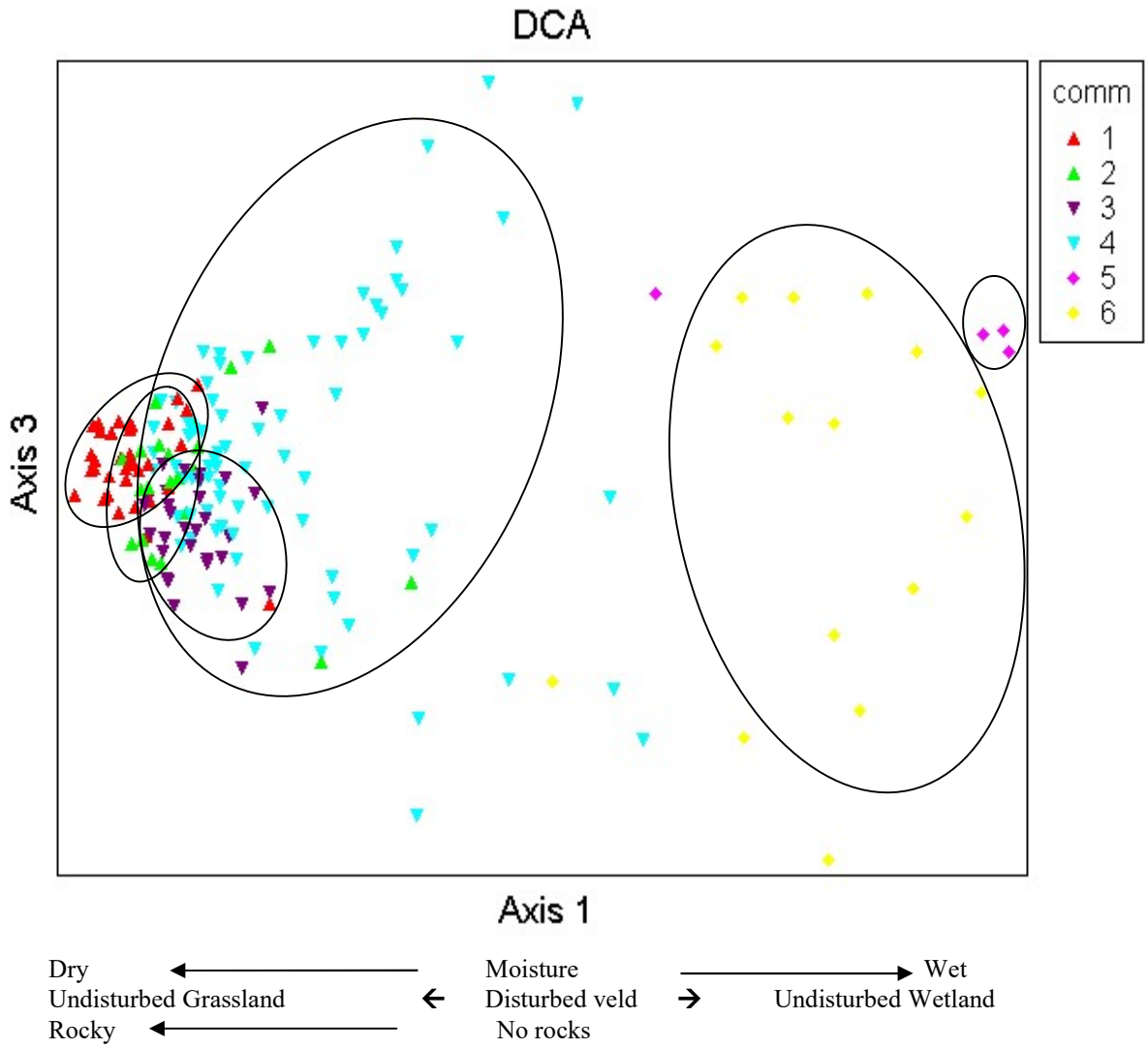

Figure 4.1: DECORANA Ordination Diagram indicating the various grassland and wetland communities in relation to the moisture content of the soil (Axis 1). The Eigen values on Axis 1 were 0.83 and on Axis 3 it was 0.35. The length of Gradient for Axis 1 was 5.524 and for Axis 3 it was 4.361. No defining variation could be identified on Axis 3.

CHAPTER FIVE

5. DISCUSSION

Factors such as fire, grazing, soils, water and pH have local influences on the plant species composition and may explain why some species were found outside their normal distribution areas of the communities identified.

The classification of the different plant communities showed good results. The different grassland communities showed good differentiation, but the actual delineation of the communities on the ground proved very difficult at the scale of this study.

5.1 *Andropogon schirensis – Aristida congesta* Community

This community is located primarily on the Dolomite formations on the eastern portions of the reserve. Dolomite plays a significant role in this general area, as is evident with all the sinkholes or dolines. It also contributes to soils with a relatively high alkalinity. The general soil formations are Mispah and Hutton (MacVicar *et al*., 1977). The *Buddleja salviifolia* variant, found in the *Xerophyta retinervis – Pellaea calomelanos* Sub-community, grows on the top of the ridge. It is possible that because of the topography some rainwater collects on site, which benefits this species. *Protea welwitschii* and *Xerophyta retinervis* are good indicator species of the rocky sub-community and are quite obtrusive.

Panicum natalense, Urelytrum agropyroides, Bulbostylis burchellii, Tristachya leucothrix and *Protea welwitschii* under normal conditions are all indicators of rocky areas and were thus mainly found in rocky habitats. The *Ctenium concinnum – Vernonia galpinii* Sub-community was predominantly found in dry, sandy soils or poor, rocky soils on an incline.

The *Dianthus mooiensis* - *Silene burchellii* sub-community was found on rocky ridges, in very shallow soils that were generally more moist than those of the *Gladiolus crassifolius – Brachiaria serrata* Communities. This area of the reserve is only well grazed during the summer after being burnt. The rest of the time the larger mammal species are not found in the area in any substantial numbers. Some of the sample plots, with the highest plant species, were found in this sub-community.

The entire set of sample plots of the *Nemesia fruticans – Senecio affinis* Sub-community were located on fairly level surfaces. The presence of *Eragrostis lehmanniana* and *Seriphium plumosum* in the *Indigofera comosa* Variant gives the impression that this portion of the reserve was overgrazed or disturbed in some way in the past. The exact cause of the disturbance is unknown, but a number of exotic Wattle bushes (*Acacia mearnsii, A. dealbata* and *A. decurrens*) are still found in the area and some mammal species do make use of the shade offered by these trees.

5.2 *Gladiolus crassifolius – Brachiaria serrata* Community

This community was found to be much drier than the other undisturbed grassveld communities and was generally associated with more rocky areas with a more pronounced slope. *Seriphium plumosum* is a species that is known to proliferate in overgrazed areas. The geology and soils did not seem to influence the plant species composition of this community and its two sub-communities. The rocky surroundings and drier habitat are the key visual determining factors.

5.3 *Eragrostis chloromelas - Setaria sphacelata* var *sphacelata* Community

This community occurred on soils that were generally very shallow (< 300 mm deep Hutton and Mispah soil forms) on Andesitic Lavas. Some of the sample sites showed signs of trampling and grazing, especially the *Gladiolus crassifolius – Eragrostis chloromelas* Sub-community. It is a drier community, associated with some rocks that stretch from north to south through the centre of the reserve. *Ziziphus zeyheriana* was very evident in this community. Two sites were located on Dolomite, high on a south-facing slope. It may be that some remnants of the Andesitic Lava are still present. The slope itself does not appear to have an influence on these communities.

5.4 *Eragrostis chloromelas - Cynodon dactylon* Community

The following sub-communities can be described as being naturally low-lying grassland communities with a high species diversity: *Setaria sphacelata* var *torta – Eragrostis chloromelas* Sub-community, *Eragrostis lehmanniana* - *Heteropogon contortus* Sub-community, *Hemizigia pretoriae – Setaria spahcelata* var *sphacelata* Sub-community and
Cymbopogon excavatus – Cassia comosa Sub- community.

During the hot summer days some game species will frequent the shade under the trees. In these areas the grasses and other herbaceous species are generally well utilized. The indigenous and exotic pioneer species then become more abundant, especially in these shady areas. An example is the *Acacia karroo – Asparagus transvaalensis* Sub-community (Species group L) (Table 4.1 attached in Appendix H). Because of grazing and trampling, the areas under and around the trees are also cleared of most of the dead organic material that can sustain a hot fire. This removal of plant material then helps to protect the tree species against the limiting factor of fire.

Because of the exclusion of fire from the areas around the wetland, some species proliferated and are now even indicators of the community. A good example of this was found in sample plots 70 and 90 where the *Asparagus laricinus – Cynodon dactylon* Sub-community with the *Rhus pyroides* Variant and *Diospyros lycioides* subsp. *guerkei*

Variant were identified. Old stone kraals also protected the tree and shrub species against fire and browsing. These could be the reasons why they were found in such high concentrations in some of the sample plots.

The *Solanum elaeagnifolium – Cynodon dactylon* Sub-community can be described as disturbed grassland. In most cases it is grassland that was transformed by exotic tree species such as wattles (*Acacia mearnsii*, *A. decurrens* and *A. dealbata*), *Populus* spp. and *Eucalyptus* spp. This sub-community is thus an indication of veld where these exotics have been removed or were subjected to annual mechanical cutting and they are now in a pioneer phase. *Solanum elaeagnifolium* is a category 1 declared weed and must be controled.

The *Hyparrhenia tamba – Asparagus laricinus* Sub-community can also be described as disturbed or transformed grassland, mainly because of the exclusion of fire from these areas next to the wetland or in the wetland blocks defined by the roads.

The *Digitaria eriantha - Hyparrhenia hirta* Sub-community is a vegetation unit, which is also severely disturbed. Almost no herbaceous species were encountered and those found were known weeds. Some mechanical re-seeding has taken place on a few of the old lands. Large mammal species were excluded from this portion of the reserve for approximately 8 years and after opening it to grazing, many of the annual herbaceous weeds have reduced in numbers. Unfortunately no quantifiable data exists to explain this phenomenon.

5.5 *Setaria verticillata – Phragmites australis* Community

Wetlands support a high diversity of life forms and many of these species cannot survive in any other habitat (Cowan, 1995). Cowan & Van Riet (1998) listed Rietvlei as both a Palustrine and a man made wetland of South Africa. They recognized four different types of freshwater marshes and Rietvlei falls in the category of a Reedbed marsh dominated by *Phragmites* species. The man made impoundments have had a profound negative effect on our natural wetland systems, by drowning them and changing the hydrological character of our rivers (Cowan & Van Riet, 1998).

Vegetation can have a significant effect on the hydrology of a wetland and the hydrology of a wetland can have a significant effect on species and species richness. The transpiration of exotic *Eucalyptus* tree species next to one of the fountains on the reserve, stopped it from flowing. When the trees were removed, the fountain started flowing within a very short period of time. The hydrology will effect the plant species composition and for example a low energy system, anaerobic conditions and other specific conditions can result in the formation of a peatland.

The common reed *Phragmites australis* is a differential species that is always associated with wet or moist soils and very seldom found far from watercourses. As far as grazing is concerned, it is not a very important species but it has some extremely important ecological roles. It protects the soil and drainage lines against erosion, filters water and provides habitat for many species of fauna. *Setaria verticillata* is known to occur in wet, disturbed areas, especially in the shade of other plants such as trees. The alien invader, *Cirsium vulgare* (Species group B) is a category 1 declared weed and must be controlled.

This wetland community can be described as being a Reedbed wetland community. Except for one sample plot that is on a rehabilitated peat mining area, the sample plots are very similar. Even this one site, where the silt from the Marais Dam was worked into the mined area, has a very similar plant species composition to the rest of the community.

5.6 *Arundinella nepalensis – Eleocharis dregeana* Community

The *Hyparrhenia tamba – Phragmites australis* Sub-community can be described as a Reedbed with an associated wet grassland community. Where the grassland comes in contact with the wet soils and water, this community can be found. The *Hemarthria altissima – Eleocharis dregeana* Sub-community can be described as a wet grassland community. No extensive reedbeds are present, but the vegetation gives a good indication that the soils are water saturated.

The lowest plant species composition was found in the two wetland communities. These wetland communities act as a winter feed bank, as the vegetation stays green and palatable for longer than on the open grasslands. The game species move into the wetlands in winter for grazing. The alien invader, *Cirsium vulgare* (Species group B) is a category 1 declared weed and must be controlled.

5.7 The Vegetation units from the Synoptic Table

Five Vegetation units for the Rietvlei Nature Reserve were described using the Synoptic Table 4.5 attached in Appendix L. These are *Xerophyta retinervis – Panicum natalense* Rocky Ridges Unit, *Diheteropogon amplectens – Panicum natalense* Rocky Grassland Unit, *Tephrosia capensis – Cymbopogon excavatus* Grassland Unit, *Eragrostis chloromelas– Themeda triandra* Grassland Unit and the *Cirsium vulgare – Phragmites australis* Wetland Unit.

Once again the classification of the different vegetation units showed good results as in the classification of the communities. The different vegetation units showed good differentiation, but the delineation of the units on the ground proved very difficult. The differentiation is more apparent because of the absence of species rather than the actual presence of any number of species. The rocky areas are very apparent and easily identified. Both grassland units had some indigenous and exotic bush clump elements. The wetland unit had an element of disturbed veld in it, as indicated by the number of the species found in this unit that are indicators of disturbance.

The compilation of a map indicating the different management units (Figure 6.2) was done, using the vegetation map (Figure 6.1). Because the reserve is fairly old and has existing roads and fire breaks, these were used as the boundaries for the management units. It would be counter productive and very destructive to go and make new roads and fire breaks because of new knowledge concerning the vegetation units and communities found. This means that some areas that should be managed as a separate entity are included in the larger management units.

5.8 Aspects of veld and wildlife management

The main aim of veld management is to support or improve the quality and production of the veld so that animal production can be increased and so that the area can sustain as high a fauna and flora species diversity as possible.

The removal of all exotic fauna and flora must continue to sustain and safeguard the indigenous communities. From this study and by viewing aerial photos, the work done on removing the exotic trees from the reserve, is very evident. The biggest threat facing the reserve and its associated fauna and flora, is the exotic weeds. The perennial herb *Campuloclinium macrocephalum* is fast becoming the one species that is spreading into the natural grassland at an alarming rate. Observations over the last few years have shown this declared weed to be invading natural grassland. Unfortunately there are many of these exotic weeds on Rietvlei Nature Reserve (Appendix C). Management plans are being implemented to eradicate these listed exotics (Rietvlei Nature Reserve, Undated).

The existing burning program should be continued to remove moribund plant material and encourage high plant species diversity. The use of fire, mineral game lick and salt to rotate the larger mammal species on the reserve, is very important and allows some areas a rest while others are being grazed. Because of fences, the animals cannot move away from an area to better grazing and rotational grazing helps to protect and sustain the plant species composition and high species diversity.

The damage to some of the trees and shrubs, mainly by eland, was visually quite evident during this study. The eland numbers should be lowered to approximately 80 mature animals to limit the excessive defoliation of shrubs and trees. During the winter months there are almost no brows available and the eland then damage the indigenous trees and shrubs looking for green food. This number of eland is calculated from the carrying capacity of the reserve and does not include brows availability. With the lowering of eland numbers the bulk grazer numbers can be increased depending on the management objectives of the reserve.

The practise of planting only endemic trees where human activities are concentrated, such as at the overnight huts, lapa, etc. should also be encouraged. It must be stated that this is a grassland reserve, with some small pockets of indigenous trees and shrubs that survive in very specific areas and only under precise conditions. It should thus be managed as a grassland reserve and must not be changed.

The identified management units can now be incorporated into the Management Plan for Rietvlei Nature reserve and will give an indication of how specifically the burning blocks must be rotated and divided so that one entire management unit is not burnt every time. Portions of the different units must be burnt together, but fire must still be prevented in the peatland areas.

CHAPTER SIX

6. CONCLUSIONS

Different vegetation units on the Rietvlei Nature Reserve were identified, classified, described and interpreted. From this baseline information, different management units were described for use by the reserve management. This study revealed that the vegetation of the Rietvlei Nature Reserve could be divided into six main communities, each with a number of sub-communities and variants.

