FLORISTIC ANALYSIS

OF THE

VOGELGAT NATURE RESERVE

CAPE PROVINCE

SOUTH AFRICA

CHERYL DE LANGE

1992

Thesis presented for the Degree of
Master of Science
University of Cape Town

Supervisor: Prof Eugéne Moll

Pillansia templemanii L. Bolus

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I would like to thank Dr and Mrs Ian Williams for all their encouragement during this study and assistance in identifying sub-standard plant specimens, as well as Vogelgat Nature Reserve for financial support. Furthermore, thanks must go to Dr Niel Fairall and the Flora Committee of the Specialist Services Branch of the Department of Nature and Environmental Conservation, for their encouragement, without which I would never have come this far.

CONTENTS

1 INTRODUCTION

Vogelgat Nature Reserve is situated approximately 10 km east from the centre of Hermanus, in the Kleinrivier Mountains (latitude 34°22'45"S and 34°24'20"S; longitude 19°17'45"E and 19°19'45"E; Fig 1) and covers an area of 603 ha. The altitude varies from 10 m at the bottom of the kloof near the "Old Gate" in the south, to 805 m at "Beacon Head", in the north (Fig 2).

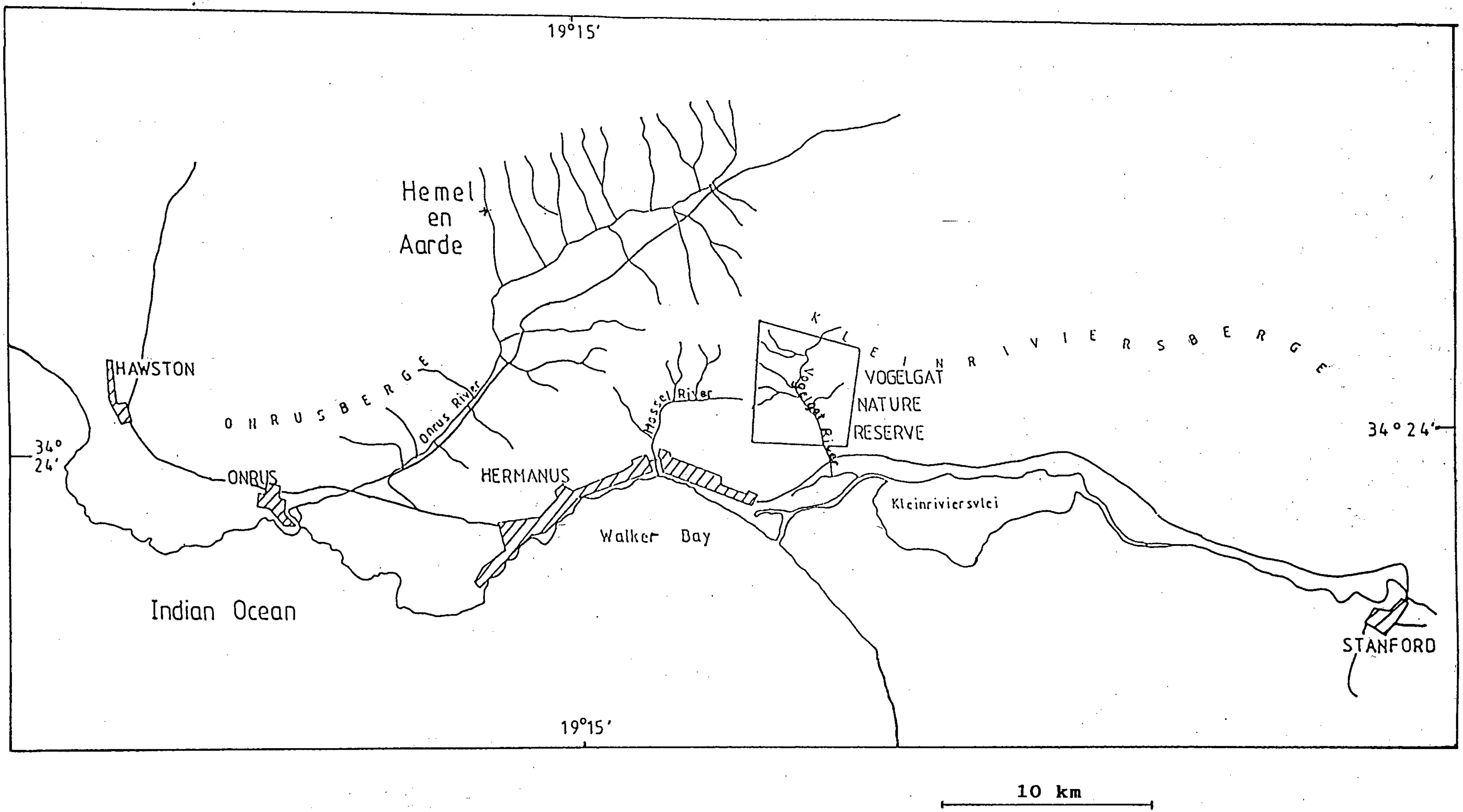
The vegetation of the Kleinrivier Mountains falls within the fynbos biome and was one of the areas used by Acocks to describe his veld type 69, fynbos (Acocks 1975).

The objectives of this study were to:

a) compile a checklist of the Reserve;
b) determine species richness;
c) compare to species richness of other fynbos reserves;
d) categorize species according to their survival mechanisms (Noble and Slayter 1980; Bell *et al.* 1984).

The Reserve falls into Climatic Region M (Schulze *et al.* 1978) in that it experiences a Mediterranean type climate. The winter months are characterized by hot, dry winds coming from the interior known locally as "Berg winds". These winds can lead to an increase in temperatures of over 10°C within a few hours (Fuggle 1981; Jackson *et al.* 1971), and are

Fig 1: Location of Reserve



responsible for the phenomenon of the highest absolute temperatures often being recorded during winter. These winds often coincide with the passing of cold fronts and are often associated with winter rains (Jackson *et al.* 1971).

Due to the Reserve's mountainous nature, and predominantly southerly aspect, rain is experienced throughout the year. A rain gauge at "Quark House" has been in operation on the Reserve since February 1981 (Fig 2). The mean annual rainfall measured over the eight years, 1981 to 1988, has been 1 035 mm (Table 1).

Table 1: Mean monthly rainfall (mm) data for Quark House (1981 - 1988).

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
73	80	87	79	78	121	99	93	128	80	53	64	1 035

2 METHODS

Plants have been actively collected on the Reserve since 1972, the main collector being Dr Ian Williams. One set of these specimens has been housed in a local herbarium specially built for the Reserve, and another at the Bolus (BOL) Herbarium. The specimens were mainly identified by the staff at the Bolus Herbarium, but some have also been identified at the National Herbarium in Pretoria. The nomenclature conforms to Gibbs Russell *et al.* (1987). A few alien species have become naturalized in the Reserve and have been included in the check list (Appendix 1).

3 RESULTS AND DISCUSSION

An overall analysis of the flora and comparison to the Cape of Good Hope Nature Reserve is given in Table 2.

Table 2: The relationship between the number of families, genera and species of Pteridophytes, Monocotyledons and Dicotyledons of the Vogelgat (VG) and Cape of Good Hope (GH) Nature Reserves.

	Pteridophyta				Monocotyledons				Dicotyledons				Total	
	Number		% total		Number		% total		Number		% total			
	VG	GH	VG	GH	VG	GH	VG	GH	VG	GH	VG	GH	VG	GH
Families	12	5	12,2	5,8	19	15	19,4	17,2	67	67	68,4	77,0	98	87
Genera	16	7	4,8	1,8	108	137	32,2	34,7	210	251	62,9	63,5	334	395
Species	22	8	2,7	0,7	279	408	34,8	37,4	501	675	62,5	61,9	802	1091

The ratio of monocot to dicot species is 1:1.79. This is slightly higher than that for the Cape Point Nature Reserve (1:1,65)(Taylor 1984), but lower that for the Cape Peninsula (1:2.02)(Adamson & Salter 1950). It is also lower than that recorded by Boucher (1977)(1:2,00) for the Cape Hangklip area.

In the Reserve, over half the total species recorded (54 %) occur in the first eight families, or 9 % of the total families (Table 3). These figures are almost exactly the same as those found by Taylor (1984) at the Cape of Good Hope Nature Reserve (CGHNR). As was found at CGHNR, 25 families (26 %)

contribute more than 1 % of the species. In species richness and distribution of species in families, these two reserves are very similar.

Table 3: Synopsis of families whose species contribute 1 % or more towards the total number of species, together with the total number of genera in each family.

Family	Species total	Species %	Genera total	Genera %
Asteraceae	89	10,7	41	11,5
Iridaceae	63	7,6	16	4,5
Ericaceae	61	7,3	6	1,7
Fabaceae	57	6,9	19	5,4
Orchidaceae	48	5,8	15	4,2
Restionaceae	42	5,1	12	3,4
Poaceae	38	4,6	22	6,2
Cyperaceae	36	4,3	12	3,4
Proteaceae	28	3,4	11	3,1
Campanulaceae	19	2,3	8	2,3
Bruniaceae	14	1,7	6	1,7
Apiaceae	14	1,7	4	1,1
Lobeliaceae	13	1,6	3	0,8
Santalaceae	12	1,4	3	0,8
Rutaceae	11	1,3	5	1,4
Asphodelaceae	10	1,2	4	1,1
Thymelaeaceae	10	1,2	3	0,8
Scrophulariaceae	9	1,1	9	2,5
Selaginaceae	9	1,1	6	1,7
Mesembryanthemae	9	1,1	4	1,1
Geraniaceae	9	1,1	2	0,6
Crassulaceae	9	1,1	2	0,6
Oxalidaceae	9	1,1	1	0,3
Hyacinthaceae	8	1,0	5	1,4
Polygalaceae	8	1,0	2	0,6

From Table 4 it can be seen that only one genus encountered in the Reserve has 15 or more species compared to the nine recorded at Cape Point and 14 at Cape Hangklip.

Table 4: Genera with 10 species or more, in order of numerical importance

Genus or Genera	No Species per Genera
Erica	52
Restio, Disa	14
Ficinia, Aspalathus, Indigofera	13
Tetraria, Thesium, Senecio	10

4 SYSTEMATIC LIST

The families of Pteridophyta are arranged according to Schelpe (1969) and the Angiosperm families according to Dyer (1975, 1976) and Gibbs Russell *et al.* (1984, 1987). Family names and spelling are as given by Gibbs Russell *et al.* (1984, 1987) except for new names allowed by the International Code of Botanical Nomenclature (Stafleu *et al.* 1978). In these cases the new names are given first followed by the old under the column "Notes".

Subspecific taxa are included where specimens were determined to this level. Genera and species are arranged alphabetically within each family. Collection numbers of each species is given.

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A PHYTOSOCIOLOGICAL SURVEY

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CONTENTS

1 INTRODUCTION

Fynbos areas are coming under increasing pressure from society in terms of recreation, water supplies and the cut flower trade (Wildlife Society of Southern Africa 1980). As more areas of fynbos disappear and become degraded, particularly in the south-western Cape, it is vitally important that those areas which have been set aside for conservation are managed in the best way possible to ensure their long term survival.

The Vogelgat Nature Reserve's objective is to maintain the greatest possible species diversity and to ensure the long-term survival of the Reserve's ecosystems. In the fynbos biome fire and alien plant eradication are the main management tools used to meet this objective. To make optimum use of fires it is necessary to know how a specific community will react to a particular fire regime, and hence the need to know what vegetation types occur on the Reserve.

The objectives of this study were:

(i) to identify, describe and classify the Coastal Mountain fynbos and remnant forest communities occurring on the Reserve;

(ii) to map the plant communities of the Reserve;

(iii) to relate the plant communities to selected habitat factors, apart from edaphic factors, namely altitude, aspect and topography.

1.1 STUDY AREA

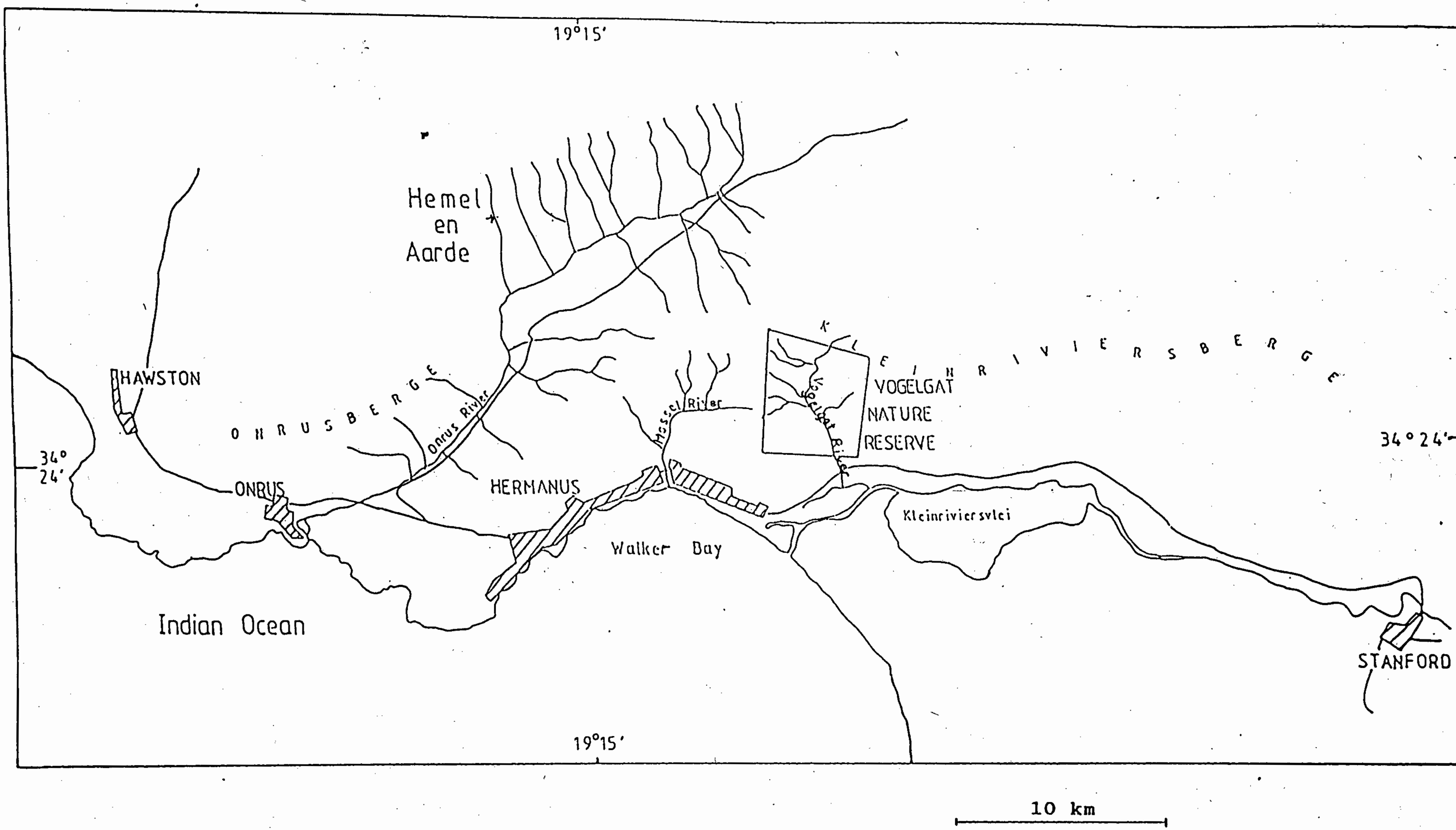
The study was carried out on a private nature reserve, Vogelgat, situated approximately 10 km east from the center of Hermanus, in the Kleinrivier Mountains (34°24′S and 19°18′ E; Fig 1). The Reserve covers an area of 603 ha, varying in altitude from 10 m in the kloof near the "Old Gate" in the south, to 805 m at "Beacon Head", in the north (Fig 2).

The mountain fynbos of the Kleinrivier Mountains falls within the fynbos biome (Kruger 1978) and Acocks veld type 69, fynbos (Acocks 1975). The area experiences a mediterranean type climate with most rain falling between May and September, summers generally being hot and dry (Schulze *et al.* 1978). Hot, dry, north-easterly winds, locally known as "Berg winds", are common during winter. The soils are typically those of the Table Mountain Group, being sandy, stoney, infertile and acidic (Taylor 1978).

1.2 HISTORY OF THE RESERVE

The farm, Vogelgat, has a recorded history of sheep grazing from 1873 until the late nineteen sixties. No records were kept regarding frequency or seasons in which the area was burnt nor as to when, and intensity grazed. It appears that the mountains were mainly used as a route to bring sheep to the harbour at Hermanus for export. As the sheep were grazed on the

Fig 1: Location of Reserve



plains in the Caledon district, there would have been little grazing by sheep while they crossed over the mountain. Since records are not available as to the state of the vegetation prior to this practice, it is difficult to determine the damage done. Acocks, while undertaking his vegetation survey, regarded the area as being in sufficiently pristine condition to be used in his description of veld type 69, fynbos, including a photograph of the Reserve under this vegetation type (Acocks 1975).

The Hermanus Municipality erected a number of wiers in the main kloof of the farm in 1940. The water was used to supply Hermanus until 1945 when the Fernkloof dams were completed. The vegetation was not deliberately burnt in an attempt to increase run-off, but wild fires did occur. The wiers are still present, and are in a fairly good state of repair. The Municipality has retained the water rights of the Reserve.

The Reserve was purchased in 1969 by Dr Ian Williams, and declared a private nature reserve in 1971 by the Cape Department of Nature Conservation, and in 1985 a Natural Heritage Site (Number 5).

1.3 GEOLOGY AND GEOMORPHOLOGY

The Reserve falls into the Cape Fold Belt, signs of which can clearly be seen in the walls of the main kloof. A fault line, with breccia, traverses the north-western corner of the Reserve.

The predominant geological formation is the Peninsula Formation (C_1Q_2) interspersed with narrow belts of the Cedarberg Formation (C_1S_2) in association with the Pakhuis Formation (C_1G). All are of the Table Mountain Series and belong to the Cape System (Geological Survey 1966).

The Pakhuis and Cedarberg Formations cross the Reserve in an east-west direction, dividing the Reserve approximately into two. Another small outcrop occurs near Beacon Head (Fig 2). Contained within the Pakhuis Formation are a number of pebbles, some with striations indicating a possible glacial origin. In places the combined thickness of the Pakhuis and Cedarberg Formations average less than 60 m (Trusswell 1977).

1.4 TOPOGRAPHY

A deep kloof with almost vertical, inaccessible cliffs, is the main feature of the Reserve. At between 300 m and 500 m a plateau area runs in a horse-shoe formation around this kloof. Along the northern and eastern borders there are higher peaks reaching up to 700 m, and loose boulder screes which in places support forest vegetation.

Most streams in the Reserve are perennial and well vegetated. The main stream flows in a south-westerly direction, drops into the kloof by means of a waterfall where it turns southward, eventually emptying into the Kleinrivier Vlei south of the Reserve's boundary. Other tributaries join it at various points along its route, most of which are also perennial.

1.5 CLIMATE

The Reserve falls into Climatic Region M (Schulze *et al.* 1978) in that it experiences a Mediterranean type climate with most rain falling from May to September and summers are warm to hot and dry.

Little climatic data are available for the mountainous terrain in the south-western Cape. One rain gauge is situated within the Reserve. Approximately 10 km to the west, on the northern slopes of the Kleinrivierberge, Department of Agriculture have established a weather station at Oude Hemel en Aarde (34°21'S, 19°14'E; 243 m; Fig 1).

1.5.1 Wind

Almost no information is available on wind conditions in mountain areas. Kruger (1974) reported wind speeds of 3,6 m/s in Jakkalsrivier catchment compared to the lowlands of 3,13 m/s at the Worcester Veld Reserve.

Winds are characteristic of the area with few calm days (pers observ). In summer they are mainly south-east to southerly, with sea breezes reinforcing the southerly gradient, resulting in winds reaching maximum velocities in the early afternoon (Fuggle 1981). Winter conditions are dominated by south-west to north-westerlies. A characteristic of the winter months is the occurrence of hot, dry winds coming from the interior, locally known as "Berg winds". These winds can lead to an increase in temperatures of over 10°C within a few hours (Fuggle 1981; Jackson *et al.* 1971), and are responsible for the phenomenon of the highest absolute temperatures being recorded during winter. Berg winds often co-inside with the passing of cold fronts (Jackson *et al.* 1971).

1.5.2 Precipitation

Due to the Reserve's mountainous nature and predominantly southern aspect, rain is experienced throughout the year. A rain gauge has been in operation on the Reserve since February 1981 and is located at Quark House, in the centre of the Reserve, at an altitude of 360 m (Fig 2). The mean annual rainfall measured over the past eight years has been 1 181 mm (Table 1).

Winter rains are associated with cold fronts. After the cold front has passed the winds back from north-west, west to south-west, pressures rise and rain usually occurs. Most rain is, however, associated with north-westerly pre-frontal winds (Jackson *et al.* 1971).

<u>Table 1</u>: Mean monthly rainfall (mm) data for Quark House (1981 - 1988)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
73	80	87	79	78	121	99	93	128	80	53	64	1 035

The summer months are relatively dry, with November and December being the driest two months. The four months, June to September, receive almost half of the annual rainfall, accounting for 43 % of the total. Two peaks are experienced, one in June and the other in September, having a average of over 120 mm per month, accounting for almost a quarter to the total rainfall, this tendency is not reflected in the data from the low lying Hemel en Aarde station. The highest recorded rainfall for one month was in June 1983, when 309 mm was recorded, and the driest was in August 1982 with 17 mm.

Rainfall is usually of low intensity, but can continue for 8 days. Thunder storms have a frequency of less than 5 days per annum (Jackson *et al.* 1971).

The higher peaks of the Reserve are often covered in cloud, and it has been estimated that over 500 mm pa can be precipitated from these clouds without being recorded in the raingauge (Fuggle 1981).

The occurrence of frost and snow have not been recorded within the boundaries of the Reserve.

1.5.3 Temperature

Records have not been kept for the Reserve, and data has been obtained from the nearby Hemel en Aarde weather station (Fig 1).

Temperatures in January have a mean daily maximum of 24,7°C and minimum of 14,8°C, dropping to 16,4°C and 8,7°C respectively in August, on average the coldest month. The coldest temperatures are associated with cold fronts which are most active during this month (Jackson *et al.* 1971). An absolute maximum of 39,3°C in January 1979, and absolute minimum of 1,8°C in July 1983 has been recorded during the time period from 1978 to 1984 (Table 2).

Table 2: Temperatures at Oude Hemel en Aarde (1978 - 1984)

Month	Mean max	Mean min	Absolute Values max max	Absolute Values max min	Absolute Values min max	Absolute Values min min
Jan	24,7	14,8	39,3	14,2	26,2	7,9
Feb	24,4	15,0	33,7	15,8	17,7	9,0
Mar	23,8	14,1	33,1	12,6	23,2	9,0
Apr	21,9	13,0	35,7	11,1	21,9	7,0
May	18,2	10,7	34,0	10,2	23,0	4,8
Jun	16,9	9,6	28,0	8,9	18,0	3,9
Jul	16,8	9,0	30,5	8,5	18,7	1,8
Aug	16,4	8,7	29,6	8,8	16,9	3,2
Sep	17,6	9,3	31,6	9,2	15,5	3,0
Oct	20,1	10,7	34,2	10,1	20,1	5,0
Nov	22,0	12,3	35,7	12,4	19,1	5,9
Dec	23,3	13,7	31,6	14,4	18,8	8,0

1.6 RECREATION

Access to the Reserve is controlled by means of permits. These are issued annually, and give details of the walks and rules of the Reserve (Appendix 2; Fig 2).

The kloof path with its numerous pools and running water, is extremely popular in summer. Most visitors to the Reserve spend their day here, seldom venturing further into the Reserve. The route up to the plateau and the main pool at "Quark House" is also well utilized. Most people ascending the mountain go directly to this hut, situated at a major cross-road of the paths. A number of other huts are located around the Reserve at various points.

The paths have been constructed with a gentle gradient, zigzagging up slopes where necessary, following the contour as far as possible. Erosion barriers have been constructed along paths were necessary and are regularly maintained. Approximately 32 km of paths have been constructed.

1.7 INTRODUCED SPECIES

A number of indigenous species have been introduced into the Reserve in the past, generally with little success. Most of these introduced plants are rare and/or endangered in their natural habitat. Table 3 gives a detailed account of each species.

1.8 PEST PLANTS

When the area was purchased, various alien plants infested different parts of the Reserve. Densities of these plants varied from scattered to medium, with few areas being entirely free of them. These alien plants have been systematically removed with follow up work continually being done to prevent reinfestation. Neighbouring land has been cleared to act as a buffer zone around the Reserve. The work is done manually.

Table 3: Species introduced into the Reserve

Species	Introduced Date	Form	No.	Location	First Flowered	Number survived	Date
Orothamnus zeyheri	May 77	seed	15	Frustration Marsh		0	Mar 79
			10	Vogel Pool		0	Mar 79
			10	White's Summit		0	Mar 79
			10	Banksia Ridge		1	Jan 78
						0	Dec 78
	Mar 78	seed	5	Vogel Pool		0	Mar 79
			10	Vulture Stream		0	Mar 79
			10	Banksia Ridge		1	Dec 78
						0	Mar 79
	May 79	seedlings	10	Vogel Pool		0	Oct 79
	Nov 79	seedlings	6	Vogel Pool (cages)		2	Jan 80
						0	Oct 80
	Jan 80	seedlings	2	Vogel Pool		0	Oct 80
	Jan 80	seedlings	2	Vogel Pool		0	May 83
	Oct 80	seedlings	3	Vogel Pool	May 83	1	May 83
						0	Sep 83
	Jul 83	seed	10	Quark House		0	Sep 83
Witsenia maura	May 77	plants	50	Vogel Pool		33	Mar 79
						32	Oct 79
						31	Feb 80
					Apr 80		
					Feb 81	6	May 83
	Aug 84	plants	25			20	Aug 85
Mimetes hirsuta	Nov 77	seedlings	4	Vogel Pool		1	Mar 81
Mimetes hottentoticus	May 79	seedlings	2	Vogel Pool		1	Mar 81
Mimetes argenteus	May 79	seedling	1	Vogel Pool		0	Feb 80
Protea stokoei	May 79	seedlings	2	Vogel Pool		1	Mar 81
						0	Feb 86
Disa hybrids:	Dec 78	seedlings		Vogel Pool		0	Jan 81
Tripetaloides x Racemosa Uniflora (yellow) x Tripetaloides Tripetaloides (yellow) x Racemosa Racemosa x Uniflora Uniflora (red) x (yellow) Veitchii x Uniflora							

1.8.1 Leptospermum laevigatum

This species has become successively more dense over the years where it occurs on the Municipal land south of the Reserve. The few trees which occurred in the Reserve have been removed and cleared to a distance of 50 m from the Reserve boundary at which point a tracer belt has been made. This area acts as a buffer zone to prevent the myrtles from entering the Reserve. It would appear that this is sufficient distance as their germination is stimulated by fire, and the area is cleared regularly.

1.8.2 Hakea gibbosa

The eastern portion of the Reserve was the most densely infested with hakea, particularly the area known as "Hakea Land" (Fig 2). The original adults have been removed. Capsules are removed from each individual plant, carried off the mountain and destroyed.

1.8.3 Pinus pinaster

Large specimens occurred scattered on the upper part of the Reserve but have been removed.

1.8.4 Acacia cyclops

This species was limited to a few individuals in the main kloof. These have been removed, but occasional seedlings are still found.

1.8.5 Eucalyptus lehmanii

A few trees were planted in the Reserve by the previous owners and shepherds. These trees have been removed, and no seedlings have been found.

2 VEGETATION

2.1 METHODS

The survey was based on the Braun-Blanquet method (Werger 1974) The method has been extensively tested within the fynbos and has been found reliable by a number of workers (Westhoff *et al.* 1978 Taylor 1969; Boucher 1977; McDonald 1983). This method is also used by the National Botanical Institute, and has become a standard method for their vegetation surveys.
Werger (1972) regarded the optimum plot size as that which gives 50 - 55 % of the species found in one hectare of uniform vegetation. Based on data from three fynbos sites, 50 % of the hectare information was reached on an average quadrat size of 51,9 m^2. Taylor (1969) and Boucher (1977) found this quadrat size to be suitable for homogeneous fynbos vegetation. Quadrats of this size and shape have become standard in vegetation surveys carried out by the National Botanical Institute. Quadrats of 5 x 10 m were found to be inappropriate for riverine communities, so these communities were recorded by walking along the river for 100 m

and within a distance of 0,5 m of the banks. At other sites, for example, marshes and rocky outcrops, the plot shape and size was adjusted to fall within the specific community. Forest relevés were larger with 10 x 20 m quadrats. Where practical the quadrats were subdivided into five 2 x 5 m to aid with the recording of the data.

Colour 1:10 000 aerial photographs were studied, and preliminary community boundaries were drawn on them. These divisions were based mainly on aspect, slope and soil moisture content, ie dry and wet areas. Relevés were then located within these areas.

2.1.1 Data collection

All higher plant species within a relevé were identified and given a cover abundance value (Table 4) based on the Braun-Blanquet scale (Table 4)(Werger 1974). Species which could not be identified in the field, were collected for later identification in the Reserve's herbarium. Further data collected from each quadrat included estimates of total vegetation cover, height and stratification, slope, aspect, altitude and rock cover.

Field work was carried out during 1985, with most of the survey being done between October and December of that year. A total of 119 relevés were set out (Fig 3).

Table 4: Cover Abundance Values (after Werger 1974)

Symbol	Definition
r	Very rare and with negligible cover (usually a single individual).
6	Present but not abundant and with a small cover value (less than 1 % of the quadrat area).
1	Numerous but covering less than 1 % of the quadrat area, or not so abundant but covering 1 to 5 % of the quadrat area.
2	Very numerous but covering less than 5 % of the quadrat area, or covering 5 - 25 % of quadrat area independent of abundance.
3	Covering 25 - 50 % of the quadrat area independent of abundance.
4	Covering 50 - 75 % of the quadrat area independent of abundance.
5	Covering 75 - 100 % of the quadrat area independent of abundance.

2.1.2 Table preparation

Data were arranged into a species by site table, and then sorted using the Programme TABSORT, developed by the Forestry Branch of the Department of Water Affairs at Jonkershoek. It has been expanded and modified by the National Botanical Institute (Boucher 1977). A Burroughs B7 800 computer of the Department of Agriculture was used to run the data. Further refinements were made by hand. The complete table is given as Appendix 3.

2.2 COMMUNITY DESCRIPTIONS

The vegetation occurring on the Reserve can be subdivided into two main categories (Fig 4):

(i) Mesic Mountain Fynbos communities (Moll *et al.* 1984), and

(ii) Forest and riparian vegetation.

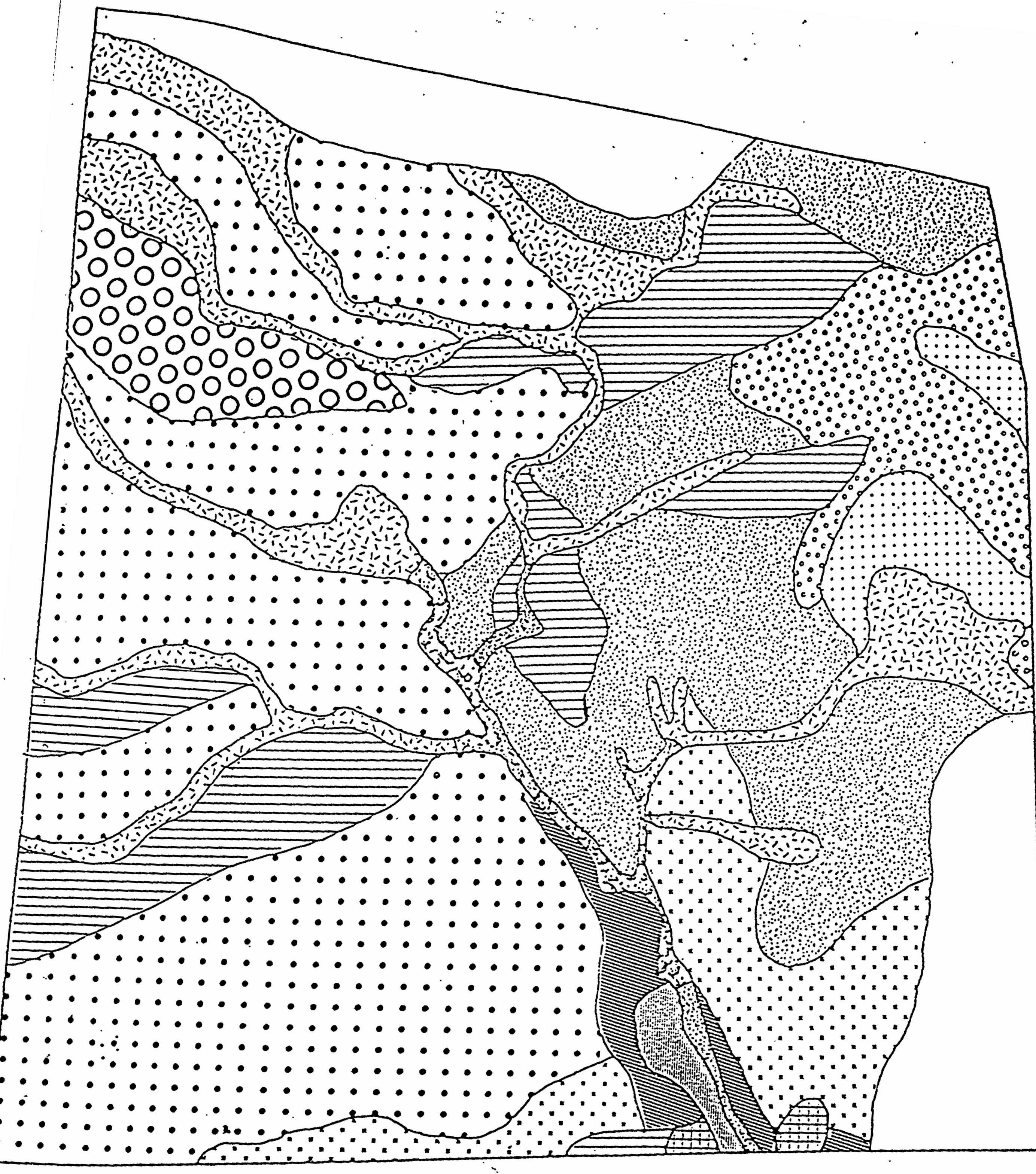
The communities were defined by means of floristic analysis, site characteristics and vegetation stratification, averaged over all the relevés within a community. A species-binomial (McDonald 1983; van Wilgen *et al.* 1985) and structural system was used to name the communities. The dominant, differential species were selected for the species-binomial part, while the structural classification (Table 5) follows the system proposed by Campbell *et al.* (1981) for vegetation classification in the Fynbos Biome. The term "community" was used as an abstract term (Shimwell, 1971) and does not imply any specific ranking.

Table 5: Structural Nomenclature (Campbell *et al.* 1981)

Height of dominant stratum		Projective Canopy cover of dominant stratum (%)	
Tall	2 m +	Closed	75 - 100
Mid-high	1 m - 2 m	Mid-dense	50 - 75
Low	0,25 m - 1 m	Open	25 - 50
Dwarf	0,25 m	Sparse	5 - 25

Legend: Plant Communities

	Community Name
A	*Brunia alopecuroides* - *Chondropetalum deustum*, mid-dense, mid-high shrubland
B	*Erica coccinea* var *coccinea* - *Widdringtonia cupressiodes*, sparse to mid-dense, mid-high proteoid veld
C	*Osmitopsis asteriscoides* - *Erica perspicua*, sparse to mid-dense, mid-high to tall shrubland
D	*Restio similis* - *Hypodiscus argenteus*, open mid-high proteoid veld
E	*Chondropetalum ebracteatum* - *Villarsia capensis*, mid-dense, mid-high shrubland
F	*Aulax umbellata* - *Protea repens*, mid-dense, mid-high proteoid veld
G	*Erica onosmiflora* - *Brunia alopecuroides*, mid-dense, low to mid-high, ericoid and restioid veld
H	*Phaenocoma prolifera* - *Chondropetalum hookerianum*, open low restioid veld
	Passerina vulgaris - *Pentaschistis capensis*, sparse to open, mid-high to tall shrubland
J	*Protea nitida* - *Protea repens*, sparse, tall Waboomveld
K	*Psoralea aculeata* - *Phylica buxifolia*, sparse to open, mid-high to tall ericioid veld
L	*Curtisia dentata* - *Ilex mitis*, closed, tall kloof forest
M	*Erica caffra* - *Blechnum capense*, open, mid-high riverine veld
	Young veld, not mapped



one kilometer

Fig 4: Plant Communities

2.2.1 Mesic Mountain Fynbos

The general structure of the communities falling within this category is of three distinct layers. Adamson (1938) found these layers to be typical of the fynbos vegetation. The upper canopy is composed mainly of the families Proteaceae and Bruniaceae, the middle layer of Bruniaceae and Ericaceae, and the lower layer predominantly Restionaceae and Cyperaceae. Smaller herbaceous and geophytic plants are also common at this level.

2.2.1.1 *Phaenocoma prolifera* - *Chondropetalum hookerianum*, open low restioid veld (Map symbol H)

RELEVéS

92	84	58	11	46
3	35	106	9	90
42	85			

TYPE SPECIES

Phaenocoma prolifera
Syncarpha vestita (was *Helichrysum vestitum*)
Chondropetalum hookerianum
Erica longiaristata
Staberoha distachya
Indigofera alopecuroides var *alopecuroides*
Saltera sarcocolla
Thamnochortus pulcher
Erica onosmiflora

Nebelia paleacea

Drosera glabripes

Drosera aliciae

Restio burchellii

Elegia filacea

Grubbia tomentosa

Phylica ericoides

Protea cynaroides

Erica cumuliflora

Restio ambiguus

Tetraria brevicaulis

Chondropetalum deustum

Leucadendron gandogeri

Ursinia paleacea

Gerbera crocea

Chondropetalum mucronatum

The differential species of this community form the basis of the mountain fynbos group on the Reserve, and are common to the communities described under this heading. It emerges as a separate community in small localized areas which do not have suitable conditions for the more habitat sensitive species. It occurs on any aspect, within the mid-altitudinal range of between 300 m and 550 m. Slopes are steep and well drained. Restionaceae are the visually dominant species, with the dark shape of *Phaenocoma prolifera* scattered throughout.

2.2.1.1.1 *Brunia alopecuriodes - Chondropetalum deustum*, mid-dense, mid-high shrubland (Map symbol A)

RELEVéS:

98 102 100 96 97
101 99 95

TYPE SPECIES

Erica plukenetii var bicarinata
Erica lutea
Berzelia squarrosa

This community occurs on the limited east-north-east aspects of the Reserve at altitudes of between 500 m and 600 m, with the slope varying from gentle (2°) to moderately steep (15°). The soils are well drained, consisting of a coarse sand with numerous stones and pebbles (Mispah series). The species richness varies between nine and 16 species per 5 x 10 m relevé (average 10,4), and is the lowest recorded species richness of all the Reserve's communities. This low species richness could be accounted for by the fact that these slopes are particularly hot the dry due to its aspect.

Structurally two layers can be distinguished. The tallest layer (0,75 m to 1,5 m) is open and dominated by *Brunia alopecuroides* and *Leucadendron xanthoconus*. The lower layer (0,25 m to 0,50 m) is mid-dense, and contains both the Ericaceae type species. *Chòndropetalum deustum* is the dominant restioid. Other common restioids include *Restio bifarius* and *Thamnochortus gracilis*. Common ericoid species are *Erica aristata* and *Penaea mucronata*. The latter two species are common within the community but have a wide distributional range, occurring in other communities.

The community is similar to the mixed ericoid and restioid fynbos of the upper mesic slopes (northerly aspect community of the inland mountain fynbos), described by Boucher (1978) in the Cape Hangklip area.

2.2.1.1.2 *Chondropetalum ebracteatum*, sparse to mid-dense, mid-high to tall shrubland

TYPE SPECIES

Chondropetalum ebracteatum
Penaea cneorum ssp *ruscifolia*
Villarsia capensis
Restio dispar
Centella eriantha var *eriantha*

The greater part of the Reserve is covered by this community. It has a wide altitudinal rage and occurs on most aspects of the Reserve. Three sub-communities can be recognized, characterized by Specific habitat requirements. Eight of the relevés within this grouping do not fall into any of these sub-communities, but form part of the general community.

2.2.1.1.2.1 *Chondropetalum ebracteatum* - *Villarsia capensis*, mid-dense, mid-high shrubland (Map symbol E)

RELEVéS

34 61 64 48 53
49 63 60

The community occurs in the north-east section of the Reserve at mid (360 m) to high altitudes (750 m) on the west-south-west to north-west aspects. The characteristic species of the community are those which are diagnostic for the community as a whole. This basic community becomes clearer where the habitat requirement is not met for the more habitat sensitive sub-communities. The species richness varies between 11 and 21, with an average of 16,2 species per 5 x 10 m relevé.

Structurally there are three layers, namely a mid-high, a lower and a dwarf layer. The mid-high layer is mid-dense, dominated by *Leucadendron xanthoconus* and *Brunia alopecuroides*, both species having a wide habitat range. Restioid and ericoid shrubs dominate the lower layer, particularly the characteristic species, *Chondropetalum ebracteatum*, which occurs in 75 % of the relevés describing this community. Other commonly occurring species in this lower level include *Thamnochortus pulcher*, *Nebelia paleacea*, *Tetraria fasciata* and *Erica onosmiflora*. The dwarf layer is generally sparse to open in density. Commonly occurring species include type species, *Villarsia capensis*, and the generalist, *Anaxeton laeve*, both of which occur at low densities.

2.2.1.1.2.2 *Erica coccinea* var *coccinea* - *Widdringtonia cupressiodes*, sparse to mid-dense, mid-high proteoid veld (Map symbol B)

RELEVéS

94	78	79	81	31
80	88	41	51	82
32	43	39	33	50
44	87	56	113	

TYPE SPECIES

Erica coccinea var *coccinea*
Hermas depauperata
Restio perplexus
Euryops abrotanifolius
Laurophyllus capensis
Widdringtonia cupressiodes
Protea lepidocarpodendron
Schizaea pectinata
Thaminophyllum latifolia
Berzelia rubra

Carpobrotus pillansii

Dilatris pillansii

Erica corydalis

Selago serrata

This sub-community occurs east of the main kloof, with a wide altitudinal range of 150 m to 600 m, with the main range lying between 150 m and 300 m. The main aspect of the community varies between south-east and west-south-west. Slopes are moderately steep, well drained and dry. The soils are white, sandy, shallow with numerous small stones scattered throughout. In places where the shale band has been exposed, *Protea lepidocarpodendron* becomes dominant. The soils here have a higher clay content and better soil moisture retention than those derived from sandstone. The species richness of the community is one of the highest, with an average of 22 species per 5 x 10 m relevé, ranging from 16 to 34 species.

Of the type species, *Erica coccinea* var *coccinea* occurred in 56 % of the 16 relevés representing the community; *Hermas depauperata*, 50 %; *Restio perplexus*, *Euryops abrotanifolius* and *Widdringtonia cupressiodes* 31 %.

Three strata can be distinguished. The upper, at between 1,5 m and 2 m is generally sparse, increasing to mid-dense on moister sites. It is dominated by *Widdringtonia cupressiodes*, *Penaea cneorum*, *Leucadendron gandogeri*, and

L xanthoconus. *Protea lepidocarpodendron*, dominates on shale outcrops. The middle stratum at about 1 m is mid-dense, increasing to dense in the absence of the lower stratum on wetter sites. Shrubs, and taller restios are common in this layer, particularly *Chondropetalum ebracteatum*. The lowest stratum at 0,25 m to 0,50 m is absent on wet areas, reaching mid-density on drier sites. Restionaceae, Cyperaceae, Poaceae and Ericaceae dominate at this level.

The Mixed lower slope fynbos of the inland mountain fynbos at Cape Hangklip (Boucher 1978) can be compared to this community.

2.2.1.1.2.3 *Osmitopsis asteriscoides* - *Erica perspicua*, sparse to mid-dense, mid-high to tall shrubland (Map symbol C)

RELEVéS

118	119	40	45	116
65	117	6	5	4

TYPE SPECIES

Osmitopsis asteriscoides
Erica perspicua
Brunia albiflora
Grubbia rosmarinifolia var *rosmarinifolia*
Disa tripetaloides ssp *tripetaloides*
Erica brevifolia

Erica tenuifolia
Gleichenia polypodioides
Pseudobaeckia africana
Roridula gorgonias
Isolepis digitata (was *Scripus*)
Ursinia eckloniana
Brunia laeve

The community is confined to the upper river courses of the Reserve, occurring on a wide range of slopes, varying from gentle to very steep (5° - 10°), and on aspects from south-east to west, similar to the community described above. The altitudinal range is between 300 m and 700 m. Higher areas are subject to mist rain. Soils are deep, dark brown to black, and humus rich. Although the soil is permanently wet and saturated, the water is not stagnant. Compared to the above described community, there were fewer species noted, averaging only 13,7 species per relevé with a range of between 9 and 19. A number of the types species have high cover abundance values, for example, *Osmitopsis asteriscoides* and *Villarsia capensis* have an average cover abundance value (Table 4) of three for the ten sampled relevés; *Chondropetalum ebracteatum* and *Erica perspicua* two. The type species of *Osmitopsis asteriscoides* and *Erica perspicua* occurred in 90 % and 70 % of the relevés respectively.

