Chapter 4: Results

4.1 Plant Communities

The vegetation of the Bynespoort Game Park may be classified as Sourish Mixed Bushveld veld type in the Savanna biome (& Low & Rebelo, 1996; Acocks, 1988).

The diverse environmental conditions which are caused by the complex topography (hills, valleys, ridges), geology and utilisation by herbivores result in a heterogeneous vegetation. The Game Park houses 10 main plant communities with a number of variations within some of the communities.

The plant communities were recognised by the presence and/or cover-abundance of the diagnostic species, also taking into account habitat characteristics such as aspect, slope, geology and soil texture.

Identification of ecosystems at the plant community level of organisation is important when investigating habitat selection by game species, and planning veld management options. The veld condition of these plant communities is equally important because the cover of plants protects the soil against erosion, and also provides an estimate of the production potential (Bothma, 1986). The plant species composition of the communities also determines the acceptability of grazing, and therefore has a large influence on habitat

selection. This could also have an effect on the potential grazing capacity of the entire Park (Bothma, 1986).

The plant communities identified in the Game Park are:

A. Sour mountain bushveld and grassland

1. *Harpochloa falx - Elionurus muticus* mountain grassland

1.1 *Harpochloa falx - Eragrostis chloromelas*

mountain grassland variation

2. *Wahlenbergia undulata - Hyparrhenia hirta* old field grassland

3. *Terminalia sericea - Burkea africana* bushveld on sand