The communities identified were: *Andropogon schirensis – Aristida congesta* Community, *Gladiolus crassifolius – Brachiaria serrata* Community, *Eragrostis chloromelas - Setaria sphacelata* var *sphacelata* Community, *Eragrostis chloromelas - Cynodon dactylon* Community, *Setaria verticillata – Phragmites australis* Community and *Arundinella nepalensis – Eleocharis dregeana* Community.

A vegetation map (Figure 6.1) of the reserve and new data on species lists are now available for the Rietvlei Nature Reserve. The different management units described (Figure 6.2) can be used as a basis for the effective ecological management of the Rietvlei Nature Reserve.

The importance of this Nature Reserve in a rapidly developing province cannot be over emphasised. This study must be used as a baseline from which regular monitoring can take place and more detailed studies of the different communities and their interactions can be done. This means that the management of the reserve can now measure whether the veld condition has remained the same, improved or deteriorated over time. The Bankenveld veld type is fast disappearing and its conservation needs some urgent attention as stated by Bredenkamp & Van Rooyen (1996). The reserve is threatened by urbanization and is fast becoming an island. Hopefully this study will also contribute as tool to give the decision-makers on local, provincial and national level enough information to continue to protect and develop this Grassland Nature Reserve in a sound and ecologically sustainable manner for all South Africans to enjoy.

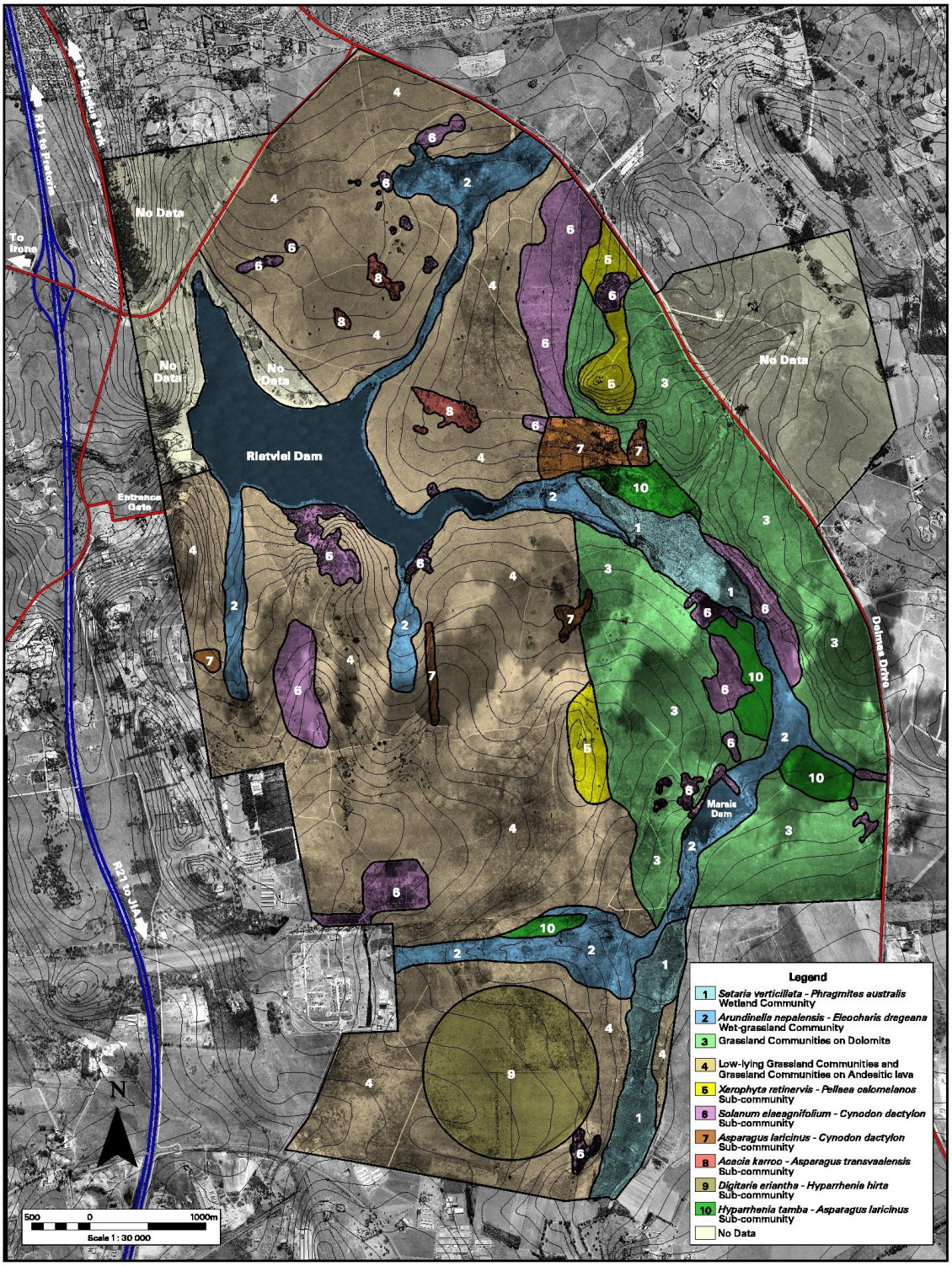

Fig 6.1: Vegetation Types of Rietvlei Nature Reserve

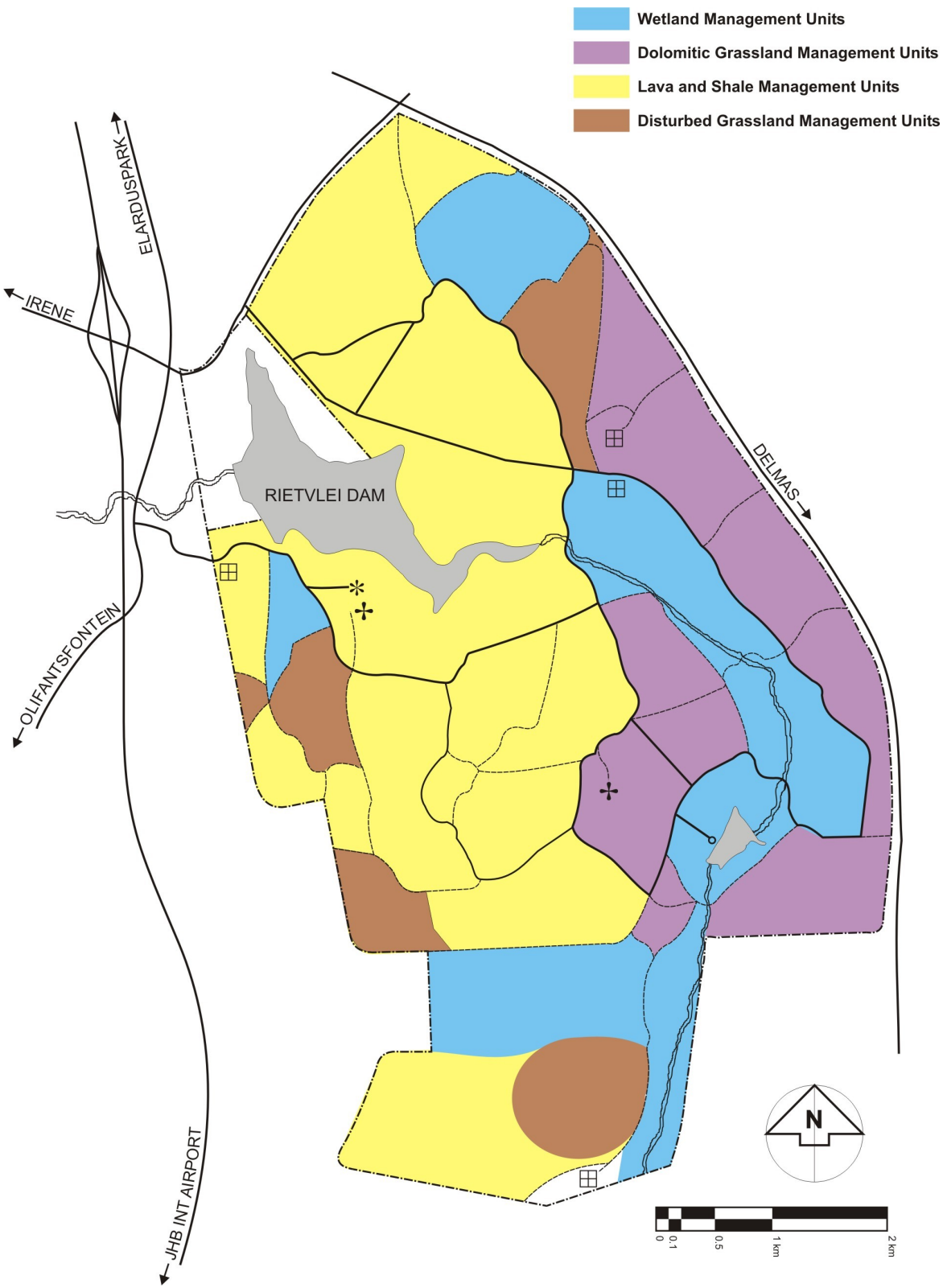

Figure 6.2: Proposed Management areas for the Rietvlei Nature Reserve.

ACKNOWLEDGEMENTS:

All honour, praise and thanks to God for the insight, power and health so that this study could be undertaken.

Thanks to the following people who all gave their special contributions and help and without whom this study would not have been possible: Vanessa Marais, Petro Lemmer, Theresa van Niekerk, Dr. Naas Rautenbach, Rihann Geyser and Wulf Haacke. Also a special thanks to Lourens du Plessis from MetroGIS.

Thank you to all my colleagues within the City of Tshwane's Nature Conservation Section for their help and support.

A special thank you to my supervisors: Prof. G.N. Smit and Dr. P.J. du Preez for all their time and effort.

ABSTRACT:

A PLANT ECOLOGICAL STUDY OF THE RIETVLEI NATURE RESERVE, GAUTENG PROVINCE

By

RIAAN MARAIS

In the Faculty of Natural & Agricultural Sciences
Department of Animal, Wildlife and Grassland Sciences
University of the Free State, Bloemfontein, South Africa

Promoter: Prof. G. N. Smit
Co-promoter: Dr. P. J. du Preez

Magister Agriculturae
(Wildlife Management)

Keywords: Biodiversity Braun-Blanquet, Classification, Ecology, Grassland, Wetland, Plant Community, Vegetation.

This study was undertaken with the objective to identify and quantify different homogeneous management units on the Rietvlei Nature Reserve to facilitate more effective management as far as grazing utilization, burning and monitoring are concerned. Vegetation units had to be identified and mapped. From the communities different management units could be identified. The study area of 3 870 hectares is a proclaimed nature reserve and is situated southeast of Pretoria in the Gauteng Province.

A phytosociological study of the vegetation was done using the Braun-Blanquet method. A total of 184 plots were sampled and classified using the Braun-Blanquet method and TWINSPAN.

This study revealed that the vegetation of the Rietvlei Nature Reserve could be divided into six main communities, each with a number of sub-communities and some with variants.

The communities identified were: *Andropogon schirensis – Aristida congesta* Community, *Gladiolus crassifolius – Brachiaria serrata* Community, *Eragrostis chloromelas - Setaria sphacelata* var *sphacelata* Community, *Eragrostis chloromelas - Cynodon dactylon* Community, *Setaria verticillata – Phragmites australis* Community and *Arundinella nepalensis – Eleocharis dregeana* Community.

The different communities described were used as a basis for the representation of a vegetation map of the reserve and the demarcation of management areas for the Rietvlei Nature Reserve.

UITTREKSEL:

'n PLANT EKOLOGIESE STUDIE VIR DIE RIETVLEI NATUURRESERVAAT, GAUTENG PROVINSIE

Deur

RIAAN MARAIS

In the Fakulteit Natuur- en Landbou wetenskappe
Departement van Vee-, Wild- en Weidingkunde
Universiteit van die Vrystaat, Bloemfontein, Suid Afrika

Promotor: Prof. G. N. Smit
Mede-promotor: Dr. P. J. du Preez

Magister Agriculturae
(Natuurlewebestuur)

Sleutelwoorde: Biodiversiteit Braun-Blanquet, Klasifikasie, Ekologie, Grasveld, Plant-gemeenskappe, Plantegroei, Vleigebied.

Die doel van die studie was om homogene bestuurseenhede vir die Rietvlei Natuurreservaat te identifiseer en te kwantifiseer vir meer effektiewe bestuur van weiding, brand en monitering. Die plantegroeieenhede moes geïdentifiseer en gekarteer word. Uit die gemeenskappe moes verskillende bestuurseenhede geïdentifiseer word. Die studiegebied van 3 870 hektaar is 'n geproklameerde natuurreservaat en is geleë suidoos van Pretoria in die Gauteng Provinsie.

'n Phytososiologiese studie van die plantegroei is gedoen deur gebruik te maak van die Braun-Blanquet metode. 'n Totaal van 184 plotte is uitgeplaas en geklassifiseer deur gebruik te maak van die Braun-Blanquet metode en TWINSPAN.

Die studie het aangetoon dat die plantegroei van Rietvlei Natuurreservaat in ses hoof gemeenskappe ingedeel kan word, elk met 'n aantal sub-gemeenskappe en sommiges met variante.

Die gemeenskappe is geidentifiseer as: *Andropogon schirensis – Aristida congesta* Gemeenskap, *Gladiolus crassifolius – Brachiaria serrata* Gemeenskap, *Eragrostis chloromelas - Setaria sphacelata* var *sphacelata* Gemeenskap, *Eragrostis chloromelas - Cynodon dactylon* Gemeenskap, *Setaria verticillata – Phragmites australis* Gemeenskap en *Arundinella nepalensis – Eleocharis dregeana* Gemeenskap.

Die verskillende gemeenskappe wat beskryf is, is gebruik as ‘n basis vir die optrek van ‘n plantegroei gemeenskap kaart vir die reservaat en die aanteken van bestuursgebiede vir die Rietvlei Natuurreservaat.

REFERENCES:

Acocks, J.P.H. 1988. *Veldtypes of South Africa*. 3nd. ed. Departement van Landbou Watervoorsiening, Navorsingsinstituut vir Plantkunde.

Bakker, J.P. & Berendse, F. 1999. Constraints in the restoration of ecological diversity in grassland and heathland communities. TREE vol. 14, no. 2: pp 63-68.

Barbour, M.G., Burk, J.H. & Pitts, W.D. 1987. *Terrestrial plant ecology*. 2nd Edition. The Benjamin/Cummings Publishing Company, Inc. Menlo Park, pp 209-229. ISBN 0-8053-0541-6.

Becking, R.W. 1957. Zurich-Montpellier School of phytosociology. The Botanical Review 23 (7): 411-488.

Behr, C.M. & Bredenkamp, G.J. 1988. *Aphytosociological classification of the Witwatersrand National Botanical Garden*. South African Journal of Botany 54 (6) 525-533.

Bezuidenhout, H. 1988. *'n Plantsosiologiese studie van die Mooirivieropvanggebied, Transvaal*. MSc. Thesis, Potchefstroom University for C.H.E., Potchefstroom.

Bezuidenhout, H.& Bredenkamp, G.J. 1990. *Areconnaissance survey of the vegetation of the dolomitic region in the Potchefstroom – Ventersdorp – Randfontein area, South Africa*. Phytocoenologia 18 (2/3) pp 387-403

Bezuidenhout, H. & Bredenkamp, G.J. 1991. *Plantegroei klassifikasie van die A-landtipe van die Mooirivier opvanggebied, Transvaal.* Suid Afrikaanse Tydskrif vir Natuurwetenskappe en Tegnologie 10 (1) pp 4-11.

Botha, A.M. 2003. *A plant ecological study of the Kareefontein Private Nature Reserve, Free State Province*. MSc. Thesis, University of the Free State, Bloemfontein.

Bothma, J. du P. 1988. *Wildplaasbestuur*. J.L. van Schaik, Pretoria.