Four strata can be identified. The upper stratum occurs at 1,5 m to 3 m above ground level, variation depending on the wetness of the site: the wetter the site, the taller and more dense it is varying between sparse and mid-dense. Dominant species in this stratum include *Osmitopsis asteriscoides, Brunia alopecuroides, Restio dispar* and *Brunia albiflora*. The intermediate stratum is approximately 1 m tall, usually mid-dense, increasing in density on the drier sites where the upper stratum is more open. *Leucadendron xanthoconus, Erica sessiliflora, Chondropetalum ebracteatum* and *Erica hispidula* dominate. The lower stratum, occurring at between 0,25 m and 0,50 m varies from mid-dense to dense, and is dominated by restioid and fern species. The lowest stratum occurs at ground level to about 0,25 m. It is sparse on wet sites, becoming mid-dense on sites which are slightly drier. *Villarsia capensis* and *Drosera glabripes* dominate.

The Upper hygric fynbos of the Cape Hangklip area described by Boucher (1978) is similar.

2.2.1.1.2.4 *Restio similis - Hypodiscus argenteus*, open, mid-high proteoid veld (Map symbol D)

RELEVéS

12	10	8	7	26
1	89	2	21	47
103	36	37	20	25
27	24	23	22	

TYPE SPECIES

Restio similis
Restio bifarius
Hypodiscus argenteus
Staberoha banksii
Restio sarcocladus
Erica coccinea var *pubescens*
Thamnochortus lucens
Berzelia incurva
Drosera cistiflora
Serruria rubicaulus

The community dominates the western half of the Reserve, occurring within the middle altitudinal range of the reserve at between 200 m and 670 m, on dry sites. The aspect varies between north to south-east, with the south-east aspect dominating. Slopes are moderate, but can become very steep in places. Species richness varies between seven and 24 with and average of 18,3 species per 5 x 10 m relevé.

The type species, *Restio similis*, occurs in the greatest percentage (47) of the 19 relevés sampled in the community; *Restio bifarius* in 37 %; *Hypodiscus argenteus* and *Staberoha banksii* in 32 %. The cover abundance value of these species is generally low (one to two). In places the type species increase in cover abundance value, becoming mid-dense, particularly at the higher altitudinal range (above 400 m) of the community.

Structurally, two distinct layers are formed in the mature vegetation: a mid-high, open upper layer (1,0 m - 1,5 m) dominated by the thin small leafed *Aulax umbellata*, and a lower layer mid-dense layer dominated by restioid and ericacious shrubs.

2.2.1.1.3 *Aulax umbellata* - *Protea repens*, mid-dense, mid-high proteoid veld (Map symbol F)

RELEVéS

114	111	115	110	112
104	28	105	120	29
30				

TYPE SPECIES

Blaeria ericoides
Leucospermum gracile
Aspalathus serpens
Watsonia schlechteri
Erica tenella var *gracilior*
Disparago laxifolia
Leucadendron spissifolium var *spissifolium*
Retzia capensis
Erica cerinthoides var *cerinthoides*
Merciera tenuifolia var *aurea*
Aspalathus ciliaris
Aristea oligocephala
Ficinia trichodes
Mairea coriacea
Pentaschistis malouinensis

Thesium euphrasioides

Cassine peragua

The community is limited to south to south-west aspects at low altitudes of between 150 m and 300 m. Slopes vary from gentle (5°) to steep (30°). The sandy soil is littered with stones, with a rock cover of 5 - 10 % and well drained with low water retention.

Of the ten sampled relevés, the type species *Blaeria ericoides*, occurred in 50 %; *Leucospermum gracile*, *Aspalathus serpens* and *Erica tenella* var *gracilior* in 40 % and *Retzia capensis* in 30 %. The community has one of the highest species richness of all the indentified communities, averaging 23,4 species per 5 x 10 m relevé, varying between 14 and 30 species.

Two structural layers can be distinguished within the community. The upper stratum (1 m to 1,5 m) is mid-dense. The lower stratum at between 0,25 m and 0,75 m is open, increasing to mid-dense where *Protea repens*, as opposed to *Aulax umbellata*, dominates the upper stratum. It is dominated by restios.

2.2.1.1.4 *Erica onosmiflora - Brunia alopecuroides*, mid-dense, low to mid-high ericoid and restioid veld (Map symbol G)

RELEVéS

70 67 71 54 57
59 55 68 62 66
69

TYPE SPECIES

Metalasia cymbifolia
Ceratocaryum argenteum (was *Willdenowia*)
Erica coccinea var *inflata*
Ehrharta setacea
Diastella divaricata ssp *montana*
Tetraria compar
Thesium capitatum
Thesium euphorbioides
Thesium quinqueflorum
Paranomus septrum-gustavianus
Restio filiformis

The community occurs in the north-eastern part of the Reserve where it is confined to the upper altitudes (520 m to 700 m) on moderate to steep slopes (10°-30°). The aspect is predominantly south-west, but varies from south-west to north on stoney soils.

Metalasia cymbifolia is the main type species of the community, occurring at a low cover abundance value of one, in 90 % of the ten sampled relevés. The other diagnostic species, *Ceratocaryum argenteum* occurred in 50 %, with a cover abundance value of two; *Erica coccinea* var *inflata* occurred in 40 %, with a cover abundance value of one. The remaining seven types species occurred in only 10 % of the sampled relevés, with a cover abundance value of one. The number of species per relevé averaged 21,7, with a range of between 14 and 27.

Structurally, three levels can be recognized in the mature community. The upper stratum, often absent on drier sites, reaches a height of between 1 m and 1,5 m. It is sparse in density, dominated by *Thesium euphorbioides*, *Erica onosmiflora*, *Saltera sarcocolla*, and *Brunia alopecuroides*. The intermediate layer is mid-dense, between 0,75 m and 1 m tall, dominated by restioid and ericioid shrubs. The lower stratum at 0,25 m to 0,50 m in height, is mid-dense in the absence of the upper stratum, dropping to sparse. Ericoid and restioid species are common.

2.2.2 Forest and Riparian Communities

2.2.2.1 *Passerina vulgaris* - *Pentaschistis capensis*, sparse to open, mid-high to tall shrubland

The community occurs at low altitudes (50 m to 100 m above sea level), generally within a limited range of aspects (south to west-south-west). It can also occur at low altitudes on east-north-east aspects.

Two sub-communities can be identified, namely *Protea nitida* - *Protea repens* sparse, tall Waboomveld and *Psoralea aculeata* - *Phylica buxifolia* sparse to open, mid-high to tall ericoid shrubland. A possible third sub-community can be indentified (map symbol I). This community is limited to low altitudes (50 m - 100 m) and south to west-south-west aspects.

2.2.2.1.1 *Protea nitida* - *Protea repens*, sparse, tall Waboomveld (Map symbol J)

RELEVéS

14 15 13 18

TYPE SPECIES

Protea nitida
Diospyros glabra
Knowltonia capensis
Pelargonium longicaule
Myrsiphyllum declinatum
Erica parviflora
Ehrharta rehmanni
Pentaschistis thunbergii
Lachenalia peersii
Eriospermum nanum
Mohria caffrorum
Tephrosia capensis

The aspect on which the community occurs is only east-north-east at low altitudes (50 - 100 m) in the kloof: The slope is moderately steep. Soils are relatively deep and sandy. The average number of species per relevé is high for the Reserve at 30,5, varying between 27 and 34.

The type species, *Protea nitida*, is visually dominant in the community, giving it a characteristic blue/grey colour. It has a high cover abundance value (three), and occurred in all the sampled relevés. The other type species, *Knowltonia capensis*, *Diospyros glabra*, *Tephrosia capensis*, *Pelargonium longicaule* and *Eriospermum nanum* are also commonly occurring species.

Structurally there are three distinct layers. The tall upper layer at a height of 3 m to 5 m, is sparse and dominated by the type species *Protea nitida*. The middle layer is dominated by *Protea repens* and *Passerina vulgaris*. This is a dense layer reaching a height of between 1,5 m and 2 m. The lower layer, at between 0,50 m and 0,75 m dominated by grasses, restios and *Erica imbricata*. It is a mid-dense layer.

2.2.2.1.2 *Psoralea aculeata - Phylica buxifolia* sparse to open, mid-high to tall ericioid veld (Map symbol K)

RELEVéS

76 73 17 83 19
75 74 107

TYPE SPECIES

Phylica buxifolia
Lampranthus emarginatus
Indigofera angustifolia
Crassula biplanata
Arctotis semipapposa
Briza maxima
Erica villosa
Psoralea aculeata
Agathosma ciliaris
Ehrharta erecta
Erica discolor
Helichrysum cymosum
Rhus glauca

This community occurs mainly on south-south-west to west-south-west aspects of the kloof at low altitudes of between 40 m to 100 mm. The slope varies from gentle to very steep. The number of species per relevé varies from 11 to 26, with an average of 17,1.

No one type species is particularly dominant in the community. *Phylica buxifolia* is the most commonly occurring of the type species.

Two layers can be distinguished in the mature vegetation. The upper layer at between 1 m and 2,5 m, is sparse to open in density. The lower layer, between 0,50 m and 0,75 m, is mid-dense to dense, dominated by *Erica hispidula*, restios and grasses.

2.2.2.2.1 *Curtisia dentata* - *Ilex mitis* closed, tall kloof forest (Map symbol L)

RELEVé

93

TYPE SPECIES

Curtisia dentata
Ilex mitis
Blechnum tabulare
Elaphoglossum angustatum
Rumohra adiantiformis
Myrsiphyllum asparagoides
Elegia thyrsifera

It occurs on south-south-west aspects, at an altitude from 100 m to 250 m. Only 13 species were recorded in the relevé.

The more rapid weathering of the shaleband is the Table Mountain Sandstone provides deeper soils than those of *in situ* weathered sandstones, sometimes resulting in steep-sided ravines, particularly where the shales meet the lower sandstones (Boucher 1978). These steep walls provide the forest with a degree of protection from fires. The forests are thus limited in extent, occurring only in the protective kloofs along the water courses. One relevé of 10 x 20 m was used to sample the community.

Rumohra adiantiformis, *Blechnum tabulare* (both types species for the community) and *Todea barbara* are common components of the interior ground cover (cover abundance value two), attaining heights up to 0,75 m. They do not build up large amounts of litter, thus help to keep fires out of the forest (Boucher 1978).

The canopy is closed, and varies in height between 10 m and 15 m. Other species typical of the forest include *Olea capensis* ssp *capensis*, *Rapanea melanophloeos*, *Pterocelastrus rostratus* and *Maytenus acuminata* (cover abundance value two). Another discontinuous, sparse shrub layer occurs at between 1 m and 3 m, comprising mainly of tree saplings.

The *Podocarpus-Rapanea* Shale forest described by Boucher (1978) for the Cape Hangklip area can be compared to this community.

2.2.2.2.2 *Erica caffra* - *Blechnum capense* open, mid-high riverine veld (Map symbol M)

RELEVéS

77 91

TYPE SPECIES

Prionium serratum

Blechnum capense

Ehrharta rehmanni var *filiformis*

Erica caffra

Empleurum unicapsulare

Psoralea pinnata

Laurentia secunda

Ficinia distans

Scriptus prolifera

Juncus capensis

This community occurs as a narrow stripe along river courses above and below the forest community described above. The altitude varies from 40 m to 280 m, on south-south-east aspects.

There is not physical protection for the community against fire, and it burns on a similar rotation as that experienced by the fynbos communities. Thirteen to 14 species were recorded per relevé.

The vegetation is much lower than that of the forest, reaching a height of 2 m to 5 m, and is mid-dense. *Erica caffra* and *Empleurum unicapsulare* are dominant. A lower layer of 0,50 m to 0,75 m is mid-dense with *Blechnum capense* and *Prionium serratum* being dominant. Mosses form a sparse ground layer (0 m - 0,10 m).

The tall fynbos of the rocky streams under the riparian vegetation of the Cape Hangklip area (Boucher 1978) can be compared to this community.

3 DISCUSSION

Werger (1974) found that the Braun-Blauquet approach to vegetation mapping, could be applied successfully to the fynbos. However, Campbell (1985) felt that it would be appropriate for use in small areas only. From this study, I would support the latter statement for the following reasons:

(a) the method is expensive in terms of time, each relevé taking approximately one hour to complete.

(b) a high degree of floristic knowledge is necessary to identify species, both in the field and herbarium (also a time consuming activity!).

(c) not all plants noted were at a stage where they could be identified in either the field or herbarium at the time of the survey, and a number of relevés had to be revisited to collect previously tagged plants.

(d) some plants could have been mistaken for other species, and hence incorrectly indentified.

Although these factors can be considered disadvantageous and costly, Reserve field personnel can learn a great deal about field conditions, and develop their knowledge of species names, habitat requirements, and interactions with other species by using the methodology. The method is also a very efficient way of compiling an initial species list and to set up a herbarium of an area. In this study a total of 242 species were identified of the 707 higher plant species which have been collected within the 603 ha of the Reserve (de Lange 1992). In approximately 0,1 % of the area 34 % of the recorded higher plant species were collected. A further advantage is that a detailed vegetation map can be compiled.

One of the objectives of the Reserve is that it should be used for research, the present survey has therefore provided a good baseline study for further studies. As the Reserve is only 603 ha, with an established herbarium and an extensive network of paths allowing for easy access, as well as an even aged, mature vegetation at the time of the study (10 years), it was an ideal site for the study.

A total of 13 communities and sub-communities were identified in the Braun-Blanquet table, indicating a great diversity of habitats within the Reserve. Each community had its own environmental requirements. Aspect, altitude and soil moisture appear to be particularly important in this regard. Once the communities were defined, their extent was determined by extrapolation to the surrounding areas using the prepared classification and by referring to aerial photographs.

The vegetation divided into two broad categories: mesic mountain fynbos, and forest and riparian communities. Of the forest and riparian communities, the forest had distinct physical boundaries which offer protection from fire. Soils here were generally deeper then those in the rest of the Reserve, mainly as a result of exposure and eroding of the shale band.

The mesic mountain fynbos communities were divided into two groups, namely those of the steep kloof slopes and the rest of the reserve. These communities vary in complexity depending on such environmental factors as altitude, aspect, slope and moisture conditions. Communities on wetter sites generally had a lower species richness.

The whole Reserve was burnt in February 1985, and a repeat survey was carried out 18 months

The whole Reserve was burnt in February 1985, and a repeat survey was carried out 18 months later, when fifty of the original relevés were re-assessed. The table (Appendix 4) for the latter survey gave the same communities as for the mature vegetation, but with different type species. When all the pre-fire species were excluded from the table the remaining species (predominantly geophytes) showed similar groupings to those previously recorded (Appendix 5). New species recorded after the fire were predominantly sprouters only visible and identifiable for a few years after a fire. These species are by nature subjected to the pressures of short or long fire rotations, and could possibly be used as indicators of community changes due to various management actions. For example, an increase in the density of geophytic plants could be indicative of short rotation burning since fire stimulates flowering of these plants.

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A PHYTOSOCIOLOGICAL SURVEY

OF THE

VOGELGAT NATURE RESERVE

CAPE PROVINCE

SOUTH AFRICA

CHERYL DE LANGE

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Thesis presented for the Degree of

Master of Science

University of Cape Town

Supervisor: Prof Eugéne Moll

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CONTENTS

1 INTRODUCTION

Fynbos areas are coming under increasing pressure from society in terms of recreation, water supplies and the cut flower trade (Wildlife Society of Southern Africa 1980). As more areas of fynbos disappear and become degraded, particularly in the south-western Cape, it is vitally important that those areas which have been set aside for conservation are managed in the best way possible to ensure their long term survival.

The Vogelgat Nature Reserve's objective is to maintain the greatest possible species diversity and to ensure the long-term survival of the Reserve's ecosystems. In the fynbos biome fire and alien plant eradication are the main management tools used to meet this objective. To make optimum use of fires it is necessary to know how a specific community will react to a particular fire regime, and hence the need to know what vegetation types occur on the Reserve.

The objectives of this study were:

(i) to identify, describe and classify the Coastal Mountain fynbos and remnant forest communities occurring on the Reserve;
(ii) to map the plant communities of the Reserve;
(iii) to relate the plant communities to selected habitat factors, apart from edaphic factors, namely altitude, aspect and topography.

1.1 STUDY AREA

The study was carried out on a private nature reserve, Vogelgat, situated approximately 10 km east from the center of Hermanus, in the Kleinrivier Mountains (34°24′S and 19°18′ E; Fig 1). The Reserve covers an area of 603 ha, varying in altitude from 10 m in the kloof near the "Old Gate" in the south, to 805 m at "Beacon Head", in the north (Fig 2).

The mountain fynbos of the Kleinrivier Mountains falls within the fynbos biome (Kruger 1978) and Acocks veld type 69, fynbos (Acocks 1975). The area experiences a mediterranean type climate with most rain falling between May and September, summers generally being hot and dry (Schulze *et al.* 1978). Hot, dry, north-easterly winds, locally known as "Berg winds", are common during winter. The soils are typically those of the Table Mountain Group, being sandy, stoney, infertile and acidic (Taylor 1978).

1.2 HISTORY OF THE RESERVE

The farm, Vogelgat, has a recorded history of sheep grazing from 1873 until the late nineteen sixties. No records were kept regarding frequency or seasons in which the area was burnt nor as to when, and intensity grazed. It appears that the mountains were mainly used as a route to bring sheep to the harbour at Hermanus for export. As the sheep were grazed on the

Fig 1: Location of Reserve

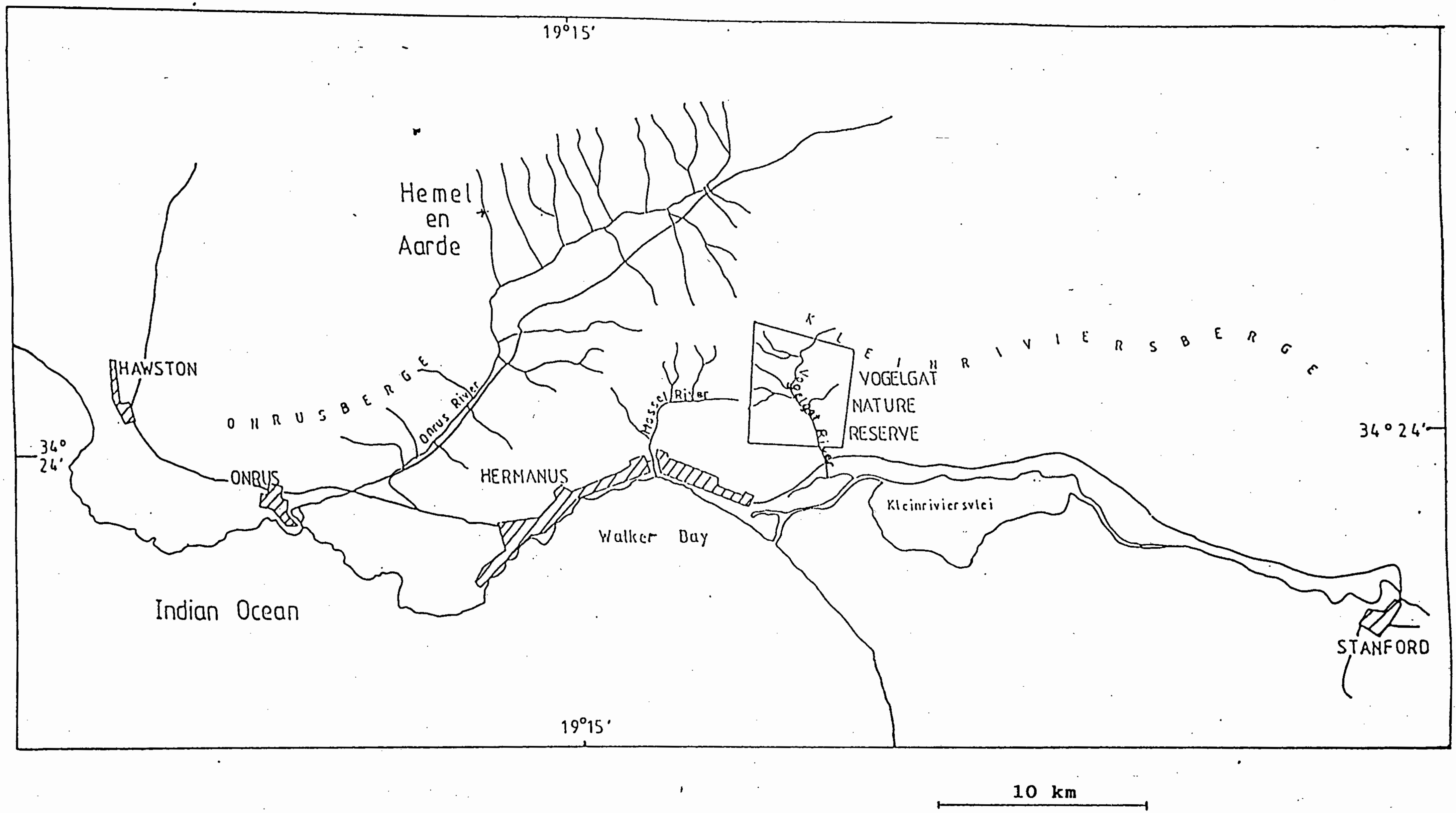
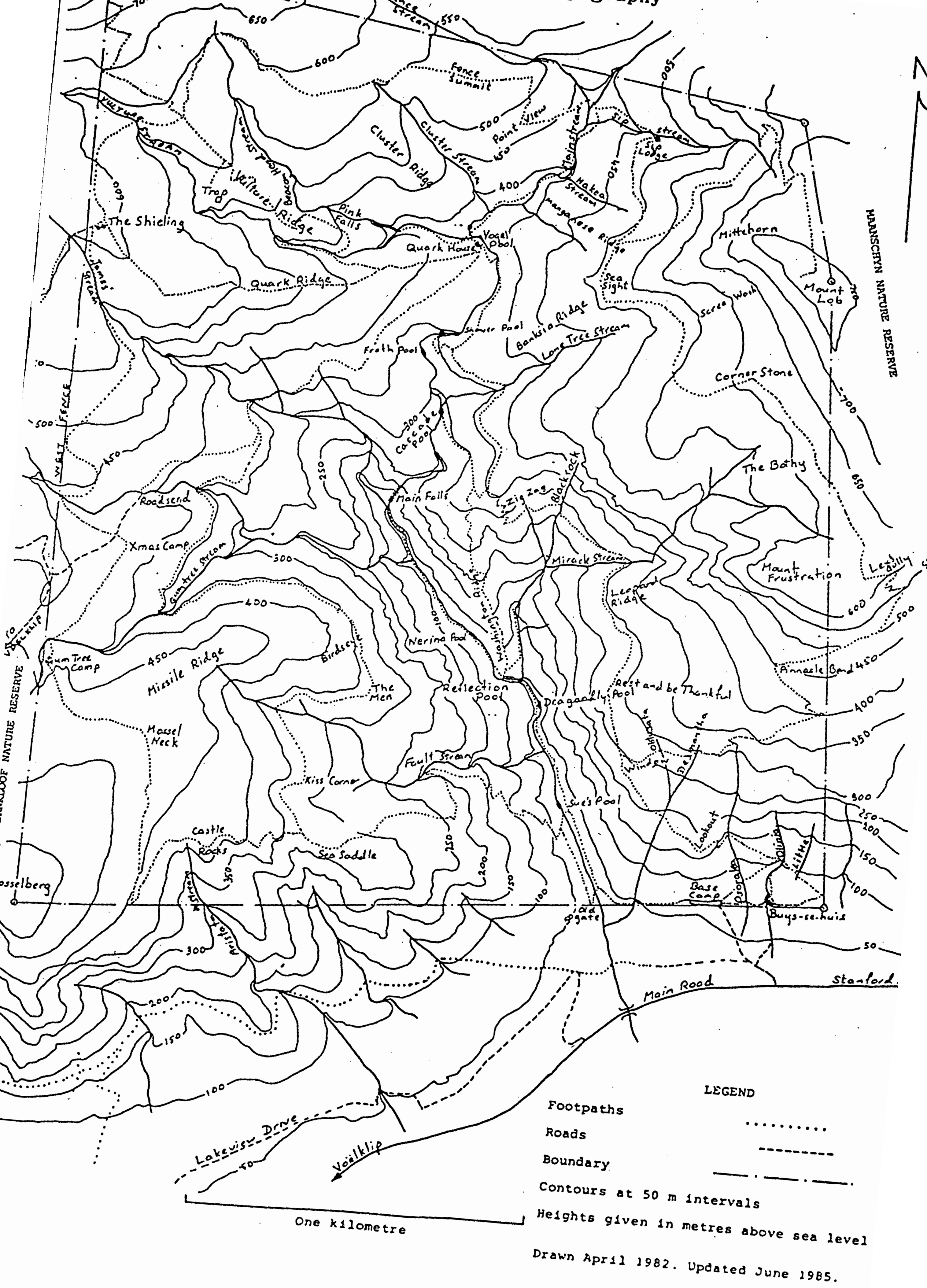


Fig 2: Topography



plains in the Caledon district, there would have been little grazing by sheep while they crossed over the mountain. Since records are not available as to the state of the vegetation prior to this practice, it is difficult to determine the damage done. Acocks, while undertaking his vegetation survey, regarded the area as being in sufficiently pristine condition to be used in his description of veld type 69, fynbos, including a photograph of the Reserve under this vegetation type (Acocks 1975).

The Hermanus Municipality erected a number of wiers in the main kloof of the farm in 1940. The water was used to supply Hermanus until 1945 when the Fernkloof dams were completed. The vegetation was not deliberately burnt in an attempt to increase run-off, but wild fires did occur. The wiers are still present, and are in a fairly good state of repair. The Municipality has retained the water rights of the Reserve.

The Reserve was purchased in 1969 by Dr Ian Williams, and declared a private nature reserve in 1971 by the Cape Department of Nature Conservation, and in 1985 a Natural Heritage Site (Number 5).

1.3 GEOLOGY AND GEOMORPHOLOGY

The Reserve falls into the Cape Fold Belt, signs of which can clearly be seen in the walls of the main kloof. A fault line, with breccia, traverses the north-western corner of the Reserve.

The predominant geological formation is the Peninsula Formation (C_1Q_2) interspersed with narrow belts of the Cedarberg Formation (C_1S_2) in association with the Pakhuis Formation (C_1G). All are of the Table Mountain Series and belong to the Cape System (Geological Survey 1966).

The Pakhuis and Cedarberg Formations cross the Reserve in an east-west direction, dividing the Reserve approximately into two. Another small outcrop occurs near Beacon Head (Fig 2). Contained within the Pakhuis Formation are a number of pebbles, some with striations indicating a possible glacial origin. In places the combined thickness of the Pakhuis and Cedarberg Formations average less than 60 m (Trusswell 1977).

1.4 TOPOGRAPHY

A deep kloof with almost vertical, inaccessible cliffs, is the main feature of the Reserve. At between 300 m and 500 m a plateau area runs in a horse-shoe formation around this kloof. Along the northern and eastern borders there are higher peaks reaching up to 700 m, and loose boulder screes which in places support forest vegetation.

Most streams in the Reserve are perennial and well vegetated. The main stream flows in a south-westerly direction, drops into the kloof by means of a waterfall where it turns southward, eventually emptying into the Kleinrivier Vlei south of the Reserve's boundary. Other tributaries join it at various points along its route, most of which are also perennial.

1.5 CLIMATE

The Reserve falls into Climatic Region M (Schulze *et al.* 1978) in that it experiences a Mediterranean type climate with most rain falling from May to September and summers are warm to hot and dry.

Little climatic data are available for the mountainous terrain in the south-western Cape. One rain gauge is situated within the Reserve. Approximately 10 km to the west, on the northern slopes of the Kleinrivierberge, Department of Agriculture have established a weather station at Oude Hemel en Aarde (34°21'S, 19°14'E; 243 m; Fig 1).

1.5.1 Wind

Almost no information is available on wind conditions in mountain areas. Kruger (1974) reported wind speeds of 3,6 m/s in Jakkalsrivier catchment compared to the lowlands of 3,13 m/s at the Worcester Veld Reserve.

Winds are characteristic of the area with few calm days (pers observ). In summer they are mainly south-east to southerly, with sea breezes reinforcing the southerly gradient, resulting in winds reaching maximum velocities in the early afternoon (Fuggle 1981). Winter conditions are dominated by south-west to north-westerlies. A characteristic of the winter months is the occurrence of hot, dry winds coming from the interior, locally known as "Berg winds". These winds can lead to an increase in temperatures of over 10°C within a few hours (Fuggle 1981; Jackson *et al.* 1971), and are responsible for the phenomenon of the highest absolute temperatures being recorded during winter. Berg winds often co-inside with the passing of cold fronts (Jackson *et al.* 1971).

1.5.2 Precipitation

Due to the Reserve's mountainous nature and predominantly southern aspect, rain is experienced throughout the year. A rain gauge has been in operation on the Reserve since February 1981 and is located at Quark House, in the centre of the Reserve, at an altitude of 360 m (Fig 2). The mean annual rainfall measured over the past eight years has been 1 181 mm (Table 1).

Winter rains are associated with cold fronts. After the cold front has passed the winds back from north-west, west to south-west, pressures rise and rain usually occurs. Most rain is, however, associated with north-westerly pre-frontal winds (Jackson *et al.* 1971).

<u>Table 1</u>: Mean monthly rainfall (mm) data for Quark House (1981 - 1988)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
73	80	87	79	78	121	99	93	128	80	53	64	1 035

The summer months are relatively dry, with November and December being the driest two months. The four months, June to September, receive almost half of the annual rainfall, accounting for 43 % of the total. Two peaks are experienced, one in June and the other in September, having a average of over 120 mm per month, accounting for almost a quarter to the total rainfall, this tendency is not reflected in the data from the low lying Hemel en Aarde station. The highest recorded rainfall for one month was in June 1983, when 309 mm was recorded, and the driest was in August 1982 with 17 mm.

Rainfall is usually of low intensity, but can continue for 8 days. Thunder storms have a frequency of less than 5 days per annum (Jackson *et al.* 1971).

The higher peaks of the Reserve are often covered in cloud, and it has been estimated that over 500 mm pa can be precipitated from these clouds without being recorded in the raingauge (Fuggle 1981).

The occurrence of frost and snow have not been recorded within the boundaries of the Reserve.

1.5.3 Temperature

Records have not been kept for the Reserve, and data has been obtained from the nearby Hemel en Aarde weather station (Fig 1).

Temperatures in January have a mean daily maximum of 24,7°C and minimum of 14,8°C, dropping to 16,4°C and 8,7°C respectively in August, on average the coldest month. The coldest temperatures are associated with cold fronts which are most active during this month (Jackson *et al.* 1971). An absolute maximum of 39,3°C in January 1979, and absolute minimum of 1,8°C in July 1983 has been recorded during the time period from 1978 to 1984 (Table 2).

Table 2: Temperatures at Oude Hemel en Aarde (1978 - 1984)

Month	Mean max	Mean min	Absolute Values max max	Absolute Values max min	Absolute Values min max	Absolute Values min min
Jan	24,7	14,8	39,3	14,2	26,2	7,9
Feb	24,4	15,0	33,7	15,8	17,7	9,0
Mar	23,8	14,1	33,1	12,6	23,2	9,0
Apr	21,9	13,0	35,7	11,1	21,9	7,0
May	18,2	10,7	34,0	10,2	23,0	4,8
Jun	16,9	9,6	28,0	8,9	18,0	3,9
Jul	16,8	9,0	30,5	8,5	18,7	1,8
Aug	16,4	8,7	29,6	8,8	16,9	3,2
Sep	17,6	9,3	31,6	9,2	15,5	3,0
Oct	20,1	10,7	34,2	10,1	20,1	5,0
Nov	22,0	12,3	35,7	12,4	19,1	5,9
Dec	23,3	13,7	31,6	14,4	18,8	8,0

1.6 RECREATION

Access to the Reserve is controlled by means of permits. These are issued annually, and give details of the walks and rules of the Reserve (Appendix 2; Fig 2).

The kloof path with its numerous pools and running water, is extremely popular in summer. Most visitors to the Reserve spend their day here, seldom venturing further into the Reserve. The route up to the plateau and the main pool at "Quark House" is also well utilized. Most people ascending the mountain go directly to this hut, situated at a major cross-road of the paths. A number of other huts are located around the Reserve at various points.

The paths have been constructed with a gentle gradient, zigzagging up slopes where necessary, following the contour as far as possible. Erosion barriers have been constructed along paths were necessary and are regularly maintained. Approximately 32 km of paths have been constructed.

1.7 INTRODUCED SPECIES

A number of indigenous species have been introduced into the Reserve in the past, generally with little success. Most of these introduced plants are rare and/or endangered in their natural habitat. Table 3 gives a detailed account of each species.

1.8 PEST PLANTS

When the area was purchased, various alien plants infested different parts of the Reserve. Densities of these plants varied from scattered to medium, with few areas being entirely free of them. These alien plants have been systematically removed with follow up work continually being done to prevent reinfestation. Neighbouring land has been cleared to act as a buffer zone around the Reserve. The work is done manually.

Table 3: Species introduced into the Reserve

Species	Introduced Date	Introduced Form	No.	Location	First Flowered	Number survived	Date
Orothamnus zeyheri	May 77	seed	15	Frustration Marsh		0	Mar 79
			10	Vogel Pool		0	Mar 79
			10	White's Summit		0	Mar 79
			10	Banksia Ridge		1	Jan 78
						0	Dec 78
	Mar 78	seed	5	Vogel Pool		0	Mar 79
			10	Vulture Stream		0	Mar 79
			10	Banksia Ridge		1	Dec 78
						0	Mar 79
	May 79	seedlings	10	Vogel Pool		0	Oct 79
	Nov 79	seedlings	6	Vogel Pool (cages)		2	Jan 80
						0	Oct 80
	Jan 80	seedlings	2	Vogel Pool		0	Oct 80
	Jan 80	seedlings	2	Vogel Pool		0	May 83
	Oct 80	seedlings	3	Vogel Pool	May 83	1	May 83
						0	Sep 83
	Jul 83	seed	10	Quark House		0	Sep 83
Witsenia maura	May 77	plants	50	Vogel Pool		33	Mar 79
						32	Oct 79
						31	Feb 80
					Apr 80		
					Feb 81	6	May 83
	Aug 84	plants	25			20	Aug 85
Mimetes hirsuta	Nov 77	seedlings	4	Vogel Pool		1	Mar 81
Mimetes hottentoticus	May 79	seedlings	2	Vogel Pool		1	Mar 81
Mimetes argenteus	May 79	seedling	1	Vogel Pool		0	Feb 80
Protea stokoei	May 79	seedlings	2	Vogel Pool		1	Mar 81
						0	Feb 86
Disa hybrids:	Dec 78	seedlings		Vogel Pool		0	Jan 81
Tripetaloides x Racemosa							
Uniflora (yellow) x Tripetaloides							
Tripetaloides (yellow) x Racemosa							
Racemosa x Uniflora							
Uniflora (red) x (yellow)							
Veitchii x Uniflora							

1.8.1 Leptospermum laevigatum

This species has become successively more dense over the years where it occurs on the Municipal land south of the Reserve. The few trees which occurred in the Reserve have been removed and cleared to a distance of 50 m from the Reserve boundary at which point a tracer belt has been made. This area acts as a buffer zone to prevent the myrtles from entering the Reserve. It would appear that this is sufficient distance as their germination is stimulated by fire, and the area is cleared regularly.

1.8.2 Hakea gibbosa

The eastern portion of the Reserve was the most densely infested with hakea, particularly the area known as "Hakea Land" (Fig 2). The original adults have been removed. Capsules are removed from each individual plant, carried off the mountain and destroyed.

1.8.3 Pinus pinaster

Large specimens occurred scattered on the upper part of the Reserve but have been removed.

1.8.4 Acacia cyclops

This species was limited to a few individuals in the main kloof. These have been removed, but occasional seedlings are still found.

1.8.5 Eucalyptus lehmanii

A few trees were planted in the Reserve by the previous owners and shepherds. These trees have been removed, and no seedlings have been found.

2 VEGETATION

2.1 METHODS

The survey was based on the Braun-Blanquet method (Werger 1974) The method has been extensively tested within the fynbos and has been found reliable by a number of workers (Westhoff *et al.* 1978 Taylor 1969; Boucher 1977; McDonald 1983). This method is also used by the National Botanical Institute, and has become a standard method for their vegetation surveys.
Werger (1972) regarded the optimum plot size as that which gives 50 - 55 % of the species found in one hectare of uniform vegetation. Based on data from three fynbos sites, 50 % of the hectare information was reached on an average quadrat size of 51,9 m^2. Taylor (1969) and Boucher (1977) found this quadrat size to be suitable for homogeneous fynbos vegetation. Quadrats of this size and shape have become standard in vegetation surveys carried out by the National Botanical Institute. Quadrats of 5 x 10 m were found to be inappropriate for riverine communities, so these communities were recorded by walking along the river for 100 m

and within a distance of 0,5 m of the banks. At other sites, for example, marshes and rocky outcrops, the plot shape and size was adjusted to fall within the specific community. Forest relevés were larger with 10 x 20 m quadrats. Where practical the quadrats were subdivided into five 2 x 5 m to aid with the recording of the data.

Colour 1:10 000 aerial photographs were studied, and preliminary community boundaries were drawn on them. These divisions were based mainly on aspect, slope and soil moisture content, ie dry and wet areas. Relevés were then located within these areas.

2.1.1 Data collection

All higher plant species within a relevé were identified and given a cover abundance value (Table 4) based on the Braun-Blanquet scale (Table 4)(Werger 1974). Species which could not be identified in the field, were collected for later identification in the Reserve's herbarium. Further data collected from each quadrat included estimates of total vegetation cover, height and stratification, slope, aspect, altitude and rock cover.

Field work was carried out during 1985, with most of the survey being done between October and December of that year. A total of 119 relevés were set out (Fig 3).

Table 4: Cover Abundance Values (after Werger 1974)

Symbol	Definition
r	Very rare and with negligible cover (usually a single individual).
6	Present but not abundant and with a small cover value (less than 1 % of the quadrat area).
1	Numerous but covering less than 1 % of the quadrat area, or not so abundant but covering 1 to 5 % of the quadrat area.
2	Very numerous but covering less than 5 % of the quadrat area, or covering 5 - 25 % of quadrat area independent of abundance.
3	Covering 25 - 50 % of the quadrat area independent of abundance.
4	Covering 50 - 75 % of the quadrat area independent of abundance.
5	Covering 75 - 100 % of the quadrat area independent of abundance.

2.1.2 Table preparation

Data were arranged into a species by site table, and then sorted using the Programme TABSORT, developed by the Forestry Branch of the Department of Water Affairs at Jonkershoek. It has been expanded and modified by the National Botanical Institute (Boucher 1977). A Burroughs B7 800 computer of the Department of Agriculture was used to run the data. Further refinements were made by hand. The complete table is given as Appendix 3.

2.2 COMMUNITY DESCRIPTIONS

The vegetation occurring on the Reserve can be subdivided into two main categories (Fig 4):

(i) Mesic Mountain Fynbos communities (Moll *et al.* 1984), and

(ii) Forest and riparian vegetation.

The communities were defined by means of floristic analysis, site characteristics and vegetation stratification, averaged over all the relevés within a community. A species-binomial (McDonald 1983; van Wilgen *et al.* 1985) and structural system was used to name the communities. The dominant, differential species were selected for the species-binomial part, while the structural classification (Table 5) follows the system proposed by Campbell *et al.* (1981) for vegetation classification in the Fynbos Biome. The term "community" was used as an abstract term (Shimwell, 1971) and does not imply any specific ranking.

Table 5: Structural Nomenclature (Campbell *et al.* 1981)

Height of dominant stratum		Projective Canopy cover of dominant stratum (%)	
Tall	2 m +	Closed	75 - 100
Mid-high	1 m - 2 m	Mid-dense	50 - 75
Low	0,25 m - 1 m	Open	25 - 50
Dwarf	0,25 m	Sparse	5 - 25

Legend: Plant Communities

	Community Name
A	*Brunia alopecuroides - Chondropetalum deustum*, mid-dense, mid-high shrubland
B	*Erica coccinea* var *coccinea - Widdringtonia cupressiodes*, sparse to mid-dense, mid-high proteoid veld
C	*Osmitopsis asteriscoides - Erica perspicua*, sparse to mid-dense, mid-high to tall shrubland
D	*Restio similis - Hypodiscus argenteus*, open mid-high proteoid veld
E	*Chondropetalum ebracteatum - Villarsia capensis*, mid-dense, mid-high shrubland
F	*Aulax umbellata - Protea repens*, mid-dense, mid-high proteoid veld
G	*Erica onosmiflora - Brunia alopecuroides*, mid-dense, low to mid-high, ericoid and restioid veld
H	*Phaenocoma prolifera - Chondropetalum hookerianum*, open low restioid veld
	Passerina vulgaris - Pentaschistis capensis, sparse to open, mid-high to tall shrubland
J	*Protea nitida - Protea repens*, sparse, tall Waboomveld
K	*Psoralea aculeata - Phylica buxifolia*, sparse to open, mid-high to tall ericioid veld
L	*Curtisia dentata - Ilex mitis*, closed, tall kloof forest
M	*Erica caffra - Blechnum capense*, open, mid-high riverine veld
	Young veld, not mapped

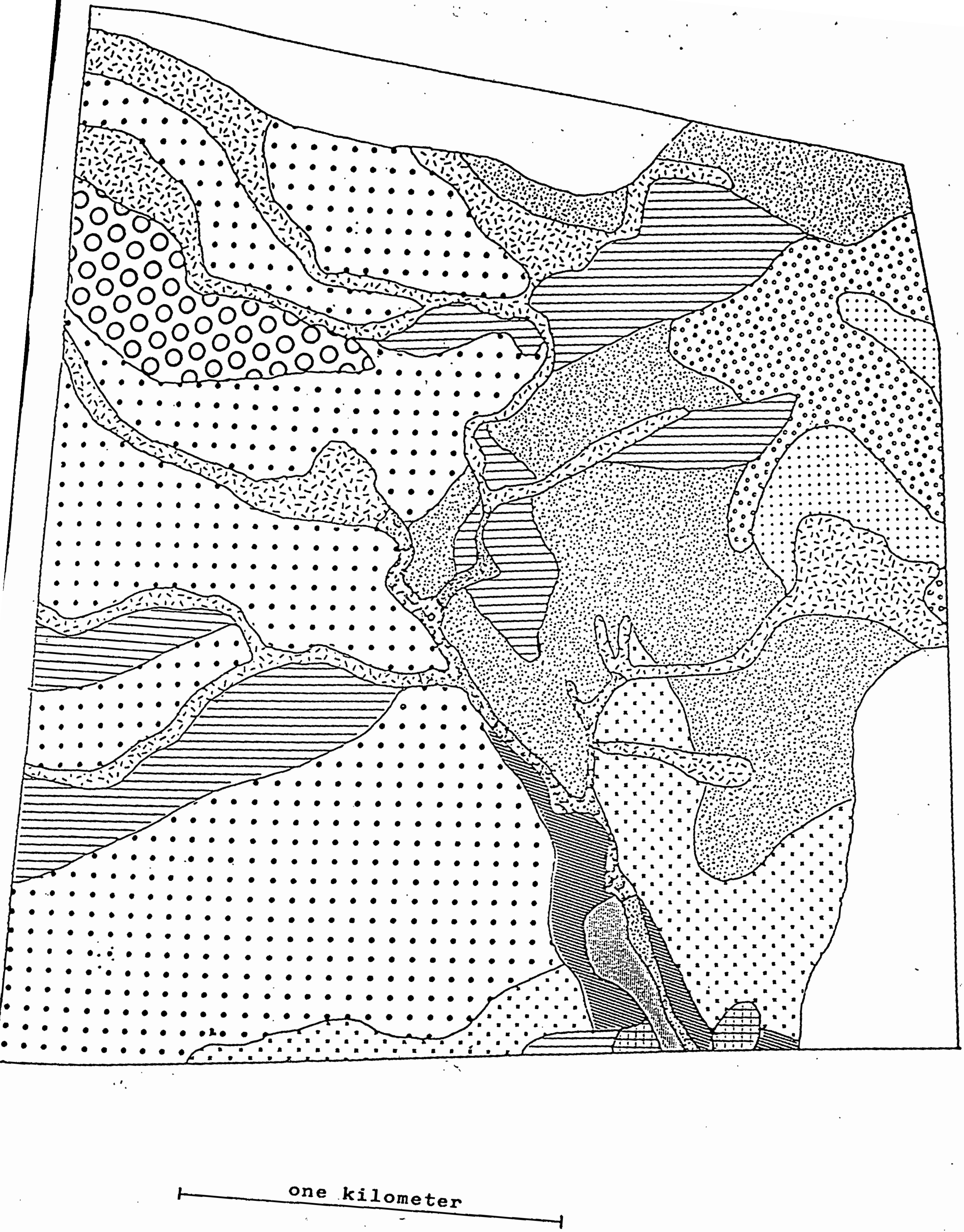


Fig 4: Plant Communities

Phaenocoma prolifera - Chondropetalum hookerianum, open low restioid veld

Chondropetalum ebracteatum - Villarsia capensis, mid-dense, mid-high shrubland

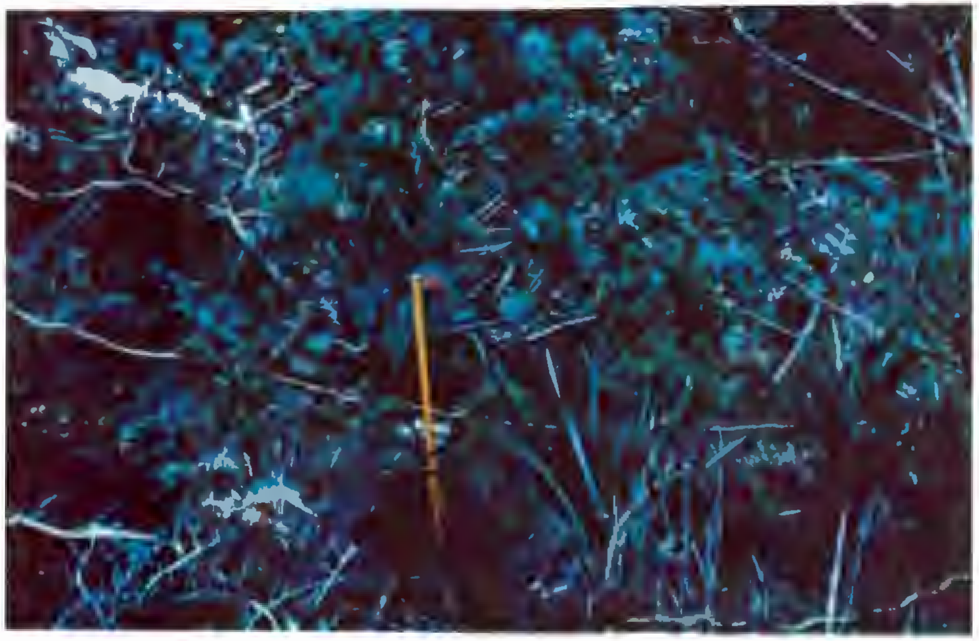
Erica coccinea var coccinea - Widdringtonia cupressiodes, sparse to mid-dense, mid-high proteoid veld

Osmitopsis asteriscoides - Erica perspicua, sparse to mid-dense, mid-high to tall shrubland

Restio similis - Hypodiscus argenteus, open, mid-high proteoid veld

Aulax umbellata - Protea repens, mid-dense, mid-high proteoid veld

Erica onosmiflora - Brunia alopecuroides, mid-dense, low to mid-high ericoid and restioid veld



Protea nitida - Protea repens sparse, tall Waboomveld

Psoralea aculeata - Phylica buxifolia sparse to open, mid-high to tall ericioid veld

Erica caffra - Blechnum capense, open mid-high riverine veld

2.2.1 Mesic Mountain Fynbos

The general structure of the communities falling within this category is of three distinct layers. Adamson (1938) found these layers to be typical of the fynbos vegetation. The upper canopy is composed mainly of the families Proteaceae and Bruniaceae, the middle layer of Bruniaceae and Ericaceae, and the lower layer predominantly Restionaceae and Cyperaceae. Smaller herbaceous and geophytic plants are also common at this level.