4. *Tristachya leucothrix - Trachypogon spicatus* mountain bushveld

4.1 *Protea caffra - Faurea saligna* mountain savanna variation

B. Sweet plains bushveld

5. *Cynodon dactylon - Acacia karroo* bushveld

5.1 *Ziziphus mucronata - Acacia karroo* bushveld variation

5.2 *Solanum panduniforme - Acacia karroo* disturbed bushveld variation

6. *Euclea crispa - Acacia karroo* bushveld on diabase

C. Sweet mountain bushveld

7. *Combretum apiculatum - Dombeya rotundifolia* bushveld of northern slopes

D. Anthropogenic vegetation

8. *Eucalyptus grandis* plantation

E. Wetlands

9. *Ischaemum fasciculatum - Phragmites australis* wetland

10. *Phragmites australis* slimes dams wetland

Plant communities of the Bynespoort Game Park

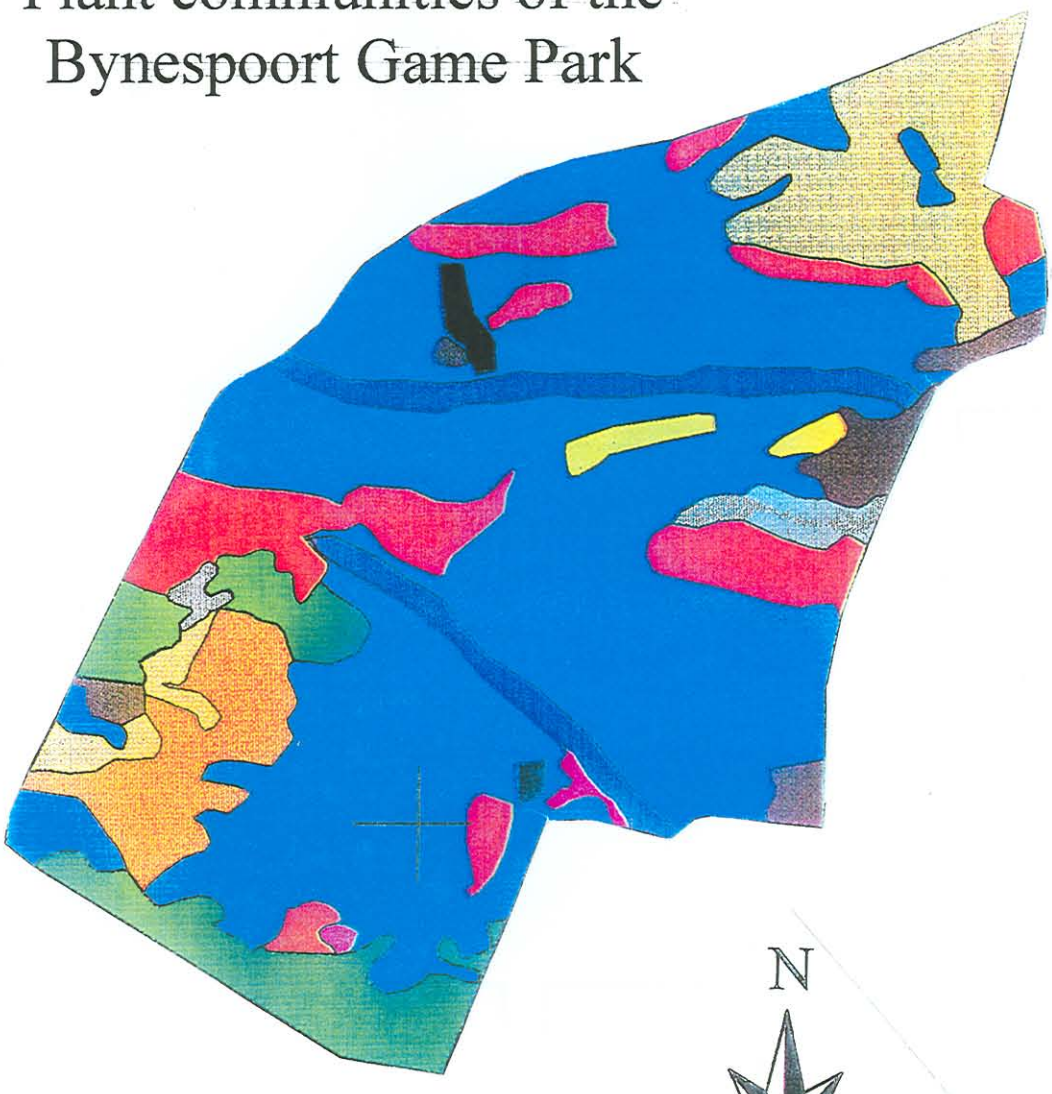
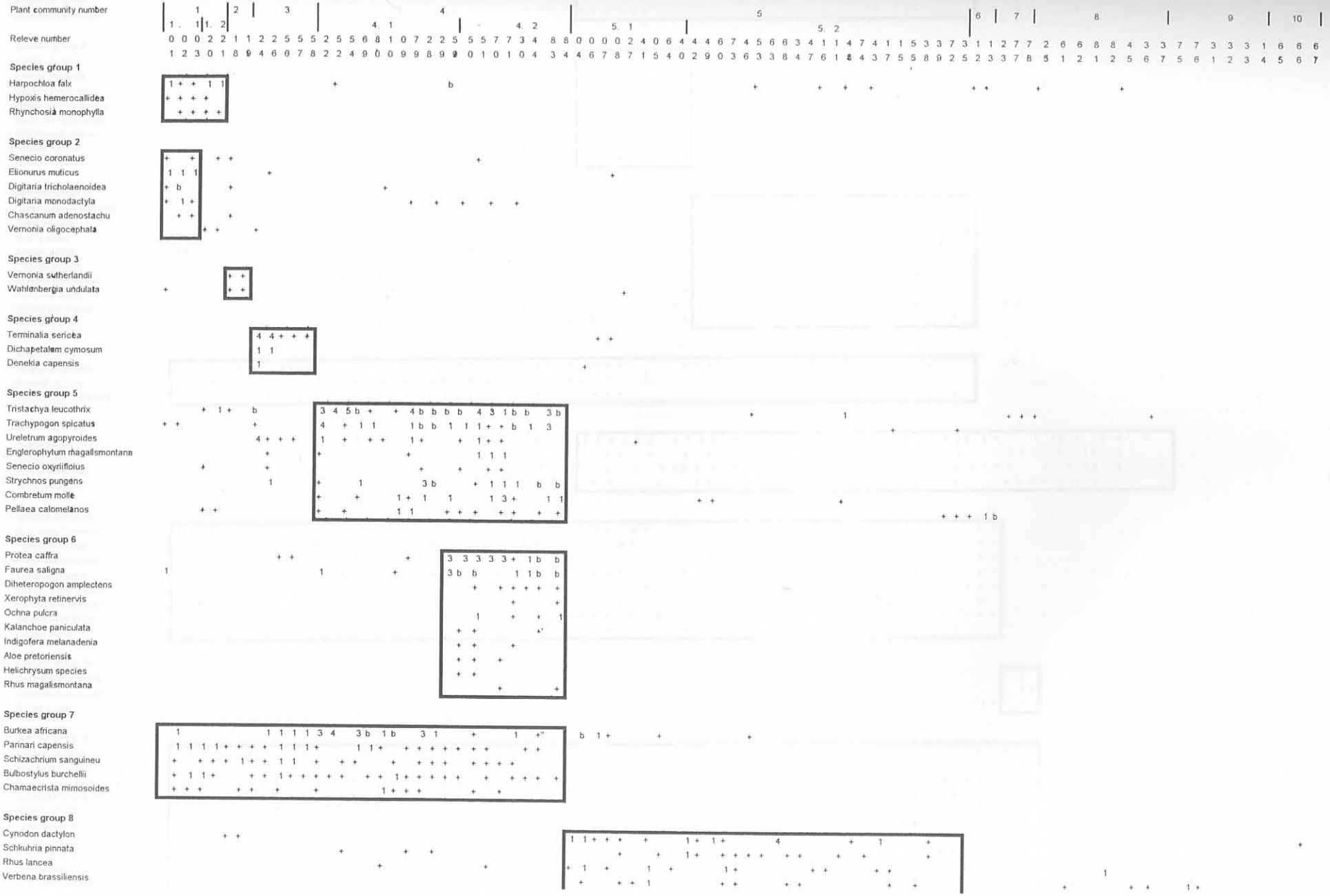
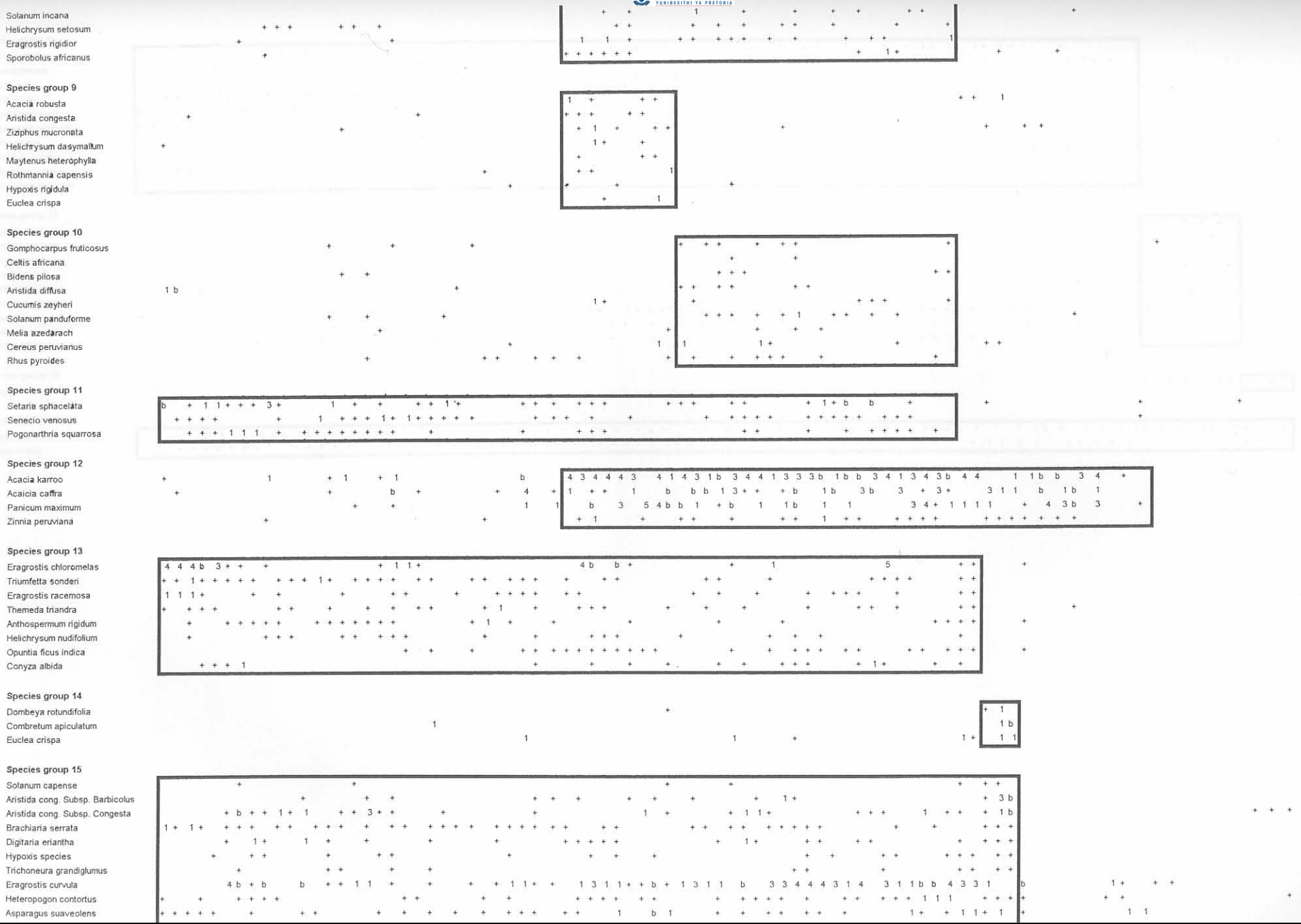