Bothma, J. du P., Van Rooyen, N. & Du Toit, J.G. 2002. Antelope and other smaller herbivores. In Bothma, J. du P. (red.) Game ranch management. 4th edition. J.L. van Schaik, Pretoria.

Braun-Blanquet, J. 1932. Plant sociology. Translated by FullerG.D. and Conrad H.S. McGraw-Hill, New York, pp 26-33.

Bredenkamp, G.J. 1975. 'n Plantsosiologiese studie van die Suikerbosrand Natuur Reservaat. MSc. Thesis, University of Pretoria, Pretoria.

Bredenkamp, G.J. & Theron G.K. 1976. Vegetation units for the Management of the grasslands of the Suikerbosrand Nature Reserve. South African Journal of Wildlife Research 6 (2) pp113-122.

Bredenkamp, G.J. & Theron G.K. 1978. A synecological account of the Suikerbosrand Nature Reserve: I The phytosociology of the Witwatersrand geological system. Bothalia 12 pp 513-529.

Bredenkamp, G.J. & Theron G.K. 1980. A synecological account of the Suikerbosrand Nature Reserve: II The phytosociology of the Ventersdorp geological system. Bothalia 13 pp 199-216.

Bredenkamp, G.J., Joubert, A.F. & Bezuidenhout, H. 1989. A reconnaissance survey of the vegetation of the plains in the Potchefstroom –Fochville – Parys area. South African Journal of Botany 55 pp 199-206.

Bredenkamp, G.J., Deutschländer, M.S. & Theron G.K. 1993. A phytosociological analysis of the Albizio harveyi – Eucleetum divinori from the sodic bottomland clay soils of the Manyeleti Game Reserve, Gazankulu, South Africa. South African Journal of Botany 59: 57-64.

Bredenkamp, G.J. & Brown, L.R. 2003. A reppraisal of Acocks' Bankenveld: origin and diversity of vegetation types. South African Journal of Botany 69(1): 7-26.

Bredenkamp, G.J., Ferguson, J.W.H., Foord, S.H. & De Frey, W.H. 1999. Floristic assessment of an Afromontane grassland fragmentation experiment in a pine plantation. Arican Journal of Ecology 37: pp 49-60.

Bredenkamp, G.J. & van Rooyen, N. 1996. Rocky Highveld Grassland. In: Low, A.B. & Rebelo, A.G. (eds) Vegetation of South Africa, Lesotho and Swaziland. Dept Environmental Affairs & Tourism, Pretoria.

Bromilow, C. 1996. Probleemplante van Suid-Afrika. Briza Publications, Arcadia, Pretoria.

Brown, L.B., Bredenkamp, G.J. & Van Rooyen, N. 1997. Phytosociological synthesis of the vegetation of the Borakalalo Nature Reserve, North West Province. South African Journal of Botany 63 (5) pp 242-253.

Budd, J.T.C. 1991. Remote sensing techniques for monitoring land-cover. In: Monitoring for Conservation end Ecology, (red.) F.B. Goldsmith. Chapman and Hall, London. 275 pp.

City Council of Pretoria. 1997. Rietvlei Nature Reserve, Culture and Recreation Department, City Council of Pretoria.

Coetzee, B.J. 1974. A phytosociological classification of the vegetation by the Braun-Blanquet technique. Bothalia 11: pp 123-133.

Coetzee, J.P., Bredenkamp, G.J. & Van Rooyen, N. 1995. Plant communities of the Sub-humid cool temperate mountain bushveld of the Pretoria – Witbank – Heidelberg area, South Africa. South African Journal of Botany 61(3): 114-122.

Cowan, G.I. 1995. Wetlands of South Africa. Department of Environmental Affairs and Tourism, Pretoria.

Cowan, G.I. and Van Riet, W. 1998. ADirectory of South African Wetlands. Department of Environmental Affairs and Tourism, Pretoria.

De Frey, W.H. 1999. Phytosociology of the Mpumalanga high altitude grasslands. MSc. Thesis, University of Pretoria, Pretoria.

Du Preez, P.J. & Bredenkamp, G.J. 1991. Vegetation classas of the southern and eastern Orange Free State (Republic of South Africa) and the highlands of Lesotho. Navorsing van die Nasionale Museum, Bloemfontein, 7: pp 478-526. ISBN 0-9470-1457-8.

Du Preez, P.J. & Venter, H.J.T. 1992. The classification of the vegetation of the Korannaberg, eastern Orange Free State, South Africa. I Afromontane fynbos communities. South African Journal of Botany 58: pp 165-172.

Du Plessis, S.S. 1968. Ecology of Blesbok (Damaliscus dorcas phillipsi) on the Van Riebeeck Nature Reserve, Pretoria, with spesial reference to Productivity. D.Sc. Verhandeling, Universiteit van Pretoria, Pretoria.

Eckhardt, H.C., Van Rooyen, N. & Bredenkamp, G.J. 1993. Use of Braun-Blanquet data for the assessment of veld condition and grazing capacity in grassland. Afr. J. Range For Sci. 10(1): 41-46.

Ehrenfeld, J.G. 2000. Defining the limits of restoration: The need for realistic goals. Restoration Ecology Vol. 8. no. 1: pp 2-9.

Fauna and Flora, 1950. Article in Publication no 1. Unknown person. April 1950.

Fraser, S.W., Van Rooyen, T.H. & Verster, E. 1987. Soil-plant relationships in the central Kruger National Park. Koedoe, 30:19-34.

Fuls, E.R., Bredenkamp, G.J. & Van Rooyen, N. 1992. The plant communities of the Vredefort – Kroonstad – Lindley – Heilbron area, northern Orange Free State. South African Journal of Botany 58 (4): pp 224-230.

Germishuizen, G. & Meyer, N.L. (eds) 2003. Plants of southern Africa: an annotated checklist. Strelitzia 14, National Botanical Institute, Pretoria.

Gibbs Russell, G.E., Watson, L., Koekemoer, M., Smook, L., Barker, N.P., Anderson, H.M., Dallwitz, M.J. 1990. Grasses of Southern Africa. Memoirs of the Botanical Survey of South Africa No. 58. National Botanic Gardens, Botanical Research Institute, RSA.

Grundling, P-L. 2004. The Rietvlei Peatlands. Working for Wetlands, South African National Biodiversity Institute, Pretoria. Unpublished.

Grundling, P-L. & Marneweck, G.C. 2000. Progress report: Preliminary impact on the impacts on the Southern Section of Rietvlei Peatland. WCS Report No: 52/2000 for City Council of Pretoria. Unpublished.

Grundling, P-L., Mazus, H. & L. Baartman. 1998. Peat resources in northern Kwazulu-Natal wetlands: Maputuland. Department of Environmental Affairs and Tourism, Pretoria.

Hannekens, S.M. 1996a. MEGATAB – A visual editor for phytosociological tables. Giesen and Geurts. University of Lancaster, Lancaster.

Hannekens, S.M. 1996b. TURBO(VEG) – Software pakage for input, processing and presentation of phytosociological data. Users guide. University of Lancaster, Lancaster.

Henderson Mayda, Fourie, D.M.C., Wells, M.J. & Henderson, L. 1987. Declared weeds and alien invader plants in South Africa. Department of Agriculture and Water Supply, Directorate of Agricultural Information, Pretoria.

Henderson, L. 2001. Alien weeds and invasive plants. Plant protection research institute handbook no12. Agricultural Research Council. Paarl Printers, Cape Town.

Hill, M.O. 1979a. TWINSPAN – a FORTRAN Program for arranging multivariante data in an ordered two-way table by classification of the individuals and attributes. Department of Ecology and Systematics, Cornell University, Ithaca, New York.

Hill, M.O. 1979b. DECORANA – a FORTRAN Program for detrended correspondence analysis and reciprocal averaging. Department of Ecology and Systematics, Cornell University, Ithaca, New York.

Janecke, B.J. 2002. Vegetation ecology of Soetdoring Nature Reserve: Pan, Grassland and karroid communities. MSc. Thesis, University of the Free State, Bloemfontein.

Kearey, P. 2001. The new Penguin Dictionary of Geology. Penguin Books, Rosebank, South Africa.

Kellman, M.C. 1980. Plant Geography. Mathuen, London and New York.

Kent, M. & Coker, P. 1992. Vegetation description and analysis: A practical approach. John Wiley and Sons, New York, pp 1-275. ISBN 0-4719-4810-1.

Kershaw, K.A. 1973. Quantitative and Dynamic plant ecology. 2nd Edision. Edward Arnold (Publishers) Limited, London, pp 12-16. ISBN 0-7131-2415-6.

Kooij, M.S. 1990. A phytosociological study of the vegetation of the northwestern Orange Free State. MSc. Thesis, University of Pretoria, Pretoria.

Landtipe- opnamepersoneel. 1987. Landtipes van die kaarte 2526 Rustenburg, 2528 Pretoria. Mem. nat. Landbouhulpbr. S.Afr. No.8.

Maclean, G.L. 1993. Roberts' Birds of Southern Africa. John Voelcker Bird Book Fund, Cape Town.

MacVicar, C.N., De Villiers, J.M., Loxton, R.F., Verster, E., Lambrechts, J.J.N., Merryweather, R.F., Le Roux, J., Van Rooyen, J.A. & Harmse, H.J. von M. 1977. Grondklassifikasie: 'n Binomiese sisteem vir Suid-Afrika. 1ste Uitgawe. Navorsingsinstituut vir Grond en Besproeiing, Pretoria, 150p.

Malan, P.W., Venter, H.J.T. & Du Preez, P.J. 1999. Vegetation ecology of the southern Free State: I Plant communities of the Zastron area. South African Journal of Botany 65 (4): pp 260-269.

Matthews, W.S. 1991. Phytosociology of the north-western mountain sourveld. MSc. Thesis, University of Pretoria, Pretoria.

Mueller-Dombois, D. & Ellenberg, H. 1974. Aims and methods of vegetation ecology. John Wiley and Sons, New York, pp 1-66. ISBN 0-471-62291-5.

Müller, D.B. 1986. Plantekologie van die Willem Pretorius – Wildtuin. PhD Dissertation, University of the Free State, Bloemfontein.

Müller, M.E. 2002. The Phytosociology of the central Free State. MSc. Thesis, University of the Free State, Bloemfontein.

Neke, K.S. & Du Plessis, M.A. 2004. The threat of Transformation: Quantifying the Vulnerability of Grasslands in South Africa. Conservation Biology 18(2): pp 466-477.

Odum, E.P. 1971. Fundamentals of ecology. Philadelphia, Saunders.

Palmer, A.R., Crook, B.J.S. & Lubke, R.A. 1988. Aspects of vegetation and soil relationships in the Andries Vosloo Kudu Reseerve, Cape Province. South African Journal of Botany 54 (4): pp 309-314.

Patterson, D.G. 1999. 1:50 000 Grondkaart. Landbounavorsingsraad, Instituut vir grond, klimaat en water. Pretoria.

Pretoria News. 1958. Pretoria News article: New Plan for Nature Reserve Fence 15 November 1958

Rietvlei Nature Reserve. Undated. Unpublished Management plan for Rietvlei Nature Reseve, City of Tshwane.

Robinson, B.H. 1996. The key species method. Evaluation of natural veld. Unpublished report, Towoomba LOS, Warmbad.

Rutherford, M.C. & Westfall, R.H. 1986. Biomes of Southern Africa - An objective categorization. Memiors of the Botanical Survey of Southern Africa No. 54. Government printer, Pretoria.

Schulze, E., Theron, G.K. & Van Hoven, W. 1994. The vegetation and identification of management units of the Imberbe Game Lodge in the mixed Bushveld of the north-western Transvaal. South African Journal of Botany 60 (2): pp 85-93.

Scott, L. & Vogel, J.C. 1983. Late Quaternary Pollen Profile from the Transvaal Highveld,South Africa. South African Journal of Science, Vol. 79, pp 266-272.

Smit, C.M., Bredenkamp, G.J. & Van Rooyen, N. 1995. The vegetation of the Ea land type in north-western KwaZulu-Natal. South African Journal of Botany 61: pp 18-28.

Smit, G.N. 1988. Die invloed van langtermyn graslaag benuttingspraktyke op die Suur-gemengde Bosveld. M.Sc. Verhandeling, Univ. Pretoria, Pretoria.

Smit, G.N. 2000. Herbivore game species – habitat requirements and diet selection (Module 2). Unpublished manuscript, Department of Grassland Science, University of the Orange Free State, Bloemfontein.

Smithers, R.H.N. 1983. Die Soogdiere van die Suider Afrikaanse Substreek. Univ. van Pretoria, C.T.P. Boekdrukkers, Kaap.

Smithers, R.H.N. 1986. South African Red Data Book - Terrestrial Mammals. S.A. National Scientific Programmes Report No. 125. Foundation for Research Development, Pretoria.

Smuts, W.J. 1997. Characteristics of South African peats and their potential exploitation. PhD Dissertation. University of Pretoria.

Stadsraad van Pretoria. 1996. 1:4000 lugfoto's van Pretoria se Munisipale gebied. Stadsraad van Pretoria, Pretoria.

Suid-Afrika (Republiek). Departement van Mynwese. 1973. 1:50 000 Geologiese Reeks. 2528CD Rietvleidam. Staatsdrukker, Pretoria.

Suid-Afrika (Republiek). Landmeter Generaal. 1991. 1:50 000 Lugfoto's, Job 951 strip 13/0146. Pretoria.

Tainton, N.M. 1988. Veld and Pasture Management in South Africa. University of Natal Press, Pietermeritzburg.

Tainton, N.M. 1999. Veld Management in South Africa. University of Natal Press, Pietermeritzburg.

The Star. 1951. Article in newspaper on 12th October 1951: Pretoria Mayor starts fishing tomorrow. Unknown person.

Theron, G.K. & van Rooyen, N. 1985. Praktiese Handleiding (Plantegroei Klassifikasie), Ekologie, Departement Plantkunde, Univ. van Pretoria.

Thomson, R. 1992. The Wildlife Game. The Nyala Wildlife Publications Trust, Westville, South Africa.

Trollope, W.S.W., Trollope, L.A. & Bosch, O.J.H. 1990. Veld and pasture management Terminology in southern Afrika. J. Weidingsveren. S.Afr. 7(1).

Van Oudtshoorn, F.P. 1991. Gids tot die grasse van Suider Afrika. Briza publikasies, Arcadia.

Van Oudtshoorn, F.P. 1999. Gids tot die grasse van Suider Afrika. Briza publikasies, Arcadia.

Van Riet, W. 1994. The effects of development on the future of Rietvleidam as a Nature Reserve. Willem van Riet Landscape Architects in association with GisLAB, Pretoria.

Van Rooyen, N., Grunow, J.O., Theron, G.K. 1988. In: Bothma, J. du P. 1988. Wildplaasbestuur. J.L. van Schaik, Pretoria.

Van Vollenhoven, A.C. 2004. Verslag oor ‘n blokhuis uit die Anglo-Boereoorlog (1899-1902) op die terrain van die Rietvleidam Natuurreservaat, Pretoria. Stad Tshwane Metropolitaanse Munisipaliteit Verslag, Pretoria.

Van Wyk, S. & Bredenkamp, G.J. 1986. ‘n Braun-Blanquet klassifikasie van die plantegroei van die Abe Bailey Natuurreservaat. South African Journal of Botany 52: pp 321-331.

Van Wyk, B-E. & Smith, G. 1996. Guide to the Aloes of South Africa. Briza Publications, Pretoria.

Van Wyk, B. 1997. Grassland: The most threatened Biome in South Africa. Ongepubliseer, Pretoria.

Van Wyk, B. & Malan, S. 1988. Veldgids tot die veldblomme van die Witwatersranden Pretoria gebied. Struik Uitgewers, Kaapstad.

Venter, C.E., Bredenkamp, G.J. & Grundlingh, P-L. 2003. Short-term vegetation change on rehabilitated peatland on Rietvlei Nature Reserve. Koedoe 46/1: pp53-63.

Viljoen, A. 1979. Die Plantekologie van die Sandveld Natuurreservaat, Hoopstad. MSc. Thesis, University of the Free State, Bloemfontein.