2.2.1.1 *Phaenocoma prolifera* - *Chondropetalum hookerianum*, open low restioid veld (Map symbol H)

RELEVéS

92	84	58	11	46
3	35	106	9	90
42	85			

TYPE SPECIES

Phaenocoma prolifera
Syncarpha vestita (was *Helichrysum vestitum*)
Chondropetalum hookerianum
Erica longiaristata
Staberoha distachya
Indigofera alopecuroides var *alopecuroides*
Saltera sarcocolla
Thamnochortus pulcher
Erica onosmiflora

Nebelia paleacea

Drosera glabripes

Drosera aliciae

Restio burchellii

Elegia filacea

Grubbia tomentosa

Phylica ericoides

Protea cynaroides

Erica cumuliflora

Restio ambiguus

Tetraria brevicaulis

Chondropetalum deustum

Leucadendron gandogeri

Ursinia paleacea

Gerbera crocea

Chondropetalum mucronatum

The differential species of this community form the basis of the mountain fynbos group on the Reserve, and are common to the communities described under this heading. It emerges as a separate community in small localized areas which do not have suitable conditions for the more habitat sensitive species. It occurs on any aspect, within the mid-altitudinal range of between 300 m and 550 m. Slopes are steep and well drained. Restionaceae are the visually dominant species, with the dark shape of *Phaenocoma prolifera* scattered throughout.

2.2.1.1.1 *Brunia alopecuriodes - Chondropetalum deustum*, mid-dense, mid-high shrubland (Map symbol A)

RELEVéS:

98 102 100 96 97
101 99 95

TYPE SPECIES

Erica plukenetii var bicarinata
Erica lutea
Berzelia squarrosa

This community occurs on the limited east-north-east aspects of the Reserve at altitudes of between 500 m and 600 m, with the slope varying from gentle (2°) to moderately steep (15°). The soils are well drained, consisting of a coarse sand with numerous stones and pebbles (Mispah series). The species richness varies between nine and 16 species per 5 x 10 m relevé (average 10,4), and is the lowest recorded species richness of all the Reserve's communities. This low species richness could be accounted for by the fact that these slopes are particularly hot the dry due to its aspect.

Structurally two layers can be distinguished. The tallest layer (0,75 m to 1,5 m) is open and dominated by *Brunia alopecuroides* and *Leucadendron xanthoconus*. The lower layer (0,25 m to 0,50 m) is mid-dense, and contains both the Ericaceae type species. *Chondropetalum deustum* is the dominant restioid. Other common restioids include *Restio bifarius* and *Thamnochortus gracilis*. Common ericoid species are *Erica aristata* and *Penaea mucronata*. The latter two species are common within the community but have a wide distributional range, occurring in other communities.

The community is similar to the mixed ericoid and restioid fynbos of the upper mesic slopes (northerly aspect community of the inland mountain fynbos), described by Boucher (1978) in the Cape Hangklip area.

2.2.1.1.2 *Chondropetalum ebracteatum*, sparse to mid-dense, mid-high to tall shrubland

TYPE SPECIES

Chondropetalum ebracteatum
Penaea cneorum ssp *ruscifolia*
Villarsia capensis
Restio dispar
Centella eriantha var *eriantha*

The greater part of the Reserve is covered by this community. It has a wide altitudinal rage and occurs on most aspects of the Reserve. Three sub-communities can be recognized, characterized by Specific habitat requirements. Eight of the relevés within this grouping do not fall into any of these sub-communities, but form part of the general community.

2.2.1.1.2.1 *Chondropetalum ebracteatum* - *Villarsia capensis*, mid-dense, mid-high shrubland (Map symbol E)

RELEVéS

34 61 64 48 53
49 63 60

The community occurs in the north-east section of the Reserve at mid (360 m) to high altitudes (750 m) on the west-south-west to north-west aspects. The characteristic species of the community are those which are diagnostic for the community as a whole. This basic community becomes clearer where the habitat requirement is not met for the more habitat sensitive sub-communities. The species richness varies between 11 and 21, with an average of 16,2 species per 5 x 10 m relevé.

Structurally there are three layers, namely a mid-high, a lower and a dwarf layer. The mid-high layer is mid-dense, dominated by *Leucadendron xanthoconus* and *Brunia alopecuroides*, both species having a wide habitat range. Restioid and ericoid shrubs dominate the lower layer, particularly the characteristic species, *Chondropetalum ebracteatum*, which occurs in 75 % of the relevés describing this community. Other commonly occurring species in this lower level include *Thamnochortus pulcher, Nebelia paleacea, Tetraria fasciata* and *Erica onosmiflora*. The dwarf layer is generally sparse to open in density. Commonly occurring species include type species, *Villarsia capensis*, and the generalist, *Anaxeton laeve*, both of which occur at low densities.

2.2.1.1.2.2 *Erica coccinea* var *coccinea - Widdringtonia cupressiodes*, sparse to mid-dense, mid-high proteoid veld (Map symbol B)

RELEVéS

94	78	79	81	31
80	88	41	51	82
32	43	39	33	50
44	87	56	113	

TYPE SPECIES

Erica coccinea var *coccinea*
Hermas depauperata
Restio perplexus
Euryops abrotanifolius
Laurophyllus capensis
Widdringtonia cupressiodes
Protea lepidocarpodendron
Schizaea pectinata
Thaminophyllum latifolia
Berzelia rubra

Carpobrotus pillansii
Dilatris pillansii
Erica corydalis
Selago serrata

This sub-community occurs east of the main kloof, with a wide altitudinal range of 150 m to 600 m, with the main range lying between 150 m and 300 m. The main aspect of the community varies between south-east and west-south-west. Slopes are moderately steep, well drained and dry. The soils are white, sandy, shallow with numerous small stones scattered throughout. In places where the shale band has been exposed, *Protea lepidocarpodendron* becomes dominant. The soils here have a higher clay content and better soil moisture retention than those derived from sandstone. The species richness of the community is one of the highest, with an average of 22 species per 5 x 10 m relevé, ranging from 16 to 34 species.

Of the type species, *Erica coccinea* var *coccinea* occurred in 56 % of the 16 relevés representing the community; *Hermas depauperata*, 50 %; *Restio perplexus*, *Euryops abrotanifolius* and *Widdringtonia cupressiodes* 31 %.

Three strata can be distinguished. The upper, at between 1,5 m and 2 m is generally sparse, increasing to mid-dense on moister sites. It is dominated by *Widdringtonia cupressiodes*, *Penaea cneorum*, *Leucadendron gandogeri*, and

L xanthoconus. *Protea lepidocarpodendron*, dominates on shale outcrops. The middle stratum at about 1 m is mid-dense, increasing to dense in the absence of the lower stratum on wetter sites. Shrubs, and taller restios are common in this layer, particularly *Chondropetalum ebracteatum*. The lowest stratum at 0,25 m to 0,50 m is absent on wet areas, reaching mid-density on drier sites. Restionaceae, Cyperaceae, Poaceae and Ericaceae dominate at this level.

The Mixed lower slope fynbos of the inland mountain fynbos at Cape Hangklip (Boucher 1978) can be compared to this community.

2.2.1.1.2.3 *Osmitopsis asteriscoides - Erica perspicua*, sparse to mid-dense, mid-high to tall shrubland (Map symbol C)

RELEVéS

118	119	40	45	116
65	117	6	5	4

TYPE SPECIES

Osmitopsis asteriscoides
Erica perspicua
Brunia albiflora
Grubbia rosmarinifolia var *rosmarinifolia*
Disa tripetaloides ssp *tripetaloides*
Erica brevifolia

Erica tenuifolia

Gleichenia polypodioides

Pseudobaeckia africana

Roridula gorgonias

Isolepis digitata (was *Scripus*)

Ursinia eckloniana

Brunia laeve

The community is confined to the upper river courses of the Reserve, occurring on a wide range of slopes, varying from gentle to very steep (5° - 10°), and on aspects from south-east to west, similar to the community described above. The altitudinal range is between 300 m and 700 m. Higher areas are subject to mist rain. Soils are deep, dark brown to black, and humus rich. Although the soil is permanently wet and saturated, the water is not stagnant. Compared to the above described community, there were fewer species noted, averaging only 13,7 species per relevé with a range of between 9 and 19. A number of the types species have high cover abundance values, for example, *Osmitopsis asteriscoides* and *Villarsia capensis* have an average cover abundance value (Table 4) of three for the ten sampled relevés; *Chondropetalum ebracteatum* and *Erica perspicua* two. The type species of *Osmitopsis asteriscoides* and *Erica perspicua* occurred in 90 % and 70 % of the relevés respectively.

Four strata can be identified. The upper stratum occurs at 1,5 m to 3 m above ground level, variation depending on the wetness of the site: the wetter the site, the taller and more dense it is varying between sparse and mid-dense. Dominant species in this stratum include *Osmitopsis asteriscoides*, *Brunia alopecuroides*, *Restio dispar* and *Brunia albiflora*. The intermediate stratum is approximately 1 m tall, usually mid-dense, increasing in density on the drier sites where the upper stratum is more open. *Leucadendron xanthoconus*, *Erica sessiliflora*, *Chondropetalum ebracteatum* and *Erica hispidula* dominate. The lower stratum, occurring at between 0,25 m and 0,50 m varies from mid-dense to dense, and is dominated by restioid and fern species. The lowest stratum occurs at ground level to about 0,25 m. It is sparse on wet sites, becoming mid-dense on sites which are slightly drier. *Villarsia capensis* and *Drosera glabripes* dominate.

The Upper hygric fynbos of the Cape Hangklip area described by Boucher (1978) is similar.

2.2.1.1.2.4 *Restio similis - Hypodiscus argenteus*, open, mid-high proteoid veld (Map symbol D)

RELEVéS

12	10	8	7	26
1	89	2	21	47
103	36	37	20	25
27	24	23	22	

TYPE SPECIES

Restio similis
Restio bifarius
Hypodiscus argenteus
Staberoha banksii
Restio sarcocladus
Erica coccinea var *pubescens*
Thamnochortus lucens
Berzelia incurva
Drosera cistiflora
Serruria rubicaulus

The community dominates the western half of the Reserve, occurring within the middle altitudinal range of the reserve at between 200 m and 670 m, on dry sites. The aspect varies between north to south-east, with the south-east aspect dominating. Slopes are moderate, but can become very steep in places. Species richness varies between seven and 24 with and average of 18,3 species per 5 x 10 m relevé.

The type species, *Restio similis*, occurs in the greatest percentage (47) of the 19 relevés sampled in the community; *Restio bifarius* in 37 %; *Hypodiscus argenteus* and *Staberoha banksii* in 32 %. The cover abundance value of these species is generally low (one to two). In places the type species increase in cover abundance value, becoming mid-dense, particularly at the higher altitudinal range (above 400 m) of the community.

Structurally, two distinct layers are formed in the mature vegetation: a mid-high, open upper layer (1,0 m - 1,5 m) dominated by the thin small leafed *Aulax umbellata*, and a lower layer mid-dense layer dominated by restioid and ericacious shrubs.

2.2.1.1.3 *Aulax umbellata* - *Protea repens*, mid-dense, mid-high proteoid veld (Map symbol F)

RELEVéS

114	111	115	110	112
104	28	105	120	29
30				

TYPE SPECIES

Blaeria ericoides
Leucospermum gracile
Aspalathus serpens
Watsonia schlechteri
Erica tenella var *gracilior*
Disparago laxifolia
Leucadendron spissifolium var *spissifolium*
Retzia capensis
Erica cerinthoides var *cerinthoides*
Merciera tenuifolia var *aurea*
Aspalathus ciliaris
Aristea oligocephala
Ficinia trichodes
Mairea coriacea
Pentaschistis malouinensis

Thesium euphrasioides
Cassine peragua

The community is limited to south to south-west aspects at low altitudes of between 150 m and 300 m. Slopes vary from gentle (5°) to steep (30°). The sandy soil is littered with stones, with a rock cover of 5 - 10 % and well drained with low water retention.

Of the ten sampled relevés, the type species *Blaeria ericoides*, occurred in 50 %; *Leucospermum gracile*, *Aspalathus serpens* and *Erica tenella* var *gracilior* in 40 % and *Retzia capensis* in 30 %. The community has one of the highest species richness of all the indentified communities, averaging 23,4 species per 5 x 10 m relevé, varying between 14 and 30 species.

Two structural layers can be distinguished within the community. The upper stratum (1 m to 1,5 m) is mid-dense. The lower stratum at between 0,25 m and 0,75 m is open, increasing to mid-dense where *Protea repens*, as opposed to *Aulax umbellata*, dominates the upper stratum. It is dominated by restios.

2.2.1.1.4 *Erica onosmiflora* - *Brunia alopecuroides*, mid-dense, low to mid-high ericoid and restioid veld (Map symbol G)

RELEVéS

70 67 71 54 57
59 55 68 62 66
69

TYPE SPECIES

Metalasia cymbifolia
Ceratocaryum argenteum (was *Willdenowia*)
Erica coccinea var *inflata*
Ehrharta setacea
Diastella divaricata ssp *montana*
Tetraria compar
Thesium capitatum
Thesium euphorbioides
Thesium quinqueflorum
Paranomus septrum-gustavianus
Restio filiformis

The community occurs in the north-eastern part of the Reserve where it is confined to the upper altitudes (520 m to 700 m) on moderate to steep slopes (10°-30°). The aspect is predominantly south-west, but varies from south-west to north on stoney soils.

Metalasia cymbifolia is the main type species of the community, occurring at a low cover abundance value of one, in 90 % of the ten sampled relevés. The other diagnostic species, *Ceratocaryum argenteum* occurred in 50 %, with a cover abundance value of two; *Erica coccinea* var *inflata* occurred in 40 %, with a cover abundance value of one. The remaining seven types species occurred in only 10 % of the sampled relevés, with a cover abundance value of one. The number of species per relevé averaged 21,7, with a range of between 14 and 27.

Structurally, three levels can be recognized in the mature community. The upper stratum, often absent on drier sites, reaches a height of between 1 m and 1,5 m. It is sparse in density, dominated by *Thesium euphorbioides*, *Erica onosmiflora*, *Saltera sarcocolla*, and *Brunia alopecuroides*. The intermediate layer is mid-dense, between 0,75 m and 1 m tall, dominated by restioid and ericioid shrubs. The lower stratum at 0,25 m to 0,50 m in height, is mid-dense in the absence of the upper stratum, dropping to sparse. Ericoid and restioid species are common.

2.2.2 Forest and Riparian Communities

2.2.2.1 *Passerina vulgaris* - *Pentaschistis capensis*, sparse to open, mid-high to tall shrubland

The community occurs at low altitudes (50 m to 100 m above sea level), generally within a limited range of aspects (south to west-south-west). It can also occur at low altitudes on east-north-east aspects.

Two sub-communities can be identified, namely *Protea nitida - Protea repens* sparse, tall Waboomveld and *Psoralea aculeata - Phylica buxifolia* sparse to open, mid-high to tall ericoid shrubland. A possible third sub-community can be indentified (map symbol I). This community is limited to low altitudes (50 m - 100 m) and south to west-south-west aspects.

2.2.2.1.1 *Protea nitida - Protea repens*, sparse, tall Waboomveld (Map symbol J)

RELEVéS

14 15 13 18

TYPE SPECIES

Protea nitida
Diospyros glabra
Knowltonia capensis
Pelargonium longicaule
Myrsiphyllum declinatum
Erica parviflora
Ehrharta rehmanni
Pentaschistis thunbergii
Lachenalia peersii
Eriospermum nanum
Mohria caffrorum
Tephrosia capensis

The aspect on which the community occurs is only east-north-east at low altitudes (50 - 100 m) in the kloof: The slope is moderately steep. Soils are relatively deep and sandy. The average number of species per relevé is high for the Reserve at 30,5, varying between 27 and 34.

The type species, *Protea nitida*, is visually dominant in the community, giving it a characteristic blue/grey colour. It has a high cover abundance value (three), and occurred in all the sampled relevés. The other type species, *Knowltonia capensis*, *Diospyros glabra*, *Tephrosia capensis*, *Pelargonium longicaule* and *Eriospermum nanum* are also commonly occurring species.

Structurally there are three distinct layers. The tall upper layer at a height of 3 m to 5 m, is sparse and dominated by the type species *Protea nitida*. The middle layer is dominated by *Protea repens* and *Passerina vulgaris*. This is a dense layer reaching a height of between 1,5 m and 2 m. The lower layer, at between 0,50 m and 0,75 m dominated by grasses, restios and *Erica imbricata*. It is a mid-dense layer.

2.2.2.1.2 *Psoralea aculeata* - *Phylica buxifolia* sparse to open, mid-high to tall ericioid veld (Map symbol K)

RELEVéS

76 73 17 83 19

75 74 107

TYPE SPECIES

Phylica buxifolia
Lampranthus emarginatus
Indigofera angustifolia
Crassula biplanata
Arctotis semipapposa
Briza maxima
Erica villosa
Psoralea aculeata
Agathosma ciliaris
Ehrharta erecta
Erica discolor
Helichrysum cymosum
Rhus glauca

This community occurs mainly on south-south-west to west-south-west aspects of the kloof at low altitudes of between 40 m to 100 mm. The slope varies from gentle to very steep. The number of species per relevé varies from 11 to 26, with an average of 17,1.

No one type species is particularly dominant in the community. *Phylica buxifolia* is the most commonly occurring of the type species.

Two layers can be distinguished in the mature vegetation. The upper layer at between 1 m and 2,5 m, is sparse to open in density. The lower layer, between 0,50 m and 0,75 m, is mid-dense to dense, dominated by *Erica hispidula*, restios and grasses.

2.2.2.2.1 *Curtisia dentata* - *Ilex mitis* closed, tall kloof forest (Map symbol L)

RELEVé

93

TYPE SPECIES

Curtisia dentata
Ilex mitis
Blechnum tabulare
Elaphoglossum angustatum
Rumohra adiantiformis
Myrsiphyllum asparagoides
Elegia thyrsifera

It occurs on south-south-west aspects, at an altitude from 100 m to 250 m. Only 13 species were recorded in the relevé.

The more rapid weathering of the shaleband is the Table Mountain Sandstone provides deeper soils than those of *in situ* weathered sandstones, sometimes resulting in steep-sided ravines, particularly where the shales meet the lower sandstones (Boucher 1978). These steep walls provide the forest with a degree of protection from fires. The forests are thus limited in extent, occurring only in the protective kloofs along the water courses. One relevé of 10 x 20 m was used to sample the community.

Rumohra adiantiformis, *Blechnum tabulare* (both types species for the community) and *Todea barbara* are common components of the interior ground cover (cover abundance value two), attaining heights up to 0,75 m. They do not build up large amounts of litter, thus help to keep fires out of the forest (Boucher 1978).

The canopy is closed, and varies in height between 10 m and 15 m. Other species typical of the forest include *Olea capensis* ssp *capensis*, *Rapanea melanophloeos*, *Pterocelastrus rostratus* and *Maytenus acuminata* (cover abundance value two). Another discontinuous, sparse shrub layer occurs at between 1 m and 3 m, comprising mainly of tree saplings.

The *Podocarpus-Rapanea* Shale forest described by Boucher (1978) for the Cape Hangklip area can be compared to this community.

2.2.2.2.2 *Erica caffra - Blechnum capense* open, mid-high riverine veld (Map symbol M)

RELEVéS

77 91

TYPE SPECIES

Prionium serratum

Blechnum capense

Ehrharta rehmanni var *filiformis*

Erica caffra

Empleurum unicapsulare

Psoralea pinnata

Laurentia secunda

Ficinia distans

Scriptus prolifera

Juncus capensis

This community occurs as a narrow stripe along river courses above and below the forest community described above. The altitude varies from 40 m to 280 m, on south-south-east aspects.

There is not physical protection for the community against fire, and it burns on a similar rotation as that experienced by the fynbos communities. Thirteen to 14 species were recorded per relevé.

The vegetation is much lower than that of the forest, reaching a height of 2 m to 5 m, and is mid-dense. *Erica caffra* and *Empleurum unicapsulare* are dominant. A lower layer of 0,50 m to 0,75 m is mid-dense with *Blechnum capense* and *Prionium serratum* being dominant. Mosses form a sparse ground layer (0 m - 0,10 m).

The tall fynbos of the rocky streams under the riparian vegetation of the Cape Hangklip area (Boucher 1978) can be compared to this community.

3 DISCUSSION

Werger (1974) found that the Braun-Blauquet approach to vegetation mapping, could be applied successfully to the fynbos. However, Campbell (1985) felt that it would be appropriate for use in small areas only. From this study, I would support the latter statement for the following reasons:

(a) the method is expensive in terms of time, each relevé taking approximately one hour to complete.

(b) a high degree of floristic knowledge is necessary to identify species, both in the field and herbarium (also a time consuming activity!).

(c) not all plants noted were at a stage where they could be identified in either the field or herbarium at the time of the survey, and a number of relevés had to be revisited to collect previously tagged plants.

(d) some plants could have been mistaken for other species, and hence incorrectly indentified.

Although these factors can be considered disadvantageous and costly, Reserve field personnel can learn a great deal about field conditions, and develop their knowledge of species names, habitat requirements, and interactions with other species by using the methodology. The method is also a very efficient way of compiling an initial species list and to set up a herbarium of an area. In this study a total of 242 species were identified of the 707 higher plant species which have been collected within the 603 ha of the Reserve (de Lange 1992). In approximately 0,1 % of the area 34 % of the recorded higher plant species were collected. A further advantage is that a detailed vegetation map can be compiled.

One of the objectives of the Reserve is that it should be used for research, the present survey has therefore provided a good baseline study for further studies. As the Reserve is only 603 ha, with an established herbarium and an extensive network of paths allowing for easy access, as well as an even aged, mature vegetation at the time of the study (10 years), it was an ideal site for the study.

A total of 13 communities and sub-communities were identified in the Braun-Blanquet table, indicating a great diversity of habitats within the Reserve. Each community had its own environmental requirements. Aspect, altitude and soil moisture appear to be particularly important in this regard. Once the communities were defined, their extent was determined by extrapolation to the surrounding areas using the prepared classification and by referring to aerial photographs.

The vegetation divided into two broad categories: mesic mountain fynbos, and forest and riparian communities. Of the forest and riparian communities, the forest had distinct physical boundaries which offer protection from fire. Soils here were generally deeper then those in the rest of the Reserve, mainly as a result of exposure and eroding of the shale band.

The mesic mountain fynbos communities were divided into two groups, namely those of the steep kloof slopes and the rest of the reserve. These communities vary in complexity depending on such environmental factors as altitude, aspect, slope and moisture conditions. Communities on wetter sites generally had a lower species richness.

The whole Reserve was burnt in February 1985, and a repeat survey was carried out 18 months

The whole Reserve was burnt in February 1985, and a repeat survey was carried out 18 months later, when fifty of the original relevés were re-assessed. The table (Appendix 4) for the latter survey gave the same communities as for the mature vegetation, but with different type species. When all the pre-fire species were excluded from the table the remaining species (predominantly geophytes) showed similar groupings to those previously recorded (Appendix 5). New species recorded after the fire were predominantly sprouters only visible and identifiable for a few years after a fire. These species are by nature subjected to the pressures of short or long fire rotations, and could possibly be used as indicators of community changes due to various management actions. For example, an increase in the density of geophytic plants could be indicative of short rotation burning since fire stimulates flowering of these plants.

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SECONDARY SUCCESSION

AND

SPECIES RESPONSE TO FIRE

IN

COASTAL MOUNTAIN FYNBOS

CAPE PROVINCE, SOUTH AFRICA

CHERYL DE LANGE

1992

Thesis presented for the Degree of
Master of Science
University of Cape Town

Supervisor: Prof Eugéne Moll

CONTENTS

1 INTRODUCTION

Fynbos areas are coming under increasing pressure from society in terms of recreation, water supplies and the cut flower trade. As more areas of fynbos disappear and become degraded, particularly in the south-western Cape, it is vitally important that those areas which have been set aside for conservation are managed in the best way possible to ensure their long term survival (Wildlife Society, 1980). Fire plays an integral role in these communities and is the main tool of management. It is important to be able to predict its effect on fynbos vegetation under a given fire regime particularly for small private, Municipal and Provincial reserves.

Fire causes repeated disturbances in fynbos. It is argued that fire is necessary to allow some plants to complete their life cycles, and that fires should take place in a fairly predictable manner to allow for the survival of these species (Seydack *et al*. 1986; Kruger 1987).

Disturbance can be defined as an external factor leading to the complete or partial destruction of the vegetation (Grime 1979). Two forms of succession can be distinguished, namely primary and secondary (McIntosh 1980). Primary succession occurs where a site is so disturbed that no effects of the previous biota are evident. Secondary succession is said to occur when the disturbance is of such a nature as to result in fairly large changes, but where the effects of the previous biota remain. Primary succession affects only small areas of the fynbos biome (Kruger 1987) and was not investigated in this study. Pyric succession is a form of secondary succession being a process whereby those species which were present before the fire recover on the site (Hanes 1971). The initial phase of pyric succession in fynbos was the focus of this study.

A limited number of studies on pyric succession have been carried out on mountain fynbos communities (Bond 1980; van Wilgen 1981; van Wilgen *et al.* 1981; Kruger 1984; Kruger 1987). This study was designed to add to the available data of the early successional pattern in fynbos, using the analytic approach of Noble and Slayter (1980), the fire response categories of Bell *et al.* (1984) and multivariate methods to compare results on different communities in order to evaluate the applicablitity of current successional models. These data should help provide a greater understanding of the succession, particularly the initial and most critical stage, eventually allowing the prediction of the consequences of a given disturbance regime within the fynbos.

The objectives of this study were to:

a) improve the description of the initial stage of pyric succession in mountain fynbos, particularly changes in species composition and cover abundance of species within a community;

b) examine the effects of fire with respect to phenological changes and population dynamics of selected species;

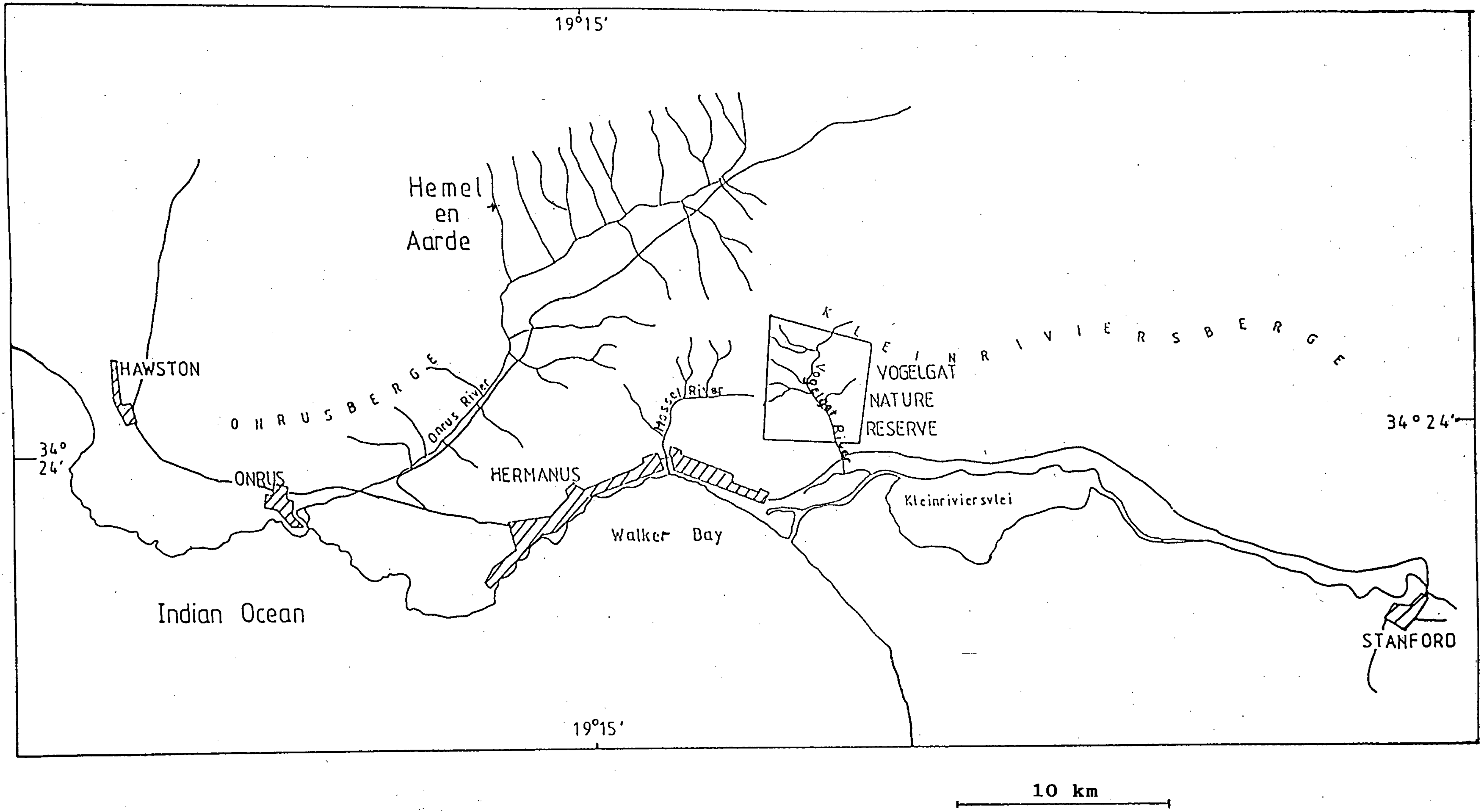
c) to categorize the species according to their survival mechanisms (Noble and Slayter 1980; Bell *et al*. 1984);

d) assess the applicability of some current successional models.

2 STUDY AREA

The study was carried out on a private nature reserve, Vogelgat, situated approximately 10 km east from the center of Hermanus, in the Kleinrivier Mountains ($34^{o}24'$S and $19^{o}18'$; Fig 1). The Reserve covers an area of 603 ha, varying in altitude from 10 m in the kloof near the "Old Gate" in the south (Fig 2), to 805 m at "Beacon Head", in the north. Details of the climate, topography and mature vegetation are given in de Lange (1992).

Fig 1: Location of Reserve



The mountain fynbos of the Kleinrivier Mountains falls within the fynbos biome (Kruger 1978) and Acocks veld type 69, fynbos (Acocks 1953). The area experiences a mediterranean type climate with most rain falling in the winter months, between June and September. Summers are usually hot and dry (Schulze *et al.* 1978). The annual average rainfall recorded in the Reserve is 1 181 mm (rain gauge located at "Quark House" - see Fig 2). Hot, dry, north-easterly winds, locally known as "Berg winds", are common during winter. Soils are typically those of the Table Mountain Group, generally being sandy, stoney, infertile and acidic (Taylor 1978).

As is common to this climate type, fire plays an integral role in community composition, structure and succession patterns (Kruger *et al.* 1984). Fire is also likely to have had an influence on the evolution of plant histories (Bond 1980; Kruger 1984).

The Reserve vegetation was about 10 years old (Table 1) when two fires, one in December 1985, and the other in February 1986, occurred (Fig 3).

During 1985 a total of 119 permanently marked relevés were set out over the Reserve for a phytosociological survey. Twelve communities (including subcommunities) were identified during this survey. Fifty of these relevés were selected, covering nine communities, for further investigation in this study (Fig 4). A brief summary of each of these communities are given in Table 2. The communities were dominated by the growth forms of restioid, ericoid and proteoid shrubs. The predominant families in the mature vegetation were the Asteraceae, Fabaceae, Restionaceae and Proteaceae (de Lange 1992).

Table 1: Fire History 1974 - 1991

Date of fire	Cause
29/12/1974	Unknown
19/12/1981	Visitors to Reserve - Smoking
07/12/1982	Farmer burning on northern slopes
08/12/1985	Farmer burning on northern slopes
02/02/1986	Picnickers braaing at lagoon
07/11/1990	Smokers

3 METHODS

3.1 DATA COLLECTION

After a fire in February 1986, 50 of the 119 five by ten meter relevés set out prior to the fire (de Lange 1992) were selected to represent nine of the pre-fire communities (Table 2; Fig 5). The relevés were sampled at monthly intervals from February 1986 to November 1987. For all communities, it was assumed that the mature (pre-fire) vegetation represented a stage in the development of the

x12 Relevés surveyed post-fire

Fig 4: Location of Relevés

successional communities. Note was not made on the behaviour patterns of the fire although it was observed from skeletal remains that the intensity of the fire varied. At some sites (particularly communities H, G and I)(see Table 2 for abbreviations used in text), rocks had burst, while at others, leaves still remained on the bushes three weeks after the fire had passed.

The following data was collected for each relevé:

1 Each species was identified.

2 All species within a relevé were given a cover abundance value (Werger 1974; Table 3) each time the relevé was surveyed. The species were classified according to Raunkiaer's life-form categories (Table 4).

3 The mechanisms governing a species response to a disturbance was determined (Section 3.2):

3.1 The method by which a species remains on the site of disturbance (Section 3.2.1).

3.2 The condition of the site which allows the species to re-establish itself (Section 3.2.2).

Table 2: Communities studied post-fire

Community Name	Habitat	Richness	Relevés	Referral Name in text
Plateau Communities:				
Sparse to mid-dense, to tall Shrubland	Gentle to steep slopes. Aspect SE - W Altitude 300 - 700m Higher altitudes subject to mist rain. Soils deep, dark brown, humus rich; permanently wet and saturated.	13,7 sp/ relevé Range 9 - 19	5 6	Community A
Sparse to mid-dense, mid-high Proteoid veld	Aspect ESE - <u>WSW</u> Altitude 150 - 600m (mainly 300 m) Soil well drained; shale outcrops	22 sp/ relevé Range 16 - 34	31 50 79 41 43 32 51 82 39 33	Community B
Transitional between communities A and B	Aspect NNE - <u>WSW</u> Altitude 360 - 750m Soil moist and dry		34 61 48 49	Community C
Mid-dense, low to mid-high Ericoid and Restioid veld	Aspect <u>SW</u> - N Altitude 520 - 700m Slope moderate to steep.	21,7 sp/ relevé Range 14 - 27	70 71 54 57 59 55	Community D
Open, mid-high Proteoid veld	Aspect <u>SE</u> - W Altitude 200 - 670m Slope moderate to very steep		7 26 20 12 21 24 25 37 36 2 27 10 47	Community E
Intermediate Plateau Community	Aspect S - NE		92 84 58 11 3 35 69 9	Community F
Kloof Communities:				
Transitional Community	Aspect SSW - WSW Altitude 50 - 360 m Soils well drained		16 72	Community G
Sparse, tall Waboom veld	Aspect ENE Altitude 50 - 100m Slope moderate to steep Soils deep and sand	30,5 sp/ relevé Range 27 - 34	14	Community H
Sparse to open, mid-high to tall Ericoid veld	Aspect SSW - WSW Altitude 40 - 100 m Slope gentle to moderate	17,1 sp/ relevé Range 11 - 26	17 83 19 74	Community I

Dominant aspects underlined.

Legend: Plant Communities

Community Name

Brunia alopecuroides - *Chondropetalum deustum*, mid-dense, mid-high shrubland

B *Erica coccinea* var *coccinea* - *Widdringtonia cupressiodes*, sparse to mid-dense, mid-high proteoid veld

A *Osmitopsis asteriscoides* - *Erica perspicua*, sparse to mid-dense, mid-high to tall shrubland

E *Restio similis* - *Hypodiscus argenteus*, open mid-high proteoid veld

C *Chondropetalum ebracteatum* - *Villarsia capensis*, mid-dense, mid-high shrubland

Aulax umbellata - *Protea repens*, mid-dense, mid-high proteoid veld

D *Erica onosmiflora* - *Brunia alopecuroides*, mid-dense, low to mid-high, ericoid and restioid veld

F *Phaenocoma prolifera* - *Chondropetalum hookerianum*, open low restioid veld

I *Passerina vulgaris* - *Pentaschistis capensis*, sparse to open, mid-high to tall shrubland

H *Protea nitida* - *Protea repens*, sparse, tall Waboomveld

G *Psoralea aculeata* - *Phylica buxifolia*, sparse to open, mid-high to tall ericioid veld

Curtisia dentata - *Ilex mitis*, closed, tall kloof forest

Erica caffra - *Blechnum capense*, open, mid-high riverine veld

Young veld, not mapped

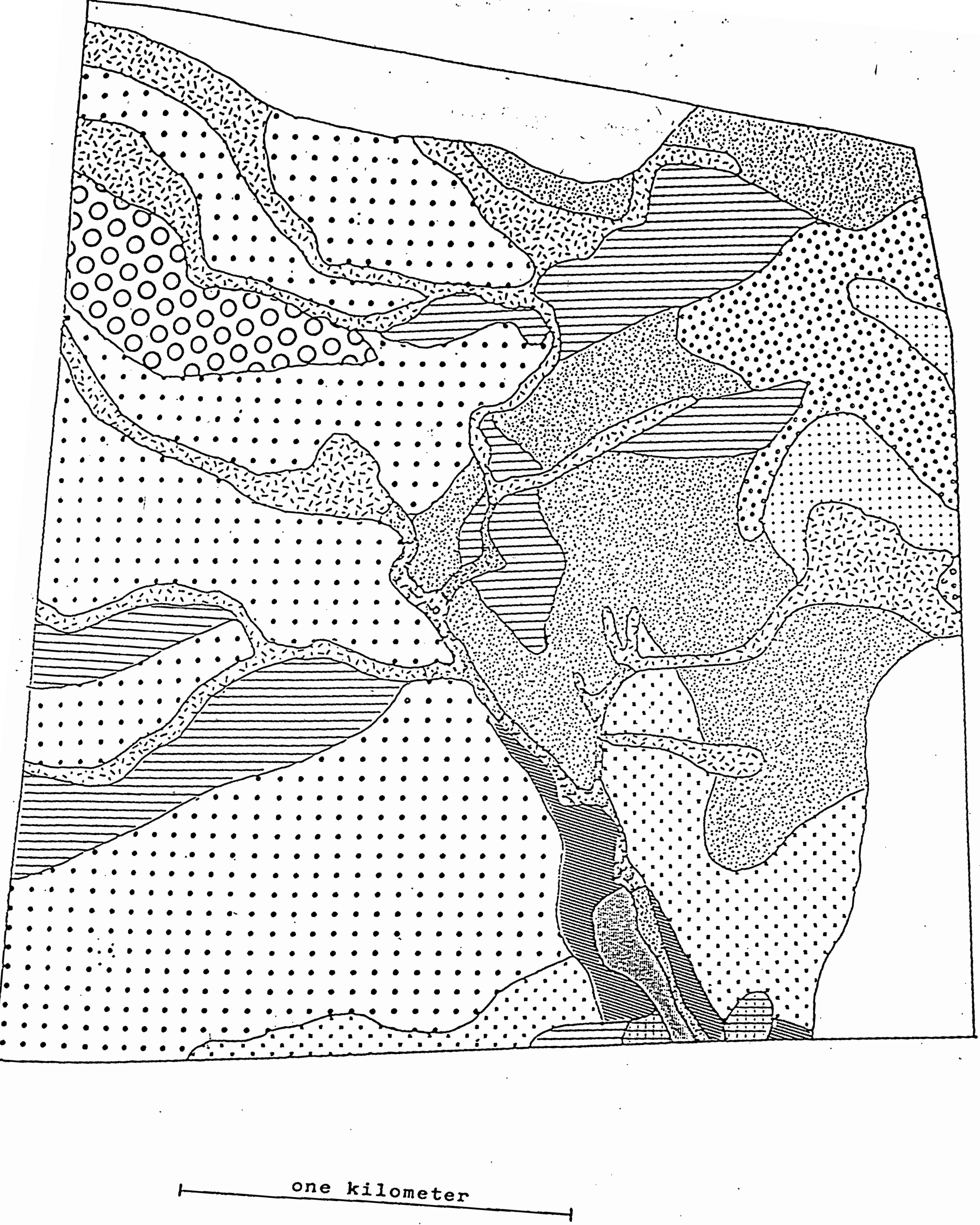


Fig 5: Plant Communities

The data for all relevés were hand sorted, creating two Braun-Blanquet tables for the data at eighteen months. One table (Appendix 4) incorporated all post-fire data, while the second table (Appendix 5) is made up of only those species not previously recorded in those relevés in the pre-fire survey (de Lange 1992).

Detrended correspondence analysis (DCA) was used to ordinate the site-time data (mature and post-disturbance relevés) from all the communities to reveal successional patterns (Austin 1977). The post-disturbance data was ordinated separately in order to display more clearly the time trajectories of the replicate sites in the compositional space of the ordination.

Comparisons were made of total species richness and equitability (Shannon-Wiener function) (Whittaker 1972), as well as richness and relative cover of growth form and regeneration groups for the mature and successional relevés.

3.2 MECHANISMS GOVERNING SPECIES RESPONSES TO DISTURBANCE

Each species noted within a relevé, was classified according to it's vital attribute proposed by Noble and Slayter (1980).

Table 3: Cover Abundance Values (Werger 1974)

Code for tables	Density Value (%)	Description
r	0,1	Very rare and with negligible cover (usually a single individual).
6	0,5	Present but not abundant, with a small cover value (less than 1 % of the quadrant area).
1	3	Numerous but covering less than 1 % of the quadrant area, or not so abundant but covering 15 % of the quadrant area.
2	15	Very numerous but covering less than 5 % of the quadrant area, or covering 5 - 15 % of the quadrant area independent of abundance.
3	38	Covering 25 - 50 % of the quadrant area, independent of abundance.
4	65	Covering 50 - 75 % of the quadrant area, independent of abundance.
5	88	Covering 75 - 100 % of the quadrant area, independent of abundance.

Table 4: Raunkiaer Plant life-forms (Shimwell 1971)

Life-form	Abbreviation	Description
Cryptophytes (Geophytes)	CR	Herbaceous plants with their survival organs protected in the soil
Chamaephytes	CH	Broomy or bunching from the ground up to about 50 cm
Therophytes (Annuals)	T	Complete their life-cycles within a year
Lianas	L	Vines
Nanophanerophytes	NA	Short trees up to about 2 m

Three main groups of vital attributes were recognized, but only the first aspect was investigated in this paper:

a) How a species arrives at, or persists on a site during or after a disturbance.

b) Time taken for selected species to reach maturity.

c) Ability of a particular species to establish and grow to maturity in the developing community.

3.2.1 Method by which a Species Persists on the Site of Disturbance

Species were divided into the following categories:

Seed regenerating species:

a) D-species: killed by disturbance, but replaced by migration.

b) S-species: survive by seed being stored in the soil, and which usually persist longer than the parent plants.

c) G-species: as for S-species, but seed stores are exhausted by one germination event.

d) C-species: seed is available while mature plants are alive on the site. Normally stored in serotinous organs in the canopy of the plant.

Vegetatively regenerating species:

e) V-species: sprout and form juvenile shoots.

f) U-species: sprout and form reproductively mature shoots if mature at the time of disturbance.

Some species persist or recolonize a site by both vegetative and germinative methods. The species encountered in the study fell into the category:

g) ð-Species: where S and U, or G and U are combined.