Fig a: Map of the plant communities of the Bynespoort Game Park

Table 1: A phytosociolgical table of the Bynespoort Game Park





Species group 16

Rhus leptodictya
Bidens bipinnata
Rhys zeyheri
Melinis repens
Vernonia poskeana
Cymbopogon excavatus
Perotis patens
Eucalyptus grandis
Cymbopogon validus
Gomphrena celesoides

Species group 17

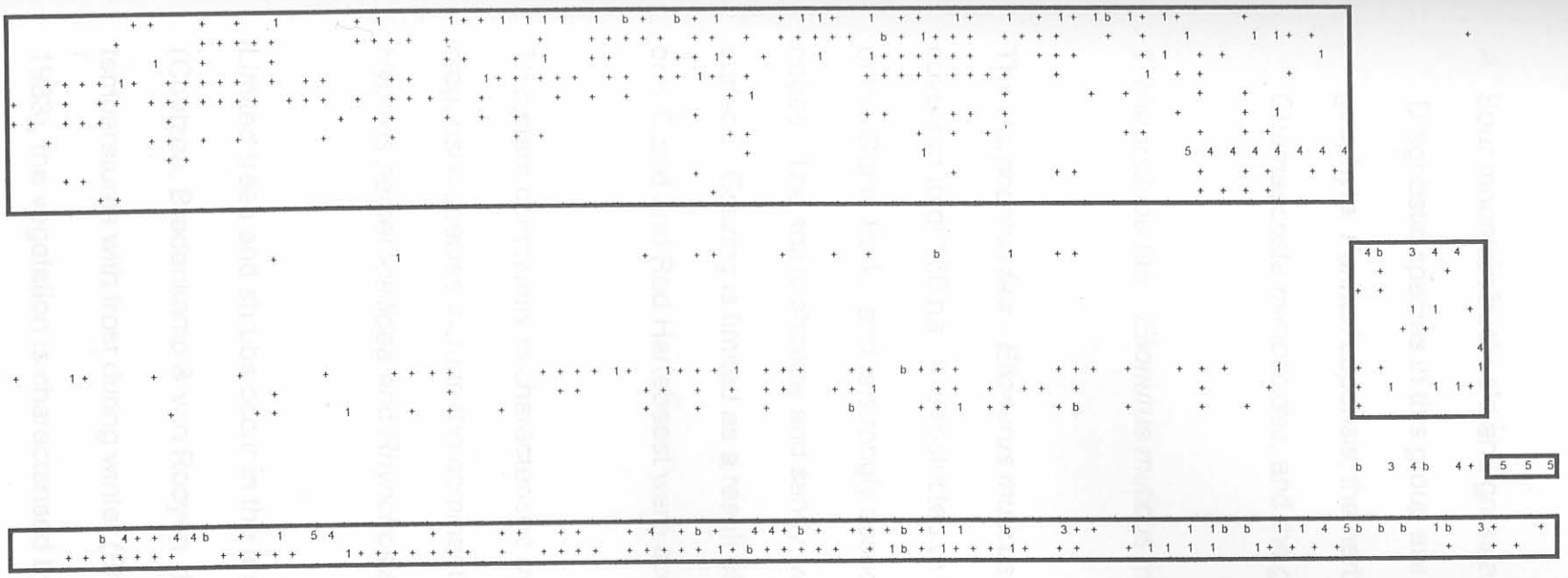
Ischaemum fasciculatum
Imperata cylindrica
Cyperus species
Acacia karroo
Gnidia capitata
Ischaemum afrum
Conyza bonariensis
Verbena bonariensis
Gnidia capitata

Species group 18

Phragmites australis

Species group 19

Hyparrhenia hirta
Tagetis minuta



A. Sour mountain bushveld and grassland; characterised by species group 7. Diagnostic species in this group are the tree, *Burkea africana,* the geophyte, *Parinari capensis*, the herbs, *Bulbostylus burchellliii* and *Chamaecrista mimosoides,* and the grass, *Schizachrium sanguineu.*

1. *Harpochloa falx - Elionurus muticus* mountain grassland (Fig. 4)

The *Harpochloa falx - Elionurus muticus* mountain grassland community covers in total 130 ha. It is restricted to the southern and south-eastern parts of the Game Park, and is strongly associated with the high altitude quartzite ridges. The soil is shallow and sandy, with a high percentage of rocks on the surface. Grazing is limited as a result of the rockiness and steep slopes, and only Eland and Red Hartebeest were occasionally found in this community.

This plant community is characterised by species group 1 (Table 1), and the diagnostic species include the dominant grass *Harpochloa falx* and the forbs *Hypoxis hemerocallidea* and *Rhynchosia monophylla.*

Limited trees and shrubs occur in the area, possibly inhibited by its altitude (Coetzee, Bredenkamp & van Rooyen, 1995), and exposure to cold temperatures with frost during winter (Bredenkamp, Theron & van Vuuren, 1983), the vegetation is characterised by a diversity of grass species of up to

1 m, tall growing among the quartzite rocks, with the dominating species being *Harpochloa falx* and *Elionurus muticus*.

Small trees cover on average only 1% of the community and some species found are *Faurea saligna, Burkea africana, Acacia karroo and A. caffra*

Shrubs cover on average 3% of the community, including small individuals of some trees. Species found are: *Acacia karroo and Burkea africana*

Forbs cover on average 20% of the community and some of the more common species are *Rhynchosia monophylla, Hypoxis haemerocallidea, Wahlenbergia undulata, Senecio oxyriifolius, Parinari capensis, Bulbostylus burchelliii, Chamaecrista mimosoides, Helichrysum dasmymallum, Senecio venosus, Triumfetta sonderi* and *Anthospermum rigidum*

Grasses are the most important component of this community and even with the large percentage of surface rocks they cover 71% of the area. Species found are *Harpochloa falx, Elionurus muticus, Digitaria eriantha, D. monodactyla, Digitaria tricholenoides, Trachypogon spicatus, Schizachyrium sanguineum, Aristida diffusa, Setaria sphacelata, Eragrostis chloromelas, E. racemosa, Brachiaria serrata, Cymbopogon excavatus and Themeda triandra*

1.1 *Harpochloa falx - Eragrostis chloromelas* mountain grassland variation

Locally within community 1, a variation is found where *Eragrostis chloromelas* is totally dominant with a canopy cover of 51-75 %.