Werger, M.J.A. 1973. Phytosociology of the upper Orange River Vally: A syntaxonomical and synecological study. DSc. Dissertation. University of Nijmegen, Nijmegen.

Werger, M.J.A. 1974. On concepts and techniques applied in the Zürich-Montpellier methods of vegetation survey. Bothalia, 11(3): 309-323.

Westhoff, V. & Van Der Maarel, E. 1978. The Braun-Blanquet approach. In: Wittaker, R.H. (ed.) Classification of plant communities. Junk, The Hague, pp 287-399. ISBN 90-6193-566-0.

APPENDIX A: BIRD LIST

Bird List of Rietvlei Nature Reserve, Pretoria

Habitats:

OG: Open Grassland and Rocky outcrops
R&M: Reeds, Marsh and Vlei
R: River
RB&P: Riverine Bush and Plantations
AT: Acacia Woodland
OW: Open Water and Pans (including shoreline)

Possibility of occurrence at Rietvlei N/R in specific habitat

H: High
M: Medium
L: Low
X: Highly unlikely
B: Occurrence when breeding

Rr.	SCIENTIFIC NAME	ENGLISH	AFRIKAANS	HABITAT					
				OG	R&M	R	RB&P	AT	OW
1	*Struthio camelus*	Common Ostrich	Volstruis	H	X	X	X	H	X
6	*Podiceps cristatus*	Great Crested Grebe	Kuifkopdobbertjie	X	X	X	X	X	H
7	*Podiceps nigricollis*	Black-necked Grebe	Swartnekdobbertjie	X	X	L	X	X	H
8	*Tachybaptus ruficollis*	Little Grebe (Dabchick)	Kleindobbertjie	X	X	H	X	X	H
55	*Phalacrocorax lucidus*	White-breasted Cormorant	Witborsduiker	X	X	M	X	X	H
58	*Phalacrocorax africanus*	Reed Cormorant	Rietduiker	X	X	H	X	X	H
60	*Anhinga rufa*	African Darter	Slanghalsvoël	X	X	H	X	X	H
62	*Ardea cinerea*	Grey Heron	Bloureier	L	M	M	B	X	H
63	*Ardea melanocephala*	Black-headed Heron	Swartkopreier	H	B	L	B	L	M
64	*Ardea goliath*	Goliath Heron	Reusereier	X	X	L	B	X	H
65	*Ardea purpurea*	Purple Heron	Rooireier	L	H	H	B	X	H
66	*Egretta alba*	Great Egret	Grootwitreier	X	B	L	B	B	H
67	*Egretta garzetta*	Little Egret	Kleinwitreier	X	B	H	B	X	H
68	*Egretta intermedia*	Yellow-billed Egret	Geelbekwitreier	L	B	X	B	X	H
69	*Egretta ardesiaca*	Black Heron	Swartreier	X	B	L	B	X	H
71	*Bubulcus ibis*	Cattle Egret	Veereier (Bosluisvoël)	H	B	M	B	M	M
72	*Ardeola ralloides*	Squacco Heron	Ralreier	X	B	L	B	X	H
74	*Butorides striatus*	Green-backed Heron	Groenrugreier	X	B	H	B	X	H
76	*Nycticorax nycticorax*	Black-crowned Night-Heron	Gewone Nagreier	X	H	H	H	X	M
78	*Ixobrychus minutus*	Little Bittern	Kleinrietreier (Woudapie)	X	H	M	M	X	L
81	*Scopus umbretta*	Hamerkop	Hamerkop	L	L	H	B	X	H
83	*Ciconia ciconia*	White Stork	Witooievaar	H	M	M	L	L	X
84	*Ciconia nigra*	Black Stork	Grootswartooievaar	L	X	X	X	X	L
85	*Ciconia abdimii*	Abdim's Stork	Kleinswartooievaar	H	X	X	X	X	L
90	*Mycteria ibis*	Yellow-billed Stork	Nimmersat	X	X	X	X	X	L
91	*Threskiornis aethiopicus*	African Sacred Ibis	Skoorsteenveër	L	H	H	B	X	H
93	*Plegadis falcinellus*	Glossy Ibis	Glansibis	X	H	L	B	X	H
94	*Bostrychia hagedash*	Hadeda Ibis	Hadeda	M	H	H	H	M	H
95	*Platalea alba*	African Spoonbill	Lepelaar	X	M	L	X	X	H
96	*Phoenicopterus ruber*	Greater Flamingo	Grootflamink	X	X	X	X	X	L
97	*Phoenicopterus minor*	Lesser Flamingo	Kleinflamink	X	X	X	X	X	L
99	*Dendrocygna viduata*	White-faced Duck	Nonnetjie-eend	X	B	M	X	X	H
100	*Dendrocygna bicolor*	Fulvous Duck	Fluiteend	X	B	L	X	X	L
101	*Thalassornis leuconotus*	White-backed Duck	Witrugeend	X	B	L	X	X	L
102	*Alopochen aegyptiacus*	Egyptian Goose	Kolgans	X	L	M	B	X	H
103	*Tadorna cana*	South African Shelduck	Kopereend	X	X	X	X	X	L
104	*Anas undulate*	Yellow-billed Duck	Geelbekeend	X	H	H	B	X	H

Rr.	SCIENTIFIC NAME	ENGLISH	AFRIKAANS	HABITAT					
				OG	R&M	R	RB&P	AT	OW
105	*Anas sparsa*	African Black Duck	Swarteend	X	X	H	B	X	L
106	*Anas capensis*	Cape Teal	Teeleend	X	X	X	X	X	H
107	*Anas hottentota*	Hottentot Teal	Gevlekte Eend	X	X	X	X	X	H
108	*Anas erythrorhyncha*	Red-billed Teal	Rooibekeend	X	X	X	X	X	H
112	*Anas smithii*	Cape Shoveler	Kaapse Slopeend	X	L	L	X	X	H
113	*Netta erythrophthalma*	Southern Pochard	Bruineend	X	B	L	X	X	H
115	*Sarkidiornis melanotos*	Comb (Knobbilled) Duck	Knobbeleend	X	X	X	X	X	L
116	*Plectropterus gambensis*	Spur-winged Goose	Wildemakou	L	M	X	X	X	M
117	*Oxyura maccoa*	Maccoa Duck	Bloubekeend	X	X	X	X	X	L
923	*Anas platyrhynchos*	Mallard	Groenkopeend	X	L	L	X	X	L
118	*Sagittarius serpentarius*	Secretarybird	Sekretarisvoël	H	X	X	X	M	X
122	*Gyps coprotheres*	Cape Vulture	Kransaasvoël	L	X	X	X	X	X
123	*Gyps africanus*	White-backed Vulture	Witrugaasvoël	L	X	X	X	X	X
126	*Milvus migrans*	Black Kite	Swartwou	L	L	L	X	L	L
940	*Milvus aegyptius*	Yellow-billed Kite	Geelbekwou	H	H	H	L	H	L
127	*Elanus caeruleus*	Black-shouldered Kite	Blouvalk	H	L	X	X	H	L
128	*Aviceda cuculoides*	African Cuckoo Hawk	Koekoekvalk	L	X	X	L	L	X
129	*Macheiramphus alcinus*	Bat Hawk	Vlermuisvalk	L	X	L	L	L	L
131	*Aquila verreauxii*	Verreaux's (Black) Eagle	Witkruisarend	L	X	X	X	X	X
135	*Aquila wahlbergi*	Wahlberg's Eagle	Bruinarend	L	X	X	M	M	X
139	*Lophaetus occipitalis*	Long-crested Eagle	Langkuifarend	M	X	X	H	L	X
142	*Circaetus cinereus*	Brown Snake-Eagle	Bruinslangarend	L	X	X	M	L	X
143	*Circaetus pectoralis*	Black-chested Snake-Eagle	Swartborsslangarend	M	X	X	M	M	X
148	*Haliaeetus vocifer*	African Fish-Eagle	Visarend	X	X	L	B	X	H
149	*Buteo vulpinus*	Steppe Buzzard	Bruinjakkalsvoël	M	X	X	H	H	X
156	*Accipiter ovampensis*	Ovambo Sparrowhawk	Ovambosperwer	X	X	H	H	M	X
157	*Accipiter minullus*	Little Sparrowhawk	Kleinsperwer	L	X	H	H	M	X
158	*Accipiter melanoleucus*	Black Sparrowhawk	Swartsperwer	X	X	L	H	L	X
164	*Circus aeruginosus*	Western (Eurasian) Marsh-Harrier	Europese Vleivalk	L	L	X	X	X	X
165	*Circus ranivorus*	African Marsh-Harrier	Afrikaanse Vleivalk	L	L	X	X	X	X
166	*Circus pygargus*	Montagu's Harrier	Blouvleivalk	L	L	X	X	X	X
167	*Circus macrourus*	Pallid Harrier	Witborsvleivalk	L	L	X	X	X	X
169	*Polyboroides typus*	African Harrier-Hawk (Gymnogene)	Kaalwangvalk	M	X	L	H	M	X
170	*Pandion haliaetus*	Osprey	Visvalk	X	X	X	X	X	L
171	*Falco peregrinus*	Peregrine Falcon	Swerfvalk	L	X	X	L	L	X
172	*Falco biarmicus*	Lanner Falcon	Edelvalk	L	X	X	L	L	X
173	*Faclo subbuteo*	Eurasian Hobby (Falcon)	Europese Boomvalk	L	L	L	L	L	L
174	*Falco cuvierii*	African Hobby (Falcon)	Afrikaanse Boomvalk	L	L	L	L	L	L
178	*Falco vespertinus*	(Western) Red-footed Falcon	Westelike Rooipootvalk	L	X	X	X	X	X
180	*Falco amurensis*	Amur Falcon (E. Redf. Kestrel)	Oostelike Rooipootvalk	H	X	X	X	X	X
181	*Falco rupicolis*	Rock Kestrel	Kransvalk	M	X	X	X	X	X
182	*Falco rupicoloides*	Greater Kestrel	Grootrooivalk	H	X	X	X	X	X
183	*Falco naumanni*	Lesser Kestrel	Kleinrooivalk	H	X	X	X	X	X
188	*Peliperdix coqui*	Coqui Francolin	Swempie	H	X	X	X	H	X
193	*Scleroptila levaillantoides*	Orange River Francolin	Kalaharipatrys	H	X	X	X	M	X
199	*Pternistes swainsonii*	Swainson's Spurfowl	Bosveldfisant	H	X	X	M	H	L
200	*Coturnix coturnix*	Common Quail	Afrikaanse Kwartel	M	L	X	X	L	X
201	*Coturnix delegorguei*	Harlequin Quail	Bontkwartel	L	L	X	X	X	X
203	*Numida meleagris*	Helmeted Guineafowl	Gewone Tarentaal	H	L	X	H	H	M
208	*Anthropoides paradisea*	Blue Crane	Bloukraanvoël	L	X	X	X	X	X
209	*Balearica regulorum*	Grey Crowned Crane	Mahem	L	X	X	X	X	X

Rr.	SCIENTIFIC NAME	ENGLISH	AFRIKAANS	HABITAT					
				OG	R&M	R	RB&P	AT	OW
210	*Rallus caerulescens*	African Rail	Grootriethaan	X	H	X	X	X	M
212	*Crecopsis egregia*	African Crake	Afrikaanse Riethaan	L	L	X	X	X	L
213	*Amaurornis flavirostris*	Black Crake	Swartriethaan	X	H	M	L	X	M
217	*Sarothrura rufa*	Red-chested Flufftail	Rooiborsvleikuiken	X	M	X	X	X	X
223	*Porphyrio madagascariensis*	African Purple Swamphen (P. Gallinule)	Grootkoningriethaan	X	H	X	X	X	M
226	*Gallinula chloropus*	Common Moorhen	Grootwaterhoender	X	M	H	X	X	H
228	*Fulica cristata*	Red-knobbed Coot	Bleshoender	X	L	L	X	X	H
229	*Podica senegalensis*	African Finfoot	Watertrapper	X	X	M	B	X	X
231	*Neotis denhami*	Denham's (Stanley's) Bustard	Veldpou	L	X	X	X	X	X
233	*Eupodotis barrowii*	Barrow's (S. Whitebellied) Korhaan	Witpenskorhaan	M	X	X	X	X	X
234	*Eupodotis caerulescens*	Blue Korhaan	Bloukorhaan	L	X	X	X	X	X
941	*Eupodotis afraoides*	Northern Black Korhaan	Witvlerkkorhaan	H	X	X	X	M	X
240	*Actophilornis africanus*	African Jacana	Grootlangtoon	X	L	X	X	X	L
242	*Rostratula benghalensis*	Greater Painted-snipe	Goudsnip	X	L	X	X	X	L
245	*Charadrius hiaticula*	Common Ringed Plover	Ringnekstrandkiewiet	X	L	X	X	X	L
248	*Charadrius pecuarius*	Kittlitz's Plover	Geelborsstrandkiewiet	M	X	X	X	X	M
249	*Charadrius tricollaris*	Three-banded Plover	Driebandstrandkiewiet	X	H	M	X	X	H
255	*Vanellus coronatus*	Crowned Lapwing	Kroonkiewiet	H	L	X	X	H	H
258	*Vanellus armatus*	Blacksmith Lapwing	Bontkiewiet	H	H	M	X	L	H
260	*Vanellus senegallus*	African Wattled Lapwing	Lelkiewiet	H	H	L	X	M	H
262	*Arenaria interpres*	Ruddy Turnstone	Steenloper	X	X	X	X	X	L
264	*Actitis hypoleucos*	Common Sandpiper	Gewone Ruiter	X	L	M	X	X	H
265	*Tringa ochropus*	Green Sandpiper	Witgatruiter	X	L	X	X	X	L
266	*Tringa glareola*	Wood Sandpiper	Bosruiter	L	H	M	X	X	H
269	*Tringa stagnatilis*	Marsh Sandpiper	Moerasruiter	X	L	X	X	X	M
270	*Tringa nebularia*	Common Greenshank	Groenpootruiter	X	M	X	X	X	H
272	*Calidris ferruginea*	Curlew Sandpiper	Krombekstrandloper	X	H	X	X	X	H
274	*Calidris minuta*	Little Stint	Kleinstrandloper	X	M	X	X	X	H
284	*Philomachus pugnax*	Ruff	Kemphaan	X	H	X	X	X	H
286	*Gallinago nigripennis*	African (Ethiopian) Snipe	Afrikaanse Snip	X	H	X	X	X	M
294	*Recurvirostra avosetta*	Pied Avocet	Bontelsie	X	L	X	X	X	L
295	*Himantopus himantopus*	Black-winged Stilt	Rooipootelsie	X	L	X	X	X	M
297	*Burhinus capensis*	Spotted Thick-knee (Dikkop)	Gewone Dikkop	H	L	X	L	H	M
300	*Cursorius temminckii*	Temminck's Courser	Trekdrawwertjie	M	X	X	X	X	L
303	*Rhinoptilus chalcopterus*	Bronze-winged Courser	Bronsvlerkdrawwertjie	L	X	X	X	L	X
305	*Glareola nordmanni*	Black-winged Pratincole	Swartvlerksprinkaanvoël	M	X	X	X	X	L
315	*Larus cirrocephalus*	Grey-headed Gull	Gryskopmeeu	X	X	M	X	X	H
322	*Sterna caspia*	Caspian Tern	Reusesterretjie	X	X	X	X	X	L
338	*Chlidonias hybridus*	Whiskered Tern	Witbaardsterretjie	X	X	X	X	X	M
339	*Chlidonias leucopterus*	White-winged Tern	Witvlerksterretjie	X	X	X	X	X	M
348	*Columba livia*	Rock Dove (Feral Pigeon)	Tuinduif	L	L	L	L	L	L
349	*Columba guinea*	Speckled (Rock) Pigeon	Kransduif	M	X	L	X	L	L
350	*Columba arquatrix*	African Olive-Pigeon (Rameron Pigeon)	Geelbekbosduif	X	X	X	L	X	X
352	*Streptopelia semitorquata*	Red-eyed Dove	Grootringduif	H	L	M	H	H	M
354	*Streptopelia capicola*	Cape Turtle-Dove	Gewone Tortelduif	H	L	H	H	H	H
355	*Streptopelia senegalensis*	Laughing Dove	Rooiborsduifie	H	L	H	H	H	H
356	*Oena capensis*	Namaqua Dove	Namakwaduifie	M	X	X	X	X	X
366	*Psittacula krameri*	Rose-ringed Parakeet	Ringnekparkiet	X	X	X	L	X	X
373	*Corythaixoides concolor*	Grey Go-away-bird	Kwêvoël	M	X	X	H	H	X
374	*Cuculus canorus*	Common (Eurasian) Cuckoo	Europese Koekoek	X	X	L	L	L	X