For the study short dispersal distances of seed for seeders was presumed, i.e. few D-species. Seed of C-species (seed stored on plant i.e. serotinous, for example Proteaceae and Bruniaceae) were presumed to have a short life span after release (Kruger 1987).

3.2.2 Conditions for Establishment

Species were further categorized according to the condition of the site before establishment could take place (Noble and Slayter 1980).

I-species: intolerant, can only establish under the conditions immediately following disturbance.

R-species: cannot establish under conditions immediately after a disturbance. Must wait until certain modifying effects have taken place by pioneer plants.

These two forms of vital attributes occur in real, 'natural' combinations amounting to a number of distinct 'species types' or 'behavior patterns', each denoted by a two-letter combination (Appendix 1).

3.3 FIRE-RESPONSE CATEGORIES

Each plant was classified according to its response to fire. This was based on Bell's *et al.* (1984) classification of Australian heathland. The categories are described in Table 5.

3.4 DIVERSITY

Simpson's index (C), a measure of dominance concentration, was used to calculated species diversity for each community.

$$C = \Sigma^2 p_i s$$

s = number of species in sample

p_i = the proportional abundance of the *i*th species

Table 5: Fire response categories (Bell *et al.* (1984)

Primary Category	Sub-category	Description
Fire ephemerals	Monocarpic, {MFE} Polycarpic {PFE}	Fire-stimulated, sometimes fire-obligate germination growth early maturity, life-spans of three months to four years.
Obligate seeders	{OS}	No capacity for vegetative regeneration; life-spans potentially less than 15 years and growth cycles terminated prematurely by fire.
Sprouters	Obligate vegetatively reproducing sprouter {OVS}	Vigorous vegetative multiplication, virtually no seed regeneration, clonal populations
	Facultative sprouter-seeder {FSS}	Variable vegetative regeneration; but usually poor, some or even abundant seed regeneration.
	Auto-regenerating long-lived sprouter {ALS}	Abundant vegetative regeneration; seed regeneration adequate to replace parent mortality.

The Shannon-Wiener index (H), which reflects evenness of relative species abundances in the community, was calculated as:

$$H = -\sum p_i \log_{10} p_i$$

4 RESULTS AND DISCUSSION

4.1 SPECIES RICHNESS PATTERNS IN RELATION TO FIRE

During the study a total of between 33 and 148 species, per community, were indentified in the 18 month post-fire vegetation, with an average of 88,3 species. The mature communities had an average of between 25 and 92 species (average 52,7)(de Lange 1992). Of these species, individuals with the ability to sprout accounted for between 51 % and 67 % of the post-fire species, slightly more than half the recorded number of species. This is lower than the 73 % recorded by van der Moezel *et al.* (1987) working in Australia, and the 66 % of the species recorded by Bell *et al.* (1984) in the Northern sand plain of Australia. The mean number of species per mature community varied between 11 (Community A) and 21,4 (Community B).

4.1.1 Species Lost from Relevés Post-Fire

The cover abundance value for species lost from any relevé generally was less than three, and often less than six (Table 3). This was similar to the "+" of Kruger (1987)(Appendix 6). Species which had a relatively high cover abundance value (> 3), usually had only occurred in one relevé, often as a single specimen, in the particular community prior to the fire (de Lange, 1992). A year post-fire many of these apparently lost species were noted outside the relevés but still within the particular community. Few parasitic species had reappeared in the relevés eighteen months post-fire.

In Community C (see Table 2 for list of abbreviations used), 2 % of the sprouting species were lost i.e. one species, *Osmitopsis afra*. This species had occurred in only one of the pre-fire relevés at a cover abundance value of less than 3 (Appendix 6). Communities B, D and E lost no sprouting species, while communities G, H and I lost the greatest percentage of these species (9, 11 and 7 % respectively). The loss of these species from the relevés, for example *Leucadendron salignum*, and *Pterocelastrus rostratus*, were mainly due to the fact that the individual had not recovered after the fire, or had sprouted and died shortly afterwards.

A greater percentage of seeding species disappeared from the relevés than sprouting species. Community C was the only community not to loose any seeding species. Communities H and I lost the greatest percentage of seeders, 25 and 27 % respectively. Both these communities occur at low altitudes (40 - 100 m) on the hot (Community H) dry slopes of the kloof (Fig 4)(de Lange 1992). Community H was represented by only one relevé in the post-fire survey, and this could account for the apparently high loss of species. The other communities (A, B, D, E, F and G), had an average percentage loss of 8,5 species, less than half that of the formerly mentioned communities.

The average loss of species, both seeders and sprouters, per community varied between 2 % (Community C) and 36 % (Community H), averaging 15 % of species, per community, being lost from the sampled relevés. These species were observed growing in other areas of the community at a later survey, and were hence not lost from the system (de Lange pers obs).

4.1.2 Species Gained in Relevés post-fire

Geophytes and seeding chamaephytes accounted for the greatest gains in species richness (Fig 6 a - i). A small amount of short range migration was also involved for example *Protea nitida* and *Rhus lucida*. Parent plants of these species had been noted in the nearby vicinity of the relevés before the fire. A minimum increase of 50 % of previously unrecorded species per community, ranging up to

Fig 6 a - f: Growth forms

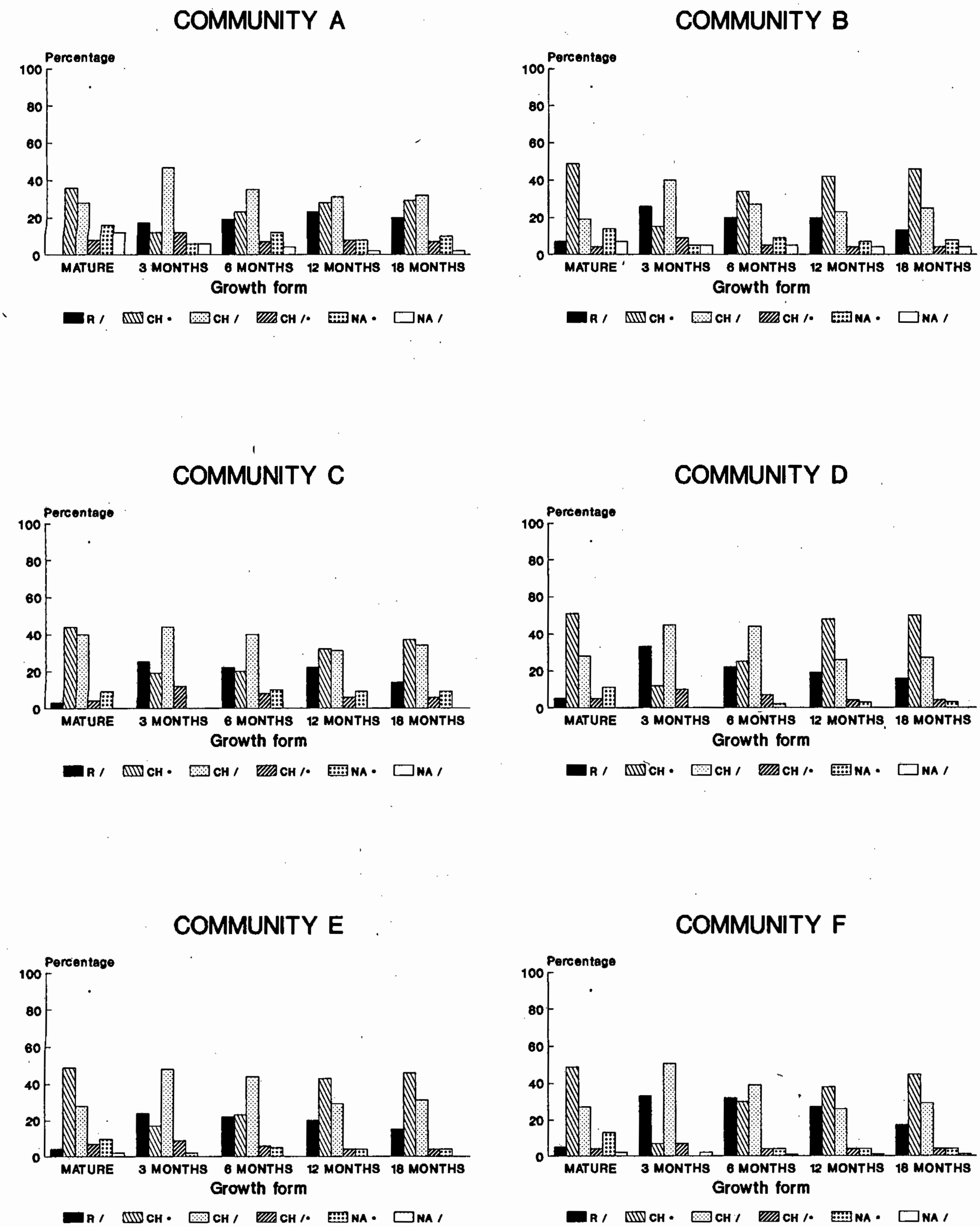
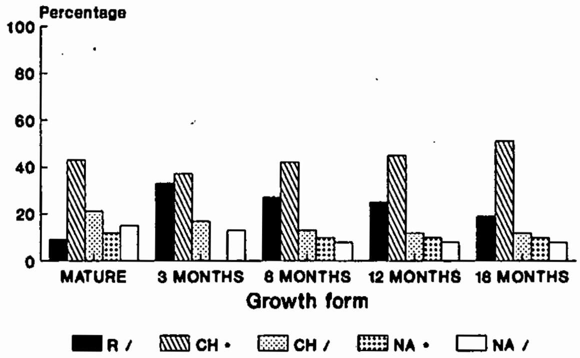
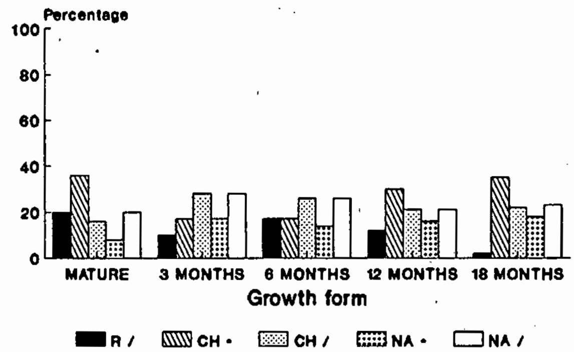


Fig 6 g - i (cont)

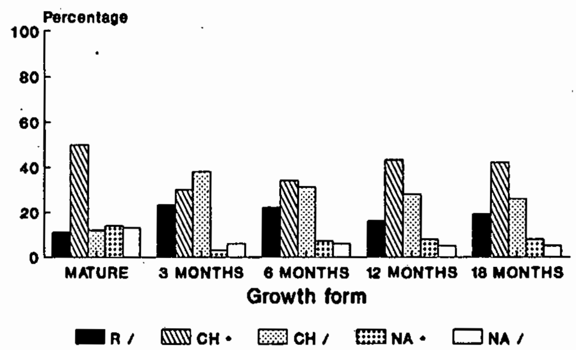
COMMUNITY G



COMMUNITY H



COMMUNITY I



R / - geophytes

CH * - chamaephytes (seed)
CH / - chamaephytes (sprout)

NA * - nanophanerophytes (seed)
NA / - nanophanerophytes (sprout)

127 % in Community I was noted, with an average of 15,2 new taxa being added to each of the sampled communities 18 months post-fire. This is lower than the average of 29 and 47 noted at Jakkalsrivier and Zachariashoek respectively by Kruger (1987) (Appendix 7).

Sprouting species accounted for the greatest increase in the number of "new" species in each community varying between 31 % (Community D), and 73 % (Community I). Community H had the lowest percentage of previously unrecorded sprouting species, namely 11 %.

New seeding species accounted for between 16 % (Community A) and 53 % (Communities H and I). Sprouters generally accounted for a greater percentage of species gains than that of the seeders. The exceptions were Communities G and H where seeders accounted for 53 % and 39 %, sprouters 41 % and 11 % respectively.

Of the different life form categories (Table 4), the greatest increase in the number of species was among the cryptophytes, which generally accounted for at least 30 % of the species richness in the post-fire communities. The reverse situation regarding geophytes was found by Hoffman *et al.* (1987) at a lowland fynbós site, Pella, in the south western Cape. Community H reflected the trend in geophytes as recorded at Pella in that it had high pre-fire levels of geophytes, but by 18 months post-fire this growth form accounted for only about 2 % of the species richness. These differences at the two sites could possibly be due, in part, to the greater amount, and more reliable rainfall experienced in the mountain fynbos, allowing larger shrubs to out compete the geophytic species. The marked increase in geophytes in the post-fire communities can be accounted for by the fact that they are particularly difficult to identify in mature veld as some species loose their leaves at certain times of the year, while others only have above ground parts for a few years after a burn, for example *Geissorhiza ovata* and *Monadenia bracteata*, surviving until the next fire underground, and are hence missed in a survey of mature veld, leading to an underestimation. Kruger (1987) experienced similar difficulties with geophytic plants in his study. The one exception to the increase in geophytes was Community H. Here they accounted for only 13 % of the increase. This was also the only community in which the seeding nanophanerophytes's accounted for a significant amount of the previously unrecorded species (33 %).

Seeding chamaephytes were the second most important group, accounting for an average of 25 % of the newly recorded species. The only community which did not reflect this general tendency was Community A where they accounted for only 5 %, sprouting chamaephytes accounted for the greatest increase in this community of 38 %. Overall, sprouting chamaephytes accounted for the third greatest increase of species, but as a group, were the least consistent in accounting for the increase of species varying between 7 % (Community H) and 38 % (Community A).

Annuals accounted for only 4 % of the overall increase of species, and were not represented in all communities (A and C). In the remaining communities they accounted for little of the increase in species richness (2 - 6 %), with the exception of Community H, where it was the third largest group, accounting for 13 % of the increase.

4.1.3 Species which remained in Sampled Relevés

The percentage species common to both mature and year old veld varied between 64 % and 98 % (Table 6), with a strong correlation between species recorded prior to the fire, and those added a year post-fire (r = 0,95). Communities which lost the greatest percentage of species were the wet marshy community (A: 64 %), and the three kloof communities (G, H and I: 80, 68 and 70 % respectively). These apparently high loses could be accounted for by the low sampling intensity of these communities. Some of the greatest apparent gains where experienced within these communities, which could again be largely attributed to the low sampling intensity (Table 6). The remaining communities retained 87 to 98 % of their pre-fire species. It would appear that the communities are relatively stable in their species composition, but there is some movement of species within the community. This movement, although low, could be of great importance for the evolutionary development of a species, as well as the recolonisation of sites where the species has become extinct.

Table 6: Summary Table of Species lost and gained post-fire

Community	Number relevés	Total pre-fire species	Post-fire species (year post-fire) remaining %	lost	lost %	gain	gain %
A	2	25	64	9	36	21	84
B	10	92	98	2	2	69	75
C	4	44	98	1	2	34	77
D	6	64	87	8	13	33	52
E	13	73	91	7	9	57	78
F	8	55	95	3	5	58	105
G	2	34	80	7	20	32	94
H	1	28	68	9	32	15	54
I	4	59	70	18	30	75	127

4.2 SPECIES VITAL ATTRIBUTES AND FIRE-RESPONSE CATEGORIES

The vital attributes and fire-response categories for some of the species recorded in the Reserve are given in Appendix 1.

In young veld the number of species were evenly divided between obligate seeders and sprouters. In Communities A and I sprouters accounted for a larger percentage of the recorded species (58 % - 35 %; 58 % - 39 % respectively). These figures are considerably lower than those recorded by Kruger (1987) of 67,8 % and 69,4 % at Jakkalsrivier and Zachariashoek respectively.

Obligate seeders accounted for more than 50 % of recorded species in mature veld, except for Community H, where the sprouting fire survival strategy predominated.

Sprouting species accounted for between 51 % and 67 % of species richness in all communities sampled, averaging slightly lower than that recorded at Jakkalsrivier and Zachariashoek (67,8 % and 69,4 % respectively;Kruger 1987). Auto-regenerating, long-lived sprouting species predominated in all communities (as was found at Jakkalsrivier and Zachariashoek: 88 - 97 % and 97 - 98 % respectively). These comprised of similar life forms as Kruger's (1987) classes, namely broad and narrow sclerophyllous shrubs, graminoides and both deciduous and evergreen geophytes. The remaining species within this group were faculative sprouter-seeders for example *Villarsia capensis*. No known obligate sprouters were recorded within the relevés. Within the sampled relevés, only one sprouting species, *Nebelia palacea* (Kruger 1978), was recorded as having a secondary post-fire juvenile period. The remaining species were classified as UI species according to the Noble-Slayter system (see Section 3.2).

Seeders accounted for between 41 % and 49 % of the species richness, excepting Community A, with only 32 % seeding species. Of the seeders, those with soil stored seeds accounted for between 63 % and 80 %. Fire ephemerals accounted for between 0 % (Community A) and 34 %, with the main range lying between 20 % and 30 %. This is considerably lower than those recorded at Zachariashoek and Jakkalsrivier (54 % and 48 % respectively).

Widely dispersed (D-species) occurred in low numbers in all communities (7 % {Community A} - 16 % of species). These, as for Zachariashoek and Jakkalsrivier were mainly wind- with a few bird-dispersed species for example *Rhus* species.

All communities had serotinous species (C-species), but they accounted for very little of the species richness (7 % - 17 %).

4.3 COVER ABUNDANCE VALUE AND EMERGENCE OF SPECIES POST-FIRE

Seeding chamaephytes are the most important component of the mature vegetation, accounting for the greatest cover abundance value with the exception of Community H (Waboomveld) occurring in the kloof where sprouting nanophanerophytes had the greatest cover (Fig 7 a - i). Seeding chamaephytes were the most variable group between communities. Communities A and E both showed a similar trend in that there was a steady increase in cover with Community E recovering slightly faster than A. Both these communities occur at mid- to high altitudes, on south-east to westerly aspects, with Community A occurring on wet sites dominated by *Osmitopsis asteriscoides*. By 18 months post-fire, in both communities, seeding chamaephytes had reached a density value of approximately 25 % (Table 3).

Community D had shown little signs of recovery by three months post-fire. At six months a plateau was reached (density value 25 %), considerably lower than that of the mature vegetation. The density remained more or less constant until the

Fig 7 a - f: Growth form densities

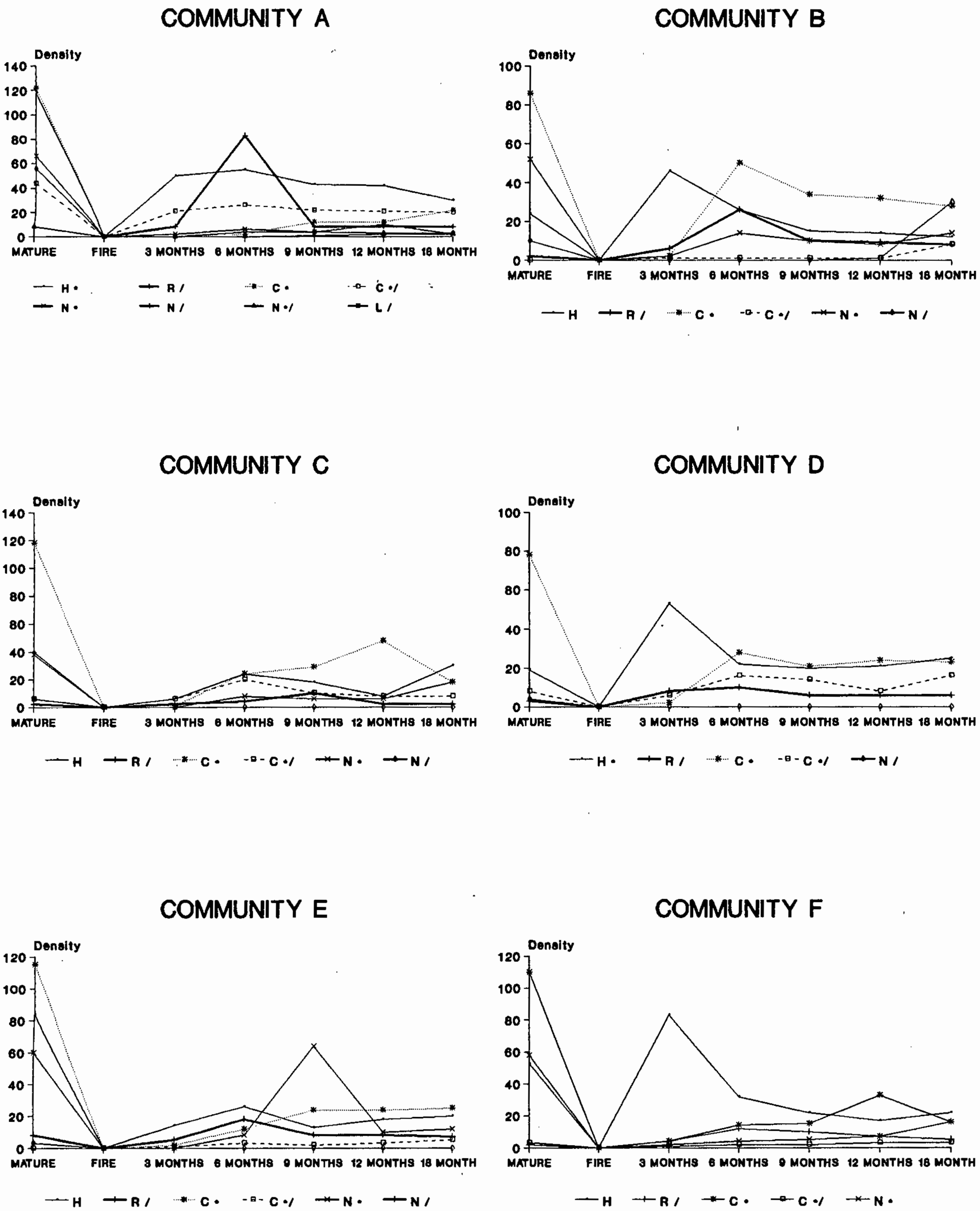
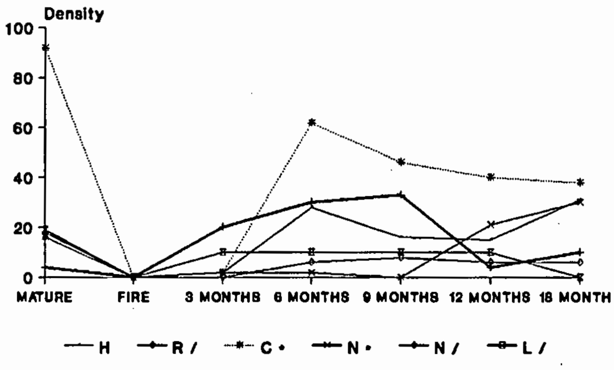
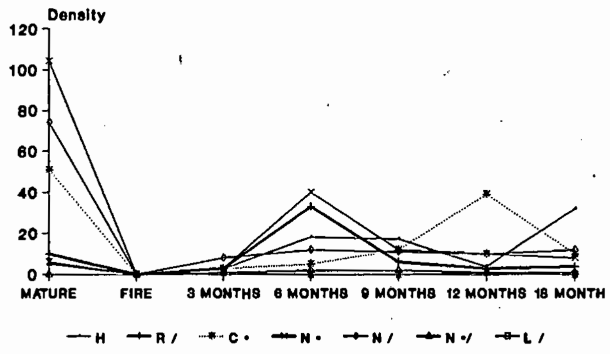


Fig 7 g - i (cont)

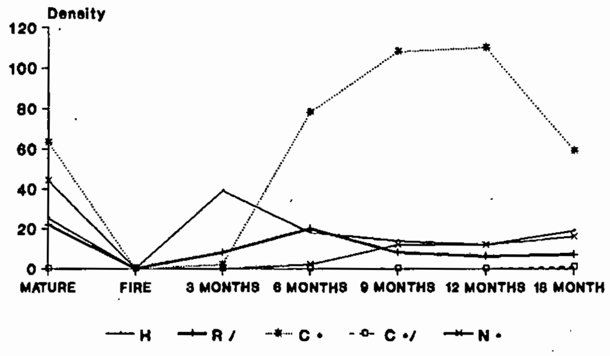
COMMUNITY G



COMMUNITY H



COMMUNITY I



R / - geophytes
L / - lianas

C * - chamaephytes (seed)
H - chamaephytes (sprout)
C */ - chamaephytes (seed & sprout)

N * - nanophanerophytes (seed)
N / - nanophanerophytes (sprout)
N */ - nanophanerophytes (seed & sprout)

termination of the study 18 months post-fire. This community occurs at high altitudes (500 - 700 m) on south-westerly to northerly aspects.

The remaining communities (B, C, F, G, H and I) all showed similar patterns, namely increasing in density value, then dropping by about a third before levelling out. Peaks were reached by the sixth month in Communities B and G, both occurring on well drained sites with a wide altitudinal range, but predominantly between 200 m and 300 m.

Communities F and H recovered slowly up to about a year post-fire, at which stage they dropped down to about half of their cover-abundance value at 18 months. Community F is a generalist community of the plateau area, while Community H occurs at low altitudes in the kloof.

Community I, occurring at an altitude of between 40 m to 100 m on south-south-west to west-south-west aspects reached it's peak at between nine months and a year post-fire. In this community, in contrast to the others, the density value increased by almost twice that of the mature phase. By 18 months post-fire it had declined to its pre-fire level. This large increase in density can mainly be attributed to the germination of five species, *Pentaschistis capensis, Pelargonium cucullatum, P. elongatum, Erica imbricata* and *E. sessiliflora*.

The former three species all grew rapidly, flowered set seed and then died back. *Pelargonium cucullatum* became straggly after its initial burst of growth, declining rapidly in cover abundance. The two Erica species which germinated in great profusion six to nine months after the fire, occurred in only one of the four sampled relevés of this community, many had died a year and a half after the fire.

Sprouting chamaephytes peaked three to nine months prior to the seeding chamaephytes. A year post-fire they had declined to their lowest density value, and were again starting to increase in density by 18 months post-fire, often reaching their pre-fire densities by this stage, and showing an upward tendency. This group forms an important component in the mature veld of Communities A and E and to a lesser extent in Communities C, F, and H.

The third most important life-form in the mature communities was that of the seeding nanophanerophytes. This group is composed mainly of Proteaceae, for example *Leucadendron xanthoconus* and *Aulax umbellata*. Although the data given in the graphs are density values, they can also be related to mass seed germination. Some communities showed a peak in germination at between six and nine months post-fire. This is particularly so in Community H, where this group had provided the

Fig 8 a - f: Ordination Graphs

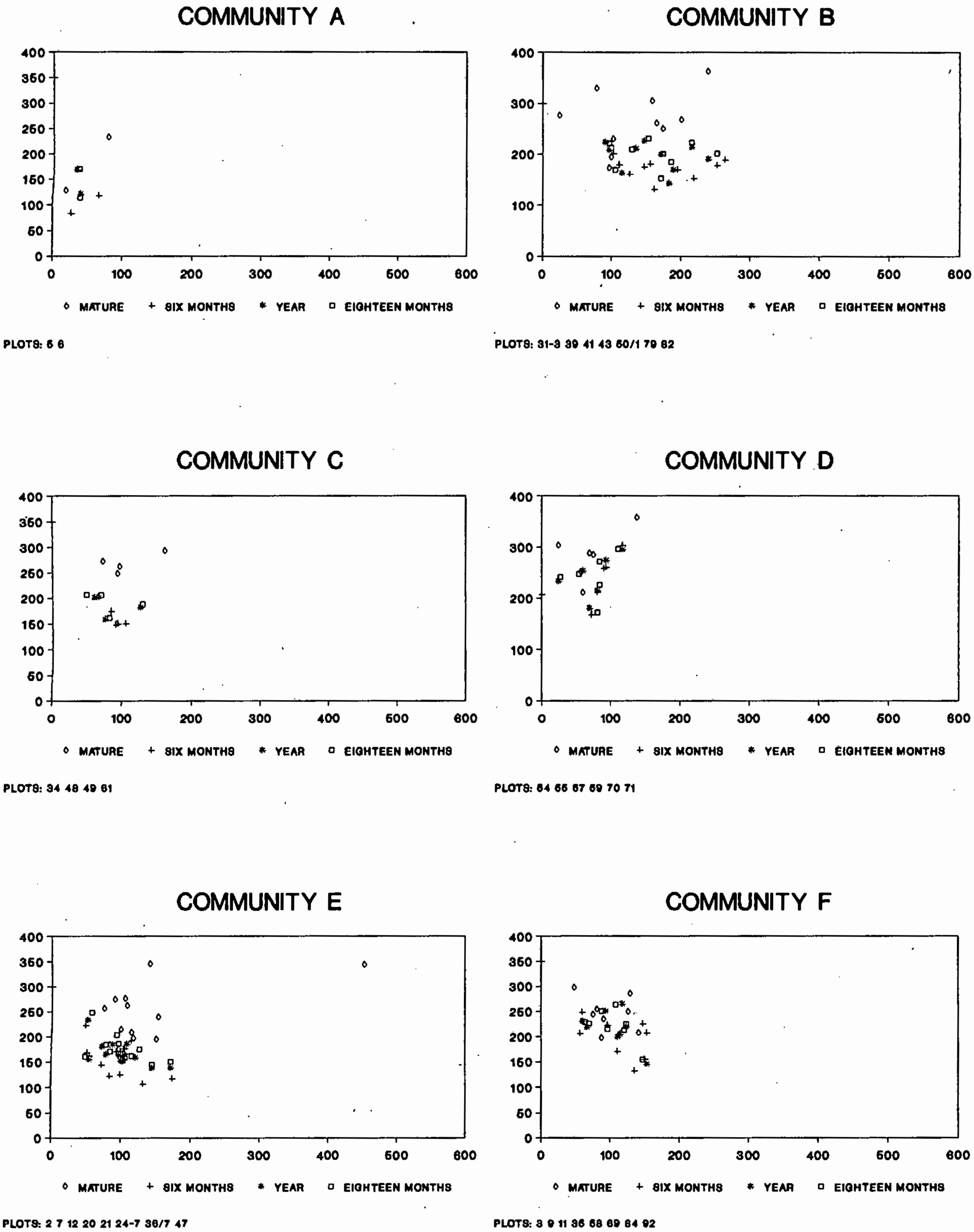
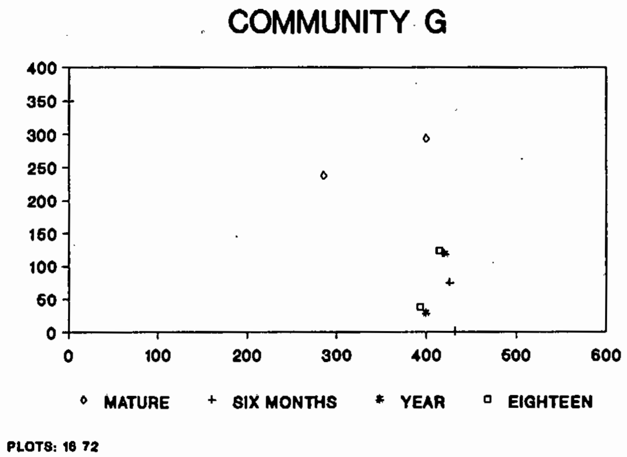
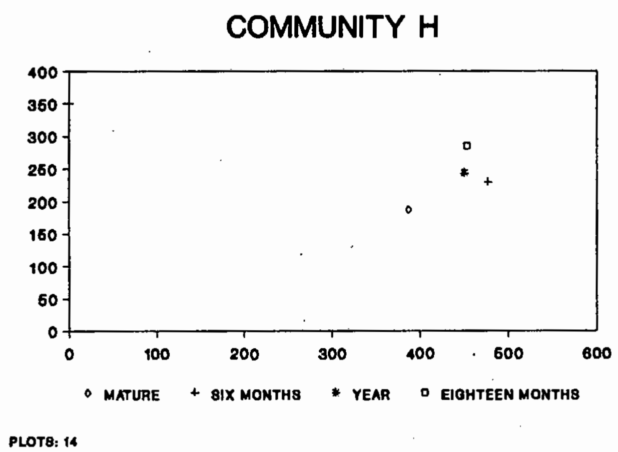
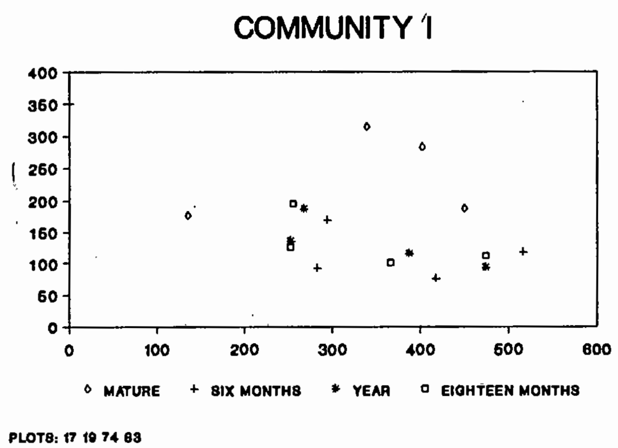


Fig 8 g - i (cont)


COMMUNITY G
400
350
300
250
200
150
100
50
0
0
100
200
300
400
500
600
MATURE
SIX MONTHS
YEAR
EIGHTEEN
PLOTS: 16 72


COMMUNITY H
400
350
300
250
200
150
100
50
0
0
100
200
300
400
500
600
MATURE
SIX MONTHS
YEAR
EIGHTEEN MONTHS
PLOTS: 14


COMMUNITY I
400
350
300
250
200
150
100
50
0
0
100
200
300
400
500
600
MATURE
SIX MONTHS
YEAR
EIGHTEEN MONTHS
PLOTS: 17 19 74 83

indicated little to no directional change in any of the communities between sampling time. The kloof communities (G, H and I) had the greatest change in composition (Fig 9 a - i).

Species richness had generally reached pre-fire levels six month post-fire. A year to 18 months post-fire it had increased by 50 % or more over the mature levels (Fig 10 a - i). Similar patterns of increases in species richness have been noted in coastal dune fynbos (Cowling *et al.* 1988). Species richness was considerably higher for the kloof communities, for example Community I had increased in richness by 150 % over the mature community at 18 months post-fire. This increase was similar to that found by Kruger (1987), and reflected his findings where the maximum number of species occurs in the second season after the burn. As for the sand plain lowland fynbos community (Musil *et al.* 1990), within days of the fire, various individuals had already begun to sprout and 50 % of the total recorded post-fire species had appeared by May (four months post-fire). This increase continued monthly until October (excluding August) whereafter there were almost no further gains in species numbers (Table 7)

Equitability of the kloof communities was only about half as high as that of the plateau fynbos communities. Maximum equitability was generally

Fig 9 a - f: Ordination trajectories

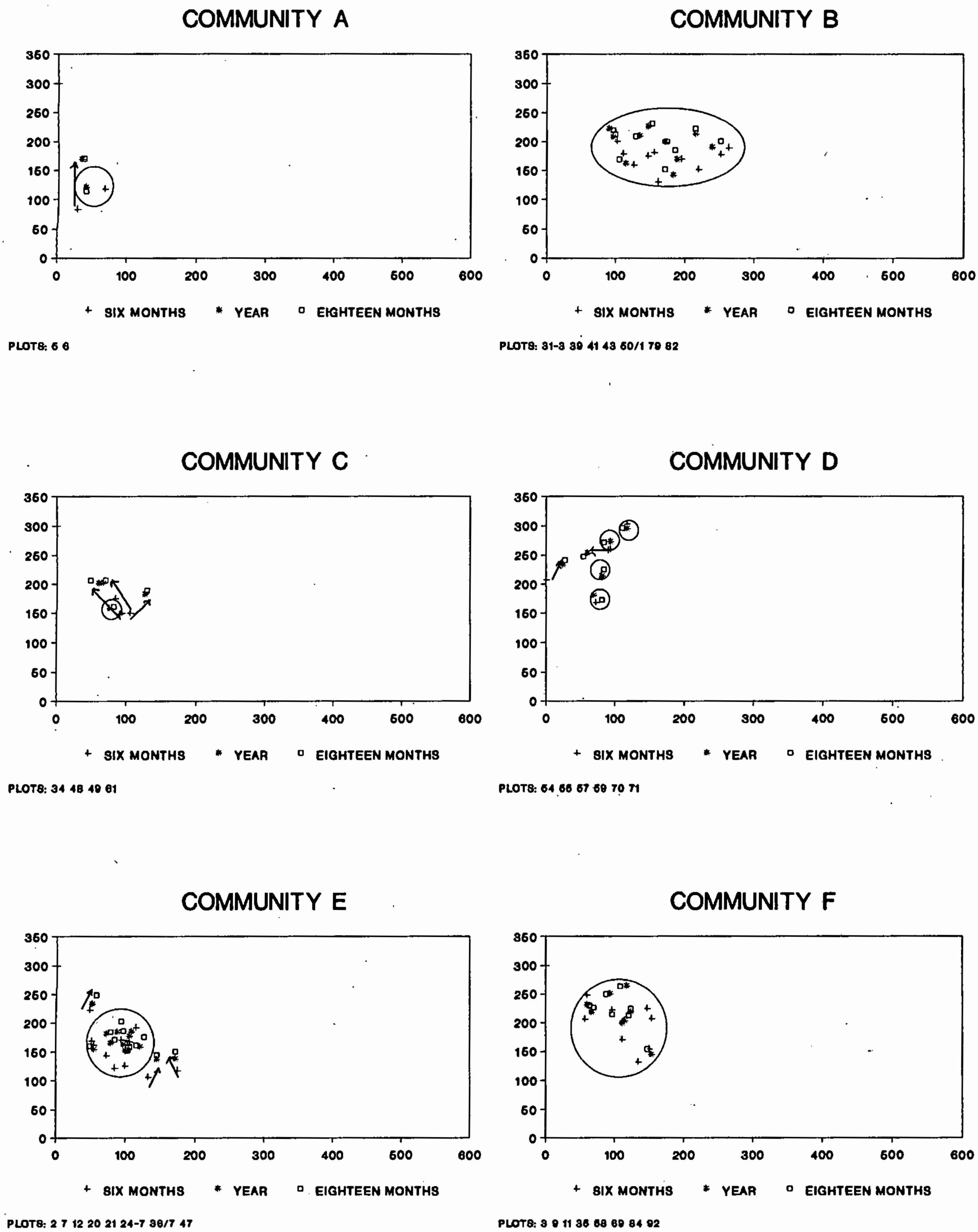
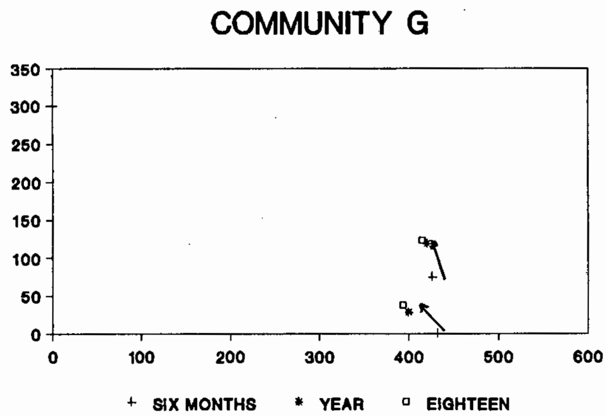
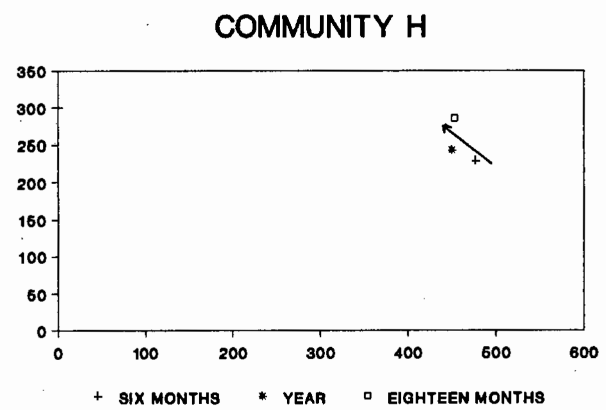


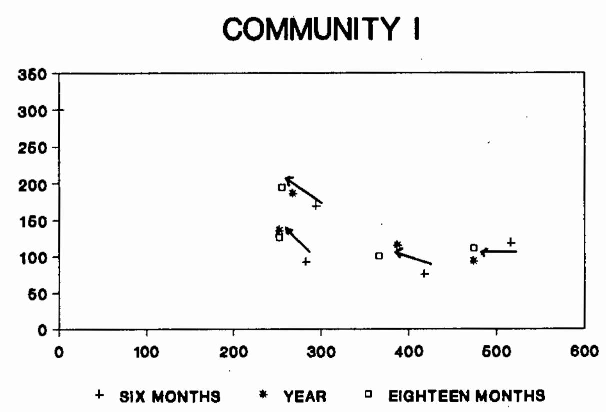
Fig 9 g - i (cont)



PLOTS: 16 72



PLOTS: 14



PLOTS: 17 19 74 83

Fig 10 a - f: Species Richness

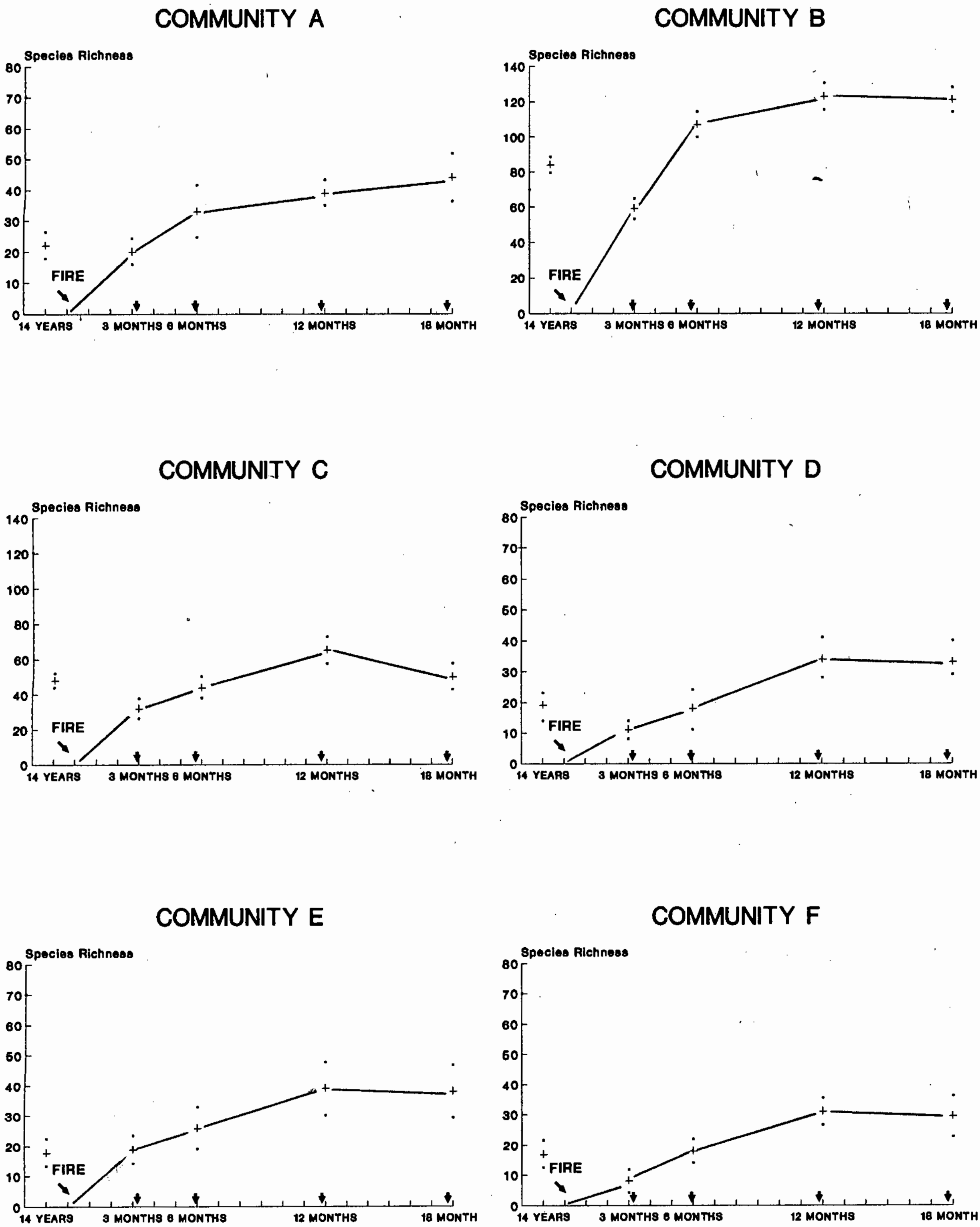
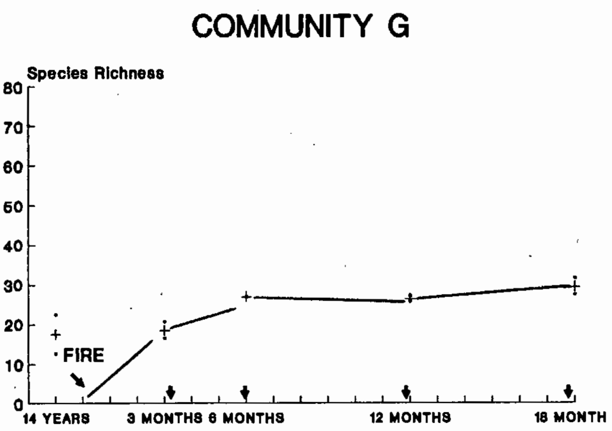
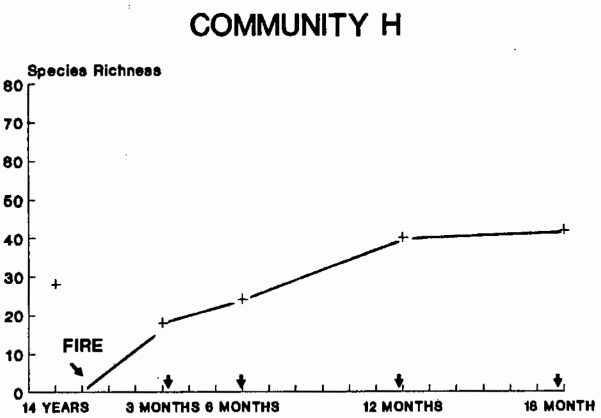