The variation is furthermore characterised by species group 2 (Table 1), and the diagnostic species include the dominant grasses, *Elionurus muticus, Digitaria tricholaenoides*. and *D. monodactyla,* and also the forbs *Senecio coronatus, Chascanum adenostachyus* and *Vernonia oligocaphala.*

Trees cover on average only 1% of the area. The only species found is *Burkea africana*

Forbs cover on average 20% of the area. Species found are *Rhynchosia monophylla, Vernonia oligocephala, Pellaea calomelanos, Helichrysum spp., Parinari capensis, Bulbostylus burchellii, Chamaecrista mimosoides, Senecio venosus, Triumfetta sonderi, Conyza albida* and *Vernonia poskeana.*

Grasses cover on average 70% of the area. Species found are *Harpochloa falx, Tristachya leucothrix, T. rehmanii, Schizachyrium sanguineum, Setaria sphacelata, Pogonarthria squarrosa, Eragrostis chloromelas, Themeda triandra, Melinis repens, Cymbopogon excavatus* and *C. validus*

2. *Wahlenbergia undulata - Hyparrhenia hirta* old field grassland (Fig. 5)

This community covers an area of 80 ha. It is situated in the south- western part of the Game Park, in a flat lowland consisting of loamy soil and limited rocks, it has a history of disturbance, and was ploughed and cultivated in the past. It has however recovered, and is now totally dominated by the tall grass *Hyparrhenia hirta* which grows up to 1,8 m tall, overshadowing and outcompeting other species, and therefore overall plant diversity is low. Because of the lack of trees in this community, it is easily distinguished from the surrounding open woodland.

This plant community is characterised by species group 3 (Table 1). The diagnostic species are the forbs *Vernonia sutherlandii,* and *Wahlenbergia undulata*. These forbs are not abundant, but are nevertheless restricted to this species group.

Shrubs cover on average 3% of this area and species often encountered are *Acacia karoo* and the semi-woody weed *Asclepias fruticosa*. The presence of *Acacia karoo* shrubs indicates that woody plants are returning to this old field and that it will develop into a woodland in the future.

Herbs found scattered in this community cover on average 40% of the community. Species found include *Vernonia sutherlandi, Wahlenbergia undulata, Helichrysum* spp., *Parinari capensis, Triumfetta sonderi*

Anthospermum rigidum, Conyza albida, Vernonia poskeana, Tagetis minuta and *Bidens bipinata*. Many of these species are weedy, indicating the secondary status of the vegetation.

Grasses cover on average 80% of the community, with the dominant *Hyparhenia hirta,* the following grass species may also be found:

Diheteropogon amplectens, Schizachyrium sanguineum

Cynodon dactylon, Setaria sphacelata, Pogonarthria squarrosa, Eragrostis rigidior, E. chloromelas, Aristida congesta sub sp. *congesta, Brachiaria serrata*

Tricholeneura grandiglumis, Digitaria eriantha, Melinis repens, Cymbopogon excavatus, Eragrostis curvula and *Heteropogon contortus*.

3. *Terminalia sericea - Burkea Africana* bushveld on sand (Fig. 6)

This community is found at three separate localities in the Game Park. The first is a large area in the north-eastern corner, and the other two are smaller patches situated in the south-west. In total these areas cover 136 ha. This community is exclusively found on the recent very sandy alluvial deposits where drainage is very good.

This plant community is characterised by species group 4 (Table 1), and diagnostic species include the woody tree *Terminalia sericea,* the poisonous

suffrutescent geoxylophyte *Dichapetalum cymosum* and *Denekia capensis*. These species show a distinct preference for well drained sandy soils.

The tree layer covers on average 33% of the community. It is characterised by dense stands of *Terminalia sericea* trees which are about 5 m tall, and few other species were encountered: *Protea caffra, Rhus leptodictya, R. zeyheri* and *Acacia karroo*.

Shrubs cover on average 5% of the community with only *Asparagus suaveolens and Acacia karroo* present in the shrub layer.

Herbs cover on average 20% of the community. Species found are *Denekia capensis, Senecio oxyriifolium, Bulbostylus burchellii, Chamaecrista mimosoides, Helichrysum setosum, Triumfetta sonderi, Anthospermum rigidum, Hypoxis* spp., *Perotis patens, Tagetis minuta* and *Bidens bipinata*.