Rr.	SCIENTIFIC NAME	ENGLISH	AFRIKAANS	HABITAT					
				OG	R&M	R	RB&P	AT	OW
375	*Cuculus gularis*	African Cuckoo	Afrikaanse Koekoek	X	X	L	L	L	X
377	*Cuculus solitarius*	Red-chested Cuckoo	Piet-my-vrou	X	X	X	M	H	X
378	*Cuculus clamosus*	Black Cuckoo	Swartkoekoek	L	X	X	M	M	X
381	*Clamator levaillantii*	Levaillant's (Striped) Cuckoo	Gestreepte Nuwejaarsvoël	X	X	X	M	M	X
382	*Clamator jacobinus*	Jacobin Cuckoo	Bontnuwejaarsvoël	X	X	X	L	L	X
385	*Chrysococcyx klaas*	Klaas's Cuckoo	Meitjie	L	X	X	L	L	X
386	*Chrysococcyx caprius*	Diderick Cuckoo	Diederikkie	H	H	H	H	H	H
391	*Centropus burchellii*	Burchell's Coucal	Gewone Vleiloerie	M	H	H	H	M	L
392	*Tyto alba*	Barn Owl	Nonnetjie-uil	H	L	L	H	H	L
393	*Tyto capensis*	African Grass-Owl	Grasuil	M	H	X	X	X	L
395	*Asio capensis*	Marsh Owl	Vlei-uil	H	H	X	X	M	M
397	*Ptilopsus granti*	Southern White-faced Scops-Owl	Witwanguil	X	X	X	X	L	X
398	*Glaucidium perlatum*	Pearl-spotted Owlet	Witkoluil	X	X	X	X	L	X
401	*Bubo africanus*	Spotted Eagle-Owl	Gevlekte Ooruil	H	X	L	H	H	M
404	*Caprimulgus europaeus*	European Nightjar	Europese Naguil	H	X	X	M	M	X
405	*Caprimulgus pectoralis*	Fiery-necked Nightjar	Afrikaanse Naguil	L	X	X	L	L	X
406	*Caprimulgus rufigena*	Rufous-cheeked Nightjar	Rooiwangnaguil	H	X	X	H	H	X
412	*Apus barbatus*	African Black Swift	Swartwindswael	L	X	X	X	X	L
415	*Apus caffer*	White-rumped Swift	Witkruiswindswael	H	X	H	H	H	H
416	*Apus horus*	Horus Swift	Horuswindswael	X	X	X	X	X	L
417	*Apus affinis*	Little Swift	Kleinwindswael	H	X	H	H	H	H
418	*Tachymarptis melba*	Alpine Swift	Witpenswindswael	L	X	X	X	X	X
421	*Cypsiurus parvus*	African Palm-Swift	Palmwindswael	H	H	H	H	H	H
424	*Colius striatus*	Speckled Mousebird	Gevlekte Muisvoël	L	X	L	H	H	X
425	*Colius colius*	White-backed Mousebird	Witkruismuisvoël	L	X	X	L	L	X
426	*Urocolius indicus*	Red-faced Mousebird	Rooiwangmuisvoël	M	X	X	H	H	X
428	*Ceryle rudis*	Pied Kingfisher	Bontvisvanger	X	X	H	X	X	H
429	*Megaceryle maxima*	Giant Kingfisher	Reusevisvanger	X	X	H	X	X	M
430	*Alcedo semitorquata*	Half-collared Kingfisher	Blouvisvanger	X	X	H	X	X	X
431	*Alcedo cristata*	Malachite Kingfisher	Kuifkopvisvanger	X	M	H	M	X	H
433	*Halcyon senegalensis*	Woodland Kingfisher	Bosveldvisvanger	X	X	X	L	L	X
435	*Halcyon albiventris*	Brown-hooded Kingfisher	Bruinkopvisvanger	X	X	X	H	H	X
438	*Merops apiaster*	European Bee-eater	Europese Byvreter	H	L	L	H	H	M
443	*Merops bullockoides*	White-fronted Bee-eater	Rooikeelbyvreter	M	L	M	H	M	X
444	*Merops pusillus*	Little Bee-eater	Kleinbyvreter	L	L	L	M	L	X
446	*Coracias garrulus*	European Roller	Europese Troupant	L	X	X	X	L	X
447	*Coracias caudata*	Lilac-breasted Roller	Gewone Troupant	L	X	X	X	L	X
449	*Coracias naevia*	Purple Roller	Groottroupant	L	X	X	X	L	X
451	*Upupa africana*	African Hoopoe	Hoephoep	H	X	X	M	H	X
452	*Phoeniculus purpureus*	Green (Redbilled) Wood-Hoopoe	Rooibekkakelaar	L	X	X	H	H	X
454	*Rhinopomastus cyanomelas*	Common Scimitarbill	Swartbekkakelaar	X	X	X	L	L	X
457	*Tockus nasutus*	African Grey Hornbill	Grysneushoringvoël	L	X	X	M	M	X
464	*Lybius torquatus*	Black-collared Barbet	Rooikophoutkapper	L	X	X	H	H	X
465	*Tricholaema leucomelas*	Acacia Pied Barbet	Bonthoutkapper	L	X	X	M	M	X
470	*Pogoniulus chryscocus*	Yellow-fronted Tinkerbird	Geelblestinker	L	X	L	L	M	X
473	*Trachyphonus vaillantii*	Crested Barbet	Kuifkophoutkapper	L	X	X	H	H	X
474	*Indicator indicator*	Greater Honeyguide	Grootheuningwyser	L	X	X	L	L	X
476	*Indicator minor*	Lesser Honeyguide	Kleinheuningwyser	M	X	X	H	H	X
478	*Prodotiscus regulus*	Brown-backed (Sharpbilled) Honeybird	Skerpbekheuningvoël	M	X	X	M	M	X
483	*Campethera abingoni*	Golden-tailed Woodpecker	Goudstertspeg	X	X	X	L	L	X
486	*Dendropicos fuscescens*	Cardinal Woodpecker	Kardinaalspeg	L	X	X	H	H	X

Rr.	SCIENTIFIC NAME	ENGLISH	AFRIKAANS	HABITAT					
				OG	R&M	R	RB&P	AT	OW
489	*Jynx ruficollis*	Red-throated Wryneck	Draaihals	M	X	X	H	H	X
492	*Mirafra cheniana*	Melodious Lark	Spotlewerik	L	X	X	X	X	X
494	*Mirafra africana*	Rufous-naped Lark	Rooineklewerik	H	X	X	X	H	X
495b	*Mirafra apiata*	Eastern Clapper Lark	Kaapse Klappertjie	H	X	X	X	X	X
506	*Chersomanes albofasciata*	Spike-heeled Lark	Vlaktelewerik	H	X	X	X	X	X
507	*Calandrella cinerea*	Red-capped Lark	Rooikoplewerik	M	X	X	X	X	X
515	*Eremopterix leucotis*	Chestnut-backed Sparrowlark	Rooiruglewerik	L	X	X	X	L	X
518	*Hirundo rustica*	Barn (European) Swallow	Europese Swael	H	H	H	H	H	H
520	*Hirundo albigularis*	White-throated Swallow	Witkeelswael	L	L	H	L	X	H
523	*Hirundo dimidiata*	Pearl-breasted Swallow	Pêrelborsswael	H	H	H	M	M	H
526	*Hirundo cucullata*	Greater Striped Swallow	Grootstreepswael	H	M	H	H	H	H
527	*Hirundo abyssinica*	Lesser Striped Swallow	Kleinstreepswael	M	L	H	M	L	M
528	*Hirundo spilodera*	South African Cliff-Swallow	Familieswael	M	L	M	L	L	L
529	*Hirundo fuligula*	Rock Martin	Kransswael	L	L	M	L	L	L
530	*Delichon urbica*	Common House-Martin	Huisswael	L	L	L	L	L	L
532	*Riparia riparia*	Sand Martin	Europese Oewerswael	L	L	L	L	L	L
533	*Riparia paludicola*	Brown-throated Martin	Afrikaanse Oewerswael	L	H	H	X	X	H
534	*Riparia cincta*	Banded Martin	Gebande Oewerswael	H	H	X	X	L	L
538	*Campephaga flava*	Black Cuckooshrike	Swartkatakoeroe	X	X	X	H	M	X
541	*Dicrurus adsimilis*	Fork-tailed Drongo	Mikstertbyvanger	M	X	X	M	M	X
545	*Oriolus larvatus*	Black-headed Oriole	Swartkopwielewaal	X	X	X	L	L	X
547	*Corvus capensis*	Cape Crow	Swartkraai	L	L	L	L	L	X
548	*Corvus albus*	Pied Crow	Witborskraai	H	X	X	H	H	M
552	*Parus cinerascens*	Ashy Tit	Akasiagrysmees	H	H	H	L	L	X
554	*Parus niger*	Southern Black Tit	Gewone Swartmees	X	X	X	L	L	X
557	*Anthoscopus minutus*	Cape Penduline-Tit	Kaapse Kapokvoël	X	X	X	L	L	X
560	*Turdoides jardineii*	Arrow-marked Babbler	Pylvlekkatlagter	L	X	X	H	M	X
567	*Pycnonotus nigricans*	African Red-eyed Bulbul	Rooioogtiptol	L	X	X	L	L	X
568	*Pycnonotus tricolor*	Dark-capped (Blackeyed) Bulbul	Swartoogtiptol	M	M	H	H	H	M
576	*Turdus libonyanus*	Kurrichane Thrush	Rooibeklyster	X	X	L	M	L	X
577.2	*Turdus smithi*	Karoo Thrush	Bruinlyster	L	X	H	H	L	X
580	*Psophocichla litsipsirupa*	Groundscraper Thrush	Gevlekte Lyster	L	X	X	L	L	X
586	*Oenanthe monticola*	Mountain Wheatear (Chat)	Bergwagter	L	X	X	X	L	X
587	*Oenanthe pileata*	Capped Wheatear	Hoëveldskaapwagter	H	X	X	X	X	X
589	*Cercomela familiaris*	Familiar Chat	Gewone Spekvreter	L	X	X	M	M	X
595	*Myrmecocichla formicivora*	Anteating Chat	Swartpiek	H	X	X	X	L	X
596	*Saxicola torquata*	African Stonechat	Gewone Bontrokkie	H	H	X	L	H	H
601	*Cossypha caffra*	Cape Robin-Chat	Gewone Janfrederik	H	H	H	H	H	L
602	*Cossypha humeralis*	White-throated Robin-Chat	Witkeeljanfrederik	L	X	X	L	L	X
613	*Cercotrichas leucophrys*	White-browed Scrub-Robin	Gestreepte Wipstert	L	X	X	L	L	X
619	*Sylvia borin*	Garden Warbler	Tuinsanger	L	X	X	H	H	X
620	*Sylvia communis*	Common Whitethroat	Witkeelsanger	X	X	X	L	L	X
621	*Parisoma subcaeruleum*	Chestnut-vented Tit-Babbler	Bosveldtjeriktik	L	X	X	H	H	X
628	*Acrocephalus arundinaceus*	Great Reed-Warbler	Grootrietsanger	X	H	X	H	X	X
631	*Acrocephalus baeticatus*	(African Marsh) African Reed-Warbler	Kleinrietsanger	X	H	M	L	X	X
633	*Acrocephalus palustris*	(Eurasian) Marsh Warbler	Europese Rietsanger	X	L	X	H	X	X
634	*Acrocephalus schoenobaenus*	(Eurasian) Sedge Warbler	Europese Vleisanger	X	M	X	X	X	X
635	*Acrocephalus gracilirostris*	(Cape Reed) Lesser Swamp-Warbler	Kaapse Rietsanger	X	H	X	X	X	X
637	*Chloropeta natalensis*	Dark-capped Yellow Warbler	Geelsanger	X	H	L	M	X	X
638	*Bradypterus baboecala*	(African Sedge) Little Rush-Warbler	Kaapse Vleisanger	X	H	X	X	X	X
643	*Phylloscopus trochilus*	Willow Warbler	Hofsanger	H	M	H	H	H	X

Rr.	SCIENTIFIC NAME	ENGLISH	AFRIKAANS	HABITAT					
				OG	R&M	R	RB&P	AT	OW
645	*Apalis thoracica*	Bar-throated Apalis	Bandkeelkleinjantjie	L	X	X	L	X	X
651	*Sylvietta rufescens*	Long-billed Crombec	Bosveldstompstert	L	X	X	L	L	X
948	*Camaroptera brevicaudata*	Grey-backed Camaroptera	Grysrugkwêkwêvoël	X	X	X	L	X	X
661	*Sphenoeacus afer*	Cape Grassbird	Grasvoël	H	H	L	L	X	L
664	*Cisticola juncidis*	Zitting (Fantailed) Cisticola	Landeryklopkloppie	H	H	X	X	L	H
665	*Cisticola aridulus*	Desert Cisticola	Woestynklopkloppie	H	L	X	X	X	X
666	*Cisticola textrix*	Cloud Cisticola	Gevlekte Klopkloppie	H	X	X	X	X	X
667	*Cisticola ayresii*	Wing-snapping (Ayres's) Cisticola	Kleinste Klopkloppie	H	X	X	X	X	X
670	*Cisticola lais*	Wailing Cisticola	Huiltinktinkie	H	X	X	X	L	X
672	*Cisticola chinianus*	Rattling Cisticola	Bosveldtinktinkie	L	X	X	L	M	X
677	*Cisticola tinniens*	Levaillant's Cisticola	Vleitinktinkie	L	H	X	X	X	X
679	*Cisticola aberrans*	Lazy Cisticola	Luitinktinkie	H	X	X	X	L	X
681	*Cisticola fulvicapillus*	Neddicky	Neddikkie	L	L	X	H	H	X
683	*Prinia subflava*	Tawny-flanked Prinia	Bruinsylangstertjie	L	H	H	H	L	H
685	*Prinia flavicans*	Black-chested Prinia	Swartbandlangstertjie	H	L	L	H	H	X
689	*Muscicapa striata*	Spotted Flycatcher	Europese Vlieëvanger	X	L	X	H	M	X
694	*Melaenornis pammelaina*	Southern Black Flycatcher	Swartvlieëvanger	X	X	X	L	L	X
698	*Sigelus silens*	Fiscal Flycatcher	Fiskaalvlieëvanger	L	X	X	H	H	X
701	*Batis molitor*	Chinspot Batis	Witliesbosbontrokkie	X	X	X	L	L	X
706	*Stenostira scita*	Fairy Flycatcher	Feevlieëvanger	H	X	X	H	H	X
710	*Terpsiphone viridis*	African Paradise-Flycatcher	Paradysvlieëvanger	L	X	X	H	M	X
713	*Motacilla capensis*	Cape Wagtail	Gewone Kwikkie	L	H	H	L	X	H
714	*Motacilla flava*	Yellow Wagtail	Geelkwikkie	L	L	X	X	X	X
716	*Anthus cinnamomeus*	African (Grassveld) Pipit	Gewone Koester	H	X	X	X	X	M
717	*Anthus similes*	Long-billed Pipit	Nicholsonse Koester	L	X	X	X	X	X
718	*Anthus leucophrys*	Plain-backed Pipit	Donkerkoester	L	X	X	X	X	X
719	*Anthus vaalensis*	Buffy Pipit	Vaalkoester	L	X	X	X	X	L
727	*Macronyx capensis*	Cape (Orangethroated) Longclaw	Oranjekeelkalkoentjie	H	H	X	X	X	H
731	*Lanius minor*	Lesser Grey Shrike	Gryslaksman	H	L	L	H	H	X
732	*Lanius collaris*	Common Fiscal	Fiskaallaksman	H	M	L	H	H	H
733	*Lanius collurio*	Red-backed Shrike	Rooiruglaksman	L	X	X	L	L	X
736	*Laniarius ferrugineus*	Southern Boubou	Suidelike Waterfiskaal	X	L	M	H	L	X
739	*Laniarius atrococcineus*	Crimson-breasted Shrike	Rooiborslaksman	L	X	X	H	H	X
740	*Dryoscopus cubla*	Black-backed Puffback	Sneeubal	L	X	X	H	H	X
741	*Nilaus afer*	Brubru	Bontroklaksman	X	X	X	L	L	X
743	*Tchagra australis*	Brown-crowned (Threestr.) Tchagra	Rooivlerktjagra	L	X	X	M	M	X
744	*Tchagra senegala*	Black-crowned Tchagra	Swartkroontjagra	M	X	X	H	H	X
746	*Telophorus zeylonus*	Bokmakierie	Bokmakierie	H	X	X	H	H	X
751	*Malaconotus blanchoti*	Grey-headed Bush-Shrike	Spookvoël	X	X	X	L	L	X
753	*Prionops plumatus*	White-crested (White) Helmet-Shrike	Withelmlaksman	X	X	X	L	L	X
758	*Acridotheres tristis*	Common Myna	Indiese Spreeu	H	H	H	H	H	H
759	*Spreo bicolour*	Pied Starling	Witgatspreeu	H	M	X	X	M	L
760	*Creatophora cinerea*	Wattled Starling	Lelspreeu	L	X	X	L	L	X
761	*Cinnyricinclus leucogaster*	Violet-backed (Plumcol.) Starling	Witborsspreeu	X	X	X	L	L	X
764	*Lamprotornis nitens*	Cape Glossy Starling	Kleinglansspreeu	H	X	X	H	H	X
769	*Onychognathus morio*	Red-winged Starling	Rooivlerkspreeu	L	X	X	L	L	X
772	*Buphagus erythrorhynchus*	Red-billed Oxpecker	Rooibekrenostervoël	L	L	L	L	L	L
787	*Cinnyris talatala*	White-bellied Sunbird	Witpenssuikerbekkie	L	L	L	H	H	L
792	*Chalcomitra amethystina*	Amethyst (Black) Sunbird	Swartsuikerbekkie	L	L	L	H	H	L
796	*Zosterops pallidus*	Cape White-eye	Kaapse Glasogie	M	M	H	H	H	L
801	*Passer domesticus*	House Sparrow	Huismossie	X	X	X	X	X	X