Fig 10 a - f (cont)





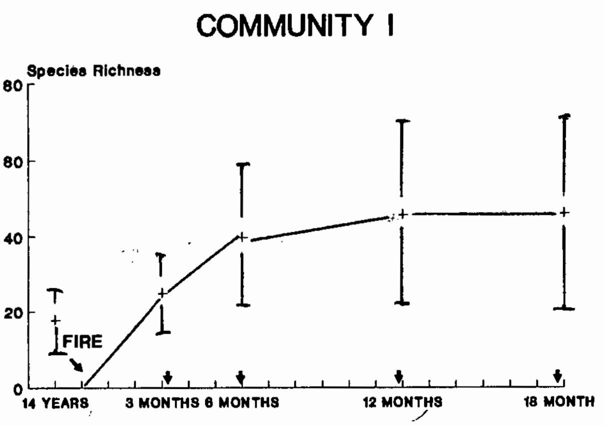


Table 7: Species Diversity data for pre- and post-fire surveys

	COMMUNITY A Mature	3 months	6 months	12 months	18 months
NUMBER OF SPECIES	22	20	33	39	44
MEAN NUMBER OF SPECIES	11	12	21	22.5	25.5
STD DEV	4.2	4.4	8.5	9.2	7.8
MAXIMUM NUMBER SPECIES	14	15	17	29	31
MINIMUM NUMBER SPECIES	8	9	15	16	20
NUMBER COMMON TO MATURE		8	17	19	20
SIMPSONS INDEX	31.9	9.2	10.9	12.9	13.9
SHANNON-WEINER INDEX	7.6	0	2.9	1.6	9.2
NUMBER OF RELEVES	2				

	COMMUNITY B Mature	3 months	6 months	12 months	18 months
NUMBER OF SPECIES	84	59	107	123	121
MEAN NUMBER OF SPECIES	21.4	17.3	33	38.7	38.3
STD DEV	4.4	5.7	7.2	7.5	6.9
MAXIMUM NUMBER SPECIES	28	30	49	52	50
MINIMUM NUMBER SPECIES	16	12	27	29	30
NUMBER COMMON TO MATURE		29	58	65	68
SIMPSONS INDEX	3	0.1	6.8	5.5	6.7
SHANNON-WEINER INDEX	8.4	4.1	13.4	17.4	14.8
NUMBER OF RELEVES	9				

	COMMUNITY C Mature	3 months	6 months	12 months	18 months
NUMBER OF SPECIES	48	32	44	65	50
MEAN NUMBER OF SPECIES	17.7	15.9	22	29.3	29.5
STD DEV	4	5.7	6.1	7.6	7.4
MAXIMUM NUMBER SPECIES	21	19	26	37	38
MINIMUM NUMBER SPECIES	12	6	13	19	20
NUMBER COMMON TO MATURE		16	22	32	30
SIMPSONS INDEX	7.3	0	4.5	6.3	5.5
SHANNON-WEINER INDEX	3.3	2.7	7.4	7.6	6.3
NUMBER OF RELEVES	4				

Table 7 (cont)

	COMMUNITY D Mature	3 months	6 months	12 months	18 months
NUMBER OF SPECIES	59	40	56	98	96
MEAN NUMBER OF SPECIES	18.2	12	17.5	34.8	33.8
STD DEV	4.4	3.7	6	6.9	5
MAXIMUM NUMBER SPECIES	23	17	27	40	38
MINIMUM NUMBER SPECIES	12	7	10	23	25
NUMBER COMMON TO MATURE		23	35	54	53
SIMPSONS INDEX	2.2	0.6	2.3	9.3	10.3
SHANNON-WEINER INDEX	6.4	4.3	9.1	10.1	9.4
NUMBER OF RELEVES	6				

	COMMUNITY E Mature	3 months	6 months	12 months	18 months
NUMBER OF SPECIES	69	57	80	121	114
MEAN NUMBER OF SPECIES	17.8	10.7	25.8	38.9	37.9
STD DEV	4.5	4.6	6.9	8.8	8.8
MAXIMUM NUMBER SPECIES	24	25	38	53	51
MINIMUM NUMBER SPECIES	10	11	12	19	18
NUMBER COMMON TO MATURE		35	41	68	66
SIMPSONS INDEX	4.5	0.4	1.3	2.8	11.9
SHANNON-WEINER INDEX	10.8	4.1	9.7	15.5	12.7
NUMBER OF RELEVES	12				

	COMMUNITY F Mature	3 months	6 months	12 months	18 months
NUMBER OF SPECIES	64	31	59	97	81
MEAN NUMBER OF SPECIES	16.9	7.9	17.9	30.9	29.3
STD DEV	4.5	3.9	3.9	4.4	6.8
MAXIMUM NUMBER SPECIES	24	12	22	37	38
MINIMUM NUMBER SPECIES	14	2	11	23	20
NUMBER COMMON TO MATURE		16	29	53	56
SIMPSONS INDEX	7.6	0.1	3.7	3.8	10.1
SHANNON-WEINER INDEX	6.9	0	9.1	12.4	9.8
NUMBER OF RELEVES	8				

Table 7 (cont)

	COMMUNITY G Mature	3 months	6 months	12 months	18 months
NUMBER OF SPECIES	31	27	41	39	43
MEAN NUMBER OF SPECIES	17.5	18.5	27	26.5	29.5
STD DEV	4.9	2.1	0	0.7	2.1
MAXIMUM NUMBER SPECIES	21	20	27	27	31
MINIMUM NUMBER SPECIES	14	17	27	26	28
NUMBER COMMON TO MATURE		11	15	15	16
SIMPSONS INDEX	1.9	24.2	31.3	13.4	8.8
SHANNON-WEINER INDEX	4.2	4.9	0.7	4.2	3.6
NUMBER OF RELEVES	2				

	COMMUNITY I Mature	3 months	6 months	12 months	18 months
NUMBER OF SPECIES	39	50	86	98	99
MEAN NUMBER OF SPECIES	17.7	24.7	39.7	45.7	46
STD DEV	8	10.1	18.2	24.1	25
MAXIMUM NUMBER SPECIES	26	31	53	66	66
MINIMUM NUMBER SPECIES	10	13	19	19	18
NUMBER COMMON TO MATURE		21	30	39	38
SIMPSONS INDEX	7.5	0.1	4.4	18.9	18.6
SHANNON-WEINER INDEX	1.8	5.4	9	7.4	6.3
NUMBER OF RELEVES	3				

reached a year post-fire, after which it started to decline slightly (Fig 11 a - i, excluding Community H, as there was only one relevé sampled in this community). Community A was an exception, in that equitability remained low for the first year, reaching pre-fire levels only after 18 months. This was mainly due to the dominance of two species namely *Villarsia capensis* and *Brunia alopecuroides*. The trend in equitability mirrored that of species richness for the different communities.

All dominant species in the mature communities had re-established 18 months after the fire (Table 8) Seeding chamaephytes were the most dominant life-form of all the communities, in both mature and post-fire stages (ie >5 % cover)(Fig 6 a - i). The mature vegetation had more dominant species than did the young post-fire communities. Seeding and sprouting chamaephytes accounted for the highest and second highest species numbers in the mature communities. The increase in species richness a year post-fire was mainly due to the latter category and the increase in recorded geophytes. Sprouting species dominated the first six months post-fire. A year post-fire at least 80% of the pre-fire dominant species had re-established, and by eighteen months the remaining 20 % had also re-established. Community G had the greatest number of new post-fire dominant species.

<u>Table 8</u>: Growth form, fire response, percentage cover and frequency (%) of occurance in plots of dominant species (> 5 % cover) in mature and post-fire communities. Species dominant in mature vegetation but also present in post-disturbance fynbos indicated by +. (See text for explanation of abbreviations).

NOBLE SLAYTER FIRE RESP	GROWTH FORM		COMMUNITY A MATURE	MONTHS POST-FIRE: SIX	TWELVE	EIGHTEEN
DR OS	NA	*Erica hispidula*	14(70)			+
UIALS	CH	*Restio dispar*	7.4(50)		+	+
SI OS	CH	*Chondropetalum ebracteatum*	16(50)		+	+
CI OS	NA	*Leucadendron xanthoconus*	24(70)	+	+	+
UI ALS	NA	*Osmitiopsis asteriscoides*	40(90)	+	+	+
SI OS	NA	*Grubbia rosmarinifolia* sub *ros*	16(30)		+	+
SI OS	CH	*Erica perspicua*	20(70)		+	+
UI ALS	CH	*Brunia laevis*	6.5(10)	+	+	+
SI OS	NA	*Brunia albiflora*	21(40)		+	+
SI OS	CH	*Simocheilus consors*	5.3(30)			+
UI ALS	CH	*Restio ambiguus*	19(30)		+	+
CI ALS	CH	*Erica sessiliflora*	5.7(70)		+	+
SI OS	CH	*Chondropetalum mucronatum*	10(40)		+	+
SI OS	CH	*Chondropetalum hookerianum*	5.3(20)		+	+
SI OS	CH	*Blaeria ericoides*	6.5(10)		+	+
USI FSS	CH	*Villarsia capensis*	34(70)	19(50)	19 (50)	+
SI OS	NA	*Brunia alopecuroides*	35(70)		7.5(50)	+
UI ALS	CH	*Osmitopsis afra*		7.5(50)		
UI ALS	CR	*Bobartia longicyma*		7.5(50)	7.5(50)	7.5(50)
δI FSS	CH	*Maxuerlla rufa*		8(100)		
UI ALS	CH	*Pentaschistis colorata*		8(100)	8(100)	
UI LAS	CH	*Diospyros glabra*			17.5(50)	17.5(50)

<u>Table 8</u> (cont):

NOBLE SLAYTER FIRE RESP	GROWTH FORM		COMMUNITY B MONTHS POST-FIRE: MATURE	SIX	TWELVE	EIGHTEEN
DR OS	NA	*Erica hispidula*	12(52)			+
UIALS	CH	*Restio dispar*	5(23)	+	+	+
SI OS	CH	*Chondropetalum ebracteatum*	8(52)		+	+
CI OS	NA	*Leucadendron xanthoconus*	6.6 (7)	7.4(50)	+	5.5 (90)
UI ALS	CH	*Restio perplexus*	7.2(35)	+	+	+
CI OS	NA	*Protea lepidocarpodendron*	6(17)	+	+	+
SI OS	NA	*Penaea cneorum* ssp *ruscifolia*	5(52)	+	+	+
SI OS	CH	*Erica onosmaeflora*	5(29)		+	+
CI OS	NA	*Aulax umbellata*	16(47)	+	+	+
SI OS	CH	*Pseudopentameris brachyphylla*		11.5(70)		
SI OS	NA	*Osteospermum rotundifolium*		5(50)		
SI PFE	CH	*Ehrharta rehmannii* var *filifor*			7.8(40)	

Table 8 (cont)

NOBLE SLAYTER FIRE RESP		GROWTH FORM		COMMUNITY C MATURE	MONTHS POST-FIRE: SIX	TWELVE	EIGHTEEN
SI	OS	CH	*Chondropetalum ebracteatum*	18(75)		+	+
CI	OS	NA	*Leucadendron xanthoconus*	23(100)		5(100)	5(100)
SI	OC	CH	*Chondropetalum mucronatum*	11(12)	+	+	+
USI	FSS	CH	*Villarsia capensis*		13.3(50)	4.5(50)	4.5(50)
SI	OS	NA	*Brunia alopecuriodes*	31(62)	10.3(50)	10.3(50	19.8(75)
UI	ALS	CR	*Bobartia longicyma*			7.5(50)	
SI	OS	CH	*Erica onosmaeflora*	5.8(50)		+	+
SI	OS	CH	*Pseudopentameris brachyphylla*		9.8(50)	9.8(50)	
SI	OS	CH	*Erica cumuliflora*	9.5(25)		+	+

Table 8 (cont):

NOBLE SLAYTER FIRE RESP		GROWTH FORM		COMMUNITY D MATURE	MONTHS POST-FIRE: SIX	TWELVE	EIGHTEEN
CI	OS	NA	*Leucadendron xanthoconus*	21(100)	8.3(83)	15.8(100)	10.5(100)
UI	ALS	CH	*Thamnochortus pulcher*	5.4(60)	+	+	+
SI	OS	CH	*Elegia filacea*	7.1(80)		9(67)	+
VI		CH	*Nebelia paleacea*	6.6(60)	+	+	13.5(50)
SI	OS	CH	*Ceratocaryum argentea*	9.8(50)	+	+	+
SI	OS	CH	*Leucospermum gracile*	5.6(30)		+	+
SI	OS	CH	*Hypodiscus albo-aristatus*	6.5(10)		+	+
SI	OS	CH	*Elegia parviflora*	7.7(60)		+	+
USI	FSS	CH	*Villarsia capensis*		12.7(33)	20.3(50)	13.5(50)
SI	OS	NA	*Brunia alopecuroides*			38.3(33)	21.6(33)
UI	ALS	CH	*Hypodiscus aristatus*			6(67)	
SI	OS	CH	*Syphocolon debilis*			9.5(17)	
UI	ALS	CH	*Tetraria fasciata*				13.3(67)

Table 8 (cont):

NOBLE SLAYTER FIRE RESP	GROWTH FORM	COMMUNITY E MATURE	MONTHS POST-FIRE: SIX	TWELVE	EIGHTEEN
CI OS NA	*Leucadendron xanthoconus*	18 (73)		5.5 (93)	+
USI FSS CH	*Villarsia capensis*			20.3 (50)	
UI ALS CH	*Hypodiscus aristatus*	5.6 (63)		+	+
SI OS CH	*Syphocolon debilis*			9.5 (17)	
DR OS NA	*Erica hispidula*	8.3 (31)			+
CI OS NA	*Aulax umbellata*	15 (63)		+	+
SI OS CH	*Simocheilus consors*	5.7 (47)		+	+
UI ALS CH	*Restio ambiguus*	5.1 (21)		+	+
SI OS CH	*Chondropetalum hookerianum*	11 (52)	+	+	+
SI OS CH	*Elegia juncea*	7.6 (52)		+	+
UI ALS CR	*Corymbium glabrum*	5.1 (47)	+	+	+
UI ALS CH	*Restio bifarius*	9.8 (36)	+	+	+
DI OS CH	*Phaenocoma prolifera*	5 (63)		+	+
SI OS CH	*Nagelocarpus serratus*	7.4 (42)		+	+
CI OS NA	*Leucadendron gandogeri*	13 (21)		+	+
SI OS CH	*Erica imbricata*	13 (84)		+	+

Table 8 (cont):

NOBLE SLAYTER FIRE RESP	GROWTH FORM	COMMUNITY F MATURE	MONTHS POST-FIRE: SIX	TWELVE	EIGHTEEN
CO OS NA	*Leucadendron xanthoconus*	29(90)		+	+
UI ALS CH	*Thamnochortus pulcher*				5.1(57)
SI OS CH	*Elegia filacea*	5.6(3)		+	+
SI OS NA	*Brunia alopecuroides*	9.1(20)		+	+
UI ALS CH	*Tetraria fasciata*			5(100)	
DR OS NA	*Erica hispidula*	5.6 (30)			+
CI OS NA	*Aulax umbellata*	5.6 (30)		+	+
SI OS CH	*Simocheilus consors*	5.6 (30)		+	+
UI ALS CH	*Restio ambiguus*	6.8 (30)		+	+
SI OS CH	*Chondropetalum hookerianum*	10 (40)	+	+	+
SI OS CH	*Elegia juncea*	12 (40)		+	+
SI OS CH	*Erica imbricata*	12 (80)		+	+
SI OS CH	*Erica onosmaeflora*	8.9 (50)		+	+
CI ALS CH	*Erica sessiliflora*	5.6 (30)	+	+	+
UI ALS CH	*Restio burchellii*	13 (60)		+	5.29 (71)
UI LAS CH	*Penaea mucronata*	11 (80)	+	+	+
SI OS CH	*Chondroptealum deustum*	5.3 (20)		+	+
UI ALS CH	*Restio triticeus*	6.5 (10)		+	+

Table 8 (cont):

NOBLE/ SLAYTER FIRE RESP		GROWTH FORM		COMMUNITY G MATURE	MONTHS POST-FIRE: SIX	TWELVE	EIGHTEEN
SI	OS	CH	*Erica onosmaeflora*	7.6(20)		+	+
SI	OS	CH	*Blaeria ericoides*	6(40)		+	+
SI	OS	CH	*Lampranthus emarginatus*	6(40)	+	+	+
SI	OS	CH	*Blaeria dumosa*	7.6(20)		+	+
CI	OS	NA	*Protea repens*	13(20)	+	+	+
SI	OS	CH	*Pentaschistis capensis*	8.2(40)	+	+	+
SI	OS	NA	*Passerina vulgaris*	6(40)	+	+	+
SI	OS	CH	*Erica lanuginosa*	8.2(40)		+	+
UI	ALS	CH	*Cymbopogon marginatus*	8.2(40)		+	+
DI		CH	*Cassytha ciliolata*	7.6(20)			
UI	ALS	CR	*Protasparagus compactus*		9(100)		
SI	OS	CH	*Crassula capensis*		7.5(50)		
SI	OS	CH	*Commelina africana*		7.5(50)		
dI	ALS	CH	*Pteridium aquilium*		44(50)	7.5(50)	
SI	PFE	CH	*Nemesia diffusa*		9(100)	9(100)	
UI	ALS	NA	*Montinia caryophyllacea*		9(100)	9(100)	15(100)
SI	OS	CA	*Pelargonium cucullatum*		26.5(100)	26.5(100)	38(100)
UI	ALS	CH	*Tetraria thermalis*			7.5(50)	
UI	ALS	CH	*Arctotis semipapposa*			7.5(50)	15(100)
UI	ALS	NA	*Rhus lucida*			9(100)	

Table 8 (cont):

NOBLE/ SLAYTER FIRE RESP		GROWTH FORM		COMMUNITY I MATURE	MONTHS POST-FIRE: SIX	TWELVE	EIGHTEEN
CI	OS	NA	*Protea repens*	16(25)	+	+	+
SI	OS	CH	*Pentaschistis capensis*	9.6(75)	13.3(50)	10.2(50)	5(33)
UI	ALS	CH	*Cymbopogon marginatus*	5.6(37)	+	+	+
UI	ALS	NA	*Montinia caryophyllacea*				6.3(100)
SI	OS	CA	*Pelargonium cucullatum*		13.8(100)	8(100)	13.3(100)
SI	OS	CH	*Simocheilus consors*			16.5(50)	22(67)
SI	OS	CH	*Erica imbricata*			9.8(50)	
dI	ALS	NA	*Rhus tomentosa*				5(33)
UI	ALS	MI	*Protea nitida*	8.1(12)	+	+	+
SI	OS	CH	*Stachys aethiopica*			38(100)	
SI	OS	CH	*Pelargonium elongatum*			9.5(25)	

Fig 11 a - f: Equitability (Shannon-Wiener function)

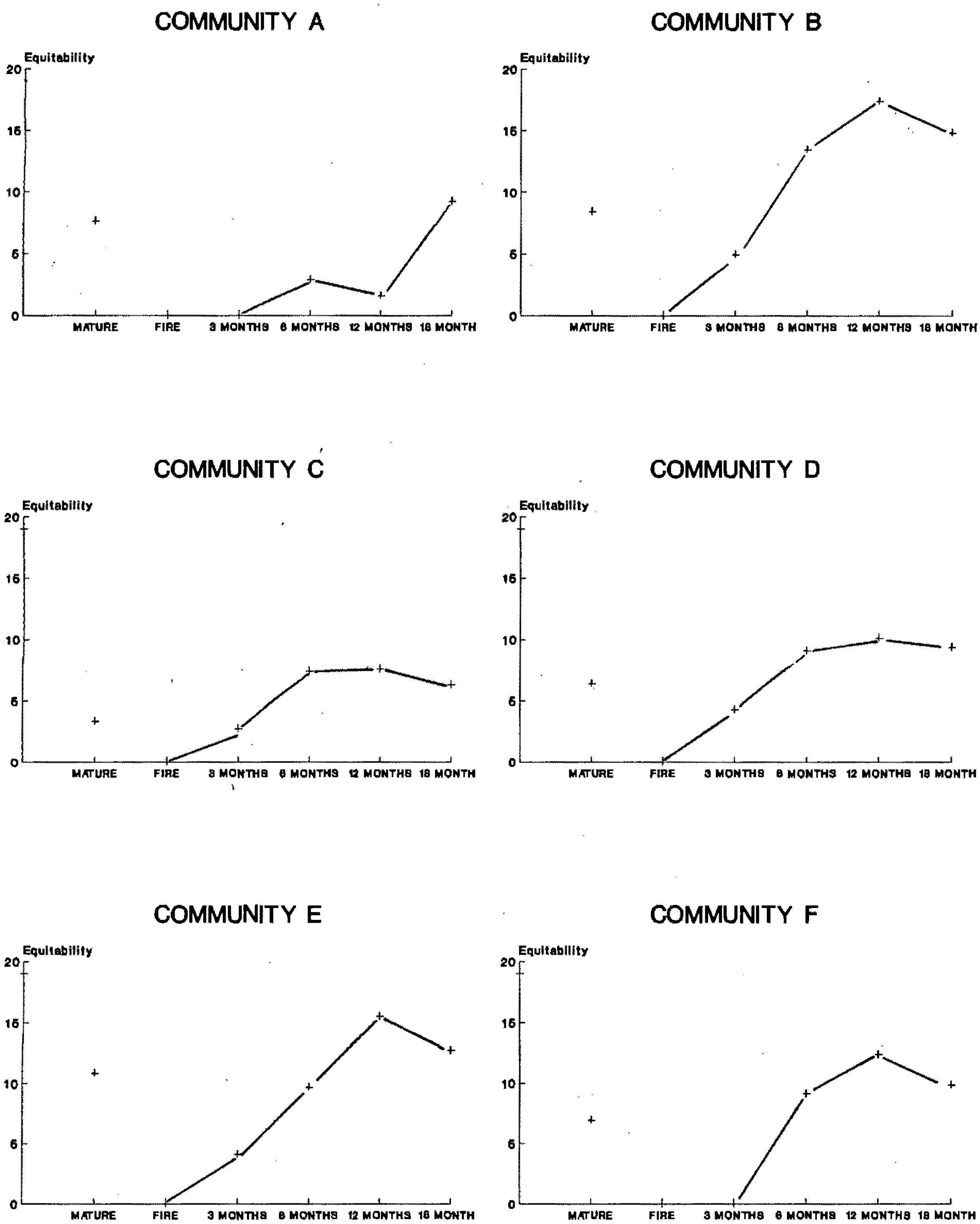
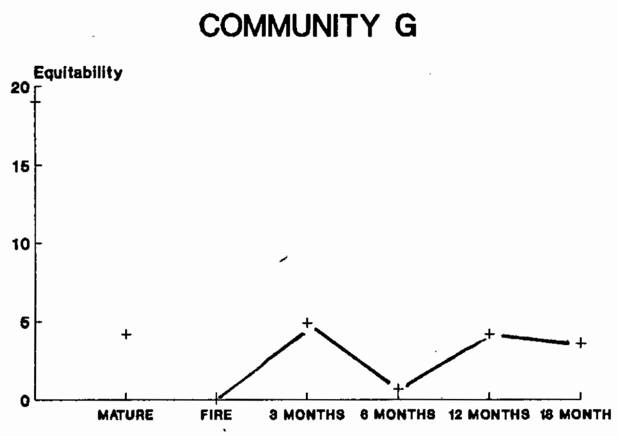
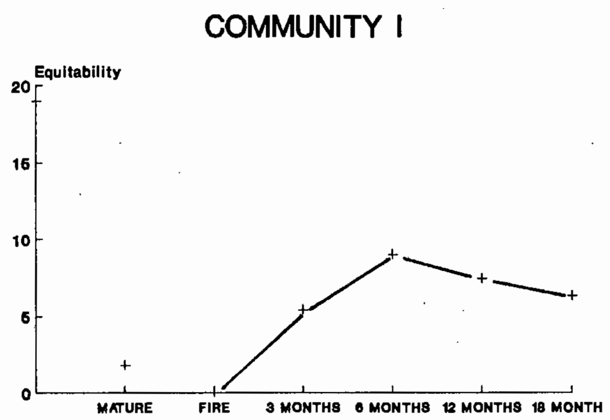


Fig 11 g - i (cont)





5 CONCLUSION

At first it appeared that a number of species had been lost from the different communities, but a brief survey of each community resulted in the location of these species, often just outside the relevé close to the site of the dead parent plant. The species which appeared to have disappeared post-fire from the relevés, had occurred at low densities, or as a single plant within the relevé prior to the fire. The problem of apparent losses could have been reduced by using smaller (e.g. 1 x 1 m^2 or 1 x 2 m^2) and more relevés, as in some instances a community was represented by only one post-fire relevé (Community H). The size of the relevés was also a problem. As the succession progressed a profusion of plants emerged making it difficult to observe all that was happening within the relevé, and when it occurred. Consequently a great deal of time had to be spent at each site, often more than an hour.

Most of the apparent "gains" of species were from species already within the relevés prior to the fire in the form of seed and/or underground organs. Most of these species are extremely difficult to see or identify in the mature veld and were missed in the initial survey of 1985. Migration appears to play a small role in adding to species richness, but is of great importance in the long term survival of individual species, particularly those with bird and wind dispersed seed.

The species turnover in the communities would appear to be at its greatest at about one year post-fire, and mostly due to "gains". The number of "new" species being added to a community's species list was still showing an upward trend when the study was terminated at eighteen months. This supports what Kruger (1987) found at Jakalsrivier and Zachariashoek.

Although the study was carried out for a period of eighteen months, the communities recognized in the mature veld could be identified within a year to eighteen months post-fire. The communities which were not very clear in the mature phase, were more clearly defined in the young veld for example Community C.

Only the immediate post-fire phase (1 - 2 years) of Kruger's (1979) model of succession was studied. Observations from this study supports his model, as in this phase seed germination, and vegetative regeneration occurred. Most of the geophytes e.g. Orchidaceae, and annuals reproduced in this phase. The pre-fire assessment fell into the mature phase (10 - 30 years), in that the tall shrubs had reached their maximum height and reproductive potential, there was also virtually no seed germination. Communities G, H and I separated out from the other communities (A, B, C, D, E and F) in both the pre- and post-fire phytosociological tables (Appendix 3 and 4), with only totally generalist species linking them.

Serotinous species were presumed to deplete their seed bank by germination and other losses after a fire, and were all classified as C-species (Kruger 1987 *op cit* Bond 1985). Those who stored their seed in the soil, were classified as S-species as it would be unlikely that they would exhaust their seed bank by a single post-fire germination event (Kruger, 1987 *op cit* Haper 1977).

Frost (1984) found that most sprouting species obtained the ability to sprout within two to three years from germination, hence it was assumed that they would all survive a fire in the juvenile state as fires do not generally occur during this period (de Lange pers obs). The majority of the sprouting species flowered and set seed within a year of the fire (U-species). A few had longer secondary juvenile stages eg *Nebelia palacea* (V-species) (Kruger 1987; de Lange pers obs).

All species were classified as being intolerant ie the seed only being able to germinate and establish within a few years after a fire. One exception noted in this and other studies, was *Erica* *hispidula* in that it has been observed as seedlings and young plants in mature and senescent fynbos. Germinating seeds of this species only being noted two to three years after a fire suggesting that they have need of an altered environment for their establishment (R-species) (Kruger 1987). The relevés were visited again three years after the fire, when it was noted that plants of a parasitic nature had appeared, becoming the dominant cover in some relevés. At about five years post-fire these parasitic species had been reduced to the occasional plant within the relevé (de Lange pers obs). It would appear that these plants need to have their hosts become established and growing vigorously (including sprouting species) before they can germinate and establish themselves. What gives these plants their cue to germinate, or what the conditions of the site must be to allow for their survival was not investigated in this study. It was noted that the Ericaceae generally germinate between December and February within a year of a February fire. These species were therefore not classified as R-species.

As at Zachariashoek and Jakkalsrivier, C-species accounted for only a limited part of the overall species richness, and of these *Leucadendron xanthoconus* dominated almost all the fynbos communities. According to Kruger's (1987) model of the influence of fire on C-species this would indicate a fire recurrence rate of about 10 to 15 years for the Reserve. This is impossible to confirm, as the fire history of the Reserve has not been well documented. A fire swept through the area in 1974, 10 years prior to the study fire of 2 February 1985. Previous to this, the record is unknown. Shepherds passing over the mountain could possibly have burnt the veld at fairly frequent intervals to allow for the easier passage of the sheep. This would suggest support for Kruger's model, at least for the 10 year fire cycle.

Not all the plants encountered in the study could be classified according to Noble and Slayter (1980) or Bell *et al.* (1984) systems, mainly due to the limited available data on the reaction of plants to fire. Kruger's (1987) thesis provided a framework on which to base the classification on. Vlok (1990; Vlok pers comm) aided with other species and others were classified according to observations made in the field. Discrepancies were noted in some cases, particularly among the Restionaceae. Kruger (1987) noted that this family mainly rely on being able to sprout after a fire, but it has been noted by Vlok (1990 pers comm), and during the course of this study that there are numerous genera and individual species, for example *Elegia*, which are obligate seeders, or sprout and seed freely, for example *Staberoha distachya*. Although every effort was made to classify the species correctly, this was not always possible with the available data.

At all sites more than half the species present in the mature fynbos, including previously dominant species, had re-established a year after the disturbance. Multivariate analyses showed no clear separation in the ordination space between mature and post-fire communities.

The post-disturbance increase in species richness is a common phenomenon in mediterranean-type communities (Hanes 1971; Trabaud & Lepart 1980; Gill & Groves 1981; Kruger & Bigalke 1984; Hoffman *et al.* 1987). The equitability was also high indication a lack of dominance by one or two species in the young vegetation.

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TABLE OF APPENDICIES

Appendix 1: Species list for Vogelgat Nature Reserve, including Vital Attributes and Fire-response Categories

COLL NO	GENERA	SPECIES	AUTHOR AND SUBSP	COMMON NAME	FIRE RESPON NOBLE SLAYTER	GROWTH FORM	ALT	BRNT	FLOW	BRNT	FLOW	NOTES
	LICHENES											
	CLADONIACEAE											
	Cladonia	*floerkiana*	(Fr) Sommer f	Scarlet tips	UNK							
	STICTACEAE											
	Lobaria	*pulmonaria*	(L) Hoffm	Lung-like lichen	UNK							
	USNEACEAE											
	Usnea	sp			UNK							
W3217	*Parmelia?*				UNK							
W3223												
	BRYOPHYTA											
	HEPATICOPSIDA											
	Frutillaria	sp			UNK							
	Isopterygium	sp			UNK							
	MARCHANTIACEAE											
	Marchantia	sp		Parasol liverwort	UNK							
	Sematophyllum	sp			UNK							
W3187/4					UNK							
W3187/5					UNK							
W3194/3					UNK							
W3213												
W3185												
	MUSCOPSIDA											
	SPHAGNACEAE											
	Sphagnum	*capense*	Hornsch	Sphgagnum moss	UNK							
	DITRICHACEAE											
	Ceratodon	*purpureus*	(Hedw) Brid		UNK							
	DICRANACEAE											
	Campylopus	*introflexus*	(Hedw) Brid		UNK							
	Dicranoloma	*billardieri*	(Brid) Par	Silky moss	UNK							
	Leucoloma	*sprengelianum*	(C Mull) Joeg	Moss	UNK							
	CALMYPERACEAE											
	Hypodontium	*pomiforme*	(Hook) C Muell	Moss	UNK							
	RHIZOGONIACEAE											
	Rhizogonium	*spiniforme*	(Hedw) Bruch ex Krauss	Dogs tail moss	UNK							
	Rhizogonium	*vallis-gratiae*	(Hampe) Hampe ex Jaeg	Catstail moss	UNK							
	PTYCHOMITRIACEAE											
	Ptychomitrium	*crispatum*	(Hedw) Jaeg	Moss	UNK							
	POLYTRICHACEAE											
	Polytrichum	*commune*	Hedw	Moss	UNK							
	ANTHOCEROTACEAE											
	Anthoceres	*natalensis*	Steph	Hornwort	UNK							
	PTERIDOPHYTA											
	FERNS											
	LYCOPODIACEAE											
	Lycopodium	*carolinianum*	L	Clubmoss	UNK	Ch						
	Lycopodium	*gnidioides*	L f	Greensnakes	UNK	Ch						

COLL NO	GENERA	SPECIES	AUTHOR AND SUBSP	COMMON NAME	FIRE RESPON NOBLE SLAYTER	GROWTH FORM	ALT	BRNT	FLOW	BRNT	FLOW	NOTES
	OSMUNDACEAE											
	Todea	*barbara*	(L) Moore	Royal Fern	UNK	Ch						
	SCHIZAEACEAE											
	Schizaea	*pectinata*	(L) Swartz	Curly Grass Fern	dI ALS	Ch						
	Schizaea	*pectinata*	Kaulf	Small Curly Grass Fern	UNK	Ch						
	Mohria	*caffrorum*	(L) Desv	Scented Fern	UNK	Ch						
	GLEICHENIACEAE											
	Gleichenia	*polypodioides*	(L) J E Sin	Coral Fern	UNK	Ch						
	HYMENOPHYLLACEAE											
	Hymenophyllum	*capense*	Schrad	Filmy Fern	UNK							
	DENNISTAEDIACEAE											
	Pteridium	*aquilinum*	(L) Kuhn	Bracken	dI ALS	Cr						
	Histiopteris	*incisa*	(Thunb) J Sm	Web Fern	UNK							
	ADIANTACEAE											
	Pteris	*dentata*	Forsk	Sawtooth Fern	UNK							
	Cheilanthes	*hastata*	(L f) Kunze	Backbone Fern	UNK							
	Cheilanthes	*viridis*	(Forsk) Swartz	Spear Fern	UNK							
	Pellaea	*pteroides*	(L) Prantl var *viridis*	Myrtle Fern	dI ALS	Ch						
	POLYPODIACEAE											
	Pleopeltis	*macrocarpa*	L	Spotted Fern	UNK							
	ASPLENIACEAE											
	Aspenium	*aethiopicum*	(Burm) Becherer		UNK							
	LOMARIOPSIDADEAE											
	Elaphoglossum	*angustatum*	(Schrad) Hieron	Tongue Fern	UNK							
	ASPIDIACEAE											
	Rumohra	*adiantiformis*	(Forst) Ching	Seven Weeks Fern	UNK							
	BLECHNACEAE											
	Blechnum	*capense*	(L) Schlechtd		UNK							
	Blechnum	*giganteum*	(Kaulf) Schlechtd		UNK							
	Blechnum	*punctulatum*	Swartz var *punctulatum*		UNK							
	Blechnum	*tabulare*	(Thunb) Kuhn		UNK							
	SPERMATOPHYTA											
	GYMNOSPERMAE											
	PINACEAE											
	Pinus	*pinaster*	Ait (Not in hab)		DT OS	Mi						
	CUPRESSACEAE											
	Widdringtonia	*cupressoides*	(L) Endl	Mountain Cedar; Bergcypres	UI ALS	Mi						
	ANGIOSPERMAE											
	MONOCOTYLEDONEAE											
	POACEAE											
W3229	*Cymbopogon*	*marginatus*	(Steud) Stapf ex Burtt Davy	Lemon grass; Akkerwani	UI ALS	Ch	1					dry sites; 75 cm ta
W3166	*Paspalum*	*vaginatum*	Sm	Upright paspalum	UNK	Ch	h					
W3115	*Stenotaphrum*	*secundatum*	(Walter) Kuntze		UNK	Ch	1					

COLL NO	GENERA	SPECIES	AUTHOR AND SUBSP	COMMON NAME	FIRE RESPON NOBLE SLAYTER	GROWTH FORM	ALT	BRNT	FLOW	BRNT	FLOW	NOTES
W3171	*Pennisetum*	*macrourum*	Trin		UNK	Ch	l					wet; 1 - 2 m
W2898	*Ehrharta*	*calycina*	Sm	Polgras	SI OS	Ch	l					1 - 1,5 m
W3720	*Ehrharta*	*erecta*	Lam	Lamarick's Ehrharta	SI OS	Ch	l					weed
W3327	*Ehrharta*	*ottonis*	Kunth ex Nees	Nut-root Grass	UI ALS	Cr	l					
W3325	*Ehrharta*	*rehmanni*	Stapf	Creeping Grass	USI FSS	Ch	l					
W3354	*Ehrharta*	*rehmanni*	Stapf var *filiformis*	Cushion grass	SI PFE	Ch	lm					moist; dense tufts
W3150	*Ehrharta*	*setacea*	Nees	Lax-tufted Grass	USI FSS	Ch	lm					dense tufts
W3105	*Ehrharta*	*tricostata*	Stapf	Reed-like Grass	UNK	Ch	m					moist; 40cm; dense
W3086	*Ehrharta*	*uniflora*	Burch ex Stapf	Curly Tuft Grass	UNK	Ch	h					5 - 25 cm
W3667	*Anthoxanthum*	*tongo*	(Trin) Stapf	Scented Vernal Grass	SI OS	Ch	l					moist; 20 cm
W3322	*Aira*	*caryophyllea*	L	Baasgras	SI OS	T	l					dry
W3272	*Merxmullera*	*rufa*	(Nees) Conert	Koperdraadgras	USI FSS	Ch						
W2749	*Pentaschistis*	*holciformis*	(Nees) Linder	Slender Grass	UNK	Ch	mh					shale
W3633	*Pentaschistis*	*capensis*	(Nees) Stapf	Falls Grass	SI OS	Ch	m					moist
	Pentaschistis	*colorata*			UI ALS	Ch						
W3574	*Pentaschistis*	*malouinensis*	(Steud) Clayton	Hair stalked Grass	UI ALS	Ch						
W3324	*Pentaschistis*	*thunbergii*	(Kunth) Stapf	Black knot-grass	SI PFE	Ch	l					
W2932	*Pentaschistis*				SI OS	Ch	l					30 cm
W2610	*Pentaschistis*				SI OS	Ch	l					50 cm
W3271	*Pseudopentameris*	*brachyphylla*	(Stapf) Conert	Rough Grass	SI OS	Ch	l					purple head; 1 m
W3149	*Pseudopentameris*	*macrantha*	(Scrad) Conert		UI FSS	Ch	l					
W3204	*Agrostis*	*bergiana*	Trin	Slender Grass	SI OS	Ch	l					moist
W3529	*Agrostis*	*montevidensis*	Sprengel ex Nees	Wisp Grass	SI	Ch	l					moist
W3193	*Polypogon*	*monspeliensis*	(L) Desf	Annual Beard Grass	SI	Ch	m					annual; 10 - 20 cm
W3371	*Lagurus*	*ovatus*	L	Baasgras	SI	Ch						annual; weed
W3827	*Sporobolus*	*capensis*	(Willd) Kunth	Rats Tail Grass	SI	Ch	l					
W3527	*Eragrostis*	*elatior*	Stapf		USI	Ch	l					moist; 25 cm
W3121	*Cynodon*	*dactylon*	(L) Pers	Coarse Quick	SI	Ch	l					
W3370	*Cynosurus*	*echinatus*	L		SI	Ch	l					
W3356	*Koeleria*	*capensis*	(Thumb) Nees	Tuft Grass; Polgras	SI OS	Ch	l					
W3066	*Plagiochloa*	*uniolae*	(L f) Adamson & Sprague	Koringgras	USI FSS	Ch	l					sand soil; 50 cm
W3318	*Briza*	*maxima*	L	Quaking Grass	SI	Ch	l					annual; weed
W3344	*Briza*	*minor*	L	Little Quaking Grass	SI	Ch	l					annual; weed
W3273	*Festuca*	*scabra*	Vahl	Munnikagras	USI FSS	Ch	l					dry; 30 - 55 cm
W3151	*Bromus*	*willdenowii*	Kunth		SI	Ch	l					sandy soil; 1 m
CYPERACEAE												
W3279	*Carpha*	*glomerata*	(Thunb) Nees	Brittle-Star Grass	SI OS	Ch	l					moist; 1m;Asterocha
W3210	*Pycreus*	*polystachyus*	(Rottb) Beauv		SI	Ch	l					moist; 20 - 40 cm
W3772	*Mariscus*	*congestus*	(Vahl) C B Clarke		SI	Ch	h					weed
W2847	*Mariscus*	*thunbergii*	(Vahl) Schrade	Monkey bulb; Aapuintjie	UI	Ch	l					1 - 1,5 m
W3065	*Ficinia*	*brevifolia*	Nees ex Kuntz		SI	Ch	l					Ficinia indica
W3234	*Ficinia*	*bulbosa*	(L) Nees		SUI	Ch	l					runners
W2467	*Ficinia*	*deusta*	(Berg) Levyns		UI	Ch	lm					
W2745	*Ficinia*	*distans*	C B Cl		UNK	Ch	l					
W3012	*Ficinia*	*monticola*	Kunth		UI	Ch	m					

COLL NO	GENERA	SPECIES	AUTHOR AND SUBSP	COMMON NAME	FIRE RESPON NOBLE SLAYTER	GROWTH FORM	ALT	BRNT	FLOW	BRNT	FLOW	NOTES
W2441	*Ficinia*	*oligantha*	(Steud) J Raynal		SI OS	Ch	mh					Ficinia filiformis
W2466	*Ficinia*	*pinguior*	C B Cl		UNK	Ch	lm					
W2991	*Ficinia*	*trichodes*	(Schrad) Benth & Hook f		SI OS	Ch	l					30 cm
W3313	*Ficinia*				SI	Ch	l					
W3318	*Ficinia*				SI	Ch	h					
W3409	*Ficinia*				SI	Ch	l					
W3687	*Ficinia*				SI	Ch	l					
W3547	*Ficinia*				SI	Ch	l					
W2678	*Isolepis*	*digitata*	Schrad	Biesie	UI ALS	Ch	l					wet; Scripus digita
W2676	*Isolepis*	*prolifer*	R Br	Biesie	UNK	Ch	l					wet; Scripus prolif
W3401	*Epischoenus*	*quadrangularis*	(Boeck) C B Cl		UNK	Ch	lm					wet
W3081	*Tetraria*	*brevicaulis*	C B Cl		SI PFE	Ch	m					
W2527	*Tetraria*	*bromoides*	(Lam) Pfeiffer	Berg palmiet	UI	Ch	m					1 m
W3433	*Tetraria*	*burmannii*	(Schrad) C B Cl		UI	Ch	l					
W3739	*Tetraria*	*compar*	(L) Lestib		UI	Ch	m					
W2445	*Tetraria*	*cuspidata*	C B Cl		UI	Ch	m					40 - 50 cm
W2452	*Tetraria*	*fasciata*	(Rottb) C B Cl		UI	Ch	m					60 - 80 cm
W3117	*Tetraria*	*microstachys*	(Vahl) Pheiff		UNK	Ch	w					10 cm
W3436	*Tetraria*	*thermalis*	(L) C B Cl	Bergpalmiet	UI	Ch	mh					1,5 m
W3104	*Tetraria*				UNK	Ch	m					1,3 m
W3208	*Tetraria*				UNK	Ch	l					30 cm
W3158	*Macrochaetium*	*hexandrum*	(Nees) Pheiffer	Dark-collared cyp	UNK	Ch	m					moist
W2440	*Neesenbeckia*	*punctoria*	(Vahl) Levyns	Raffia Reed	UNK	Ch	lm					moist
W3240	*Chrysithrix*	*capensis*	L	Flatleaved	UI	Ch	lm					moist
W3243	*Chrysithrix*	*junciformis*	Nees	Round-leaved	UI	Ch	m					60 cm
W3010	*Schoenoxiphium*	*sparteum*	(Wahl) C B Cl		UNK	Ch	l					moist; Carex bisexu
W3373	*Carex*	*clavata*	Thunb	Swamp Grass	SI	Ch	l					moist
ARACEAE												
W3280	*Zantedeschia*	*aethiopica*	(L) Spreng	Arum Lily; Varkblom	UI	Cr	l					moist
RESTIONACEAE												
sn	*Restio*	*ambiguus*	Mast		UI	Ch	mh					moist
W3219	*Restio*	*bifarius*	Mast	Big Brown Bugs	UI	Ch	mh					50 cm
W3056	*Restio*	*bifidus*	Thunb	Light Brown Bugs	UI	Ch	m					45 cm
W3053	*Restio*	*burchellii*	Pillans	Small Blobs	UI	Ch	mh					
	Restio	*cuspidata*	Thunb		UI	Ch						
W2463	*Restio*	*dispar*	Mast	Vlei Giant	UI	Ch	m					moist; 2 m
W2468	*Restio*	*egregius*	Hochst	Jumps	UI	Ch	lm					
sn	*Restio*	*filiformis*	Poir	Slender stems	UI	Ch						
W2988	*Restio*	*perplexus*	Kunth	Balhare	UI	Ch	l					thick mat; 30 cm
W2494	*Restio*	*sarcocladus*	Mast	Light Brown Darts	UI	Ch	mh					50 cm
W2446	*Restio*	*similis*	Pillans	Slender Blobs	UI	Ch	m					
W2764	*Restio*	*triticeus*	Rottb	Nondescript Reed	UI	Ch	l					1 m
W3057	*Restio*				UNK	Ch						
W3132	*Restio*				UNK	Ch						