It is interesting to note that the suffrutescent geoxylophyes *Dichapetalum cymosum* and *Parinari capensis* are abundantly present in these deep sandy soils.

Grass species such as *Ureletrum agropyroides* and *Trachypogon spicatus* dominate the grass stratum. Grasses cover on average 74% of the community and some other species found are, *Tristachya leucothrix, Schizachyrium sanguineum, Setaria sphacelata, Pogonarthria squarrosa,*

Eragrostis racemosa, E. curvula, Themeda triandra, Brachiaria serrata, Digitaria eriantha, Melinis repens, Heteropogon contortus and *Hyparrhenia hirta*

4. Tristachya leucothrix - Trachypogon spicatus mountain bushveld (Fig 7)

This community covers 174 ha of the Game Park, covering the second largest area in the park. It occurs widespread throughout the park but is almost exclusively found on the quartzite ridges, mostly on the southerly and easterly facing slopes. The dominant grasses are *Tristachya leucothrix* and *Trachypogon spicatus*. This is an important habitat for the mountain loving mammals such as mountain reedbuck and kudu, and they are frequently seen there.

This plant community is characterised by species group 5 (Table 1). Diagnostic species for this community include the dominant grasses *Trachypogon spicatus, Tristachya leucothrix,* and *Ureletrum agropyroides*, the woody species *Strychnos pungens, Engelophytum magalismontana* and *Combretum molle,* and the forbs *Senecio oxyriifolius*, and *Pallaea calomelanos* , the xerophytic fern.

Trees cover on average 5% of the community.

Shrubs cover on average 5% of the community and species commonly found are *Asparagus suaveolens,* and *Aloe greatheadii subsp. daveyana*

Herbs cover on average 25% of the community. Prominent species, other than the diagnostic species, found are:
Kalanchoe paniculata, Indigofera melanadenia, Helichrysum spp., Bulbostylus buchelli and *Chamaecrista mimosoides*

Grasses cover on average 74% of this community with the following species occurring: *Ureletrum agropyroides, Schizachyrium sanguineum, Setaria sphacelata, Pogonarthria squarrosa, Eragrostis chloromelas, E. racemosa, E. curvula, Themeda triandra* and *Heteropogon contortus.*

4.1 *Protea caffra - Faurea saligna m*ountain savanna variation

This variation of community 4 is found exclusively on the south facing slopes of the steepest quartzite ridges. In these areas trees are dominant, covering 50% of the area. The tree species which dominate the variation are *Protea caffra* and *Faurea saligna*, and this causes the structure of the variation to be distinctly different to the main community.

This variation is characterised by species group 6, and diagnostic species include the dominant woody *Protea caffra* , *Faurea saliga* and *Ochna pulcra,*

the shrubs *Xerophyta retunervis* and *Rhus magalismotana* as well as the forbs *Indigofera melanadenia Aloe pretoriensis* and *Helichrysum spp.*.

Tree species found in this variation are *Protea caffra, Faurea saligna, Rhus leptodictya, R. magalismontana, Combretum molle, Strychnos pungens* and *Ochna pulcra*

Shrubs cover 3% of this community. Species found are *Xerophyta retinervis Asparagus suaveolens* and *Acacia karroo.*

Herbs cover on average 20 % of the variation. Species found are *Kalanchoe paniculata, Indigofera melanadenia, Helichrysum* spp., *Parinari capensis, Bulbostylus burchellii, Chamaecrista mimosoides, Schkuhria pinnata* and *Helichrysum setosum.*

Grasses cover on average 70% of the variation with prominent species *Diheteropogon amplectens, Schizachyrium sanguineum, Sporobolus africanum, Setaria sphacelata, Eragrostis racemosa* and *Themeda triandra*

B. Sweet plains bushveld, characterised by species group 12. Diagnostic species are: the trees *Acacia karroo* and *Acacia caffra,* the grass *Panicum maximum* and the forb *Zinnia peruviana.*

5. *Cynodon dactylon - Acacia karroo* bushveld (Fig 8,Fig 9)

This is the most extensive plant community in the game park. It is spread throughout the park and is closely associated with the recent alluvial deposits. It covers 838 ha which is more than half of the total area of the Game Park.

The importance of this community for grazing cannot be overstated, as it provides the game with the most resources, and most of the game species frequent this community for grazing and shelter.

The community is characterised by the presence of *Acacia* species, and is described by some as being an open woodland.

This plant community is characterised by species group 8 (Table 1), and diagnostic species include the tree *Rhus lancea,* the grasses *Cynodon dactylon, Eragrostis rigidior* and *Sporobolus africanus.*, indicating that the area is heavily utilised, and the forbs *Schkuria pinnata, Verbena brassiliensis, solanum incana* and *Helichrysum setosum,* most of which are poorer weedy species, emphasising the fact that the area is heavily utilised.

The community consists of 2 variations, and each one will be discussed in detail.