Rr.	SCIENTIFIC NAME	ENGLISH	AFRIKAANS	HABITAT					
				OG	R&M	R	RB&P	AT	OW
803	*Passer melanurus*	Cape Sparrow	Gewone Mossie	H	M	X	H	H	M
804	*Passer diffusus*	Southern Grey-headed Sparrow	Gryskopmossie	M	X	X	H	H	X
807	*Amblyospiza albifrons*	Thick-billed Weaver	Dikbekwewer	X	M	X	M	X	X
811	*Ploceus cucullatus*	Village (Spottedbacked) Weaver	Bontrugwewer	X	L	X	L	X	X
813	*Ploceus capensis*	Cape Weaver	Kaapse Wewer	X	M	X	M	X	X
814	*Ploceus velatus*	Southern Masked-Weaver	Swartkeelgeelvink	M	H	H	H	H	H
820	*Anomalospiza imberbis*	Cuckoo Finch	Koekoekvink	L	L	X	X	X	X
821	*Quelea quelea*	Red-billed Quelea	Rooibekkwelea	H	H	M	H	H	H
824	*Euplectes orix*	Southern Red Bishop	Rooivink	M	H	L	M	L	H
826	*Euplectes afer*	Yellow-crowned (Golden) Bishop	Goudgeelvink	M	H	L	X	X	X
829	*Euplectes albonotatus*	White-winged Widowbird	Witvlerkflap	M	H	L	H	M	M
831	*Euplectes ardens*	Red-collared Widowbird	Rooikeelflap	M	H	L	H	M	M
832	*Euplectes progne*	Long-tailed Widowbird	Langstertflap	H	H	X	X	X	M
834	*Pytilia melba*	Green-winged Pytilia (Melba Finch)	Gewone Melba	X	X	X	L	L	X
841	*Lagonosticta rhodopareia*	Jameson's Firefinch	Jamesonse Vuurvinkie	L	M	M	H	L	L
844	*Uraeginthus angolensis*	Blue Waxbill	Gewone Blousysie	L	X	X	L	M	X
846	*Estrilda astrild*	Common Waxbill	Rooibeksysie	M	H	M	H	L	H
852	*Ortygospiza atricollis*	African Quailfinch	Gewone Kwartelvinkie	H	H	X	X	X	H
854	*Amandava subflava*	Orange-breasted Waxbill	Rooiassie	M	H	X	X	X	H
856	*Amadina erythrocephala*	Red-headed Finch	Rooikopvink	L	X	X	L	L	X
857	*Lonchura cucullata*	Bronze Mannikin	Gewone Fret	L	H	X	H	L	X
860	*Vidua macroura*	Pin-tailed Whydah	Koningrooibekkie	M	H	X	H	H	M
867	*Vidua chalybeata*	Village Indigobird (Steelblue W/finch)	Staalblouvinkie	L	L	X	L	L	X
869	*Serinus mozambicus*	Yellow-fronted (-eyed) Canary	Geeloogkanarie	L	H	X	H	H	X
870	*Serinus atrogularis*	Black-throated Canary	Bergkanarie	H	M	X	H	H	M
881	*Serinus gularis*	Streaky-headed Seedeater	Streepkopkanarie	L	L	X	H	H	X
885	*Emberiza capensis*	Cape Bunting	Rooivlerkstreepkoppie	L	X	X	X	X	X
886	*Emberiza tahapisi*	Cinnamon-breasted (Rock) Bunting	Klipstreepkoppie	L	X	X	X	X	X
	Number of listed possible species: 319 **Number of confirmed species: 272**								

APPENDIX B: MAMMAL LIST

THE MAMMALS OF RIETVLEI NATURE RESERVE

Mammal species, which definitely occur, based on specimens collected and deposited in the Transvaal Museum, sight records or ecological and distributional parameters in spite of restrictions imposed by urban development. The conservation status of red data species are given in the first column, i.e. R = Rare, V = Vulnerable, I = Indeterminate.

	SCIENTIFIC NAME	**COMMON NAME**
	Myosorex varius	Forest shrew
I	*Suncus infinitesimus*	Least dwarf shrew
	Suncus varilla	Lesser dwarf shrew
	Crocidura mariquensis	Swamp musk shrew
	Crocidura cyanea	Reddish-grey musk shrew
	Crocidura silacea	Peters' musk shrew
	Crocidura hirta	Lesser red musk shrew
R	*Atelerix frontalis*	Hedgehog
V	*Chrysospalax villosus*	Rough-haired golden mole
	Taphozous mauritianus	Tomb bat
	Tadarida aegyptiaca	Egyptian free-tailed bat
	Eptesicus capensis	Cape serotine bat
	Scotophilus dinganii	Yellow house bat
	Scotophilus borbonicus	Lesser yellow house bat
	Nycteris thebaica	Common slit-faced bat
	Rhinolophus clivosus	Geoffroy's horseshoe bat
	Rhinolophus darlingi	Darling's horseshoe bat
I	*Rhinolophus blasii*	Peak-saddle horseshoe bat
	Rhinolophus simulator	Bushveld horseshoe bat
	Galago moholi	Bushbaby
	Cercopithecus aethiops	Vervet monkey
	Manis temminckii	Pangolin
	Lepus capensis	Cape hare
	Lepus saxatilis	Scrub hare
	Cryptomys hottentotus	Common mole rat
	Hystrix africaeaustralis	Cape porcupine
	Pedetes capensis	Springhare
	Graphiurus murinus	Woodland dormouse
	Thryonomys swinderianus	Greater cane rat
	Otomys angoniensis	Angoni vlei rat
	Otomys irroratus	Vlei rat
	Rhabdomys pumilio	Striped mouse
	Mus musculus	House mouse
	Mus indutus	Desert pygmy mouse
	Mus minutoides	Pygmy mouse
	Mastomys coucha	Natal multimammate mouse
	Aethomys chrysophilus	Red veld rat

	SCIENTIFIC NAME	COMMON NAME
	Rattus rattus	House rat
	Tatera brantsii	Highveld gerbil
V	*Mystromys albicaudatus*	White-tailed rat
	Dendromus melanotis	Grey pygmy climbing mouse
	Dendromus mystacalis	Chestnut climbing mouse
R	*Proteles cristatus*	Aardwolf
R	*Hyaena brunnea*	Brown hyaena
	Acinonyx jubatus	Cheetah
R	*Panthera pardus*	Leopard
V	*Felis lybica*	African wild cat
	Leptailurus serval	Serval
	Caracal caracal	Caracal
	Felis catus	Domestic cat
	Canis mesomelas	Black-backed jackal
	Canis familiaris	Domestic dog
	Aonyx capensis	Cape clawless otter
R	*Poecilogale albinucha*	African weasel
	Ictonyx striatus	Striped polecat
R	*Civettictis civetta*	African civet
	Genetta genetta	Small-spotted genet
	Genetta tigrina	Large-spotted genet
	Suricata suricatta	Suricate
	Cynictis penicillata	Yellow mongoose
	Galerella sanguinea	Slender mongoose
	Ichneumia albicauda	White-tailed mongoose
	Atilax paludinosus	Water mongoose
V	*Orycteropus afer*	Aardvark
	Potamochoerus larvatus	Bush pig
	Connochaetes gnou	Black wildebeest
	Alcelaphus buselaphus	Red hartebeest
	Sylvicapra grimmia	Common duiker
	Damaliscus dorcas phillipsis	Bluebook
V	*Ourebia ourebi*	Oribi
	Antidorcas marsupialis	Springbok
	Raphicerus campestris	Steenbok
	Tragelaphus oryx	Common Eland
	Redunca fulvorufula	Mountain reedbuck
	Equus burchellii	Plains zebra
R	*Ceratotherium simum*	Square-lipped (white) rhinoceros
	Hippopotamus amphibius	Common hippopotamus
	Syncerus caffer caffer	Cape buffalo
	Kobus ellipsiprymnus	Waterbuck
	Redunca arundinum	Common reedbuck
	Otocyon megalotis	Bat-eared fox
	Procavia capensis	Hyrax

APPENDIX C: INDIGENOUS AND EXOTIC PLANT LIST

Scientific Names	**Common English Names**	**Afrikaans Names**
Abildgaardia ovata		
Abrus laevigatus		
Acacia caffra	Common hook thorn	Gewone haakdoring
Acacia decurrens	Green wattle	Groenwattel
Acacia karroo	Sweet thorn	Soetdoring
Acacia mearnsii	Black wattle	Swartwattel
Acalypha angustata	Copper leaf	Katpisbossie
Acalypha caperonioides		
Achyranthus aspera	**Chaff flower**	**Langklits**
Acrotome hispida	White cat's paws	
Agrimonia procera	Agrimony	Geelklits
Agrostis eriantha var *planifolia A Red Data*		
Agrostis lachnantha var *lachnantha*	Bent grass	Vink-agrostis
Albuca setosa		Slymuintjie
Alloteropsis semialata subsp *semialata*	Blackseed grass	Donkersaadgras
Aloe greatheadii var *davyana*		Kleinaalwyn
Aloe zebrine		
Alysicarpus rugosus subsp *perennirufus*	Pioneer fodder plant	
Amaranthus hybridus subsp. *hybridus*	Common pigweed	Kaapse misbredie
Androcymbium melanthioides var *melanthioides*	Pajama flower	Patrysblom
Andropogon schirensis	Stab grass	Tweevingergras
Anthephora pubescens	Wool grass	Borseltjiegras
Anthospermum rigidum subsp *pumulum*		
Anthospermum rigidum subsp *rigidum*		
Araujia sericifera	**Moth catcher**	**Motvanger**
Aristida adscensionis subsp *adscenscionis*	Annual threeawn	Eenjarige steekgras
Aristida bipartita	Rolling grass	Grootrolgras
Aristida canescens subsp *canescens*	Pale three-awn	Vaalsteekgras
Aristida congesta subsp *barbicollis*	Spreading threeawn grass	Witsteekgras
Aristida congesta subsp *congesta*	Tassle threeawn grass	Katstertsteekgras
Aristida diffusa subsp *burkei*	Iron grass	Ystergras
Aristida junciformis subsp *junciformis*	Ngongoni three-awn	Ngongoni steekgras
Aristida scabrivalvis subsp *scabrivalvis*	Purple three-awn	Perssteekgras
Aristida stipitata	Long awned three-awn	Langnaaldsteekgras
Artemisia afra	Wild wormwood	Wilde-als
Arundinella nepalensis	River grass	Riviergras
Asclepias adscendens	Pom-pom cartwheels	
Asclepias eminens	Large turret flower	
Asclepias gibba var *gibba*	Humped turret flower	
Asclepias stellifera	Meadow stars	
Asparagus cooperi		
Asparagus flavicaulis subsp *flavicaulis*		
Asparagus laricinus	Wild asparagus	Katbos
Asparagus suaveolens	Wild asparagus	Katdoring
Aspidoglossum lamellatum		
Aspidoglossum ovalifolium		
Asplenium cordatum	Rusty-back fern	
Aster harveyanus		Bloublommetjie
Aster peglerae		
Aster squamatus		
Athrixia elata	Wild tea	Bostee
Avena fatua	Common wild oats	Gewone wildehawer
Azolla filiculoides		
Babiana hypogea var *hypogea*		Bobbejaanuintjie

Scientific Names	**Common English Names**	**Afrikaans Names**
Barleria macrostegia		
Becium obovatum var *obovatum*	Cat's wiskers	Katsnor
Bergia decumbens		
Berkheya insignis		
Berkheya radula		Boesmanrietjie
Berkheya setifera		
Bewsia biflora	False love grass	Vals eragrostis
Bidens bipinnata	Spanish blackjack	Spaanse knapsekêrel
Bidens formosa	Cosmos	Kosmos
Bidens pilosa	Blackjack	Knapsekêrel
Blepharis innocua		
Blepharis squarrosa		
Blepharis stainbankiae		
Blumea dregeanoides		
Bonatea porrecta	Terrestrial orchid	Grondorgidie
Bonatea speciosa var *antennifera*		
Boophone disticha	Cape poison bulb	Seeroogblom gifbol
Brachiaria serrata	Velvet grass	Fluweelgras
Brachystelma barberae		
Platvoetaasblom		
Buddleja salviifolia	Sagewood	Saliehout
Bulbine capitata		
Bulbostylis burchellii		Biesie
Callilepis leptophylla	Wild daisy	Bergbitterbossie
Campuloclinium macrocephalum	**Pom pom weed**	**Pompombossie**
Canthium gilfillanii	Velvet rock alder	Fluweelklipels
Celtis africana	White stinkwood	Witstinkhout
Cephalaria zeyheriana	Mock scabious	
Chaetacanthus costatus		
Chamaecrista comosa var *capricornia*		
Chascanum hederaceum var *hederaceum*		
Cheilanthes hirta var *hirta*	Hairy lip fern	Harige lipvaring
Cheilanthes viridis var *glauca*	Blue cliff brake	Blou kransruigtevaring
Cheilanthes viridis var *viridis*	Cliff brake	Kransruigtevaring
Chenopodium album	White goosefoot	Wit hondebossie
Chenopodium carinatum	Green goosefoot	Groen hondebossie
Chironia palustris subsp *transvaalensis*		
Chironia purpurascens subsp *purpurascens*		
Chloris virgata	Feathertop chloris	Witpluim chloris
Chlorophytum bowkeri		
Chlorophytum cooperi		
Chlorophytum fasciculatum		
Chlorophytum tranvaalense		
Chortolirion angolense		
Ciclospermum leptophyllum	Wild celery	Wildeseldery
Cirsium vulgare	**Scotch thistle**	**Skotse dissel**
Clematis brachiata	Traveler's joy	Klimop
Clematis villosa subsp villosa		Pluimbossie veerbossie
Cleome monophylla		
Combretum erythrophyllum	River bushwillow	Rivier-vaderlandswilg
Commelina africana var *africana*		
Commelina africana var *krebsiana*		
Commelina africana var *lancispatha*		
Commelina benghalensis		Blouselblommetjie
Commelina erecta		
Commelina livingstonii		