COLL NO	GENERA	SPECIES	AUTHOR AND SUBSP	COMMON NAME	FIRE RESPON NOBLE SLAYTER	GROWTH FORM	ALT	BRNT	FLOW	BRNT	FLOW	NOTES
W3315	*Ischyrolepis*	*capensis*	(L) Linder	Loose Tips	UI	Ch	1					Restio cuspidatus
W3429	*Ischyrolepis*	*gaudichaudiana*	(Kunth) Linder	May the Lord help us	UI	Ch	1					70 cm
W3810	*Nevillea*	*obtusissima*	(Steud) Linder	Spruce cones	SI OS	Ch	mh	2/86	3/88			60 cm; Restio o
W3144	*Platycaulos*	*cascadensis*	(Pillans) Linder	Flat snakes	UNK	Ch	m					moist30 cm
W2497	*Chondropetalum*	*deustum*	Rottb	Small Millet Reed	SI OS	Ch	lm					40 cm
W3131	*Chondropetalum*	*ebracteatum*	(Kunth) Pillans	Large Millet Reed	SI	Ch	lm					80 cm
W3202	*Chondropetalum*	*hookerianum*	(Mast) Pillans	Medium Millet Reed	SI	Ch	m					70 cm
W2577	*Chondropetalum*	*mucronatum*	(Nees) Pillans	Giant Millet Reed	SI	Ch	mh					2 m
W3419	*Elegia*	*capensis*	(Burn f) Schelpe	Tufted Golden Curls	SI	Ch	m					
W2478	*Elegia*	*filacea*	Mast	Little Golden Curls	SI	Ch	l					40-70cm;E parviflor
W2536	*Elegia*	*juncea*	L	Golden Curls	SI	Ch	m					wet; 2,5 m
W3480	*Elegia*	*neesii*	Mast	Rough Golden Curls	SI	Ch	mh					moist; 2 m
W3141	*Elegia*	*thyrsifera*	(Rottb) Pers	Large Golden Curls	SI	Ch	m					moist; 2 m
W3167	*Elegia*				SI	Ch	h					moist; 1 - 1,4 m
W3548	*Calopsis*	*aspera*	(Mast) Linder	Besemriet	SI	Ch	m					20 cm; Leptocarpus
W3539	*Calopsis*	*membranacea*	(Pillans) Linder	Besemriet	UI	Ch	mh	12/81	3/84			moist; Leptocarpus
W3059	*Thamnochortus*	*fruticosus*	Berg	Besemriet	UI	Ch	l					40 - 70 cm
W3428	*Thamnochortus*	*gracilis*	Mast		UI	Ch	l	12/81	3/83			45 - 70 cm
W3113	*Thamnochortus*	*insignis*	Mast	Dekriet	UI	Ch	l					weed; 1,6 m
W3122	*Thamnochortus*	*lucens*	(Poir) Linder	Jakkalsstert	UI	Ch	l					70 cm; T dichotonus
W2904	*Thamnochortus*	*pulcher*	Pillans		UI	Ch	lm					60 cm; Restio p
W3434	*Staberoha*	*distachyos*	(Rottb) Kunth		USI	Ch	lm	12/81	4/83			40 cm
	Staberoha	*banksii*			SI	Ch						
W3578	*Mastersiella*	*digitata*	(Mast) Gilg-Benedict		SI	Ch	m					45 cm
W2905	*Hypodiscus*	*albo-aristatus*	(Nees) Mast	Trout Flies	SI	Ch	m					north; 50 cm
W3811	*Hypodiscus*	*argenteus*	(Thunb) Mast	Minks	UI	Ch	lm					north; 60 - 90 cm
W3484	*Hypodiscus*	*aristatus*	(Thunb) Krauss	Hedgehogs	UI	Ch	m	12/81	8/83			50 cm
W2902	*Ceratocaryum*	*argenteum*	Nees ex Kunth	Olifantsriet	SI OS	Ch	m					1 m; Willdenowia a
COMMELINACEAE												
W2720	*Commelina*	*africana*	L var *africana*	Geelselblommetjie	SI	Ch	l					moist; prostrate
JUNCACEAE												
W2927	*Prionium*	*serratum*	(L f) Drege ex Meyer	Palmiet	UI	Ch						moist
W3165	*Juncus*	*capensis*	Thunb	Cape Rush	UI	Ch	mh					30 - 40 cm
W2976	*Juncus*	*lomatophyllus*	Sprengel	Fringe-leafed Rush	UNK	Ch	l					wet
COLCHICACEAE												
W2881	*Baeometra*	*uniflora*	(Jacq) Lewis	Baeometra	UNK	Cr	l					
W3495	*Onixotis*	*punctata*	(L) Mabberley	Hanekammetjie	UNK	Cr	lm					thk Ixia; Dipidax p
ASPHODELACEAE												
W3211	*Bulbinella*	*triquetra*	(L f) Kunth	Katstert	UI ALS	Cr	lm	12/81	3/82			thread leaves;wh fl
W2995	*Bulbine*	*favosa*	(Thunb) Roem & Schult	Yellow Morning Asphodel	UI ALS	Cr	lm					thk rnd leaf;yel fl
W2574	*Bulbine*	*lagopus*	(Thunb) N E Br	Hare's foot Asphodel	UI ALS	Cr						25 - 90 cm; flr yel
W3124	*Bulbine*	*tuberosa*	(Miller) Oberm	Wildekopieva	UI ALS	Cr	l					60-9cm;pugioniformi

COLL NO	GENERA	SPECIES	AUTHOR AND SUBSP	COMMON NAME	FIRE RESPON NOBLE SLAYTER	GROWTH FORM	ALT	BRNT	FLOW	BRNT	FLOW	NOTES
W2417	*Trachyandra*	*esterhuysenae*	Oberm	Slender Cabbage Flower	UI ALS	Cr	m					
W2598	*Trachyandra*	*hirsuta*	(Thunb) Kunth	Hairy Cabbage Flower	UI ALS	Cr	l	12/81	10/82			60 cm; thick leaf
W3268	*Trachyandra*	*hirsutiflora*	(Adamson) Oberm	Hairy-flowered Cabbage	UI ALS	Cr	l	12/81	9/82			15-30cm;purp flrs
W3286	*Trachyandra*	*revoluta*	(L) Kunth	Water Grass;	UI ALS	Cr	l	12/81	9/82			wet; like grass; 30
				Hotnotskool								
W3675	*Trachyandra*	*tabularis*	(Baker) Oberm		UI ALS	Cr	m	12/85	9/86			
W3559	*Caesia*	*contorta*	(L f) Dur & Schinz	Grass Asphodel	UI ALS	Cr	m					40 cm
ERIOSPERMACEAE												
W3199	*Eriospermum*	*nanum*	Marloth	Woolly Seeds	UI ALS	Cr	l					
W3422	*Eriospermum*	*schlechterin*	Baker	Woolly Seeds	UI ALS	Cr	l	12/81	3/83			
W3642	*Eriospermum*				UI ALS	Cr	m	12/85	1/86			15 cm
W3566	*Kniphofia*	*uvaria*	(L) Hook f	Red Hot Poker; Soldaat	UI ALS	Ch	h					moist
W3024	*Aloe*	*succotrina*	Lam	Bergaalwyn	UI ALS	Ch	l					
ALLIACEAE												
W3374	*Agapanthus*	*africanus*	(L) Hoffsgg	Klein bloulelie	UI ALS	Cr	l	12/81	11/82			
W3197	*Tulbaghia*	*alliacea*	L f	Wild Garlic;	UI ALS	Cr	l	12/81	2/82			15 - 30 cm
				Wildeknofel								
HYACINTHACEAE												
W3330	*Albuca*	*cooperi*	Baker	Sentry Boxes	UI ALS	Cr	l	12/81	10/82			"Ixia"
W3387	*Urginea*	*dregei*	Baker	Mountain Squill	UI ALS	Cr	l	12/81	11/82			Ornithogalum uncifo
W2731	*Drimea*	*media*	Jacq ex Willd	Jeukbolui	UI ALS	Cr	l	12/81	3/82			petals fold back
W3758	*Ornithogalum*	*dubium*	Houtt	Yellow Chink	UI ALS	Cr	m	2/86	12/86			shale
W2682	*Ornithogalum*	*juncifolium*	Jacq	Skilpadkos	UI ALS	Cr	l					10 cm
W3343	*Ornithogalum*	*thyrsoides*	Jacq	Chinkerinchee;	UI ALS	Cr	l	12/81	10/82			
				Viooltjie								
W3729	*Lachenalia*	*montana*	Schltr ex W Barker		UI ALS	Cr	l	2/86	11/86			
W3364	*Lachenalia*	*peersii*	Marloth ex Barker	Bekkies	UI ALS	Cr	l	12/81	10/82			35 cm
ASPARAGACEAE												
W2599	*Myrsiphyllum*	*asparagoides*	(L) Willd	Breeblaarklimop	UI ALS	Cr	l					
W3481	*Myrsiphyllum*	*declinatum*	(L) Oberm	Kruilkransie	UI ALS	Cr	l					shady
W2628	*Myrsiphyllum*	*scandens*	(Thunb) Oberm	Florists Asparagus	UI ALS	Cr	l					forest
W3541	*Protasparagus*	*aethiopicus*	(L) Oberm	Haakdoring	UI ALS	Cr	l					
W3192	*Protasparagus*	*compactus*	(Salter) Oberm		UI ALS	Cr	l					
W3123	*Protasparagus*	*rubicundus*	(Berg) Oberm	Wag 'n bietjie	UI ALS	Cr	l					1,4 m
HAEMODORACEAE												
W3396	*Dilatris*	*pillansii*	Baker	Rooiwortel	UI ALS	Cr	m	12/81	12/82			leaves up to 30 cm
sn	*Dilatris*	*viscosa*	L f	Yellow Head	UI ALS	Cr	mh					wet;60cm;sticky orn
W3366	*Wachendorfia*	*paniculata*	Burm	Rooikanol	UI ALS	Cr	l	12/81	11/82			70 cm; pleated leav
W3812	*Wachendorfia*	*thyrsiflora*	Burm		UI ALS	Cr	m					wet; 1,8 m
LANARIACEAE												
W3388	*Lanaria*	*lanata*	(L) Dur & Schinz	Cape Edelweiss;	UI ALS	Cr	lm	12/81	11/82			80 cm
				Kapokblom								
AMARYLLIDACEAE												
W3001	*Nerine*	*sariensis*	(L) Herb		UI ALS	Cr	l					
W2989	*Haemanthus*	*coccineus*	L	Paintbrush; Rooikwas	UI ALS	Cr	l					6 - 20 cm
W2983	*Amaryllis*	*belladonna*	L	March Lily	UI ALS	Cr	l					40-90cm flr;20-60cm
W3418	*Cyrtanthus*	*leucanthus*	Schltr	White Fire Lily	UI ALS	Cr						25 cm
W3644	*Cyrtanthus*	*ventricosus*	(Jacq) Willd	Brandlelie	UI ALS	Cr	m	2/86	2/86	12/81	1/82	10 - 20 cm

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	HYPOXIDACEAE											
W3231	*Empodium*	*plicatum*	(Thunb) Garside	Golden Star	UI ALS	Cr	l	12/81	5/82			2-3plt lvs;flr tip
W3654	*Spiloxene*	*curculigoides*	(Bolus) Garside	Yellow Star	UI ALS	Cr	m	2/86	4/86	12/81	9/82	shale
W2454	*Spiloxene*	*monophylla*	(Schltr) Garside	Little Yellow Star	UI ALS	Cr	h	2/86	1/87			
	TECOPHILACEAE											
W3719	*Cyanella*	*hyacinthoides*	L		UI ALS	Cr	l	2/86	10/86			
	IRIDACEAE											
W3251	*Romulea*	*flava*	(Lam) de Vos var *flava*	White Fruitang	UI ALS	Cr	l	12/81	6/82			yellow or white flo
W3257	*Romulea*	*rosea*	(L) Eckl var *reflexa* (Eckl) Beg	Pink Fruitang	UI ALS	Cr	l	12/81	7/82			3-8 cm;needle-like
W3692	*Moraea*	*lurida*	Ker Gawler	Black Iris	UI ALS	Cr	h	2/86	10/86			shale
W2580	*Moraea*	*neglecta*	Lewis	Yellow Iris	UI ALS	Cr	m	12/81	9/82	2/86	10/86	20 - 50 cm
W3552	*Moraea*	*papilionacea*	(L f) Ker Gawl	Hairy Iris	UI ALS	Cr	l					10 - 20 cm
W3703	*Moraea*	*ramosissima*	(L f) Druce	Giant Iris	SI MFE	Cr	lm	12/81	11/82	2/86	10/86	wet; branch inflore
W3731	*Moraea*	*tricuspidata*	(L f) Lewis	Blouooguintjie	UI ALS	Cr	lm	12/81	10/82	2/86	11/86	25 - 60 cm; whte fl
W3298	*Moraea*	*tripetala*	(L f) Ker Gawler	Small Blue Iris	UI ALS	Cr	lm	12/81	9/82			50 cm; unbranched
W3770	*Moraea*	*vallisavium*	Goldblatt	Vogelgat Iris	UI ALS	Cr	h	2/86	12/86			moist
W3641	*Homeria*	*galpinii*	L Bolus	Yellow Tulip; Geel Tulp	UI ALS	Cr	lm	12/81	2/82	12/85	1/86	25 - 30 cm
W3694	*Homeria*	*ochroleuca*	Salisbury	Giant Tulip; Groot tulp	UI ALS	Cr	l	2/86	10/86			
W3362	*Bobartia*	*filiformis*	(L f) Ker Gawler	Biesie	UI ALS	Cr	l	12/81	11/82			50 cm
W3741	*Bobartia*	*gladiata*	(L f) Ker ssp *gladiata*	Flat-leaf Bobartia	UI ALS	Cr		2/86	11/86			wet
W2947	*Bobartia*	*longicyma*	Gillet ssp *magna*	Gillet ex Strid	UI ALS	Cr	l					1,8 m
W2648	*Bobartia*	*gladiata*	(L f) Ker		UI ALS	Cr	m					30 - 40 cm
W2852	*Aristea*	*africana*	(L) Hoffsgg	Maagbossie	UI ALS	Cr	l					
W3790	*Aristea*	*confusa*	Goldblatt		UI ALS	Cr	h	2/86	2/87			moist; 1,3 m
W3779	*Aristea*	*juncifolia*	Baker	Blousuurkanol	UI ALS	Cr	m	2/86	1/87			wet; 30 - 50 cm
W2623	*Aristea*	*major*	Andrews	Blousuurkanol	UI ALS	Cr	l					1,5 m
W3397	*Aristea*	*oligocephala*	Baker	Few flowered Aristea	UI ALS	Cr	lm	12/81	12/82			paper aristea
W3669	*Aristea*	*spiralis*	(L f) Ker Gawler		UI ALS	Cr		2/86	8/86			50cm;unbrh flr;pape
W2929	*Aristea*	*zeyheri*	Baker	Grassy-leafed Aristea	UI ALS	Cr	m					moist; 30 cm
W2597	*Geissorhiza*	*aspera*	Goldblatt	Syblom; Rough	UI ALS	Cr	l	12/81	9/82			
W3683	*Geissorhiza*	*bryicola*	Goldblatt	Moss loving	UI ALS	Cr	l	2/86	9/86			kloof
W3754	*Geissorhiza*	*burchellii*	Foster	Burchell's	UI ALS	Cr	m	2/86	12/86			shale
W3404	*Geissorhiza*	*cataractarum*	Goldblatt	of the waterfalls	UI ALS	Cr	m					moist
W3685	*Geissorhiza*	*hesperanthoides*	Schltr		UI ALS	Cr	mh	2/86	9/86			
W3675	*Geissorhiza*	*hispidula*	(Foster) Goldblatt	Hairy	UI ALS	Cr	lm	2/86	9/86			
W3289	*Geissorhiza*	*ovata*	(Burm f) Asch & Graeb	Pink satin	UI ALS	Cr	lm	12/81	9/82			15 cm
W3676	*Geissorhiza*	*parva*	Baker	Baby	UI ALS	Cr	m	2/86	9/86			moist
W3267	*Hesperantha*	*falcata*	(L f) Ker Gawler	Aandblommetjie	UI ALS	Cr	l	12/81	9/82			15 cm
W3304a	*Hesperantha*	*pilosa*	(L f) Ker Gawler	Aandblom	UI ALS	Cr	l	12/81	9/82			
W3323	*Hesperantha*	*radiata*	(Jacq) Ker Gawler		UI ALS	Cr	l	12/81	9/82			
W3311	*Ixia*	*dubia*	Vent	Kalossie	UI ALS	Cr	l	12/81	9/82			20-70cm;stem unbh;y
W2922	*Ixia*	*flexuosa*	L	Koringblom	UI ALS	Cr	l					
W3281	*Ixia*	*micrandra*	Baker	Kalossie	UI ALS	Cr		12/81	9/82			20-6cm;wht-pk fl;cy
W3753	*Ixia*	*stricta*	(Eckl ex Klatt) Lewis	Kalossie	UI ALS	Cr	m	2/86	12/86			shale

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W3025	*Chasmanthe*	*aethiopica*	(L) N E Br	Suurkanol	UI ALS	Cr	l					
W2990	*Gladiolus*	*brevifolius*	Jacq var *minor* Lewis	Pypie	UI ALS	Cr	l					15 - 65 cm
W2942	*Gladiolus*	*brevitubus*	Lewis	Little Salmon Tube	UI ALS	Cr	m					moist
W2854	*Gladiolus*	*bullatus*	(Thunb) ex Lewis	Caledon Bluebell	UI ALS	Cr	m					35 - 70 cm
W3807	*Gladiolus*	*carneus*	Delaroche	Painted Lady	UI ALS	Cr	h	2/86	10/86			wet; 1 m; shale
W2836	*Gladiolus*	*debilis*	Ker var *cochleatus* Sweet	Painted Lady	UI ALS	Cr	lm					30 - 65 cm; marks
W1393	*Gladiolus*	*maculatus*	Sweet ssp *maculatus*		UI ALS	Cr	lm	2/86	8/86			30-80cm;dull fl;sce
W3662	*Gladiolus*	*maculatus*	Sweet ssp *hibernus* (Ingram) Oberm		UI ALS	Cr	l					
W3270	*Gladiolus*	*punctulatus*	Shrank var *punctulatus*	Pypie	UI ALS	Cr	l	12/81	9/82			25 - 90 cm; no scen
W3399	*Tritoniopsis*	*doddii*	(Lewis) Lewis	Rietpypie	UI ALS	Cr	l	12/81	12/82			15 - 50 cm
W3000	*Tritoniopsis*	*lata*	(L Bolus) Lewis var *lata*	Rietpypie	UI ALS	Cr	lm	12/81	4/82			moist;1-3 narrow lg
W2981	*Tritoniopsis*	*nervosa*	(Thunb) Goldblatt	Plok	UI ALS	Cr	lm					40cm;lvs ven;fl pk;
W3780	*Tritoniopsis*	*pulchra*	(Baker) Goldblatt	Rooipypie	UI ALS	Cr	m	12/85	2/87	2/86	2/87	
	Tritoniopsis	*triticea*	(Burm f) Goldblatt		UI ALS	Cr						40 cm;leaf with "pe
W3776	*Tritoniopsis*	*williamsiana*	Goldblatt		UI ALS	Cr	m	2/86	1/87			wet
W2710	*Micranthus*	*alopecuroides*	(L) Ecklon	Vleiblommetjie	UI ALS	Cr						
W2710	*Micranthus*	*junceus*	(Baker) N E Br	Vleiblommetjie	UI ALS	Cr						
W3394	*Thereianthus*	*bracteolatus*	(Lan) Lewis	Bloupypie	UI ALS	Cr	m	12/81	12/82			30 cm; dark pypie
W3785	*Thereianthus*	*juncifolius*	(Baker) Lewis	Vleibloupypie	UI ALS	Cr	m	2/86	3/87			wet
W2912	*Lapeirousia*	*corymbosa*	(L) Ker Gawl ssp *corymbosa*		UI ALS	Cr	l					10 - 15 cm; purple
W3355	*Lapeirousia*	*micrantha*	(Meyer ex Klatt) Baker		UI ALS	Cr	l	12/81	11/82			light pypie
W3153	*Watsonia*	*pyramidata*	(Andr) Stapf	Kanolpypie	UI ALS	Cr	m					80 - 1,5 m
W3718	*Watsonia*	*rogersii*	L Bolus	Kanolpypie	UI ALS	Cr	m	2/86	10/86			20 - 50 cm; shale
W2972	*Watsonia*	*schlechteri*	L Bolus	Kanolpypie	UI ALS	Cr	m					30-90cm;edge lf thk
W3316	*Watsonia*	*stenosiphon*	L Bolus	Kanolpypie	UI ALS	Cr	l	12/81	9/83			
W2899	*Pillansia*	*templemannii*	L Bolus	Fire Lily	UI ALS	Cr	lm					1,2 m; 1 leaf
	ORCHIDACEAE											
W3353	*Holothrix*	*cernua*	(Burm f) Schelpe	Tryphia	dI ALS	Cr	l	12/81	10/82			wet;15-30cm;hairy l
W2924	*Holothrix*	*villosa*	Lindley	Tryphia	dI ALS	Cr	l					
W3725	*Bartholina*	*etheliae*	(H Bolus) Kraenzl	Spider Orchid	dI ALS	Cr	m					8 - 15 cm
W3766	*Pachites*	*bodkinii*	H Bolus		dI ALS	Cr	h	2/86	12/86			9 - 12 cm
W3689	*Satyrium*	*bicallosum*	Thunberg		dI ALS	Cr	l	2/86	10/86			S bracteatum (L.f.)
sn	*Satyrium*	*coriifolium*	Sw		dI ALS	Cr	m	12/85	9/86			77cm;thk leaf;orng
W3748	*Satyrium*	*humile*	Lindley		dI ALS	Cr	m	2/86	11/86			
W3701	*Satyrium*	*lupulinum*	Lindley		dI ALS	Cr	m	2/86	10/86			50 cm; red orchid
W3321	*Satyrium*	*retusum*	Lindley	Ewwatrewwa	dI ALS	Cr	l	12/81	9/82			
W3742	*Satyrium*	*rostratum*	Lindley		dI ALS	Cr	m	2/86	11/86			
W3709	*Satyrium*	*stenopetalum*	Lindley ssp *brevicalcaratum* (H Bol) Hall		dI ALS	Cr	m	2/86	10/86			35cm;stm red;fl gre
W2800	*Shizodium*	*obliquum*	Lindley	Kapotjie	dI ALS	Cr	m					wet; 30 cm
W3740	*Disa*	*bivalvata*	(L f) Dur & Schinz		dI ALS	Cr	m	2/86	11/86			wet; 30 cm
W2985	*Disa*	*cornuta*	(L) Sw	Horned Disa	dI ALS	Cr	m					35cm;thk w maroon s
W3706	*Disa*	*cylindrica*	(Thunb) Sw		dI ALS	Cr	m	2/86	10/86			peat
W3688	*Disa*	*fasciata*	Lindley	Adenandra Orchid	dI ALS	Cr	m	2/86	10/86			
W2753	*Disa*	*ferruginea*	(Thunb) Sw	Cluster Disa	dI ALS	Cr	m					20 - 50 cm; red flo
W3173	*Disa*	*filicornis*	(L f) Thunb		dI ALS	Cr	m					wet; 10-20cm;pk fl;
W3161	*Disa*	*glandulosa*	Burchell ex Lindley		dI ALS	Cr	m					moist; 5 cm

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W3674	*Disa*	*lineata*	H Bolus		dI ALS	Cr	m	2/86	10/86			moist
W3680	*Disa*	*obtusa*	Lindley		dI ALS	Cr		2/86	9/86			moist
W2711	*Disa*	*patens*	(L f) Thunb		dI ALS	Cr	m					wet; 5-15cm;yel fl;
W3730	*Disa*	*racemosa*	L f		dI ALS	Cr	m	2/86	11/86			wet; pink flower; 9
W2941	*Disa*	*tripetaloides*	(L f) N E Br ssp *tripetaloides*	Streamside Disa	dI ALS	Cr						wet; 8 cm
	Disa	*uncinata*	H Bolus		dI ALS	Cr						wet; 10 - 30 cm
W2977	*Disa*	*uniflora*	Berg	Red Disa	dI ALS	Cr	m					wet; 60 cm
	Herschelia		(Lindl) Schelpe	Brown orchid	dI ALS	Cr						
W2982	*Herschelia*	*graminifolia*			dI ALS	Cr	m					shale
W2914	*Herschelia*	*purpurescens*	(Bol) Kraenzl		dI ALS	Cr	l					
W3627	*Monadenia*	*atrorubens*	(Schltr) Rolfe		dI ALS	Cr	m					peat
W3805	*Monadenia*	*bolusiana*	(Schltr) Rolfe		dI ALS	Cr	m					
W3308	*Monadenia*	*bracteata*	(Sw) Durand & Schinz		dI ALS	Cr		12/81	9/82			
W3724	*Monadenia*	*conferata*	(H Bol) Kreanzl		dI ALS	Cr	m	2/86	11/86			dry
sn	*Monadenia*	*opyrydea*	Lindley		dI ALS	Cr	m	2/86	9/86			dry
W3736	*Monadenia*	*pygmaea*	(H Bol) Durand & Schinz		dI ALS	Cr	m	2/86	11/86			dry
sn	*Monadenia*	*rufescens*	(Thunb) Lindley		dI ALS	Cr	m					
W3722	*Disperis*	*capensis*	(L f) Sw	Moederkappie	dI ALS	Cr	m	2/86	10/86			dry
W3716	*Disperis*	*paludosa*	Harvey	Helmets	dI ALS	Cr	m	2/86	10/86			wet
W3554	*Pterygodium*	*acutifolium*	Lindl	Coeled Friar; Oumakappie	dI ALS	Cr	h	12/81	10/82	12/85	10/86	
W3707	*Ceratandra*	*atrata*	(L) Dur & Schinz		dI ALS	Cr	m	2/86	10/86			dry
W3103	*Ceratandra*	*globosa*	Lindley		dI ALS	Cr	m					
W3710	*Corycium*	*carnosum*	(Lindl) Rolfe		dI ALS	Cr	m	2/86	10/86			wet
W3728	*Corycium*	*rubiginosum*	(Sond) Rolfe	Green Orchid	dI ALS	Cr	m	2/86	11/86			shale
W3665	*Liparis*	*capensis*	Lindley		dI ALS	Cr	m	2/86	6/86			shale
W2665	*Acrolophia*	*capensis*	(Berg) Fourc var *lamellata* (Lindl) Schelpe	Brown Orchid	dI ALS	Cr	m					dry
W3806	*Acrolophia*	*ustulata*	(H Bol) Schltr & Bol	Black orchid	dI ALS	Cr	m					dry
sn	*Eulophia*	*aculeata*	(L f) Spreng ssp *acculeata*	Aandblommetjie	dI ALS	Cr	m	2/86	12/86			moist; 10 - 30 cm
W3573	*Eulophia*	*tabularis*	(L f) H Bolus	Yellow orchid	dI ALS	Cr	h					peat
DICOTYLEDONAE												
PIPERACEAE												
W2754	*Peperomia*	*retusa*	(L f) A Dietr var *retusa*		SI		l					rocks advoids fire
MYRICACEAE												
W3365	*Myrica*	*kraussiana*	Buchinger ex Meisner	Oval-leaf waxberry	UI ALS	Na	l					
W3191	*Myrica*	*quercifolia*	L	Maagpynbossie	UI ALS	Na	l					
W2415	*Myrica*	*serrata*	Lam	Lanceleaf waxberry	UI ALS	Ch	l					moist
PROTEACEAE												
W2999	*Paranomus*	*septrum-gustavianus*	(Sparrm) Hyl	Perdebos	SI OS	Na	m	12/74	4/80			dry; 1 m
W2375	*Serruria*	*adscendens*	(Lam) R Br var *adscendens*	Spinnekopbossie	SI OS	Ch	l	12/74	10/77			dry
W3138	*Serruria*	*elongata*	R Br	Langbeenspinnekop-bossie	SI OS	Ch	l					50 - 80 cm
W2355	*Serruria*	*rubricaulis*	R Br	Spinnekopbossie	UI ALS	Ch	m					30 cm
W2337	*Serruria*	*caputpharotis*	mss		SI OS	Ch						50 cm

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W3299	*Mimetes*	*capitulatus*	(L) R Br	Klompstompie	SI OS	Na						
W2698	*Mimetes*	*cuculatus*	(L) R Br	Rooistompie	UI ALS	Ch	m					1,5 m; 70 cm
W3378	*Mimetes*	*palustris*	Salisb ex Knight	Kleinstompie	SI OS	Ch	h					
W1335	*Orothamnus*	*zeyheri*	Pappe ex Hook f		SI SO	Na	m					
W2994	*Spatalla*	*curvifolia*	Salisb ex Knight	Curvaceous wanton	SI OS	Ch	lm					75 cm
W3218	*Protea*	*cordata*	Thunb	Heartshaped Protea	UI ALS	Ch	mh					dry; north
W3011	*Protea*	*cynaroides*	(L) L	Giant Protea	UCI ALS	Na	m					2 m
W1476	*Protea*	*lepidocarpodendron*	(L) L	Blackbearded Protea	CI OS	Na	m					1 - 2 m
W1477	*Protea*	*mundii*	Klotzsch	Small White Protea	CI OS	Na	m					
W2762	*Protea*	*nitida*	Miller	Waboom	UCI OS	Mi	l					1 - 3 m
W2765	*Protea*	*repens*	(L) L	Sugarbush; Suikerbossie	CI OS	Na	l					
W2796	*Protea*	*scabra*	R Br	Rough-leaf Protea	UI ALS	Ch	l					dry
W3005	*Protea*	*speciosa*	(L) L	Brown-bearded Protea	UI ALS	Ch	h					1,2 m
W3553	*Leucospermum*	*conocarpodendron*	(L) Buek ssp *viridum* Rourke	Kreupelhout	SI OS	Na	l					3 m
W2625	*Leucospermum*	*gracile*	(Salisb ex Knight) Rourke	Platluisiesbos	SI OS	Ch	m					dry; mat
W2699	*Diastella*	*divaricata*	(Berg) Rourke ssp *montana* Rourke	Minute Protea	SI OS	Ch	m					dry; creeping
W2819	*Leucadendron*	*gandogeri*	Schinz ex Gand	Berggeelbos	CI OS	Na	m					1,6 m
W3040	*Leucadendron*	*micrcophalum*	(Gand) Gand & Schinz	Stickies	CI OS	Ch	h	12/74	7/79			50 cm
W2769	*Leucadendron*	*salignum*	Berg	Sunshine Protea	UI ALS	Ch	l					2 m
W2809	*Leucadendron*	*spissifolium*	(Salisb ex Knight) Williams *spissifolium*	Vleigeelbos	UI ALS	Na						1,5 m
W2801	*Leucadendron*	*xanthoconus*	(O Ktze) K Schum	Geelknoppiesbos	CI OS	Na	m					1 - 2 m
W2658	*Aulax*	*umbellata*	(Thunb) R Br	Feather Duster	CI OS	Na	lm	12/74	12/78			dry
	Hakea	*gibbosa*	(SM) Cav	Rock Hakea	CI OS	Na						
LORANTHACEAE												
W3174	*Viscum*	*capense*	L f ssp *capense*	Mistletoe	SR OS	Ch	l					parasite on Rhus
SANTALACEAE												
W3248	*Colpoon*	*compressum*	Berg	Cape Sumach	UI ALS	Na	l					dry; 4 m
W3225	*Colpoon*	*speciosum*	(A W Hill) Bean	Wild Plum	UI ALS	Ch	l	12/81	5/82			
W3794	*Thesidium*	*minus*	A W Hill		SR OS	Ch	l					
W3576	*Thesium*	*capitatum*	L	Capitate Thesium	SR PFE	Ch	l	12/81	11/83			dry; 30 cm
W3038	*Thesium*	*ericifolium*	A DC	Small-leafed Thesium	SR PFE	Ch	l					25 - 30 cm
W2570	*Thesium*	*euphorbioides*	L	Tall Thesium	SR OS	Na	m					dry; 2 m
W2402	*Thesium*	*euphrasioides*	A DC	Leafless Thesium	SR OS	Ch	m					20 cm
W3425	*Thesium*	*funale*	L	Slender Rocklike Thesium	SR PFE	Ch	l	12/81	3/83			10 - 50 cm
W2548	*Thesium*	*quinqueflorum*	Sond	Leafy Thesium	SR PFE	Ch	l					60 cm
W2713	*Thesium*	*sedifolium*	A DC ex Levyns	Shaleband Thesium	SR PFE	Ch	m					30 cm; shale
W2549	*Thesium*	*spicatum*	L	Lidjiestee	SR PFE	Ch	m					50 cm
W2550	*Thesium*	*virgatum*	Lam	Heterophyllous Thesium	SR PFE	Ch	m					40 cm
GRUBBIACEAE												
W3506	*Grubbia*	*rosmarinifolia*	Berg ssp *rosmarinifolia*	Skilpadbos	SI OS	Ch	m					wet
W2568	*Grubbia*	*tomentosa*	(Thunb) Harms	Koolhout	UI ALS	Na	m					2 m
POLYGONACEAE												
W3317	*Rumex*	*angiocarpus*	Murb	Sheep Sorrel	SI	Ch	l	12/81	6/82			weed
W2844	*Rumex*	*cordatus*	Poiret	Maksuring	SI PFE	Ch	l					dry; pink seed; 60
W2646	*Rumex*	*crispus*	L	Curled Dock	SI	Ch						weed; 1,4 m; lrge l

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AIZOACEAE												
W3395a	*Adenogromma*	*glomerata*	(L f) Druce		SI MFE	Ch	l					dry
W2608	*Pharnaceum*	*elongatum*	(D C) Adamson		SI	Ch	l					creeping
PHYTOLACCACEAE												
W3762	*Phytolacca*	*octandra*	L		UNK	Ch	l	2/86	12/86			
MESEMBRYANTHEMACEAE												
W2869	*Carpobrotus*	*edulis*	(L) L Bol	Hottentot Fig	UNK	Ch	l					creeping mat
W3154	*Carpobrotus*	*pillansii*	L Bol	Mountain Fig	DR OS	Ch	m					
W3628	*Drosanthemum*	*stokoei*	L Bol	Bergvygie	SI OS	Ch	m					
W2926	*Erepsia*	*inclaudens*	(Haw) Schwant	Altydvygie	SI	Ch	l					20 cm
W2789	*Erepsia*	*oxysepala*	(Schltr & Berger) L Bol		SI	Ch	h					20 cm
W3424	*Lampranthus*	*bicolor*	(L) Jacobsen	vygie	SI	Ch	l	12/81	3/87			50 cm
W2910	*Lampranthus*	*deltoides*	(L) Glen	Vygie	SI	Ch	m					rocks
W2651	*Lampranthus*	*emarginatus*	(L) N E Br var *emarginatus*	Vygie	SI	Ch	l					15 - 30 cm
W3373	*Lampranthus*	*furvus*	(L Bol) N E Br		SI	Ch	l	12/81	11/82			
CARYOPHYLLACEAE												
W3264	*Cerastium*	*capense*	Sond	Cape cerastium	SI	Ch	l	12/81	9/82			weed
RANUNCULACEAE												
W3677	*Anemone*	*tenuifolia*	(L f) D C	Cape Anemone	UI ALS	Ch	m	2/86	9/86			60 cm
W2530	*Knowltonia*	*capensis*	(L) Huth	Brandblaar	UI ALS	Ch	l					
W2797	*Knowltonia*	*cordata*	H Rasm	Kaatjiedrieblaar	UI ALS	Ch	l					
LAURACEAE												
W2978	*Cassytha*	*ciliolata*	Nees	Devil's Tresses	DI	L	m					parasite
FUMARIACEAE												
W3320	*Fumaria*	*muralis*	Sond ex Koch	Drug Fumitory	UNK	Ch						weed
BRASSICACEAE												
W3417	*Heliophila*	*linearis*	(Thunb) Dc var *linearifolia* (Burd ex DC) M	Bloubekkie	UNK	Ch	l					dry; 50 cm
DROSERACEAE												
W2695	*Drosera*	*aliciae*	R Hamet	Ground rose	dI ALS	Ch	m					roset levs;spike pu
W3195	*Drosera*	*capensis*	L	Sundew; Doublom	dI ALS	Ch	m					moist; 20 cm; leaf
W3490	*Drosera*	*cistiflora*	L	Doublom	dI ALS	Ch	l	12/81	9/82			unbh stem;no leaf s
W2660	*Drosera*	*glabripes*	(Harv) Stein	Woody sundew	dI ALS	Ch	lm					hair on stem; 20 cm
W2870	*Drosera*	*hilaris*	Cham & Schlechtd	Sprawling Sundew	dI ALS	Ch	l					25 cm; deep root
	Drosera	*slockii*	M R Cheek		dI ALS	Ch	m					wet
W2917	*Drosera*	*trinerva*	Spreng	Little sundew	dI ALS	Ch	l	12/81	9/82			roset of leaves;wht
RORIDULACEAE												
W2790	*Roridula*	*gorgonias*	Planch	Giant fly-catcher	SI OS	Na	m					wet; 1 m
CRASSULACEAE												
W2964	*Cotyledon*	*orbiculata*	L var *orbiculata*	Varkoor	SI	Ch	l					1 m
W2729	*Crassula*	*biplanata*	Haw	Klipblom	SI OS	Ch	l					
W3230	*Crassula*	*capensis*	(L) Baill var *capensis*	Cape snowdrop	SI	Ch	m					10 cm
W2971	*Crassula*	*coccinea*	L	Red Crassula	SI	Ch	lm					rocks
W3067	*Crassula*	*decumbens*	Thunb var *decumbens*	Minute crassula	SI	Ch	l					
W2865	*Crassula*	*fascicularis*	Lam	White crassula	SI PFE	Ch	l					40 cm
W3335	*Crassula*	*glomerata*	Berg	Brakvygie	SI	Ch	l					
W3372	*Crassula*	*nudicaulis*	L var *nudicaulis*	Bare-stemmed crassula	SI	Ch	l					
W3608	*Crassula*	*rupestris*	Thunb ssp *rupestris*	Rock crassula	SI	Ch	m					50 cm; rocks

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	MONTINIACEAE											
W2833	*Montinia*	*caryophyllacea*	Thunb	Bergklapperbos	UI ALS	Na	l	12/81	4/82			1 m
	CUNONIACEAE											
W2270	*Cunonia*	*capensis*	L	Butterspoons; Rooiels	UI ALS	Mi	l					
	BRUNIACEAE											
W3587	*Raspalia*	*microphylla*	(Thunb) Brogn	False Cedar	UNK	Ch	h					90 cm; rocks
W3505	*Nebelia*	*paleacea*	(Berg) Sweet	Bergstompie	VI	Ch	m					dry; 1 m; small bal
W3039	*Staavia*	*radiata*	(L) Dahl	Altydbossie	UI ALS	Ch	l					80 cm
W3502	*Pseudobaeckia*	*africana*	(Burm f) Pillans	Stream bush	SI	Na	m					wet; 3 m
W3557a	*Pseudobaeckia*	*cordata*	(Burm f) Niedenzu	Heart-leaf Brunia	SI	Ch	mh					moist
W2180	*Brunia*	*albiflora*	Phillips	Coffee bush	SI OS	Na						wet; 3 m
W3507	*Brunia*	*alopecuroides*	Thunb	Red berries	CI OS	Na	m					wet; 1,5 m
W2855	*Brunia*	*laevis*	Thunb	Stompie	UI ALS	Ch	m					90cm; large balls;
W3241	*Brunia*	*nodiflora*	L	Volstruisies	UI ALS	Na	m					90 cm; large open f
W3002	*Berzelia*	*incurva*	Pillans	Klipknopbossie	UI ALS	Na	h					1 m
W2074	*Berzelia*	*lanuginosa*	(L) Brongn	Kolkol	CI OS	Na	l					wet; 3 m
W2174	*Berzelia*	*rubra*	Schlechtd	Slender Buttons	UI ALS	Na	mh					1 m
	Berzelia	*squarosa*			SI OS	Na						
W2558	*Berzelia*	*arachnoidea*	(Wendl) Eckl & Zeyh	Spider Bush	UNK	Ch	mh					moist; 2 m
	ROSACEAE											
W3367	*Rubus*	*pinnatus*	Willd	Bramble; Braambos	UI ALS	Ch	l					moist; weed; shade
W2411	*Cliffortia*	*atrata*	Weim	Climbers Friend	SI OS	Ch	m					1 m
W2457	*Cliffortia*	*graminea*	L f var *graminea*	Poaceae-like	UI ALS	Ch	mh					2 m
W3619	*Cliffortia*	*stricta*	Weim		UNK	Ch	m					1 m; shale
	FABACEAE											
W3148	*Virgilia*	*divaricata*	Adamson	Keurboom	SI OS	Mi	l					weed; 4 m
W2811	*Cyclopia*	*genistoides*	(L) R Br var *genistoides*	Honey Tea	UI ALS	Ch	lm					70 cm
W2808	*Podalyria*	*calyptrata*	Willd	Ertjiebos	SI OS	Na						moist; 3 m
W3491	*Podalyria*	*cuneifolia*	Vent	Wilde-ertjie	SI OS	Na	l					
W3494	*Podalyria*	*speciosa*	Eckl & Zeyh	Klapperbos	UI ALS	Na	m					
W3489	*Liparia*	*splendens*	(Burm f) J J Bos & de Wit ssp *comantha* (E & Z) Bos & de Wit	Orange Nodding head	UI ALS	Ch		12/81	8/83			1 m
W2344	*Priestleya*	*calycina*	H Bol	Fleeting Silver Pea	SI OS	CH						
W2303	*Priestleya*	*vestita*	(Thunb) D C	Silver Pea	UI ALS	Ch	m					moist; 2 m
W3135	*Amphithalea*	*ericifolia*	E & Z ssp *ericifolia*		SI SO	CH	m					30 - 50 cm
W3802	*Amphithalea*	*intermedia*	E & Z		SI OS	CH	l					
W3803	*Amphithalea*	*virgata*	E & Z		UI ALS	CH	l	12/81	10/82	2/86	9/87	
W2605	*Rafnia*	*cuneifolia*	Thunb	Soethoutbossie	UI ALS	Ch	m	2/86	9/89			1 m;colpoon leaves;
W3693	*Lebeckia*	*inflata*	H Bol		SI PFE	Ch	l					
W3712	*Lebeckia*	*wrightii*	(Harv) H Bol	Twisted Pea Flower	SI PFE	Ch	m	2/86	7/86			
W3514	*Aspalathus*	*abientina*	Thunb	Broom	SI OS	Ch	l	12/81	11/83			30 cm
W3751	*Aspalathus*	*aspalathoides*	(L) Dahlge	Silver Pea	SI OS	Ch	m	12/81	11/82	2/86	12/86	20 cm
W2513	*Aspalathus*	*batodes*	E & Z ssp *batodes*	Prickly Pea	UI ALS	Ch	mh					30 - 40 cm
W3384	*Aspalathus*	*batodes*	E & Z ssp *spinulifer* Dahlger	Little Prickly Pea	UNK	Ch	m					
W3820	*Aspalathus*	*ciliaris*	L	Hairy Pea	UI ALS	Ch	mh	12/81	11/82			1,5 m