5.1 Ziziphus mucronata - Acacia karroo bushveld variation

This is the woodland variation of the community. This reflects an historically more natural and undisturbed environment. Many species are abundant in this variation.

This variation is characterised by species group 9 (Table 1). Diagnostic species include the trees *Acacia robusta, Ziziphus mucronata, and Euclea crispa*, the grass *Aristida congesta,* and the forbs *Rothmannia capensis,* and *Hypoxis rigidula*.

Trees cover 60% of this variation and species, other than the diagnostic species, observed are *Acacia karroo, A. robusta, A. caffra, Celtis africana Rhus leptidictya, R. pyroides* and *R. zeyheri.*

The large diversity of trees, and especially nutritious trees, indicates a large browse potential, and emphasises the importance of this variation to the browsing ungulates.

Shrubs cover on average 15% of the area with six species common. These are *Maytenus heterophylla, Asparagus suaveolens, Rothmannia capensis* and *Aloe greatheadii susp. davyana. Cereus peruvianus* and *Opuntia ficus-indica* are also diagnostic of this variation and are regarded as a serious threat to the natural vegetation. These exotic invasive succulents have

invaded many sections of this variation, and could have a serious effect on the future vegetation species composition of the variation.

Herb species cover on average 30% of the variation with the following species found: *Hypoxis rigidior, Bidens pilosa, Cucumus zeyheri, Solanum panduniforme, Senecio venosus, Triumfetta sonderi, Anthospermum rigidum Conyza albida, Bidens bipinata, Vernonia poskeana, Zinnea peruviana* and *Tagetis minuta*

Grass species are abundant, covering 85% of the variation, and are well utilised by various herbivore species. Species found are *Setaria sphacelata, Pogonarthria squarrosa, Eragrostis chloromelas, Themeda triandra, Aristida congesta sub barbicollis, Hyparrhenia hirta, Heteropogon contortus* and *Sporobolus fimbriatus*.

5.2 Solanum panduniforme - Acacia karroo disturbed bushveld

This variation contains a number of plant species which indicate a disturbed environment. In areas where this variation is present there is either very heavy grazing and trampling by game, or has a history of disturbance through mining, building (ruins), or other human activity.

The invasive alien species *Melia azedarach and Cereus peruvianus,* unpalatable grass *Aristida diffusa,* the tree *Celtis africana,* the shrub *Solanum*

panduniforme and the forbs *Gomphocarpus fruticosus, Bidens pilosa* and *Cucumis zeyheri* are diagnostic of this variation. The variation is characterised by species group 10 (Table 1).

Trees cover on average 50% of the variation with the following species, other than the diagnostic species, can be found: *Acacia karroo, A. robusta, Rhus leptodictya, R. pyroides, R. magalismontana*
R. zeyheri and *Euclea crispa.*

Shrubs cover on average 20% of the variation.
Species found are *Acacia caffra* and *Euclea crispa,* and *Cereus peruvianus* which is an exotic invader, and can become a serious problem where it grows in the shade of common bushveld trees.

Forbs cover on average 20 % of the variation. Species found are: *Bidens bipinata, Tagetis minuta, Senecio venosus, Anthospermum rigidum, Helichrysum nudifolium, Hypoxis spp. and Vernonia poskeana.*

Grasses cover on average 80% of the variation with the following species observed: *Cynodon dactylon, Sporobolus fimbriatus, Setaria sphacelata, Pogonarthria squarrosa, Eragrostis chloromelas, E. rigidior, E. curvula, E. racemosa, Aristida congesta* sub *barbicollis, Heteropogon contortus and Hyparrhenia hirta*

6. *Euclea crispa - Acacia karroo* bushveld on diabase

This is a small community which covers only 7 hectares. It consists of two small patches in the south of the Game Park, and is easily spotted due to its very dense thickets of shrubs and trees. It is found on deep fertile soils of the Diabase rock.

This plant community is characterised by species group 13 (Table 1). Diagnostic species are the grasses *Eragrostis chloromelas, E. racemosa* and *Themeda triandra*, the forbs *Triumfetta sonderi, Anthospermum rigidum, Helichrysum nudifolium* and *Conyza albida,* and the alien invader *Opuntia ficus-indica.*

Trees are dense and cover 100% of the community with the following species prominent: *Euclea crispa, Rhus leptdictya, Acacia karroo, Acacia robusta* and *A. caffra. Melia azedrach* is an exotic tree which also occurs in this community, and is one of the most invasive alien trees in the savanna (Bromilon, 1995.)

Shrubs cover on average 15% of the community. Species found are: *Euclea crispa* and *Asparagus suaveolens.*

Forbs cover on average 10% of the community and those occurring are the diagnostic species already mentioned.

As a result of the total cover of the trees in this community there are few grass species, and those that do occur are usually associated with the shade of trees.