Scientific Names	Common English Names	Afrikaans Names
Convolvulus sagittatus		
Conyza albida	Tall fleabane	Vaalskraalhans
Conyza canadensis	Horseweed fleabane	Kanadese skraalhans
Conyza pinnata		
Conyza podocephala		
Corchorus asplenifolius		
Corchorus confusus		
Crabbaea acaulis		
Crabbaea angustifolia		
Crabbaea hirsuta	Prickle head	
Crabbaea ovalifolia		
Crassula capitella subsp *nodulosa*		
Crassula lanceolata subsp *transvaalensis*		
Crassula setulosa var *setulosa*		
Crassula swaziensis subsp *swaziensis* var *swaziensis*		
Crepis hypochaeridea		
Crinum graminicola		Graslelie
Crotalaria brachycarpa		Jaagsiektebossie
Crotalaria sphaerocarpa subsp *sphaerocarpa*	Mealie crotolaria	Mielie crotolaria
Crotolaria lotoides		
Ctenium concinnum	Sickle grass	Sekelgras
Cucumis hirsutus	Wild cucumber	Suurkomkommer
Cucumis zeyheri	Wild cucumber	Wilde agurkie
Cuscuta campestris	**Dodder**	**Dodder**
Cussonia paniculata subsp *sinuata*	Highveld cabbage tree	Hoëveld kiepersol
Cyanotis speciosa	Doll's powder puff	Bloupoeierkwassie
Cyathula uncinulata		
Cycnium tubulosum	Pink ink plant	
Cymbopogon excavatus	Broadleaved turpentine grass	Breëblaar terpentyngras
Cynodon dactylon	Couch grass	Kweek
Cynoglossum hispidum	Hound's tongue	Ossetongblaar
Cyperus esculentus var *esculentus*		Yellow nutsedge
Cyperus fulgens var *fulgens*		
Cyperus laevigatus		
Cyperus obtusiflorus var *obtusiflorus*		Witbiesie
Cyperus sphaerospermus		Matjiesgoed
Dactyloctenium australe	LM Grass	LM Gras
Datura stramonium	**Common thorn apple**	**Olieboom**
Dianthus mooiensis subsp *mooiensis* var *mooiensis*	Wild pink	Wilde angelier
Diclis reptans	Dwarf snapdragon	
Dicoma anomala subsp *anomala*		Maagbitterwortel
Dicoma anomala subsp *gerrardii*		
Digitaria diagonalis var *diagonalis*	Brown-seed finger grass	Bruinsaadvingergras
Digitaria eriantha	Finger grass	Vingergras
Digitaria eylesii	Eyles' finger grass	Swartsaadtweevingergras
Digitaria monodactyla		
Diheteropogon amplectens	Broadleaved bluestem	Breëblaar blougras
Diheteropogon filifolius	Threadleaved bluestem	Smalblaar blougras
Dimorphotheca spectabilis		Blou bietou
Diospyros lycioides subsp *guerkei*	Bushveld bluebush	Bosveldbloubos
Dipcadi viride		Gifbolletjie slymuintjie
Drimia elata	.	Jeukbol
Drimia multisetosa		
Dryopteris athamantica		

Scientific Names	Common English Names	Afrikaans Names
Echinochloa colona	Jungle rice	Watergras
Ehretia rigida	Puzzle bush	Deurmekaarbos
Eleocharis dregeana	Finger sedge	
Elephantorrhiza elephantina	Elephant's root	Olifantswortel
Eleusine coracana subsp *africana*	Goose grass	Osgras
Elionurus muticus	Wire grass	Draadgras
Equisetum ramosissimum	Horse-tail fern	Perdestertvaring
Eragrostis capensis	Heartseed love grass	Hartjiesgras
Eragrostis chloromelas	Curly leaf	Krulblaar
Eragrostis curvula	Weeping love grass	Oulandsgras
Eragrostis gummiflua		
Eragrostis heteromera	Bronze love grass	Rooikopergras
Eragrostis inamoena	Tite grass	
Eragrostis lehmanniana var *lehmanniana*	Lehmann's love grass	Knietjiesgras
Eragrostis nindensis	Wether love grass	Hamelgras
Eragrostis patentipilosa	Footpath love grass	Voetpad eragrostis
Eragrostis plana	Tough love grass	Taaipoleragrostis
Eragrostis racemosa	Narrow heart love grass	Smalhartjiesgras
Eragrostis rigidior	Broad-leaved curly leaf	Breëkrulgras
Eragrostis superba	Sawtooth love grass	Weeluisgras
Eriosema burkei var *burkei*		
Eriosema psoraleoides		
Eriosema salignum	Narrow-leaved Eriosema	Smalblaar eriosema
Eriospermum cooperi var *cooperi*		
Eriospermum flagelliforme		
Eucalyptus camaldulensis	Red river gum	Rooibloekom
Eucalyptus sp		Bloekom
Euclea crispa subsp *crispa*	Blue guarri	Bloughwarrie
Eucomis autumnalis subsp *clavata*	Pineapple flower	Wilde pynappel
Eulophia hians var *hians*	Ground orchid	Grondorgidee
Eulophia hians var *nutans*	Ground orchid	Grondorgidee
Eulophia ovalis var *bainesii*		
Eulophia ovalis var *ovalis*		
Eulophia tuberculata		
Eulophia welwitschii		
Euphorbia clavaroides var *truncata*		Vingerpol
Euphorbia striata var *striata*		Melkgras
Eustachys paspaloides	Fan grass	Bruin hoenderspoor
Felicia muricata subsp *muricata*	White felicia	Blouheuning karooblom
Fimbristylis complanata		
Freesia grandiflora		
Galium capense subsp *garipense*		
Gazania krebsiana subsp *serrulata*	Common gazania	Botterblom
Geigeria burkei subsp *burkei* var *burkei*		Vermeersiektebossie
Geigeria burkei subsp *burkei* var *intermedia*		Vermeersiektebossie
Gerbera ambigua	Pink and white Gerbera	Griekwateebossie
Gerbera piloselloides	Yellow gerbera	Swartteebossie
Gerbera viridifolia subsp *viridifolia*		Griekwateebossie
Gladiolus crassifolius		
Gladiolus dalenii subsp *dalenii*	Wild gladiolus	Wildeswaardlelie
Gladiolus elliotii		
Gladiolus papilio		
Gladiolus permeabilis subsp *edulis*		Kleinaandblom
Gladiolus pretoriensis		
Gladiolus woodii		
Gnidia caffra		

Scientific Names	Common English Names	Afrikaans Names
Gnidia capitata		Kerrieblom
Gnidia microcephala		Besembossie
Gnidia sericocephala		
Gomphocarpus fruticosus subsp *fruticosus*	Milkweed	Melkbos
Gomphocarpus glaucophyllus		Bloumelkbos
Graderia scabra		
Graderia subintegra	Wild penstemon	
Grewia flava	Velvet raisin bush	Fluweelrosyntjiebos
Gunnera perpensa	River pumpkin	Rivierpampoen
Gymnosporia buxifolia	Spikethorn	Pendoring
Habenaria bicolor Near Threatened		
Habenaria epipactidea		
Habenaria kraenzliniana		
Haplocarpha lyrata		
Haplocarpha scaposa	False gerbera	Tonteldoosbossie
Harpochloa falx	Caterpillar grass	Ruspergras
Hebenstretia comosa		
Helichrysum aureonitens	Golden everlasting	Goue sewejaartjie
Helichrysum callicomum		
Helichrysum cephaloideum		
Helichrysum coriaceum		Vaalteebossie
Helichrysum dasymallum		
Helichrysum mundtii		
Helichrysum nudifolium var nudifolium[1]	Hottentot's tea	Hottentotstee
Helichrysum pilosellum		
Helichrysum rugulosum		
Helichrysum setosum	Yellow everlasting	Geelsewejaartjie
Helictotrichon turgidulum	Small oats grass	Klein hawergras
Hemarthria altissima	Swamp couch	Rooikweek
Hemizygia pretoriae subsp *pretoriae*	Dwarf sage bush	
Hermannia cordata		
Hermannia depressa	Creeping red Hermannia	Rooiopslag
Hermannia grandistipula		
Hermannia lancifolia		
Hermannia transvaalensis		
Heteropogon contortus	Spear grass	Assegaaigras
Hibiscus aethiopicus var *ovatus*	Common dwarf Hibiscus	
Hibiscus microcarpus		
Hibiscus pusillus	Dwarf hibiscus	
Hibiscus trionum		
Huernia hystrix var *hystrix*	Porcupine huernia	Ystervark-huernia
Hydrocotyle sp		
Hyparrhenia hirta	Common thatching grass	Dekgras
Hyparrhenia tamba	Blue thatching grass	Blou tamboekiegras
Hypericum aethiopicum subsp *zeyheri*	Small hypericum	Vlieëpisbossie
Hypericum lalandii	Spindly hypericum	Laland se sintjanskruid
Hyperthelia dissoluta	Yellow thatching grass	Geeltamboekiegras
Hypochoeris radicata	Hairy wild lettuce	Harige skaapslaai
Hypoxis acuminata		
Hypoxis argentea var *argentea*	Small yellow star flower	
Hypoxis colchicifolia	Broad-leaved Hypoxis	
Hypoxis hemerocallidea	Star flower	Gifbol
Hypoxis interjecta		
Hypoxis iridifolia		
Hypoxis multiceps		
Hypoxis rigidula var *pilosissima*	Silver-leaved star flower	Wilde tulp

Scientific Names	Common English Names	Afrikaans Names
Hypoxis rigidula var *rigidula*	Silver-leaved star flower	Wilde tulp
Imperata cylindrica	Cottonwool grass	Donsgras
Indigastrum burkeanum		
Indigofera adenoids		
Indigofera comosa		
Indigofera egens		
Indigofera filipes		
Indigofera hedyantha		Aambeibossie
Indigofera heterotricha		
Indigofera hilaris var *hilaris*	Red indigo bush	
Indigofera melanadenia		
Indigofera oxalidea		
Indigofera oxytropis		
Indigofera setiflora		
Indigofera zeyheri		
Ipomoea bathycolpos		Veldsambreeltjies
Ipomoea crassipes	Leafy-flowered Ipomoea	Wildewinde
Ipomoea oblongata		
Ipomoea ommaneyi		Beespatat
Ipomoea purpurea	Morning glory	Purperwide
Ipomoea simplex		
Ipomoea transvaalensis		
Jamesbrittenia aurantiaca	Cape saffron	Saffraanbossie
Justicia anagalloides		
Kalanchoe thyrsiflora	White lady	Geel plakkie
Kniphofia ensifolia subsp *ensifolia*		Vuurpyl
Kniphofia porphyrantha	Red-hot poker	Vuurpyl
Kohautia amatymbica	Tremble tops	
Kohautia lasiocarpa		
Kyllinga alba	White button sedge	Witbiesie
Kyllinga erecta var *erecta*		
Kyllinga melanosperma		
Lactuca inermis	Wild lettuce	
Lantana rugosa	Bird's brandy	Voëlbrandewyn
Ledebouria cooperi	Cooper's squill	
Ledebouria leptophylla sp nov.		
Ledebouria marginata		
Ledebouria ovatifolia		
Ledebouria revoluta	Common ledebouria	
Leersia hexandra	Wild rice grass	Wilderysgras
Lemna gibba	Duck weed	Damslyk
Leonotis ocymifolia	Wild dagga	Wildedagga
Leonotis randii		
Lepidium transvaalense		
Leucas martinicensis		
Limeum viscosum subsp *viscosum* var *viscosum*		
Limosella longiflora		
Lippia javanica	Fever tea	Koorsbossie
Lithops lesliei subsp *lesliei*		
Lotononis calycina	Hairy lotononis	
Lotononis eriantha		
Lotononis foliosa		
Lotononis laxa		
Lotononis listii		
Loudetia simplex	Russet grass	Stingelgras
Macledium zeyheri subsp *zeyheri*	Doll's protea	

Scientific Names	Common English Names	Afrikaans Names
Manulea parviflora var *parviflora*		
Mariscus congestus		
Melilotus alba	White sweet clover	Witstinkklawer
Melinis nerviglumis	Bristle leaf red top	Steekblaarblinkgras
Melinis repens subsp *repens*	Red top grass	
Menodora africana		Balbossie
Mentha aquatica		
Merremia palmata		
Microchloa caffra	Pincushion grass	Elsgras
Mimulus gracilis	Wild monkey flower	
Momordica balsamina		Laloentjie
Monocymbium ceresiiforme	Boat grass	Bootjiegras
Monopsis decipiens	Butterfly lobelia	Skoenlapperplant
Monsonia angustifolia	Crane's bill	Angelbossie
Monsonia burkeana		Naaldebossie
Moraea stricta		Bloutulp
Nemesia fruticans		Wilde leeubekkie
Neorautanenia ficifolius		
Nesaea sagittifolia var *sagittifolia*		
Nesaea schinzii		
Nidorella anomala		
Nidorella hottentotica		
Oenothera rosea	Pink evening primrose	Pienk aandblom
Oenothera tetraptera	White evening primrose	Witaandblom
Oldenlandia herbacea var *herbacea*		
Ornithogalum tenuifolium subsp *tenuifolium*		Bosui
Oxalis corniculata	Jimson weed	Steenboksuring
Oxalis depressa	Sorrel	Suring
Oxalis obliquifolia	Sorrel	Suring
Oxygonum dregeanum subsp *canescens* var *canescens*		
Pachycarpus schinzianus		Bitterwortel
Panicum deustum	Broad-leaved Panicum	Breëblaarbuffelsgras
Panicum natalense	Natal panicum	Suurbuffelsgras
Parinari capensis subsp *capensis*	Dwarf mobola	Grysappeltjie
Paspalum dilatatum	Common paspalum	Gewone paspalum
Paspalum scrobiculatum	Veld paspalum	Veldpaspalum
Paspalum urvillei	Giant paspalum	Langbeen-paspalum
Pavonia burchellii		
Pearsonia cajanifolia subsp *cajanifolia*		
Pearsonia sessilifolia subsp *sessilifolia*		Silwerertjietee
Pelargonium luridum	Stalkflowered pelonium	Wildemalva
Pellaea calomelanos var *calomelanos*	Black cliff brake	Swart kransruigtevaring
Pennisetum clandestinum	Kikuyu	Kikoejoe
Pentanisia angustifolia	Wild verbena	Sooibrandbossie
Pentarrhinum insipidum		Donkieperske
Persicaria decipiens		
Persicaria hydropiper		
Persicaria lapathifolia	Spotted knotweed	Hanekam
Peucedanum magalismontanum	Wild parsley	Wildepietersielie
Phragmitis australis		Fluitjiesriet
Phyllanthus glaucophyllus		
Phyllanthus incurvus		
Phyllanthus parvulus var *parvulus*	Dye bush	Kleurbossie
Physalis angulata	Wild gooseberry	Wilde appeliefie
Phytolacca octandra	Ink berry	Inkbessie