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W3797	*Aspalathus*	*dunsdoniana*	Alston ex Dahlgr	Silly Pea	SI	Ch	m	2/86	3/87			
W2595	*Aspalathus*	*excelsa*	Dahlgr	Sweet Sented Pea	SI	Na	l	2/86	9/89			2,5 m; site 17
W2934	*Aspalathus*	*hispida*	Thunb ssp *hispida*	Wasblommetjiesbossie	UNK	Ch	l					
W3823	*Aspalathus*	*intervallaris*	H Bol		UNK	Ch	lm					
W3617	*Aspalathus*	*marginata*	Harvey	Broad-leaved Pea	UI	Ch	mh	12/81	11/82	2/86	12/86	
W3787	*Aspalathus*	*oblongifolia*	Dahlgr	Slender Pea	SI	Ch	l					2 m
W3309	*Aspalathus*	*ramulosa*	E Mey	Mini-branched Pea	UI ALS	Ch	l	12/81	9/82			
W3515	*Aspalathus*	*serpens*	Dahlgr	Little Creeping Pea	SI	Ch	l	12/81	11/83			sprawling
W3283	*Hypocalyptus*	*oxalidifolius*	(Sims) Baill	Sorrel-leafed Pea	SI PFE	Ch	l	12/81	9/82			30 cm
W3332	*Medicago*	*polymorpha*	L	Burr Clover	SI	Ch	l	12/81	9/82			weed
W3305	*Trifolium*	*angustifolium*	L	Pink Bunny-Tail	SI	Ch	l					annual; weed
W3498	*Indigofera*	*angustifolia*	L var *angustifolia*	Wildeboontjie	SI PFE	Ch	l	12/81	10/83			30 cm
W3792	*Indigofera*	*cytisoides*	Thunb		SI	Ch	l	2/86	3/87			1 m
W3768	*Indigofera*	*coriacea*	Ait var *hirta* Harv		USI	Ch	h	2/85	12/86			
W3563	*Indigofera*	*filifolia*	Thunb	Leafless Pea	SI PFE	Ch	l					wet; 2 m
W3759	*Indigofera*	*filifolia*	Thunb var *minor* Salt	Little leafless Pea	SI	Ch	m	2/86	11/86			moist
W3499	*Indigofera*	*glomerata*	E Mey	Hairy Pea	SI PFE	Ch	l	12/81	10/83			20 cm
W3796	*Indigofera*	*gracilis*	Sprengel	Slender Pea	SI	Ch	mh					moist
W3201	*Indigofera*	*ionii*	Jarvie & Stirton	Ion's Pea	SI	Ch	m	2/86	10/83			moist; 35 cm
W2554	*Indigofera*	*mauritanica*	(L) Thunb	Sprawling Pea	SI	Ch	m					
W3822	*Indigofera*	*ovata*	Thunb	Round-leaf Pea	SI PFE	Ch	h	2/86	12/86			
W2439	*Indigofera*	*superba*	Stirton	Superb Pea	SI	Ch	mh	2/86	2/87			moist; 2 m
W3757	*Indigofera*	*alopecuroides*	(Burm f) D C var *alopecuroides*		SI PFE	Ch	m	2/86	12/86			
W3738	*Indigofera*	*sarmentosa*	L f		SI	Ch	m	2/86	11/86			
W2566	*Psoralea*	*aphylla*	L	Blue Broom; Bloukeur	SI OS	Na						wet; 1 - 3 m
W3524	*Psoralea*	*pinnata*	L	Fonteinbos	SI OS	Mi	l	12/81	12/83			wet; 4 m
	Psoralea	*aculeata*	L	Rough broom	UI ALS	Mi	l					
W3456	*Psoralea*	*restioides*	E & Z	Siren's Tresses	SI OS	Ch	l	12/81	8/83			
W3808	*Psoralea*	*usitata*	Stirton	Weeping Broom	UI ALS	Ch	mh	2/86	1/88			shale
W	*Otholobium*	*fruticans*	(L) Thunb		UI ALS	Ch						
W3562	*Tephrosia*	*capensis*	Pers var *capensis*		UI ALS	Ch	l					
W3319	*Vicia* -	*hirsuta*	(L) S F Gray	Wilde-ertjie	UI ALS	Ch	l	12/81	8/82			
W3646	*Rhynchosia*	*angustifolia*	DC		UI ALS	Ch		12/85	3/86			shale
W3686	*Rhynchosia*	*chrysoscias*	Benth		UI ALS	Ch	lm	2/86	9/86			
W3292	*Rhynchosia*	*capensis*	(Burm) Schinz		UI ALS	L	l	12/81	9/82			yellow_flower
W3297	*Rhynchosia*	*leucoscias*	Benth	Blink-ertjie	UI ALS	L	l	12/81	9/82			
W3800	*Rhynchosia*	*leucoscias*	Benth var *angustifolia* Harv		UI ALS	L	l	2/86	8/87			
W3341	*Dipogon*	*lignosus*	(L) Verdc	Wilde-ertjie	UI ALS	L	l	12/81	10/82			creeper
GERANIACEAE												
W3265	*Geranium*	*molle*	L	Dove's Foot	SI OS	Ch	l					annual, perennial;
W3774	*Pelargonium*	*capitatum*	(L) L'Herit		SI OS	Ch	lm					30 - 90 cm
W3310	*Pelargonium*	*chamaedryfolium*	Jacq	Fleeting Pelargonium	SI OS	Ch	l	12/81	9/82			sprawling
W3338	*Pelargonium*	*cucullatum*	(L) L'Herit ssp *cucullatum*	Wildemalva	SI OS	Na	l	12/81	10/82			2 m ; red edge
W3377	*Pelargonium*	*cucullatum*	(L) L'Herit ssp *strigifolium* Volschenk	Mountain Pelargonium	UI ALS	Ch	h					
W3277	*Pelargonium*	*elongatum*	(Cav) Salisb	Table Mountain Pelargonium	SI OS	Ch	l	12/81	8/82			15 - 30 cm; red rin

COLL NO	GENERA	SPECIES	AUTHOR AND SUBSP	COMMON NAME	FIRE RESPON NOBLE SLAYTER	GROWTH FORM	ALT	BRNT	FLOW	BRNT	FLOW	NOTES
W2607	*Pelargonium*	*longicaule*	Jacq	Myrrh leaved Pelargonium	UI ALS	Ch	l					P. myrrhifolium var
W3743	*Pelargonium*	*longifolium*	(Burm f) Jacq	Bearded Pelargonium	UI ALS	Ch	l	12/81	11/82	2/86	11/86	
W2606	*Pelargonium*	*papilionaceum*	(L) L'Herit	Scented Geranium	SI OS	Ch	l					
OXALIDACEAE												
	Oxalis	*corniculata*	L	Procumbent Oxalis	UI ALS	Cr	l					
W2747	*Oxalis*	*dentata*	Jacq	Sorrel; Suring	UI ALS	Cr	l	12/81	5/82			moist;30cm; shade d
W3235	*Oxalis*	*eckloniana*	Presl var *sonderi* Salt	Purple sorrel	UI ALS	Cr	l	12/81	5/82			
W3684	*Oxalis*	*heterophylla*	D C	Tufted sorrel	UI ALS	Cr	l	2/86	9/86			
W3147	*Oxalis*	*incarnata*	L	White sorrel	UI ALS	Cr	l					
W3236	*Oxalis*	*luteola*	Jacq	Yellow Sorrel	UI ALS	Cr	l					8 cm;leaves roset g
W3655	*Oxalis*	*polyphylla*	Jacq var *polyphylla*		UI ALS	Cr	l					30 cm
W3237	*Oxalis*	*truncatula*	Jacq	Purple Hairy-back sorrel	UI ALS	Cr	lm	12/81	5/82			
W2747	*Oxalis*				UI ALS	Cr						
LINACEAE												
W2871	*Linum*	*thunbergii*	E & Z	Flax	SI PFE	Ch	l					dry; 50 cm
RUTACEAE												
W3176	*Agathosma*	*bifida*	(Jacq) Bartl & Wendl	Mountain Buchu	UI OVS	Ch	m					30 cm
W2237	*Agathosma*	*capensis*			UI ALS	Ch	l					30 cm
W1532	*Agathosma*	*ciliaris*	(L) Druce	Berg Buchu	UI ALS	Ch	l					dry
W2235	*Agathosma*	*imbricata*	(L) Willd	Wild Buchu	UI ALS	Ch	l					25 - 30 cm
W1937	*Agathosma*	*serratifolia*	(Curtis) Spreeth	Long leaved Buchu	SI OS	Ch	l					moist
W2804	*Adenandra*	*uniflora*	(L) Willd	China flower	SI OS	Ch	l					30 cm
W3618	*Adenandra*	*viscida*	E & Z	Sticky China flower	UI ALS	Ch	h	12/82	7/85			50 cm
W3602	*Coleonema*	*album*	(Thunb) B & W	Cape May	SI OS	Ch	l					2 m; rock
W2198	*Diosma*	*hirsuta*	L	Hottentote Boegoe	UI ALS	Ch	lm					30 - 50 cm
W1948	*Diosma*	*oppositifolia*	L	Bitte-boegoe	UI ALS	Ch	m	12/81	4/82			
W3083	*Empleurum*	*unicapsulare*	(L f) Skeels	False Buchu	SI OS	Ch	h					3 - 4 m
POLYGALACEAE												
W2555	*Polygala*	*bracteolata*	L	Skaapertjie	SI OS	Ch	m					80 cm
W2872	*Polygala*	*garcini*	D C	Milk Maker	UI ALS	Ch	l					30 - 40 cm
W2815	*Polygala*	*myrtifolia*	L	Septemberbos	UNK	Ch	l					2 m
W2872	*Polygala*	*umbellata*	L	Clustered Milk Maker	SI OS	Ch	l					dry; 40 cm
W2675	*Muraltia*	*bulusii*	Levyns	Soft muraltia	UI ALS	Ch	lm	12/81	12/82			10-15 cm; M. ericoi
W3750	*Muraltia*	*concava*	Levyns		SI PFE	Ch	h	2/86	11/86			
W3157	*Muraltia*	*filiformis*	(Thunb) D C var *caledonensis* Levyns	Swamp Muraltia	SI	Ch	h					
W2788	*Muraltia*	*heisteria*	(L) D C	Pyp-in-die-sybossie	SI	Ch	l					40 - 50 cm
EUPHORBIACEAE												
W3666	*Clutia*	*alaternoides*	L var *alternoides*	Broad-leaf Clutia	VI	Ch	m	2/86	6/86			shale
W3041	*Clutia*	*polygonoides*	L	Narrow-leaf Clutia	UI ALS	Ch	mh					60 cm
W2835	*Euphorbia*	*erythrina*	Link	Pisgoed	UI ALS	Ch	l					dry; 70 cm; east
W2820	*Euphorbia*	*silenifolia*	(Haw) Sweet	Silene-leaved milk root	UI ALS	Cr	m	12/81	4/82			7 cm

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ANACARDIACEAE												
W2148	*Laurophyllus*	*capensis*	Thunb	Iron Martin; Ystermartiens	UI ALS	Mi	m					wet; 6 m
W3255	*Rhus*	*glauca*	Thunb	Bloukoenibos	UI ALS	Na	1					
W3483	*Rhus*	*lucida*	L	Taaibos	UI ALS	Mi	1	12/81	8/83			
W3259	*Rhus*	*scytophylla*	E & Z	Red flowered Rhus	UI ALS	Na	m					
W2317	*Rhus*	*tomentosa*	L	Wild Currant	dT ALS	Mi	1					
AQUIFOLIACEAE												
W2414	*Ilex*	*mitis*	(L) Radlk	Africa Holly; Without	UI ALS	Mi	1					
CELASTRACEAE												
W2733	*Maytenus*	*acuminata*	(L f) Loes var *acuminata*	Silky Bark	UI ALS	Na	1m					
W3087	*Putterlickia*	*pyracantha*	(L) Szyszyl	Wildegranaat	UI ALS	Mi	1					dry; 30 -40 cm
W1949	*Pterocelastros*	*rostratus*	(Thunb) Walp	Red Cherry Wood	UI ALS	Mi	1					2 m
W2752	*Cassine*	*peragua*	L	Bastard Saffron Wood	UI ALS	Mi	1					
W1947	*Hartogiella*	*schinoides*	(Spreng) Codd	Lepelhout	UI ALS	Mi	1					
ICACINACEAE												
W3828	*Apodytes*		(Braam) A E van Wyk		UI ALS	Mi	1m					moist; A. dimidata
RHAMNACEAE												
W2737	*Phylica*	*buxifolia*	L	Wild Box	USI FSS	Na	1					2 - 3 m
W2428	*Phylica*	*ericoides*	L	Snow Flakes	SI OS	Na	1m	12/74	1/78			90 cm
W3228	*Phylica*	*imberbis*	Berg var *imberbis*	Beardless Phylica	UI ALS	Ch	1	12/81	5/82			
W3426	*Phylica*	*lasiocarpa*	Sond	Woolly-Fruit Phylica	UI ALS	Ch	1	12/81	1/83			dry; 60 cm
W2845	*Phylica*	*stipularis*	L	Phylica with stipules	UI ALS	Na	1					
MALVACEAE												
W2816	*Anisodonta*	*scabrosa*	(L) Bates	Cape Mallow	SI OS	Ch	1					2 - 3 m; like hybis
W3649	*Hibiscus*	*aethiopicus*	L var *aethiopicus*	Wildestokroos	UI ALS	Ch	1	2/86	3/86			
W3660	*Hibiscus*	*trionium*	L		SI OS	Ch	1	2/86	5/86			25 cm; yel fl w blk
STERCULIACEAE												
W3304	*Hermannia*	*hyssopifolia*	L	Agtdaegeneesbossie	SI OS	Ch	1	12/81	9/82			
W2823	*Hermannia*	*rudis*	N E Br	Stick Hermannia	SI OS	Ch	1					dry
W2822	*Hermannia*	*salviifolia*	L f var *salviifolia*	Salvia-leafed Hermannia	SI OS	Na	1					60 cm
VIOLACEAE												
W3249	*Viola*	*decumbens*	L var *decumbens*	Wild Violet	UI ALS	Ch	1					30 cm
FLACOURTACEAE												
W2236	*Kiggelaria*	*africana*	L	Wild Peach; Kershout	UI ALS	Mi	1					
PENACEAE												
W3503	*Penaea*	*cneorum*	Meerb ssp *ruscifolia* Dahlg	Stream Penaea	SI OS	Na	m					moist; 2 m
W2315	*Penaea*	*mucronata*	L	Mountain Penaea	UI ALS	Ch	1m					30 cm
W2260	*Brachysiphon*	*acutus*	(Thunb) Juss	Pink Clump	UI ALS	Na	1					30 cm
W1946	*Brachysiphon*	*rupestris*	Sond	Rock Flower	SI OS	Na	m					4 - 8 cm
W3068	*Sonderothamnus*		(Sond) Dahlg	Beautiful Penaea	UI ALS	Ch	m					
W2282	*Saltera*	*sarcocolla*	(L) Bullock	Vlieëbossie	UI ALS	Na	1	2/86	9/89			1 m
OLINIACEAE												
W2007	*Olinia*	*ventosa*	(L) Cufod	Hard Pear; Hardepeer	UI ALS	Mi	1					

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THYMELAEACEAE												
W2827	*Gnidia*	*galpinii*	C H Wr	Yellow Stripper	SI OS	Ch	m					north
W3571	*Gnidia*	*humilis*	Meisn	Little Stripper	SI OS	Ch	m					moist
W2561	*Gnidia*	*oppositifolia*	L	Streamside Stripper	SI OS	Na	m					wet; 3 m
W3568	*Gnidia*	*penicillata*	Licht ex Meisn	Blue Paint Brush	SI OS	Ch	h	12/81	10/84			moist
W3357	*Gnidia*	*pinifolia*	L	Resprouting Stripper	UI ALS	Ch	lm	12/81	11/82			1 m
W2856	*Struthiola*	*ciliata*	(L) Lam ssp *ciliata*		SI OS	Ch	m					dry; 30 cm
W3487	*Struthiola*	*confusa*	C H Wr	Cats Tail	SI OS	Ch	l	12/81	8/83			hairy flowers
W2575	*Struthiola*	*myrsinites*	Lam		SI OS	Ch	lm					2 m; willow bush
W2459	*Struthiola*	*tomentosa*	Andr	Roemenaggie	SI OS	Na	lm					45 cm
W2624	*Passerina*	*vulgaris*	Thoday	Gonna	SI OS	Na	l					2 m
HALORAGIDACEAE												
W3637	*Laurembergia*	*repens*	Berg ssp *brachypoda* (Hiern) Oberm		UI ALS	Ch	l					moist; Laurentia se
APIACEAE												
W3258	*Centella*	*difformis*	(E & Z) Adamson	Hairy Paws	SI PFE	Ch	lm	12/81	7/82			dry
W2531	*Centella*	*eriantha*	(Rich) Drude var *eriantha*	Little Fans	SI PFE	Ch	m					
W2987	*Centella*	*rupertris*	(E & Z) Adamson	Rock Centella	UNK	Ch	m					dry
W2900	*Centella*	*triloba*	(Thunb) Drude	Paddy Paws	UI ALS	Ch	mh					
W3735	*Centella*	*virgata*	(L f) Drude var *virgata*	Slender Centella	SI PFE	Ch	m	2/86	11/86			shale
W3640	*Hermas*	*capitata*	L f var *minima* (E & Z) Sond		UI ALS	Ch	h					
W3585	*Hermas*	*ciliata*	L f	Comb edged Tinder-leaf	UI ALS	Hp	h	12/81	11/82			
W2689	*Hermas*	*depauperata*	L	Tontelblaar	UI ALS	Na	m					1 m; H. villosa
W3411	*Hermas*	*quinquedentata*	L f	Kleintontelblaar	UI ALS	Ch	m	12/81	1/83			30 cm
W3777	*Hermas*				UI ALS	Ch		2/86	1/87			
W3363	*Thunbergiella*	*filiformis*	(Lam) Wolff	Slender Umbellifer	UI ALS	Cr	l	12/81	11/81			
W2707	*Peucedanum*	*capillaceum*	Thunb var *rigidum* (E & Z) Sond	Hair-like Blister Bush	UI ALS	Na	l					
W3413	*Peucedanum*	*ferulaceum*	(Thunb) Sond var *ferulaceum*	Fennel-like Blister Bush	UI ALS	Cr	l		?			dry
W2672	*Peucedanum*	*galbanum*	(L) Benth & Hook f	Blister Bush; Berg selerie	UI ALS	Ch	l					moist; 3 m; shelter
CORNACEAE												
W2418	*Curtisia*	*dentata*	(Burm f) C A Sm	Assegaai Tree	UI ALS	Mi	l					
ERICACEAE												
W2810	*Erica*	*aristata*	Andr var *aristata*		SI OS	Ch	m					20 - 30 cm
W2557	*Erica*	*articularis*	L var *articularis*		SI OS	Ch	m					wet;30-40cm;carifol
W2828	*Erica*	*azaleifolia*	Salisb		SI OS	Ch	m					40 cm
R319	*Erica*	*banksia*	Andr var *banksia*	Tutu Heath	SI OS	Ch	h					
08691	*Erica*	*blancheana*	L Bol			Ch						Prior only Cape Poi
W3556	*Erica*	*brevifolia*	Soland ex Salisb		SI OS	Ch	h					60 cm
W2600	*Erica*	*caffra*	L		SI OS	Ch	l					dry; 3 m
W2787	*Erica*	*cerinthoides*	L var *cerinthoides*	Red Erica	UI ALS	Ch	m	12/81	2/82			1,8 m
W2718	*Erica*	*coccinea*	L var *coccinea*		SI OS	Na	m					30 cm
W2560	*Erica*	*coccinea*	L var *inflata* H A Bak		SI OS	Na	m					50 cm
W2757	*Erica*	*coccinea*	L var *pubescens* (H Bol) Bulfer		SI OS	Na	l					dry; 1,3 m
W2802	*Erica*	*corifolia*	L		SI OS	Ch	lm					30 cm

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W2957	*Erica*	*corydalis*	Salisb		SI OS	Ch	mh					30 cm
W2715	*Erica*	*cristata*	Dulfer		SI OS	Ch	m					30 - 40 cm; E. pycu
W2622	*Erica*	*cumuliflora*	Salisb		SI OS	Ch	m					moist; 40 cm
W2873	*Erica*	*curviflora*	L var *curviflora*		SI OS	Ch	m					moist; 50 cm
W2461	*Erica*	*curvirostris*	Salisb var *curvirostris*		SI OS	Ch	mh					40 cm
W2725	*Erica*	*desmantha*	Benth var *urceolata* H A Bak		SI OS	Ch	mh					1,2 m
W2709	*Erica*	*discolor*	Andr var *discolor*		SI OS	Ch	l					dry; 40 - 50 cm
W2857	*Erica*	*fastigiata*	L var *coventryana* H Bol		SI OS	Ch	m					moist
W2815	*Erica*	*hispidula*	L var *hispidula*		DR OS	Na	lm					
W2839	*Erica*	*holosericea*	Salisb var *holosericea*		SI OS	Ch	m					moist
W2760	*Erica*	*lanuginosa*	Andr		SI OS	Ch	m					dry
W3829	*Erica*	*imbricata*	L		SI OS	Ch	h					
W3580	*Erica*	*ioniana*	Oliver mss	Small Nodding Heath	UI ALS	Ch	m					moist
W2697	*Erica*	*longiaristata*	Benth		SI OS	Ch	lm					40 cm
W2824	*Erica*	*lutea*	Berg	Yellow Heath	SI OS	Ch	l					40 cm
W2692	*Erica*	*massonii*	L f var *minor* Benth		UI ALS	Ch	m					30 cm
W2993	*Erica*	*nudiflora*	L		SI OS	Ch						shale; 20 - 30 cm
W2702	*Erica*	*obliqua*	Thunb		SI OS	Ch	m					30 - 40 cm
W3351	*Erica*	*obtusata*	Klotzsch ex Benth		SI OS	Ch	m					
W2727	*Erica*	*onosmiflora*	Salisb	Langblaar Heide	SI OS	Ch	m					40 - 70 cm
W2807	*Erica*	*parviflora*	L var *parviflora*		SI OS	Ch	l					70 cm
W2759	*Erica*	*parvula*	Guth & Bol	Rock Erica	SI OS	Ch	m					25 - 30 cm
W3545	*Erica*	*perspicua*	Wendl var *perspicua*	Six penny Heath	SI OS	Ch	l					moist; 1,6 m
W2724	*Erica*	*perspicua*	Wendl var *latifolia* Benth	Nine penny Heath	SI OS	Ch	m					moist; 50 - 1,5 m
Dsn	*Erica*	*petiolaris*	Lam		SI OS	Ch	h					
D254	*Erica*	*petrophila*	H Bol		SI OS	Ch	m					
R278	*Erica*	*physophylla*	Benth		SI OS	Ch	m					
W2786	*Erica*	*placentiflora*	Salisb	Pregnant Heath	SI OS	Ch	m					50 cm
W2794	*Erica*	*plukenetii*	L var *plukenetti*	Hangertjie	SI OS	Ch	l					30 - 50 cm
W2986	*Erica*	*plukenetii*	L var *bicarinata* H Bol		SI OS	Na	m					
W3069	*Erica*	*pogonanthena*	Bartl		SI OS	Ch	m					moist; 25 cm
W3581	*Erica*	*rhopalantha*	Dulfer var *rhopalantha*		SI OS	Ch	l	12/81	2/85			
W2697	*Erica*	*sessiliflora*	L f var *sessiliflora*		CI ALS	Ch	m					moist; 60 cm
W2837	*Erica*	*spumosa*	L		SI OS	Ch	m					shale; 20 - 30 cm
W3564	*Erica*	*suffulta*	Wendl ex Benth		SI OS	Ch	m					25 cm
W3579	*Erica*	*tenella*	Andr var *gracilior* H Bol		SI OS	Ch	l	12/81	2/85			20 - 30 cm
W2693	*Erica*	*tenella*	Andr var *tenella* H Bol		SI OS	Ch	m					35 cm
W3383	*Erica*	*tenuifolia*	L		SI OS	Ch	m					30 cm
W2601	*Erica*	*villosa*	Andr	Kapkoppie	SI OS	Ch	l					30 - 40 cm
W3551	*Erica*	*sp*			SI OS	Ch	m					
W2701	*Blaeria*	*barbigera*	(Salisb) F Don	Bearded Heath	SI OS	Ch	m					moist; 30 - 40 cm
W3582	*Blaeria*	*dumosa*	Wendl var *dumosa*	Bushy Heath	SI OS	Ch	l	12/81	2/85			
W2703	*Blaeria*	*dumosa*	Wendl var *breviflora* N E Br		SI OS	Ch	m					30 cm
W3583	*Blaeria*	*ericoides*	L	Honey Heath	SI OS	Ch	l	12/81	2/85			
W2719	*Simocheilus*	*consors*	N E Br		SI OS	Ch	m					30 - 40 cm

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W3588	*Sympieza*	*labialis*	(Salisb) Druce		SI OS	Ch	l					50 cm
W2723	*Sympieza*	*williamsiorum*	Oliver mss		SI OS	Ch	h					50cm;capitellata Li
W3630	*Scyphogyne*	*muscosa*	(Ait) Druce	Mossy-she-cup	SI OS	Ch	l	12/81	2/85			60 cm
W3052	*Nagelocarpus*	*serratus*	(Thunb) Bullock	Worthless Heather	SI OS	Ch	m					75 cm
MYRSINACEAE												
W2974	*Myrsine*	*africana*	L	Cape Myrtle; Myrting	UI ALS	Na	l					
W2628	*Rapanea*	*melanophloeos*	(L) Mez	Kaapse Boekenhout	UI ALS	Mi	l					
SAPOTACEAE												
W3111	*Sideroxylon*	*inerme*	L	Melkhoutboom	UI ALS	Mi	l					
EBENACEAE												
W3476	*Euclea*	*polyandra*	(L f) E Mey ex Hiern	Kersbos	UI ALS	Na	l					
W3120	*Euclea*	*racemosa*	Murray	Sea Guarri	UI ALS	Na	l					
W2407	*Diospyros*	*glabra*	(L) de Winter	Blueberry Bush	UI ALS	Na	l	12/81	10/82			
OLEACEAE												
W3544	*Chionanthus*	*foveolatus*	(E Mey) Stearn ssp *foveolatus*	Fine-leaved Iron Wood	UNK	Mi	l					
W3414	*Olea*	*capensis*	L ssp *capensis*	Ironwood; Ysterhout	UI ALS	Mi	l	12/81	1/83			
GENTIANACEAE												
W3508	*Sebaea*	*aurea*	(L f) Roem & Schult	Sebaea; Naeltjiesblom	SI	Ch	h					
W2842	*Sebaea*	*micrantha*	(Cham & Schlechtd) Schinz var *micrantha*		SI	Ch	l					
W2621	*Chironia*	*jasminoides*	L	Large Chironia	SI PFE	Ch	m					moist
W3516	*Chironia*	*linoides*	L ssp *nana* Verdoorn	Dwarf Chironia	SI	Ch	l	12/81	11/83			
W2940	*Chironia*	*melampyrifolia*	Lam	Streamside Chironia	SI	Ch	m					moist
W2945	*Chironia*	*tetragona*	L f	Sticky Chironia	SI	Ch	m					dry
W2821	*Villarsia*	*capensis*	(Houtt) Merrill	Yellow Frills	USI FSS	Ch	m					wet
ASCLEPIADACEAE												
W3440	*Astephanus*	*triflorus*	(L f) Schultes	Feather Duster		L						
W3652	*Aspidoglossum*	*heterophyllum*	E Mey		UI ALS	Cr	l	2/86	3/86			
W3763	*Asclepias*	*crispa*	Berg		UI ALS	Cr	l	2/86	12/86			
W3160	*Secamone*	*alpinii*	Schultes	Monkey Rope	UI ALS	L	l					
W2992	*Orbea*	*variegata*	(L) Haw	Toad Plant; Aasblom	UNK	herb	l					
CONVOLVULACEAE												
W2690	*Cuscata*	*angulata*	Engelm	Dodda	SR OS	parsit	m					
BORAGINACEAE												
W2793	*Lobostemon*	*montanus*	(D C) Buek	Douwurmbossie	SI	shrub	l					1 m
STILBACEAE												
W3076	*Stilbe*	*rupestris*	Compton	Rock Stilbe	SI OS	shrub	m					
LAMIACEAE												
W2889	*Stachys*	*aethiopica*	L	Katpisbossie	SI	Ch	l					shade; forest
SOLANACEAE												
W3530	*Solanum*	*hermannii*	Dunal	Apple of Sodom	UI ALS	shrub	l					weed
W2744	*Solanum*	*retroflexum*	Dunal	Black nightshade	SI	shrub	l					weed
W3216	*Datura*	*ferox*	L	Grootstinkblaar	SI	Ch	l					weed
RETZIACEAE												
W3504	*Retzia*	*capensis*	Thunb	Hedgehogs	UI ALS	Na	m					2 m

COLL NO	GENERA	SPECIES	AUTHOR AND SUBSP	COMMON NAME	FIRE RESPON NOBLE SLAYTER	GROWTH FORM	ALT	BRNT	FLOW	BRNT	FLOW	NOTES
SCROPHULARIACEAE												
W3276	*Hemimeris*	*racemosa*	(Houtl) Merrill	Tiny Yellow Flowers	SI	Ch	l	12/81	9/82			moist; annual
W3275	*Nemesia*	*diffusa*	Benth	Witleenbekkie	SI PFE	Ch	l	12/81	9/82			moist
W2316	*Halleria*	*lucida*	L	Tree Fuchsia; Witolyf	UI	Mi	l	12/74	7/77	2/85	9/89	
W2875	*Teedia*	*lucida*	Rudolphi	Stinkbos	SI	Na	m					1,2 m
W2848	*Oftia*	*africana*	(L) Bocq	Sweet Scroph	SI	Na	l					
W2843	*Manulea*	*benthamiana*	Hiern Benthamus	Hand Flower	SI	Ch	l					
W2546	*Sutera*	*hispida*	(Thunb) Druce	Honey Flower	SI PFE	Ch	l					
W2841	*Polycarena*				SI	Ch	l					15 cm
W3482	*Zaluzianskya*	*capensis*	(L) Walp	Verfblommetjie	SI	Ch	l					annual;Z dentata (B
SELAGINACEAE												
W2584	*Dischisma*	*ciliatum*	(Berg) Choisy ssp *ciliatum*		SI	Ch	l	12/81	9/82			annual, perennial
W2705	*Selago*	*serrata*	Berg	Blou-aarbossie	SI	Ch	lm					30 cm
W2674	*Selago*	*spuria*	L		SI PFE	T	l					annual, perennial;
W2686	*Selago*	*verbenacea*	L f		SI PFE	T	l	12/81	11/82			
W2593	*Agathelpis*	*angustifolia*	(Thunb) Choisy		SI PFE	Ch	l					A dubia (L.) Hutch.
W2973	*Melasma*	*scabrum*	Berg	Love Flower	UNK	Ch	m					moist; parasite; we
W2670	*Harveya*	*capensis*	Hook	White Harveya; Inkblom	UNK	Ch	m					dry; parasite
W2671	*Harveya*	*tubulosa*	Harv ex Hiern	Red Harveya; Rooi Inkblom	UNK	Ch	l					dry; parasite
W2829	*Hyobanche*	*sanguinea*	L	Cat's Claws; Katnaels	UNK	Ch	m					dry; parasite
LENTIBULARIACEAE												
W2984	*Utricularia*	*bisquamata*	Schrank	Bladderworst	SI	Ch	m					wet; annual
RUBIACEAE												
W3072	*Anthospermum*	*aethiopicum*	L		SI	Ch	l					1,5 m
W2967	*Anthospermum*	*galioides*	Reichb f ssp *reflexifolium* (O Ktze) Puff		SI	Ch	l					20 cm
W3071	*Anthospermum*	*spathulatum*	Spreng ssp *spathulatum*		SI	Ch	l					1,5 - 2 m
W3075	*Carpacoce*	*heteromorpha*	(Buek) L Bol	Curlies	SI	Ch	lm					dry
W2604	*Carpacoce*	*spermacocea*	(Reichb f) Sond ssp *spermacocea*		SI	Ch	m					moist
W3621	*Carpacoce*	*vaginellata*	Salter		UI ALS	Ch	m	12/81	6/82			
DIPSACACEAE												
W3082	*Scabiosa*	*africana*	L Wild	Scabius	SI	Ch	l					25 cm
CUCURBITACEAE												
W3372	*Zehneria*	*scabra*	(L f) Sond ssp *scabra*	Dawedjies	UNK	L	l					
W3577	*Kedrostis*	*nana*	(Lam) Cogn var *nana* Bryony		UI ALS	L	l					
CAMPANULACEAE												
W3389	*Merciera*	*leptoloba*	A D C	White Fox-tail	UI ALS	Ch	l	12/81	11/82			dry
W2937	*Merciera*	*tenuifolia*	(L f) A DC var *aurea* (Schltr) Adamson	Blue fox-tail	UI ALS	Ch	m					dry
W3910	*Roella*	*incurva*	A DC var *incurva*	Blue Roella	SI PFE	Ch	l	12/81	1/83			
W3809	*Roella*	*muscosa*	L f	Mossy Roella	SI	Ch	mh	2/86	1/88			dry
W3423	*Roella*	*psammophila*	Schltr	White Roella	SI PFE	Ch	l	12/81	3/83			
W3416	*Prismatocarpus*	*brevilobus*	A DC		SI	Ch	l					
W3423	*Prismatocarpus*	*schlechteri*	Adamson		SI	Ch	l	12/81	4/83			
W2953	*Prismatocarpus*	*sessilis*	Ecklon var *sessilis*		SI	Ch	m					
W3786	*Prismatocarpus*				SI	Ch	l	2/86	3/87			
W2968	*Siphocodon*	*debilis*	Schltr		SI	Ch	l					

COLL NO	GENERA	SPECIES	AUTHOR AND SUBSP	COMMON NAME	FIRE RESPON NOBLE SLAYTER	GROWTH FORM	ALT	BRNT	FLOW	BRNT	FLOW	NOTES
W3782	*Helichrysum*	*cymosum*	(L) D Don ssp *cymosum*	Golden Sage	SI OS	Ch	l					
	Helichrysum	*humile*			SI PFE	Ch						
W3090	*Helichrysum*	*indicum*	(L) Grierson	Velvet Herb	SI	Ch	l					annual
W2952	*Helichrysum*	*litorale*	H Bol	Sewejaartjie	DI PFE	T	m					
W2950	*Helichrysum*	*mucronatum*	Less var *niveum* (DC) Harv	Baby Everlasting	SI	Ch	m					shale
W2916	*Helichrysum*	*pandurifolium*	Schrank	Hottentotskooigoed	SI	Na	l					H. auriculatum Less
W3804	*Helichrysum*	*tinctum*	(Thunb) Hillard & Burtt		SI	Ch	m					shale
W2620	*Syncarpha*	*vestita*	(L) B Nord com nov	Cape Everlasting	DI PFE	Na	m					Helichrysum dry
W2706	*Edmondia*	*fasciata*	(Andr) Hilliard		UI ALS	Ch	m					
W2631	*Edmondia*	*pinifolia*	(Lam) Hilliard		SI OS	Ch	m					
W3511	*Edmondia*	*sesamoides*	(L) Hilliard		DI PFE	Ch	l	12/81	11/83			
W2609	*Stoebe*	*aethiopica*	L	Knoppiesbos	SI OS	Ch	l					
W2721	*Stoebe*	*capitata*	Berg		SI OS	Ch	l					30 cm
W2996	*Stoebe*	*cinerea*	Thunb	Vaalrenosterbossie	DI PFE	Ch	m					50 - 70 cm; shale
W2460	*Stoebe*	*incana*	Thunb		DI PFE	Ch	m					dry; 40 - 50 cm
W2997	*Stoebe*	*plumosa*	(L) Thunb	Slangbos	DI	Ch	m					30 - 1m
W2750	*Stoebe*	*spiralis*	Less		DI PFE	Ch	l					50 cm
W3227	*Disparago*	*lasiocarpa*	Cass		UI ALS	Ch	l	12/81	5/82			
W2909	*Disparago*	*laxifolia*	DC		SI	Ch	m					dry
W2512	*Metalasia*	*cymbifolia*	Harv	Thick-leaf Blombos	SI OS	Na	m					dry; 30 cm
W3116	*Metalasia*	*muricata*	(L) D Don	Blombos	DI OS	Na	l					1,5 m
W2553	*Metalasia*	*seriphiifolia*	DC	Fine-leaf Blombos	SI OS	Ch	l					dry
W3112	*Bryomorphe*	*lycopodioides*	(Sch Bip) Levyns	Moss Daisy	SI OS	Hp	h					
W3700	*Athrixia*	*heterophylla*	(Thunb) Less ssp *heterophylla*		UI ALS	Ch	h	2/86	10/86			
W3398	*Heterolepsis*	*aliena*	(L f) Druce	Rock Daisy	UI ALS	Ch	l	12/81	12/82			
W3415	*Osmitopsis*	*afra*	(L) Bremer	Belskruie	UI ALS	Ch	lm	12/81	1/83			
W2784	*Osmitopsis*	*asteriscoides*	(Berg) Less	Mountain Daisy; Bels	UI ALS	Na	m					1,5 m
	Oedera	*capensis*			SI OS	Ch						
W3492	*Oedera*	*prolifera*	L f	Multiple Daisy	SI	Ch	l	12/81	9/83			dry
W3098	*Athanasia*	*trifurcata*	(L) L	Klaaslouwsbos	SI	Ch	h					weed
W2551	*Thaminophyllum*	*latifolia*	Bond	Shade Daisy	SI	Na	m					wet
W3253	*Cenia*	*turbinata*	(L) Pers	Ganskos	SI	Ch	l	12/81	6/82			dry
W2576	*Hippia*	*frutescens*	(L) L	Small Wormwood; Rankerals	SI	Ch	l					
W3496	*Hippia*	*pilosa*	(Berg) Druce	Dwarf Wormwood	SI	Ch	mh					dry
W3302	*Senecio*	*cymbalariifolius*	(Thunb) Less		UI ALS	Ch	l	12/81	9/82			
W3650	*Senecio*	*erubesceus*	Ait var *erubescens*		UI ALS	Ch	l	2/86	3/86			dry
W3560	*Senecio*	*filifolius*	Harv		SI	Ch	m					30 cm
W3301	*Senecio*	*hastifolius*	(Thunb) Less		UI ALS	Ch	l	12/81	9/82			dry
W3521	*Senecio*	*littoreus*	Thunb var *hispidulus* Harv	Hongerblom	SI	Ch						
W2663	*Senecio*	*lyratus*	L f	Ragwort	SI	Ch	l	12/81	10/82			moist; 2 m
W2734	*Senecio*	*pinifolius*			UI ALS	Ch	m					dry; 15 - 20 cm
W3431	*Senecio*	*pubigerus*	L	Koghrabossie	DI PFE	Ch	l	12/81	4/83			dry; 1 m
W2742	*Senecio*	*repens*	G Rowley	Fingerettes	SI OS	Ch	l					
W2635	*Senecio*	*umbellatus*	L		DI PFE	Ch	l					

Appendix 2: Permit

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PERMIT

TO ENTER VOGELGAT NATURE RESERVE

Name: Miss Cheryl de Lange

Address: P. B. 6546

George 6530

PERMISSION is hereby given to the abovenamed person or his wife, or son, or daughter accompanied by his or her party to enter the Vogelgat Private Nature Reserve. 1/9/89 – 31/8/90

This permit is not transferable to anybody else, and the total number of persons at any one time entering the Reserve under this permit is to be limited to ten.

The holder of this permit undertakes to obey the rules attached hereto relating to this Reserve and furthermore to be responsible for seeing that all members of his or her party obey these same rules.

This permit is issued on behalf of the Board of Vogelgat Nature Reserve (Pty) Ltd, by Dr. Ion Williams. 29 Tenth Street, Voëlklip 7203.

Signed: Signed
Director.

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VOGELGAT NATURE RESERVE

RULES

No person shall:

1. enter the Reserve without a permit to do so;
2. introduce into or be in possession of any flora, fauna, weapon, trap, explosive or poison within the Nature Reserve;
3. remove from the Nature Reserve any flora, fauna, nests, objects of historical, archaeological or scientific interest or any property therein;
4. damage, injure or destroy any flora, fauna or nests within the Nature Reserve;
5. damage, destroy or deface in any manner any natural object or any property, including that belonging to the Municipality, within the Nature Reserve;
6. make a fire within the Nature Reserve or commit any act whereby a fire may be caused therein;
7. introduce into, operate or use within the Nature Reserve any class of vehicle;
8. discard any refuse whatsoever within the Nature Reserve;
9. in any way pollute or throw anything into waters within the Nature Reserve;

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NO DOGS

introduce into the ~~Nature Reserve or be in possession, or in charge of dogs within the Nature Reserve, unless under proper control~~. Any loose-running dogs found in the Nature Reserve will be destroyed;

damage, climb over or through any wire fence, or other fence, within or bounding the Nature Reserve;

at any time unnecessarily or unreasonably make or cause to be made a noise, or do anything which may be a nuisance, impediment or hindrance to other persons, or which may give offence to any person within the Nature Reserve.

camp within the reserve.

sons found contravening these rules will be prouted under the Nature and Environmental Conseron Ordinance of 1974.

By Order of the Board of Directors,
Vogelgat Nature Reserve (Pty) Ltd.,
29, Tenth Street, Voëlklip 7203.

NOTICE

s an express condition of your visit to this Reserve the Company known as Vogelgat Nature Reserve Ltd., shall not be responsible for any bodily injury her fatal or otherwise, nor shall the Company be onsible for any damage you may suffer arising the loss or damage to your property brought

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into the Reserve irrespective of whether such bodily injury, loss or damage arises as the result of fire, theft, floods or from the negligence or intentional act of any person whether or not in the employ of the Company, or caused by any animal in the Reserve.

All visitors, whether or not they occupy accommodation within the Reserve are deemed to contract with the Company on this basis.

HERBARIUM

The Vogelgat Herbarium is available for plant identification and lists of species may be had on request.

AVIFAUNA

A check list of birds to be seen in the Reserve is available on request.

Appendix 3 : Table of mature relevés

PLOT	11 1	1	11 1 1	1		111111 11		1	11		1		
	90099099	97783884583438354851	1144161	11 2 8 24033222222	36645466	11111020223	76755556666	98514 30 948	31700	1111	77181770	9	79
	82067195	48911081122396304763	8905657654	2087619217367057432	41483930	41502485090	07147958269	248163569025	86289	4538	63739547	3	71
ASPECT	ENEEEEEE	WW SESWWE N S	S W S	E EE NNE	WWWNNWW	S S	W W N	W WEESESW	W SSW	EEEE	W SEEWWS	S	SS
	NNNNNNNN	SSSSSSSSNSSN S N SNS	SS SSS	S SSSSNN NSSNNN N	SSSSNNSN	SS S SN	NSSSSS N	SN NSSSNSSN	S SSS	NNNN	SSSNNSSS	S	SS
	EEEEEEEE	WWWWWEEWWEWWWESEWEWW	SSEWWWWEWS	EEEEEEWEEWEEEEEENNE	WWWWWEWW	SWWSWSSSSWW	WWWWWWNWWWE	SWWNWEEWEEWW	WSWWW	EEEE	WWWEEWWW	E	EE
ALTITUDE	55556556	1 113124613443273361	3344364765	4456333325433233322	36677766	22222212323	56576576666	335444314243	3 12	1	1 1	2	2
	00050550	56050280570050755055	5400005006	6357480800577033065	60350530	50052570040	85502230550	055650753803	65500	5550	55550440	5	48
	00000000	00000000000000000000	0000000000	0000000000000000000	00000000	00000000000	00000000000	000000000000	00000	0000	00000000	0	00
LAND	1111 1	1111111111111111 1111	1121111111	1111111111111111111	1111 11	11111111111	111 11 1111	11111111 111	11111	1111	11111111	1	22
FACET	00005025	53303303033300360000	5510505000	0000330330433333333	30005500	00050030533	00050050000	000003302000	33440	3333	43633894	0	11
SLOPE	11 1	223231 323113312331	1 2 42	132413 22 12311111	21113111	111 212131	22311212213	121 1 2 212	313	1113	37133 12	3	
	55555525	95567465595509305155	5565505055	5005005550300350950	00555555	55065000009	50055005550	415355505959	55358	0503	70443350	9	31
PERCENTAGE	6 6	1 118 1	3	4211 111 121121	1 1 2	1 111	1 21 2	1 1 1	2	1	49 4 1	1	11
ROCK	00000000	05050000555505505 20	0000000055	5500005000 50000005	00005000	5 5 0 090	55550000550	0000550 5500	500	5505	0050500	0	00
NUMBER	11	22232222121211221222	11111111 1	1121212211 12222122	21111211	22232131122	22112212221	211111111212	11211	2333	11212111	1	11
SPECIES	99894699	30846432676098023612	0795353690	6707471130763023830	14877109	17903408750	76860342476	194554596140	63323	7140	74146816	3	34
SOIL	mdddddd	ddddddddddwddddddddd	mmwmmmmmmm	ddddddddddddddddddd	mmmdddmm	ddddddddddd	ddddddwdddd	dddwdddddddd	ddddd	dddd	dddddddd	d	ww
MOISTURE													
PLOT	11 1	1	11 1 1	1		111111 11		1	11		1		
	90099099	97783884583438354851	1144161	11 2 8 24033222222	36645466	11111020223	76755556666	98514 30 948	31700	1111	77181770	9	79
	82067195	48911081122396304763	8905657654	2087619217367057432	41483930	41502485090	07147958269	248163569025	86289	4538	63739547	3	71
Erica plukenetii v bicarinata	121111												
Erica lutea	2212 21												
Berzelia squarrosa	22	1 1						1					
Erica coccinea var coccinea		11111 11 11					1						
Hermas depauperata		1 111 1 11 1											
Restio perplexus		13 11 3 3									2		
Euryops abrotanifolius		1111 1											
Laurophyllus capensis		111 2				2							
Widdringtonia cupressiodes		1111 2											
Stoebe incana	11 1	1 111 2		1 1	1								
Anthospermum aethiopicum		111 1									1		
Cuscuta angulata		1 1 1 2 r 1 1											
Protea lepidocarpodendron		2 65											
Schizaea pectinata		2 1											
Thaminophyllum latifolium		1 1											
Berzelia rubra		1											
Carpacoce spermacocea		11											
Carpobrotus pillansii		1											
Dilatris pillansii		1											
Erica corydalis		1											
Mimetes cucullatus		r											
Phylica lasiocarpa		2											
Selago serrata		1											

Appendix 3 (cont)

PLOT	11 1 90099099 82067195	1 97783884583438354851 48911081122396304763	11 1 1 1144161 8905657654	1 11 2 8 24033222222 20876192173670574 32	 36645466 41483930	111111 11 11111020223 41502485090	 76755556666 07147958269	1 98514 30 948 248163569025	11 31700 86289	 1111 4538	1 77181770 63739547	 9 3	 79 71
Osmitopsis asteriscoides			533145 421				r						1
Erica perspicua			4311224										
Brunia albiflora		2	253 5										
Grubbia rosmarinifolia			45 2										
Disa tripetaloides			1										
Erica brevifolia			1										
Erica tenuifolia			1										
Gleichenia polypodioides			3										
Pseudobaeckia africana			2										
Roridula gorgonias			2										
Isolepis digitata			2										
Ursinia eckloniana			1										
Brunia laevis			4				1						
Restio similis				3 2 1 1112 11	1			1					
Restio bifarius	3 3			333 14 11									
Hypodiscus argenteus				2 311221		2			2				
Staberoha banksii	3	2 1	3	1 2 21 1			3		1				
Restio sarcocladus				42									
Erica coccinea var pubescens	1			3 1									
Thamnochortus lucens				3 1									
Berzelia incurva				2									
Drosera cistiflora				2									
Serruria rubricaulis				2									
Agathelpis angustifolia				1									
Chondropetalum ebracteatum		2 1141 21 2 2	4124 2	1 1	411313		1 1						
Penaea cneorum ssp ruscifolium		112 31 2 11 1 1	221 2	1 1									
Villarsia capensis		1	5324 2 53	2 1	211 1 11		2 1	1					
Restio dispar	2	1 4 2 1	211 3 2										1
Centella eriantha		1 1	12										11
Blaeria ericoides		2 2	4			223 2 2			22				
Leucospermum gracile		3 1				24 2 12	213						
Aspalathus serpens						2222					1		
Watsonia schlechteri						112 2					2		
Erica tenella var gracilior		1				1 2 2 1							
Disparago laxifolia		1 1				2 22					1		
Leucadendron spissifolium			2			22 2							
Retzia capensis		r				1 1 1							
Erica cerinthoides						2 2							
Merciera tenuifolia var aurea						1 1							
Aspalathus ciliaris						1							
Aristea oligocephala						1							

Appendix 3 (cont)

PLOT	11 1 90099099 82067195	1 97783884583438354851 48911081122396304763	11 1 1 1144161 8905657654	1 11 2 8 24033222222 20876192173670574 32	36645466 41483930	111111 11 11111020223 41502485090	76755556666 07147958269	1 98514 30 948 248163569025	11 31700 86289	1111 4538	1 77181770 63739547	9 3	79 71
Peucedanum galbanum										1 2	2		
Stachys aethiopica									1	2 1			
Myrsine africana									1	2	1		
Ischyrolepis capensis									1	1	1		
Ischyrolepis gaudichaudiana									1	1			
Rhynchosia capensis						1				1	2		
Chrysanthemoides monilifera									2	2 2	1 1		
Lobelia erinus									2	1	1 1 1		1
Protea repens				2				2	4	52	4 4		
Myrsiphyllum asparagoides												1	
Rumohra adiantiformis												2	
Curtisia dentata												2	
Elaphoglossum angustatum												1	
Elegia thyrsifera												1	
Blechnum tabulare												2	
Ilex mitis												1	
Olea capensis ssp capensis						r			2	21		2	
Rapanea melanophloeos										1	r 2	2	
Pterocelastrus rostratus											1	2	
Erica caffra													11
Blechnum capense			2										12
Prionium serratum											1		22
Ehrharta rehmannii var filif											1		21
Empleurum unicapsulare													4
Ficinia distans													1
Juncus capensis													1
Psoralea pinnata													1
Isolepis prolifera													1
Todea barbara						2						2	22
Maytenus acuminata												1	2
Brachylaena neriifolia			1								1 11		32
Leucadendron xanthoconus	4 244444	21 12 311212 42	25 232 33	4324 12 3 41 121r4	315312rr	2 1 r	123134r3121	34125313122	1 1				
Erica imbricata	2	11111 2 11 2 1 31 2	2 212	213 23141 12112222	2 1	2 2 21	2 1 111	1112142 3111	1	2r2	2		
Penaea mucronata	21 2222	1 22 12 12	2 2 12	232 121 1	1 1 1 1	2 2 12 1	1111 1 11 1	2312222 2	1	1 1	2		
Hypodiscus aristatus	3	r 21 2 1121	3	1 22 21 1122111	11	22222213 11	21 11 111	11 2 112		1 33			
Erica hispidula	22 3	21 14 33 3 1 21 2	21 211 43	33331	12 21	2 2222 21	2 2 2	3 1 2	1	2	2 2 2		
Aulax umbellata		42r2 3 4 2 r 4	1r 2	1 311 4 4134122	1 r	4254425 4	r	13 2 2		r 2	5		
Anaxeton laeve	11	1 111r1 111 11		221 1	1 11111	1111 1 11	1 11 11	1 1 1	2				
Simocheilus consors		1111 2r 1 12	3r 2	2 2 r2 2 22 21	2 2	3 333 2		1 2 3 1 2	2	2 4	1 2		
Erica sessiliflora	2 2 2	1 r 1 1 2	2211112	1 11	2 1 11	2 32 1 1r	1 1 1 1	1 32		2	r		

Appendix 4: Table of relevés at eighteen months post-fire

	3574435833 1091321293 B	65 A	3644 4189 C	775555 014795 D	7221222332214 60214576 707 E	98513349 2481 59 F	17 62 G	1 4 H	1817 7394 I
Thaminophyllum latifolium	7								
Berzelia rubra	7								
Restio perplexus	1 1								
Retzia capensis	77								
Grubbia tomentosa	71	7	7 7		7 7				
Penaea cneorum ssp ruscifolia	777 7 7		7		7	7			
Tetraria brevicaulis	77		7						
Laurophyllus capensis	7 7								
Cliffortia atrata	77 7				7	7			
Erica coccinea var coccinea	7								
Lampranthus emarginatus	7								
Psoralea aculeata	7								
Lebeckia inflata	7								
Euryops abrotanifolius	7 7								
Restio dispar	7 1								
Indigofera superba	7 77							7	
Widdringtonia cupressiodes	17								
Monadenia bracteata	7								
Indigofera filifolia	7								
Lobelia chamaepitys	7								
Gladiolus bullatus	7								
Brunia albiflora	7								
Hypocalyptus oxalidifolius	7 7								
Struthiola tomentosa	77								
Protea lepidocarpodendron	11		7						
Pillansia templemanii	1 2				7	7			
Berzelia squarrosa	7								
Ficinia oligantha	7							7	
Carpacoce spermacocea	7 7					7			
Schizaea pectinata	7								
Polygala bracteolata	7 7		7						
Indigofera glomerata	77		7			7			
Phylica ericoides	7 77								
Bobartia filiformis	7								
Hermas depauperata	171 117				7 7	7			7
Ehrharta rehmannii var filifolia	3772							1	7
Ehrharta ottonis	7777						7	7	
Osmitopsis asteriscoides	7	11		7					
Geissorhiza ovata	7	77							
Hermas ciliata		7							
Gnidia oppositifolia		7							
Ursinia eckloniana		1							
Erica brevifolia		7							
Chondropetalum mucronatum		7	2	1					
Erica fastigata var coventryana			7	7					
Blaeria barbigera			7	7					
Chironia jasminoides			7			7			
Disa patens			7		7				
Restio filiformis			1	1					1
Hermas quinquedentata			77		7				
Brunia alopecuroides			1						
Chondropetalum ebracteatum	1 71 1		1111	7	1	7			
Pentaschistis colorata	1 7 7 7	72	7		7				
Erica longiaristata	777 7 1			7 77		77 7			
Erica cerinthoides var cerinthoides	7 7				7				
Thamnochortus lucens	1		3		1				
Disparago lasiocarpa	7 7		7			7			
Ehrharta setacea	7			7					1
Indigofera ovata	7		71						
Centella difformis	7		7	7					
Corymbium cymosum	1				7				
Leucospermum gracile	7								

Appendix 4 (cont)

	3574435833 1091321293 B	65 A	3644 4189 C	775555 014795 D	7221222332214 60214576 707 E	98513349 2481 59 F	17 62 G	1 4 H	1817 7394 I
Metalasia cymbifolia	7			77 77	7 7	7			
Ceratocaryum argenteum	1		1	21					
Erica coccinea var inflata				77 7		7			
Syncarpha speciosissima				77 7	7 7				
Senecio pinifolius				7					
Anapalina W3776				7					
Restio sarcocladus					2				
Helichrysum litorale					7				
Lightfootia axillaris					7				
Berzelia incurva					7				
Erica coccinea var pubescens					7				
Staberoha banksii		2			2727 7				
Leucadendron gandogeri	7 7				773 77	3			7
Aspalathus aspalathoides	7				7 77				
Chondropetalum deustum	1			1	737 3	7 1			
Corymbium scabrum forma filiforma	1			7	777 7	7			
Hypodiscus argenteus					1 771 1				1
Euphorbia silenifolia					777 7				7
Restio similis			7		77 7111				
Stoebe incana	7			7	7 77				
Mimetes cucullatus					777	1			
Restio bifarius					7 1 111				
Aspalathus oblongifolia					7 7				
Lobelia erinus						7			
Brachylaena neriifolia						7			
Calopsis asper						7			
Sutera hispida						7			
Disa cylindrica						7 7			
Monadenia ophrydea						7			
Linum thunbergii						7			
Edmondia pinifolia						7			
Elegia thyrsifera						7			
Thamnochortus pulcher		1	7	1 1 71	177 7 711	71172			
Roella incurva					7				
Disa cornuta					7	7			
Rafnia cuneifolia					7 7				
Erica tenella var tenella				7	1				
Restio ambiguus			1	1	2 1	7 1			
Brunia laevis		1		1		7			
Corymbium congestum		7				7			
Staberoha distachya	17 17 11		1	12 7	77112 11	1 1 1 1			
Watsonia schlechteri	7 1 77		7 7	77 7	77 77 17	777 777			
Protea cynaroides	7 7 77	1	7	77	7 7 7	7			
Erica onosmiflora	7 7 7		7 7	7 77	7	7 777			
Drosera glabripes	7 7 1 7	7	7721	77	77 77 7	1			
Indigofera alopecuroides	7 317 77 7		7	77 7	72 77777	77 7			
Anaxeton laeve	1177 77		7 77	777	7 77	777			
Erica aristata	7	7	7	77	77 7	7 7			
Centella triloba	7 77 77777	7	7 7	7 717	7 377777 77	7 17 7			
Schizaea pectinata	777 7		7	7 1	7 7 1	2 7			777
Micranthus alopecuroides	7 7		7	77	7	7 7 77			
Thereianthus bracteolatus	7 777		7 7	7 777	7 7 7 7777	77 7			
Osmitopsis afra	1 7771 11	1		177	1 77	1 7	7		
Merciera tenuifolia var azurea	7		7	7 7	77 7 777777	7			7
Mairea coriacea	7 7 7 17	7	7	777 7	7 77 7777	7 7			8
Drosera aliciae	1 7 77	7	1 7	7 1 2	77 7 1 71	1 7 1			
Chondropetalum hookerianum	71	2	1	2 7	2 7 12 11	11 1 1			1
Merxmullera rufa	77777771	71	7177	7111 7	1717777771771	77717777			
Tritoniopsis doddii	1 7 77 7		7	77 7	7777777777 7	777 777			7
Villarsia capensis	7 7 1	73	12	7 2 3	7 77 77	1			
Phaenocoma prolifera	7 77		17	77 7	777777	77 7			
Edmondia sesamoides	77 7			7 7	77 7	7 7 7			

Appendix 4 (cont)

	3574435833 1091321293 B	65 A	3644 4189 C	775555 014795 D	7221222332214 60214576 707 E	98513349 2481 59 F	17 62 G	1 4 H	1817 7394 I
Dilatris pillansii	17			77	7	777			
Erica cumuliflora	7	7	7	7 7	7 77 7	7			
Nebelia paleacea	1		7 11	7 7	7 7	7			
Drosera cistiflora	7 7	7			7	7			7
Lobelia jasionoides var jasionoides	777 7				7 7	7 7			
Gerbera crocea	7	7	7		7 1				
Hypodiscus albo-aristatus	1			12		1			
Mastersiella digitata	7			7		1			
Elegia filacea	1			221 7	12 1	1 71			
Ficinia monticola	7	7			77				
Pentaschistis capensis	1					3			
Erica plukenetii var bicarinata	7					7			
Blaeria dumosa var brevifolia	7					7			
Anthospermum aethiopicum	7								7
Disa bivalvata	7	7	7	7	77	7			
Aspalathus excelsa							7		
Selago serrata							1		
Myrsine africana							1		
Lapeirousia corymbosa							71		7
Spiloxene curculigoides							7		
Protasparagus compactus							11		
Koeleria capensis							77		
Ficinia brevifolia							1		
Rumex cordatus							7		
Cyanella hyacinthoides							7		
Erica lanuginosa			7				7		
Geissorhiza aspera							7		7
Eriospermum nanum								7	
Protea repens								7	
Hermannia salviifolia								7	
Pelargonium longicaule								7	
Colpoon compressum								7	
Struthiola tomentosa									7
Aira caryophyllea									7
Cotula turbinata									7
Festuca scabra									17
Gazania pectinata									7
Pentaschistis thunbergii									7
Lightfootia longifolia var longifolia									7
Wachendorfia paniculata									7
Erica villosa									7
Agathosma ciliaris									7
Helichrysum pandurifolium									7
Geissorhiza byricola									7
Drosera hilaris									7
Castalis nudicaulis var nudicaulis									7
Eriospermum schlechteri									7
Senecio repens									7
Crassula biplanata									7
Phylica lasiocarpa									7
Chrysanthemoides monilifera									7
Pelargonium cucullatum var cucullatum		7					23	7	1272
Pelargonium elongatum	7						31	7	3
Ornithogalum juncifolium							72		711
Nemesia diffusa	7 1						21		7 7
Rhus lucida	7						21		711
Selago spuria	7 7				7		71	7	7 2
Montinia caryophyllacea							71	2	7 77
Lachenalia peersii							77	7	7
Arctotis semipapposa							2	7	7
Cymbopogon marginatus							1	7	121
Commelina africana							1	1	1 1
Diospyros glabra							1	7	
Passerina vulgaris							77	1	
Rapanea melanophloeos								7	1
Psoralea pinnata							7	7	7

Appendix 4 (cont)

	3	5	7	4	4	3	5	8	3	3	6	5	3	6	4	4	7	7	5	5	5	5	7	2	2	1	2	2	2	3	3	2	2	1	4	9	8	5	1	3	3	4	9	1	7	1	1	8	1	7
	1	0	9	1	3	2	1	2	9	3			4	1	8	9	0	1	4	7	9	5		6	0	2	1	4	5	7	6		7	0	7	2	4	8	1		5	9		6	2	4	7	3	9	4
	B										A		C				D						E													F									G	H	I			
Gnidia galpinii							7	7																																	7								7	
Selago verbenacea						7		7												7																								7		7				7
Gerbera piloselloides					7					1			7							1				7							1																		7	
Moraea ramosissima			1		7																	1																			7								1	
Myrica quercifolia	7														7																																		7	
Spiloxene monophylla			7								7		7								7													7									7					7		
Trachyandra revoluta								1																										7													7			
Erica azaleifolia													7																																					
Corymbium enerve																								1																										
Carpacoce heteromorpha																										7																								

Appendix 5 : Table of species not recorded prior to fire

Communities	B	A	C	D	E	F	G	H	I
	3574435833 1091321293	65	3644 4189	775555 014795	72212223322214 602145764 707	98513369 2481 59	17 62	1 4	1817 7394
Lebeckia inflata	7								
Indigofera superba	7 77							7	
Monadenia bracteata	7								
Indigofera filifolia	7								
Lobelia chamaepitys	7								
Gladiolus bullatus	7								
Hypocalyptus oxalidifolius	7 7								
Struthiola ciliata	77								
Carpacoce vaginellata	7 7					7			
Bobartia filiformis	7								
Hermas ciliata		7							
Gnidia oppositifolia		7							
Pentaschistis colorata	1 7 7 7	72	7		7				
Disparago lasiocarpa	7 7		7			7			
Indigofera glomerata	77		7			7			
Indigofera ovata	1		71						
Polygala bracteolata	7 7		7						
Centella difformis	7		7	7					
Corymbium cymosum	1				7				
Geissorhiza ovata	7	77							
Pillansia templemanii	1 2				7	7			
Helichrysum litorale					7				
Lightfootia axillaris					7				
Aspalathus aspalathoides	7				7 77				
Corymbium scabrum	1			7	777 7	7			
Euphorbia silenifolia					777 7 7				7
Aspalathus oblongifolia					7 7				
Sutera hispidula						7			
Disa cylindrica						7 7			
Roella incurva					7				
Disa cornuta					7	7			
Rafnia cuneifolia					7 7				
Chironia jasminoides			7			7			
Disa patens			7		7				
Corymbium congestum		7				7			
Centella triloba	7 77 77777	7	7 7	7 717	7 377777 377	7 17 7			
Micranthus alopecuroides	7 7		7	77	7	7 7 77			
Thereianthus bracteolatus	7 777		7 7	7 777	7 7 77777	77 7			
Merxmuellera rufa	77777771	71	7177	7111 7	17177777711771	77717777			
Lobelia jasionoides	777 7				7 7	7 7			
Elegia parviflora	1			1 7					
Ficinia monticola	7	7			77				
Spiloxene curculigoides							7		
Ficinia brevifolia							1		
Rumex cordatus							7		
Cyanella hyacinthoides							7		
Geissorhiza aspera							7		7
Lapeirousia corymbosa							71		7
Koeleria capensis							77		
Hermannia salviifolia								7	
Aira caryophyllea									7
Cotula turbinata									7
Gazania pectinata									7
Lightfootia longifolia									7
Wachendorfia paniculata									7
Helichrysum pandurifolium									7
Geissorhiza bryicola									7
Festuca scabra									17
Drosera hilaris									7
Castalis nudicaulis									7
Senecio repens									7

Appendix 5 (cont)

Communities	B	A	C	D	E	F	G	H	I
	3574435833	65	3644	775555	72212223322214	98513369	17	1	1817
	1091321293		4189	014795	602145764 707	2481 59	62	4	7394
Pelargonium elongatum	7						31	7	3
Ornithogalum juncifolium							72		711
Nemesia diffusa	7 1						21		7 7
Selago spuria	7 7				7		71	7	7 2
Zantedeschia aethiopica								1	7
Dipogon lignosus							7		7
Restio cuspidatus							7		1
Ficinia W 3313						7	7		7
Senecio cymbalariifolius						7			7
Lobelia sètacea					7				7
Homeria galpinii	7777 1 77	7	7 77	77777	77777777777777	77 7 7			7 7
Aristea juncifolia	7777 7	7	7 7	7 77	7 7 77 7 7 777	7 77 1	7		7
Lobelia coronopifolia	77 77	7	77	777	7 7 77 7	71 7			77
Othonna quinquedentata	17		7 7		7 7	72	7	7	7 1
Ficinia W 3547	7	7	7		77				72
Ehrharta ottonis	7777						7	7	
Ixia dubia	7				7 7 7 7	7			77
Anapalina triticea	7			7	7	7 7			7
Selago verbenacea	7 7			7			7	7	7
Disa bivalvata	7	7	7	7	7 7	g			
Gerbera piloselloides	7 1		7	1	7 1				7
Moraea ramosissima	1 7			1		1			1
Spiloxene monophylla	7	7	7	7	7	7			7
Trachyandra hirsutiflora	1				7				7
Senecio pinifolius				7					
Anapalina sp nov				7					
Monadenia ophrydea						7			
Linum thunbergii						7			
Edmondia pinifolia						7			
Corymbium enerve					1				
Carpacoce heteromorpha					7				

APPENDIX 6: Species lost from relevés post-fire

Pre-fire cover-abundance
(No. relevés lost from)
Communities (See text:
Table 2.1 for abbreviations)

a	b		B	A	C	D	E	F	G	H	I
SI	OS	*Erica tenuifolia*	2(1)	-	-	-	-	-	-	-	-
UI	ALS	*Leucadendron spissifolium* spp. *spissifolium*	15(1)	-	-	-	-	-	-	-	-
SI	OS	*Cuscuta angulata*	-	2(3)	-	-	-	-	-	-	-
SI	OS	*Blaeria ericoides*	-	2(1)	-	-	-	-	-	-	-
SI	OS	*Staberoha banksii*	-	2(1)	-	-	-	-	-	-	-
SI	OS	*Thesium spicatum*	-	0(1)	-	-	-	-	-	-	1(1)
SI	OS	*Erica azaleifolia*	-	4(1)	-	-	0(1)	-	-	-	-
SI	OS	*Erica corifolia*	-	0(1)	-	-	-	-	-	-	-
SI	OS	*Carpha glomerata*	-	0(1)	-	-	-	-	-	-	-
SI	OS	*Thesium ericifolium*	-	0(1)	-	-	-	-	2(1)	-	-
SI	OS	*Thesium virgatum*	-	1(2)	-	-	-	-	-	-	-
UI	ALS	*Osmitopsis afra*	-	-	0(1)	-	-	-	-	-	-
SI	OS	*Erica coccinea* var *coccinea*	-	-	-	1(1)	-	-	-	-	-
SI	OS	*Diastella divaricata* ssp. *montana*		-	-	3(1)	-	-	-	-	-
SI	OS	*Thesium capitatum*	-	-	-	1(1)	-	-	-	-	-
SI	OS	*Thesium euphorbioides*	-	-	-	1(1)	-	-	-	-	-
SI	OS	*Thesium quinqueflorum*	-	-	-	1(1)	-	-	-	-	-
SI	PFE	*Tetraria brevicaulis*	-	-	-	1(1)	-	2(1)	-	-	-
ŏI	FSS	*Pseudopentameris macrantha*	-	-	-	1(2)	1(2)	-	-	-	-
SI	OS	*Erica rhopolantha*	-	-	-	1(1)	3(1)	-	-	-	-
SI	PFE	*Agathelpis angustifolia*	-	-	-	-	1(1)	-	-	-	-
SI	OS	*Serruria rubricaulis*	-	-	-	-	1(1)	-	-	-	-
SI	OS	*Erica longiaristata*	-	-	-	-	0(1)	-	-	-	-
SI	OS	*Erica villosa*	-	-	-	-	1(1)	-	-	-	-
CI	OS	*Protea repens*	-	-	-	-	-	2(1)	-	-	16(1)
UI	ALS	*Tetraria cuspidata*	-	-	-	-	-	1(2)	-	-	-
SI	OS	*Metalasia cymbifolia*	-	-	-	-	-	-	2(1)	-	-
SI	OS	*Pentaschisis capensis*	-	-	-	-	-	-	19(1)	-	5(3)
UI	ALS	*Phylica stipularis*	-	-	-	-	-	-	8(1)	-	-
UI	ALS	*Ischyrolepis gaudichaudiana*	-	-	-	-	-	-	2(1)	-	-
DI	OS	*Cassytha ciliolata*	-	-	-	-	-	-	19(1)	-	-
UI	ALS	*Thamnochortus gracilis*	-	-	-	-	-	-	2(1)	-	-
UI	ALS	*Knowltonia capensis*	-	-	-	-	-	-	-	3(1)	-
UI	ALS	*Tephrosia capensis*	-	-	-	-	-	-	-	3(1)	-
dI	ALS	*Mohria caffrorum*	-	-	-	-	-	-	-	3(1)	-
SI	OS	*Erica lanuginosa*	-	-	-	-	-	-	-	3(1)	-
UI	ALS	*Leucadendron salignum*	-	-	-	-	-	-	-	0(1)	-
dI	ALS	*Pellaea pteroides*	-	-	-	-	-	-	-	3(1)	-
SI	OS	*Lobelia erinus*	-	-	-	-	-	-	-	3(1)	-
DI	OS	*Metalasia muricata*	-	-	-	-	-	-	-	38(1)	-
SI	OS	*Cliffortia atrata*	-	-	-	-	-	-	-	15(1)	-
SI	OS	*Aspalathus serpens*	-	-	-	-	-	-	-	-	1(1)
SI	OS	*Disparago laxifolia*	-	-	-	-	-	-	-	-	1(1)

δI	FSS	*Phylica buxifolia*	-	-	-	-	-	-	-	-	4(1)
SI	OS	*Lampranthus emarginatus*	-	-	-	-	-	-	-	-	5(2)
UI	ALS	*Psoralea aculeata*	-	-	-	-	-	-	-	-	1(1)
SI	OS	*Passerina vulgaris*	-	-	-	-	-	-	-	-	1(1)
UI	ALS	*Protasparagus compactus*	-	-	-	-	-	-	-	-	1(1)
SI	OS	*Hypodiscus albo-aristatus*	-	-	-	-	-	-	-	-	4(1)
UI	ALS	*Pterocelastrus rostratus*	-	-	-	-	-	-	-	-	1(1)
dI	ALS	*Prionium serratum*	-	-	-	-	-	-	-	-	1(1)
UI	ALS	*Brachylaena neriifolia*	-	-	-	-	-	-	-	-	2(2)
SI	OS	*Calopsis asper*	-	-	-	-	-	-	-	-	4(1)
SI	OS	*Berkheya armata*	-	-	-	-	-	-	-	-	10(1)
SI	OS	*Erica aristata*	-	-	-	-	-	-	-	-	1(1)
SI	OS	*Scyphogyne muscosa*	-	-	-	-	-	-	-	-	1(1)

Column a: Noble and Slayter classification
Column b: Bell *et al*. Fire Response Categories

Nomenclature after Gibbs Russell

APPENDIX 7: Species gained in relevés post-fire

Mean post-fire density values rounded to nearest hole number (Table 3)
Communities (See text: Table 2)
(Number relevés sampled)

a	b	species	A	B	C	D	E	F	G	H	I
UI	ALS	*Geissorhiza ovata*	1(2)	0(1)	-	-	-	-	-	-	-
UI	ALS	*Hermas ciliata*	0(1)	-	-	-	-	-	-	-	-
SI	OS	*Gnidia oppositifolia*	0(1)	-	-	-	-	-	-	-	-
UI	ALS	*Pentaschistis colorata*	8(2)	0(4)	0(1)	0(1)	-	-	-	-	-
UI	ALS	*Corymbium congestum*	0(1)	-	-	-	-	0(1)	-	-	-
dI	ALS	*Drosera glabripes*	0(1)	-	-	-	-	-	-	-	-
UI	ALS	*Centella triloba*	0(1)	0(8)	0(2)	1(4)	3(9)	0(4)	-	-	-
UI	ALS	*Osmitopsis afra*	2(1)	1(7)	-	1(3)	-	0(2)	0(1)	-	-
UI	ALS	*Mairea coriacea*	0(1)	0(5)	0(1)	0(4)	0(7)	0(2)	-	-	0(1)
dI	ALS	*Drosera aliciae*	0(1)	-	-	-	-	-	-	-	-
δI	FSS	*Merxuellera rufa*	2(2)	1(8)	1(4)	2(5)	1(13)	1(8)	-	-	-
dI	ALS	*Drosera cistiflora*	0(1)	0(2)	-	-	-	0(1)	-	-	0(1)
UI	ALS	*Gerbera crocea*	0(1)	-	-	-	-	-	-	-	-
UI	ALS	*Ficinia monticola*	0(1)	0(1)	-	-	0(2)	-	-	-	-
dI	ALS	*Disa bivalvata*	0(1)	0(1)	0(1)	0(1)	0(2)	0(1)	-	-	-
UI	ALS	*Homeria galpinii*	0(1)	1(7)	0(3)	0(5)	1(13)	0(4)	-	-	0(2)
UI	ALS	*Aristea juncifolia*	0(1)	0(5)	0(2)	0(3)	0(9)	1(4)	0(1)	-	0(1)
UI	ALS	*Lobelia coronopifolia*	0(1)	0(4)	0(2)	0(3)	0(5)	0(3)	-	-	0(2)
SI	OS	*Ficinia* W 3547	0(1)	0(1)	0(1)	-	0(2)	-	-	-	4(2)
UI	ALS	*Bobartia longicyma*	8(1)	0(2)	-	-	0(1)	-	1(1)	-	0(1)
UI	ALS	*Spiloxene monophylla*	0(1)	0(1)	0(1)	0(1)	0(1)	0(1)	-	-	0(1)
UI	ALS	*Osmitopsis asteriscoides*	-	0(1)	-	-	-	-	-	-	-
SI	OS	*Lampranthus emarginatus*	-	0(1)	-	-	-	-	-	-	-
SI	OS	*Psoralea aculeata*	-	0(1)	-	-	-	-	-	-	-
SI	OS	*Lebeckia inflata*	-	0(1)	-	-	-	-	-	-	-
SI	OS	*Indigofera superba*	-	0(3)	-	-	-	-	-	0(1)	-
dI	ALS	*Monadenia bracteata*	-	0(1)	-	-	-	-	-	-	-
SI	PFE	*Indigofera filifolia*	-	0(1)	-	-	-	-	-	-	-
SI	OS	*Lobelia chamaepitys*	-	0(1)	-	-	-	-	-	-	-
UI	ALS	*Gladiolus bullatus*	-	0(1)	-	-	-	-	-	-	-
SI	PFE	*Hypocalyptus oxalidifolius*	-	0(2)	-	-	-	-	-	-	-
UI	ALS	*Pillansia templemanii*	-	2(2)	-	-	0(1)	0(1)	-	-	-
SI	OS	*Carpacoce spermacocea*	-	0(2)	-	-	-	0(1)	-	-	-
SI	OS	*Polygala bracteolata*	-	0(2)	0(1)	-	-	-	-	-	-
SI	PFE	*Indigofera glomerata*	-	0(2)	0(1)	-	-	-	-	-	-
UI	ALS	*Bobartia filiformis*	-	0(1)	-	-	-	-	-	-	-
SI	PFE	*Ehrharta rehmannii* var. *filiformis*	-	5(4)	-	-	-	-	-	3(1)	0(1)
UI	ALS	*Ehrharta ottonis*	-	0(4)	-	-	-	-	0(1)	1(1)	-
UI	ALS	*Erica cerinthoides*	-	0(2)	-	-	-	-	-	-	-
UI	ALS	*Thamnochortus lucens*	-	0(1)	10(1)	-	-	-	-	-	-
SI	PFE	*Indigofera ovata*	-	0(1)	1(2)	-	-	-	-	-	-
SI	PFE	*Centella difformis*	-	0(1)	0(1)	0(1)	-	-	-	-	-
UI	ALS	*Corymbium cymosum*	-	0(1)	-	-	0(1)	-	-	-	-
SI	OS	*Metalasia cymbifolia*	-	0(1)	-	-	-	-	-	-	-
SI	OS	*Aspalathus aspalathoides*	-	0(1)	-	-	-	-	-	-	-
UI	ALS	*Corymbium scabrum*	-	0(1)	-	0(1)	0(4)	0(1)	-	-	-
UI	ALS	*Watsonia schlechteri*	-	0(4)	0(2)	0(3)	0(6)	0(6)	-	-	-
dI	ALS	*Pellaea pteroides*	-	0(4)	0(1)	1(2)	0(3)	1(2)	-	-	-
UI	ALS	*Micranthus alopecuroides*	-	0(2)	0(1)	0(2)	0(1)	0(4)	-	-	-

UI	ALS	*Thereianthus bracteolatus*	-	0(4)	0(2)	0(4)	0(7)	0(3)	-	-	-
UI	ALS	*Merciera tenuifolia* var. *azurea*		0(1)	0(1)	0(2)	0(9)	0(1)	-	-	0(1)
UI	ALS	*Anapalina triticea*	-	1(5)	0(1)	0(3)	1(12)	0(6)	-	-	0(1)
SI	OS	*Erica cumuliflora*	-	0(1)	-	-	-	-	-	-	-
UI	FSS	*Lobelia jasionoides*	-	0(4)	-	-	-	0(2)	-	-	-
SI	OS	*Pentaschistis capensis*	-	0(1)	-	-	-	5(1)	-	-	-
SI	OS	*Erica plukenetii*	-	0(1)	-	-	-	0(1)	-	-	-
SI	OS	*Pelargonium elongatum*	-	0(1)	-	-	-	-	21(2)	0(1)	10(1)
SI	PFE	*Nemesia diffusa*	-	0(2)	-	-	-	-	8(2)	-	0(2)
UI	ALS	*Rhus lucida*	-	0(1)	-	-	-	-	-	-	2(3)
SI	PFE	*Selago spuria*	-	0(2)	-	-	0(1)	-	2(2)	0(1)	4(2)
UI	ALS	*Aristea major*	-	0(1)	-	-	-	-	-	-	-
UI	ALS	*Haplocarpha lantata*	-	0(1)	-	-	-	-	0(1)	-	0(2)
SI	OF	*Osteospermum rotundifolium*		2(7)	-	0(1)	0(3)	0(1)	0(1)	-	-
SI	OS	*Othonna quinquedentata*	-	0(2)	0(2)	-	0(2)	2(2)	0(1)	0(1)	1(2)
UI	ALS	*Rhynchosia capensis*	-	0(3)	-	-	0(1)	0(1)	1(2)	-	0(2)
UI	ALS	*Lanaria lanata*	-	0(3)	-	-	-	-	0(2)	-	-
UI	ALS	*Ixia dubia*	-	0(1)	-	-	0(3)	0(1)	-	-	0(2)
SI	OS	*Brunia alopecuroides*	-	0(2)	1(1)	-	-	-	-	-	-
SI	PFE	*Selago verbenacea*	-	0(2)	-	0(1)	-	-	0(1)	1(1)	0(1)
UI	ALS	*Gerbera piloselloides*	-	0(2)	0(1)	1(1)	0(2)	-	-	-	0(1)
UI	MFE	*Moraea ramosissima*	-	0(2)	-	1(1)	-	0(1)	-	-	1(1)
UI	ALS	*Myrica quercifolia*	-	0(1)	0(1)	-	-	-	-	-	0(1)
SI	OS	*Penaea cneorum* ssp. *ruscifolium*		0(1)	-	-	0(1)	-	-	-	-
CI	OS	*Protea lepidocarpodendron*	-	0(1)	-	-	-	-	-	-	-
SI	OS	*Chironia jasminoides*	-	-	0(1)	-	-	0(1)	-	-	-
dI	ALS	*Disa patens*	-	-	0(1)	-	-	-	-	-	-
UI	ALS	*Disparago lasiocarpa*	-	-	0(1)	-	-	0(1)	-	-	-
SI	OS	*Ceratocaryum argenteum*	-	-	1(1)	-	-	-	-	-	-
ðI	FSS	*Staberoha distachya*	-	-	1(1)	-	-	-	-	-	-
SI	OS	*Erica lanuginosa*	-	-	0(1)	-	-	-	-	-	-
UI	ALS	*Ischyrolepis capensis*	-	-	1(1)	-	-	-	-	-	-
SI	OS	*Pseudopentameris brachyphylla*		-	4(2)	0(2)	-	-	-	-	-
UI	ALS	*Thamnochortus gracilis*	-	-	1(1)	-	-	-	-	-	-
SI	OS	*Syncarpha speciosissima*	-	-	-	0(3)	0(2)	-	-	-	-
SI	OS	*Senecio pinifolius*	-	-	-	0(1)	-	-	-	-	-
UI	ALS	*Anapalina* sp nov	-	-	-	0(1)	-	-	-	-	-
SI	OS	*Chondropetalum deustum*	-	-	-	1(1)	-	-	-	-	-
SI	OS	*Stoebe incana*	-	-	-	0(1)	-	-	-	-	-
SI	OS	*Erica tenella* var *tenella*	-	-	-	0(1)	0(1)	-	-	-	-
UI	ALS	*Dilatris pillansii*	-	-	-	0(2)	0(1)	0(3)	-	-	-
SI	OS	*Elegia parviflora*	-	-	-	1(2)	-	-	-	-	-
SI	OS	*Metalasia muricata*	-	-	-	0(1)	-	-	0(1)	-	-
UI	ALS	*Clutia polygonoides*	-	-	-	0(1)	-	-	-	-	-
UI	ALS	*Hermas depauperata*	-	-	-	-	0(2)	0(1)	-	-	0(1)
dI	ALS	*Disa patens*	-	-	-	-	0(1)	-	-	-	-
UI	ALS	*Hermas quniquedentata*	-	-	-	-	0(1)	-	-	-	-
UI	ALS	*Erica cerinthoides*	-	-	-	-	0(1)	-	-	-	-
SI	OS	*Metalasia cymbifolia*	-	-	-	-	0(2)	0(1)	-	-	-
DI	PFE	*Helichrysum litorale*	-	-	-	-	0(1)	-	-	-	-
SI	OS	*Lightfootia axillaris*	-	-	-	-	0(1)	-	-	-	-
SI	OS	*Aspalathus aspalathoides*	-	-	-	-	0(3)	-	-	-	-
UI	ALS	*Euphorbia silenifolia*	-	-	-	-	0(4)	-	-	-	0(1)
UI	ALS	*Mimetes cucullatus*	-	-	-	-	0(3)	-	-	-	-
SI	OS	*Aspalathus oblongifolia*	-	-	-	-	0(2)	-	-	-	-
SI	PFE	*Roella incurva*	-	-	-	-	0(1)	-	-	-	-
dI	ALS	*Disa cornuta*	-	-	-	-	0(1)	0(1)	-	-	-
UI	ALS	*Rafnia cuneifolia*	-	-	-	-	0(2)	-	-	-	-

UI	FSS	*Lobelia jasionoides*	-	-	-	-	0(2)	-	-	-	-
SI	OS	*Aspalathus serpens*	-	-	-	-	0(1)	0(1)	-	-	1(1)
δI	FSS	*Ehrharta rehmannii*	-	-	-	-	3(1)	0(1)	-	-	-
SI	PFS	*Lobelia setacea*	-	-	-	-	0(1)	-	-	-	-
UI	ALS	*Aristea oligocephala*	-	-	-	-	0(3)	-	-	-	0(1)
UI	ALS	*Tetraria compar*	-	-	-	-	0(3)	-	-	-	0(1)
UI	ALS	*Tetraria cuspidata*	-	-	-	-	0(2)	-	-	-	-
SI	OS	*Lobelia pinifolia* var. *pinifolia*		-	-	-	0(5)	-	-	-	-
UI	ALS	*Anapalina triticea*	-	-	-	-	0(1)	-	-	-	-
UI	ALS	*Corymbium enerve*	-	-	-	-	0(1)	-	-	-	-
SI	OS	*Carpacoce heteromorpha*	-	-	-	-	0(1)	-	-	-	-
SI	OS	*Indigofera glomerata*	-	-	-	-	-	0(1)	-	-	-
SI	OS	*Chondropetalum ebracteatum*		-	-	-	-	0(1)	-	-	-
UI	ALS	*Mimetes cucullatus*	-	-	-	-	-	0(1)	-	-	-
SI	OS	*Lobelia erinus*	-	-	-	-	-	0(1)	-	-	-
UI	ALS	*Brachylaena neriifolia*	-	-	-	-	-	0(1)	-	-	-
SI	OS	*Calopsis asper*	-	-	-	-	-	0(1)	-	-	-
SI	PFS	*Sutera hispidula*	-	-	-	-	-	0(1)	-	-	-
dI	ALS	*Disa cylindrica*	-	-	-	-	-	0(2)	-	-	-
dI	ALS	*Monadenia ophrydea*	-	-	-	-	-	0(1)	-	-	-
SI	PFS	*Linum thunbergii*	-	-	-	-	-	0(1)	-	-	-
SI	PFS	*Helichrysum humile*	-	-	-	-	-	0(1)	-	-	-
SI	OS	*Elegia thyrsifera*	-	-	-	-	-	0(1)	-	-	-
UI	ALS	*Brunia laevis*	-	-	-	-	-	0(1)	-	-	-
δI	FSS	*Protea cynaroides*	-	-	-	-	-	0(1)	-	-	-
UI	ALS	*Ischyrolepis capensis*	-	-	-	-	-	2(1)	-	-	4(1)
SI	OS	*Ficinia* W 3313	-	-	-	-	-	0(1)	0(1)	-	0(1)
UI	ALS	*Senecio cymbalariifolius*	-	-	-	-	-	0(1)	-	-	0(1)
UI	ALS	*Ischyrolepis gaudichaudiana*		-	-	-	-	0(1)	-	-	0(1)
SI	OS	*Ursinia paleacea*	-	-	-	-	-	0(7)	-	-	0(1)
δI	FSS	*Pseudopentameris macrantha*	-	-	-	-	-	0(1)	-	-	-
SI	OS	*Gnidia galpinii*	-	-	-	-	-	0(1)	-	-	-
SI	OS	*Selago serrata*	-	-	-	-	-	-	2(1)	-	-
UI	ALS	*Lapeirousia corymbosa*	-	-	-	-	-	-	2(2)	-	0(1)
UI	ALS	*Spiloxene curculigoides*	-	-	-	-	-	-	0(1)	-	-
SI	OS	*Koeleria capensis*	-	-	-	-	-	-	1(2)	-	-
SI	OS	*Ficinia brevifolia*	-	-	-	-	-	-	2(1)	-	-
SI	PFS	*Rumex cordatus*	-	-	-	-	-	-	0(1)	-	-
UI	ALS	*Cyanella hyacinthoides*	-	-	-	-	-	-	0(1)	-	-
UI	ALS	*Geissorhiza aspera*	-	-	-	-	-	-	0(1)	-	0(1)
UI	ALS	*Ornithogalum juncifolium*	-	-	-	-	-	-	8(2)	-	-
UI	ALS	*Lachenalia peersii*	-	-	-	-	-	-	1(2)	-	0(1)
UI	ALS	*Arctotis semipapposa*	-	-	-	-	-	-	8(1)	1(1)	-
SI	OS	*Psoralea pinnata*	-	-	-	-	-	-	0(1)	1(1)	0(1)
SI	OS	*Ehrharta erecta*	-	-	-	-	-	-	0(1)	-	-
SI	OS	*Dipogon lignosus*	-	-	-	-	-	-	0(1)	-	0(1)
CI	OS	*Aulax umbellata*	-	-	-	-	-	-	0(1)	-	-
UI	ALS	*Tetraria thermalis*	-	-	-	-	-	-	0(1)	-	0(1)
SI	OS	*Indigofera angustifolia*	-	-	-	-	-	-	0(1)	-	-
CI	OS	*Protea repens*	-	-	-	-	-	-	-	1(1)	-
SI	OS	*Hermannia salviifolia*	-	-	-	-	-	-	-	1(1)	-
UI	ALS	*Colpoon compressum*	-	-	-	-	-	-	-	1(1)	-
SI	OS	*Pelargonium cucullatum*	-	-	-	-	-	-	-	1(1)	-
UI	ALS	*Zantedeschia aethiopica*	-	-	-	-	-	-	-	4(1)	0(1)
δI	FSS	*Ehrharta rehmannii*	-	-	-	-	-	-	-	1(1)	-
UI	ALS	*Restio filiformis*	-	-	-	-	-	-	-	-	1(1)
δI	ALS	*Ehrharta setacea*	-	-	-	-	-	-	-	-	1(1)
CI	OS	*Leucadendron gandogeri*	-	-	-	-	-	-	-	-	0(1)

UI	ALS	*Hypodiscus argenteus*	-	-	-	-	-	-	-	-	1(1)
SI	OS	*Chondropetalum hookerianum*	-	-	-	-	-	-	-	-	1(1)
SI	OS	*Aira caryophyllea*	-	-	-	-	-	-	-	-	0(1)
SI	PFS	*Cotula turbinata*	-	-	-	-	-	-	-	-	0(1)
ŏI	FSS	*Festuca scabra*	-	-	-	-	-	-	-	-	1(2)
SI	ALS	*Gazania pectinata*	-	-	-	-	-	-	-	-	0(1)
SI	PFE	*Pentaschistis* cf *thunbergii*	-	-	-	-	-	-	-	-	0(1)
UI	ALS	*Lightfootia longifolia* var. *longifolia*	-	-	-	-	-	-	-	-	0(1)
UI	ALS	*Wachendorfia paniculata*	-	-	-	-	-	-	-	-	0(1)
SI	OS	*Helichrysum pandurifolium*	-	-	-	-	-	-	-	-	0(1)
UI	ALS	*Geissorhiza bryicola*	-	-	-	-	-	-	-	-	0(1)
UI	ALS	*Drosera hilaris*	-	-	-	-	-	-	-	-	0(1)
UI	ALS	*Castalis nudicaulis*	-	-	-	-	-	-	-	-	0(1)
UI	ALS	*Eriospermum schlechteri*	-	-	-	-	-	-	-	-	0(1)
SI	OS	*Senecio repens*	-	-	-	-	-	-	-	-	0(1)
UI	ALS	*Phylica lasiocarpa*	-	-	-	-	-	-	-	-	0(1)
UI	ALS	*Ornithogalum juncifolium*	-	-	-	-	-	-	-	-	2(3)
UI	ALS	*Protea nitida*	-	-	-	-	-	-	-	-	0(1)
UI	ALS	*Phylica stipularis*	-	-	-	-	-	-	-	-	0(1)
SI	OS	*Stachys aethiopica*	-	-	-	-	-	-	-	-	0(2)
SI	OS	*Oedera capensis*	-	-	-	-	-	-	-	-	1(1)
UI	ALS	*Myrsiphyllum declinatum*	-	-	-	-	-	-	-	-	1(1)
SI	PFS	*Lobelia setacea*	-	-	-	-	-	-	-	-	0(1)
CI	OS	*Leucadendron xanthoconus*	-	-	-	-	-	-	-	-	1(3)
SI	OS	*Pseudopentameris brachyphylla*		-	-	-	-	-	-	-	0(1)
UI	ALS	*Hypodiscus aristatus*	-	-	-	-	-	-	-	-	4(1)
SI	OS	*Syncarpha vestita*	-	-	-	-	-	-	-	-	0(1)
UI	ALS	*Penaea mucronata*	-	-	-	-	-	-	-	-	0(1)
SI	OS	*Nevillea obtusissimus*	-	-	-	-	-	-	-	-	1(1)
UI	ALS	*Saltera sarcocolla*	-	-	-	-	-	-	-	-	0(1)
UI	ALS	*Agapanthus africanus*	-	-	-	-	-	-	-	-	0(1)

Column a: Noble and Slayter classification
Column b: Bell *et al.* Fire Response Categories