Scientific Names	Common English Names	Afrikaans Names
Plantago lanceolata	Buckhorn plantain	Small weëblaar
Plectranthus neochilus		
Pogonarthria squarrosa	Herring bone grass	Sekelgras
Pollichia campestris	Waxberry	Teesuikerbossie
Polygala amatymbica	Dwarf polygala	
Polygala hottentotta	Small purple broom	
Polygala rehmannii		
Polygala uncinata		
Populus alba	White poplar	Witpopulier
Portulaca quadrifida	Purslane	Porslein
Protea welwitschii subsp *welwitschii*	Honeyscented protea	Vaalsuikerbos
Psammotropha myriantha		
Pseudognaphalium luteo-album		
Pycreus macranthus		
Pygmaeothamnus chamaedendrum var *chamaedendrum*	Sand apple	Goorappel
Pygmaeothamnus zeyheri var *zeyheri*	Sand apple	Goorappel
Pyracantha angustifolia	Yellow fire thorn	Geelbranddoring
Ranunculus meyeri		
Ranunculus multifidus	Common buttercup	Geelbotterblom
Raphionacme hirsuta	Khadi root	Khadiwortel
Rhus dentata	Nana-berry	Nanabessie
Rhus discolor		Gwarrie
Rhus lancea	Karee	Karee
Rhus magalismontana subsp *magalismonta*	Rock currant	Klip-taaibos
Rhus pyroides var *gracilis*	Common wild currant	Taaibos
Rhus pyroides var *pyroides*	Common wild currant	Taaibos
Rhus rigida var *rigida*		Kliptaaibos
Rhus zeyheri	Blue currant	Blou taaibos
Rhynchosia crassifolia		
Rhynchosia minima var *prostrata*		
Rhynchosia monophylla		
Rhynchosia totta var *totta*	Yellow carpet bean	Tottabossie
Rhynchospora brownii		
Richardia brasiliensis	Tropical richardia	Tropiese richardia
Riocreuxia burchellii		
Robinia pseudoacacia	Black locust	Witakasia
Rotheca hirsuta		Small violet bush
Rumex crispus	Curley dock	Krultongblaar
Rumex sagittatus	Climbing sorrel	Rooisuring
Salix babylonica	Weeping willow	Treurwilg
Salvia runcinata		Wildesalie
Scabiosa columbaria	Wild scabiosa	Bitterbos
Scadoxus puniceus	Red paintbrush	Rooikwas mieliegifbol
Schistostephium crataegifolium	Golden flat flower	Bergkruie
Schizachyrium sanguineum	Red autumn grass	Rooi herfsgras
Schizobasis intricata		Volstruiskos
Schkuhria pinnata	Dwarf marigold	Klein kakiebos
Schoenoplectus corymbosis		
Scilla nervosa	Wild squill	Sandlelie
Scleria bulbifera		
Scolopia zeyheri	Thorn pear	Doringpeer
Sebaea leiostyla		
Sehima galpinii		
Selaginella dregei	Spike moss	Stekelmos
Selago densiflora		Koningstapyt

Scientific Names	Common English Names	Afrikaans Names
Selago tenuifolia		
Senecio affinis		
Senecio consanguineus	Starvation senecio	Hongerbos senecio
Senecio coronatus		Sybossie
Senecio erubescens var *crepidifolius*		
Senecio glanduloso-pilosus		
Senecio gregatus		
Senecio inaequidens	Canary weed	Geelopslag
Senecio inornatus		
Senecio isatideus	Dan's cabbage	Blouvleibossie
Senecio lydenburgensis		
Senecio othonniflorus		
Senecio scitus		
Senecio venosus		Besembossie
Setaria incrassata	Vlei bristle grass	Vleimannagras
Setaria nigrirostris	Black seed bristle grass	Swartsaadmannagras
Setaria pallida-fusca	Garden bristle grass	Tuin mannagras
Setaria sphacelata var *sericea*	Golden Bristle grass	Goue mannagras
Setaria sphacelata var *sphacelata*	Small creeping foxtail	Kleinkruipmannagras
Setaria sphacelata var *torta*	Creeping bristle grass	Kruipmannagras
Setaria verticillata		
Sida alba	Spiny sida	Stekeltaaiman
Sida dregei	Spider-leg	
Sida rhombifolia subsp *rhombifolia*	Arrow leaf Sida	Taaiman
Silene bellidioides		
Silene burchellii var *burchellii*	Gunpowder plant	Kruitbossie
Sium repandum	Water parsnip	
Solanum elaeagnifolium	**Silver-leaf bitter apple**	**Satansbos**
Solanum mauritianum	**Bugweed**	**Luisboom**
Solanum panduriforme	Poison apple	Gifappel
Solanum sisymbriifolium	**Wild tomato**	**Doringbitterappel**
Sonchus dregeanus		
Sonchus nanus		
Sonchus oleraceus	Sow thisle	Sydissel
Sonchus wilmsii	Milk thistle	Melkdissel
Sphenostylis angustifolius	Wild swetpea bush	Wilde ertjie
Sporobolus africanus	Rat's tail dropseed	Taaipol
Sporobolus fimbriatus	Bushveld dropseed	Bosveldfynsaadgras
Sporobolus pectinatus	Fringed dropseed	Kammetjiesgras
Sporobolus stapfianus	Fibrous dropseed	Veselfynsaadgras
Stiburus alopecuroides	Pongwa grass	Koperdraadgras
Seriphium plumosum	Bankrupt bush	Bankrotbos
Striga asiatica		
Striga bilabiata	Small witch weed	
Striga elegans		Rooiblom
Tagetes minuta	Tall khaki weed	Lang kakiebos
Talinum caffrum	Porcupine root	Ystervarkwortel
Tarchonanthus camporatus	Wild campher bush	Wildekanferbos
Tephrosia burchellii		
Tephrosia capensis var *capensis*		
Tephrosia elongata var *elongata*		
Tephrosia longipes subsp *longipes* var *longipes*		
Tephrosia rhodesica var *rhodesica*		
Tephrosia semiglabra		
Teucrium trifidum		Koorsbossie
Themeda triandra	Red grass	Rooigras

Scientific Names	Common English Names	Afrikaans Names
Thesium magalismontanum		
Thesium utile		Besembossie
Thunbergia atriplicifolia		
Tolpis capensis		
Trachyandra asperata var *nataglencoensis*		
Trachyandra saltii var *saltii*		
Trachypogon spicatus	Giant spear grass	Bokbaardgras
Tragus berteronianus	Common carrot-seed grass	Gewone wortelsaadgras
Triaspis hypericoides subsp *nelsonii*		Klapperbossie
Trichodesma physaloides	Chocolate bells	
Trichoneura grandiglumis var *grandiglumis*	Small rolling grass	Klein rolgras
Trifolium africanum var *lydenburgense*		
Triraphis andropogonoides	Broom needle grass	Perdegras
Tristachya biseriata	Trident grass	Drieblomgras
Tristachya leucothrix	Hairy trident grass	Harige drieblomgras
Tristachya rehmannii	Broom trident grass	Besem drieblomgras
Tritonia nelsonii		
Triumfetta sonderi		Maagbossie
Trochomeria macrocarpa subsp *macrocarpa*	Bobbejaankomkommer	
Typha capensis	Bulrush	Papkuil
Urelytrum agropyroides	Centipede quinine grass	Kinagras varkstertgras
Urochloa mosambicensis	Bushveld signal grass	Bosveldsinjaalgras
Urochloa panicoides	Garden signal grass	Tuin beesgras
Ursinia nana subsp *leptophylla*		Magriet
Vangueria infausta subsp *infausta*	Wild medlar	Wildemispel
Verbena bonariensis		Purple top
Verbena brasiliensis		
Vernonia galpinii		Kwasbossie
Vernonia natalensis	Silver vernonia	
Vernonia oligocephala	Cape vernonia	Blounaaldetee bossie
Vernonia poskeana		
Veronica anagallis-aquatica		
Vigna unguiculata subsp *stenophylla*		
Vigna vexillata var *vexillata*	Narrow-leaved wild pea	Wilde-ertjie
Wahlenbergia denticulata var *transvaalensis*		
Wahlenbergia epacridea		
Wahlenbergia undulata		
Xerophyta retinervis	Monkey's tail	Bobbejaanstert
Xysmalobium undulatum	Uzara	Bitterwortel
Zaluzianskya elongata		
Zinnia peruviana		Redstar zinnia
Ziziphus mucronata subsp *mucronata*	Buffalothorn	Blinkblaarwag'nbietjie
Ziziphus zeyheriana	Dwarf buffalothorn	Dwergblinkblaarwag'nbietjie
Zornia milneana		

Plants in **Bold** are Category 1 Invader plants (Henderson, 2001) and must be controlled.

APPENDIX D: HERPETOFAUNA LIST

List of Reptiles and Amphibians confirmed and expected (?) to occur on the Rietvlei Nature Reserve.

Scientific Names	Common Names	
CLASS : REPTILIA	**REPTILES**	
Order :CHELONIA	**TORTOISES**	
Suborder: PLEURODIRA	**Side-necked Terrapins**	
Family: Pelomedusidae	**Side-necked Terrapins**	
Pelomedusa subrufa	Helmeted Terrapin	
Suborder: Cryptodira	**Modern Tortoises**	
Family: Testudinidae	**Land Tortoises**	
Geochelone pardalis	Leopard Tortoise	
Order: SQUAMATA	**SCALE-BEARING REPTILES**	
Suborder: LACERTILIA	**LIZARDS**	
Family: Gekkonidae	**Geckos**	
Pachydactylus capensis	Cape Thick-toed Gecko	?
Pachydactylus affinis	Transvaal Thick-toed Gecko	
Lygodactylus capensis	Cape Dwarf Gecko	
Family :Agamidae	**Agamas**	
Agama aculeata distanti	Distant's Ground Agama	
Family: Scincidae	**Skinks**	
Mabuya capensis	Cape Skink	
Mabuya punctatissima	Speckled Skink	
Lygososma sundevallii	Writhing Skink	
Panaspis wahlbergi	Wahlberg's Snake-eyed Skink	
Acontias occidentalis	Western Leg-less Skink	?
Acontias gracilicauda	Slender-tailed Legless Skink	?
Family: Lacertidae	**Old World Lizards or Lacertids**	
Nucras holubi	Holub's Sandveld Lizard	
Nucras ornata	Ornate Sandveld Lizard	
Pedioplanis lineoocellata	Spotted Sand Lizard	
Ichnotropis capensis	Cape Rough-scaled Lizard	
Family: Gerrhosauridae	**Plated Lizards**	
Gerrhosaurus flavigularis	Yellow-throated Plated Lizard	
Family: Cordylidae	**Girdled Lizards**	
Chamaesaura aenea	Transvaal Grass Lizard	
Chamaesura anguina	Cape Grass Lizard	?
Cordylus vittifer	Transvaal Girdled Lizard	?
Family: Varanidae	**Monitor Lizards**	
Varanus albigularis	Rock or White-throated Monitor	
Varanus niloticus	Water or Nile Monitor	

Scientific Names	Common Names	
Suborder: SERPENTES	**SNAKES**	
Family: Typhlopidae	**Blind Snakes**	
Typhlops bibronii	Bibron's Blind Snake	
Rhinotyphlops lalandei	Delalande's Blind Snake	?
Family: Leptotyphlopidae	**Thread Snakes**	
Leptotyphlops conjunctus	Cape Thread Snake	
Leptotyphlops scutifrons	Peters' Thread Snake	
Leptotyphlops distanti	Distant's Thread Snake	?
Family: Atractaspididae	**African Burrowing Snakes**	
Atractaspis bibronii	Bibron's Stiletto Snake	
Aparallactus capensis	Cape Centipede-eater	
Amblyodipsas polylepis	Common Purple-glossed Snake	?
Family: Colubridae	**Typical Snakes**	
Lycodonomorphus rufulus	Brown Water Snake	
Lamprophis aurora	Aurora Snake	
Lamprophis inornatus	Olive House Snake	?
Lamprophis fuliginosus	Brown House Snake	
Lycophidion capense	Cape Wolf Snake	?
Duberria lutrix	Slug-eater	?
Pseudaspis cana	Mole Snake	
Psammophylax rhombeatus	Rhombic Skaapsteker	
Psammophylax tritaeniatus	Striped Skaapsteker	
Psammophis trinasalis	Fork-marked Sand Snake	
Psammophis brevirostris	Short-snouted Sand Snake	
Psamophis crucifer	Cross-marked Sand Snake	
Prosymna sundevallii	Sundevall's Shovel-snout	
Philothamnus hoplogaster	Green Water Snake	
Philothamnus occidentalis	Western Green Water Snake	
Philothamnus semivariegatus	Spotted Bush Snake	?
Crotaphopeltis hotamboeia	Red-lipped or Herald Snake	
Telescopus semiannulatus	Tiger Snake	?
Dispholidus typus	Boomslang	
Dasypeltis scabra	Rhombic Egg-eater	
Family: Elapidae	**Cobras, Mambas and others**	
Elapsoidea sundevallii media	Highveld Garter Snake	
Hemachatus haemachatus	Rinkals	
Naja annulifera	Snouted Cobra	
Naja mossambica	Mozambique Spitting Cobra	
Family: Viperidae	**Adders**	
Causus rhombeatus	Rhombic Night Adder	
Bitis arietans	Puff Adder	
CLASS: AMPHIBIA	**AMPHIBIANS**	
Order: ANURA	**FROGS**	
Family: Pipidae	**Clawed Frogs**	

Scientific Names	Common Names	
Xenopus laevis	Common Platanna	
Family: Bufonidae	**Toads**	
Bufo gutturalis	Guttural Toad	
Bufo rangeri	Raucous Toad	
Bufo poweri	Western Olive Toad	
Schismaderma carens	Red Toad	
Family: Microhylidae	**Rain Frogs**	
Breviceps adspersus	Bushveld Rain Frog	
Family: Ranidae	**Common Frogs**	
Afrana angolensis	Common River Frog	
Tomopterna cryptotis	Tremolo Sad Frog	
Tomopterna natalensis	Natal Sand Fog	
Strongylopus fasciatus	Striped Stream Frog	
Phrynobatrachus natalensis	Snoring Puddle Frog	
Cacosternum boettgeri	Common Caco	
Pyxicephalus adspersus	Giant African Bullfrog	
Family: Hyperoliidae	**Reedfrogs**	
Kasssina senegalensis	Bubbling Kassina	

APPENDIX E: GRAVES ON RIETVLEI NATURE RESERVE

A.Michiel Christiaan Elardus Erasmus
12/09/1849 – 08/06/1895

B. Petrus Jacobus van Staden
27/05/1888 – 30/07/1918

C. Cecilia Moodie
20/06/1842 – 10/11/1905

D. Jacob Willem van Reenen
22/02/1846 – 04/06/1916

APPENDIX F: OLD FARMHOUSE AND OUTBUILDINGS

APPENDIX G: BRAUN-BLANQUET DATA FORM

BRAUN-BLANQUET DATA FORM

RELEVé NR.: _____ GPS ref.: _____

DATE: _____ District: _____

Locality: _____

SPECIES:	BB-value	SPECIES:	BB-value
1		54	
2		55	
3		56	
4		57	
5		58	
6		59	
7		60	
8		61	
9		62	
10		63	
11		64	
12		65	
13		66	
14		67	
15		68	
16		69	
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			
43			
44			
45			
46			
47			
48			
49			
50			
51			
52			
53			

Veg. type (Low & Rebelo, 1996)_____

Land type: _____

Altitude (m)_____

Physiognomy:_____

Dom. spp.:_____

_____

_____

Aspect: N, NE, E, SE, S, SW, W, NW.

Slope: Flat (0-3), Gradual (3-8), Moderate (8-16), Steep (16-26), Very steep (26-45), 45°

Exposure:full sun(1), semi-shade(2), full shade (3)

Topogr. pos :Plain (1),Foot slope (2), Mid-slope (3), Shoulder (4), Plateau (5)

Geomorphology: Convex, Concave, Flat.

Topogr.: Mountain, hill, ridge, summit, cliff, ravine, valley, plain, donga, vlei, pan, floodplain, dune, river-bed, river-bank. _____

Geology: _____

Outcrop: _____

% area covered by rock:_____

Size of rock:Gravel(10mm), stones(10-50mm) rocks (50-200mm), boulders (200mm)

Degree of surf.eros.:None(1),moderate(2),high(3)

Crust formation: _____Drainage._____

Biotic influence:_____

Levels of trampling: None(1), moderate(2), high(3)

Soil form:_____Soil fam :_____

Soil sample no.:_____

Soil depth (mm):_____

Tot. % canopy cover:_____

" " " Large trees (6m):_____

" " " Small trees (2-6m):_____

" " " Shrubs: (2m):_____

" " " Forbs: _____

General notes: (management, utilisation, etc.)

_____

_____