Grasses do however cover 80% of the community with the following species present: *Pogonarthria squarrosa, Aristida congesta* subsp. *barbicollis, A. congesta* subsp. *congesta, Panicum maximum* and *Sporobolus africanum.*

C. Sweet mountain bushveld, characterised by species group 15 (Table 1). Diagnostic species in this group are the grasses *Aristida congesta* subsp. *barbicollis, A. congesta* subsp. *congesta, Brachiaria serrata, Digitaria eriantha, Eragrostis curvula, Heteropogon contortus* and *Sporobolus fimbriatus,* the forbs *Solanum capense, Hypoxis sp.* And *Asparagus suaveolens.*

7. Combretum apiculatum - Dombeya rotundifolia bushveld on northern slopes (Fig 10)

Because of the aspect the north facing slope of the quartzite ridges have a warmer micro-climate than the south facing slopes, and therefore the vegetation is distinctly different on these north slopes. This community covers approximately 25 ha and is found in two localities, one in the east and a smaller area in the west.

Animal species are frequently found in this community and it is fairly heavily utilised by the ungulates.

This plant community is characterised by species group 14 (Table 1.). The The dominant trees *Dombeya rotundifolia Combretum apiculatum,* and *Euclea crispa* are diagnostic of the plant community. These trees require a warmer climate to exist, which this northern aspect provides. These are also valuable trees in terms of browse for the ungulates.

The trees cover 57% of the community and other species present are: *Rhus leptodictya, R. zeyheri* and *Acacia caffra.*

Shrubs cover approximately 5% of the community. Species present are: *Euclea crispa. Asparagus suaveolens* and *Acacia karroo*

There are not many herbs found in this community. Species found are: *Solanum capense, Hypoxis* sp., *Bidens bipinata, Vernonia poskeana, Gnidia capitata* and *Tagetis minuta*

Grasses cover on average 80% of the community. Species present are: *Aristida congesta* subsp. *barbicollis, A. congesta* subsp. *congesta, Brachiaria serrata, Digitaria eriantha, Panicum maximum, Heteropogon contortus,* and *Hyparrhenia hirta.* The presence of these grass species indicates that the

community is over-utilised. This is possibly due to trampling by browsers to utilise the tree and shrub layers.

D. Anthropogenic vegetation, characterised by species group 19 (Table 1). The diagnostic species in this group are the grass *Hyparrhenia hirta* and the weed *Tagetis minuta*.

8. *Eucalyptus grandis* plantations (Fig 11)

This community consists mainly of dense stands of *Eucalyptus* trees of about 20 m tall. This occurs in areas where human settlements were involved in the past. This community covers 35 ha of the park and is totally covered with trees. The monotonous stands of alien plants can pose a problem as they lower the biodiversity and condition of the veld, and have the ability to invade natural veld. Because of this the plant diversity in this community is low. Game was also found to avoid this area to a great extent.

This plant community is characterised by species group 16 (Table 1). The diagnostic species is the dominant tree *Eucalyptus grandis*. This is an exotic which is an Australian native, and can become invasive (Bromilon, 1995). The forbs *Gomphrena celosioides, Perotis patens, Vernonia poskeana* and Bidens bipinnata, the trees *Rhus leptodictya* and *Rhus zeyheri* and the

grasses *Melinis repens, Cymbopogon excavatus* and *Cmbopogon validus* are also diagnostic of this species group.

Trees cover 100% of the community. Other than the diagnostic species already mentioned, *Acacia Karroo* is also present.

Shrubs cover on average 3% of the community.

Species present include: *Acacia karroo* and *Asparagus suaveolens*

Herbs cover on average 8% of the community.

Species present include: *Conyza bonariensis, Tagetes minuta, Verbena bonariensis, Gnidia capitata* and *Solanum capense*.

Grasses cover on average 81% of the community.

Species present are: *Panicum maximum, Sporobolus fimbriatus, Hyparrhenia hirta* and *Heteropogon contortus*.

9. Ischaemum fasciculatum - Phragmites australis wetlands (Fig 12)

This community covers 70 ha, and is found surrounding the two waterways which flow through the Game Park. These are densely covered with reeds and grasses. This community is utilised by various ungulate species.

This community is characterised by species group 17 (Table 1), and diagnostic species include the grasses *Ischaemum fasciculatum, Imperata cylindrica* and *Ischaemum afrum,* the forbs *Verbena bonariensis, Conyza bonariensis, Gnidia capitata, Cyperus sp.*and *Acacia karroo* in shrub form..

Trees do not occur in this community, but a number of shrub species do occur, and they cover 2% of the community. Species included are: *Acacia karroo* and *Asclepias fruticosus.*

Herbs are not abundant as a result of the dense grass cover, and they cover only 5% of the community. Species present are: *Verbena brassiliensis, V. bonariensis, Gnidia capitata, Tagetis minuta* and *Bulbostylus burchellii.*

Grasses and reeds cover 100% of the community.
Species found are all mentioned as diagnostic of the community.

10. Phragmites australis slimes dam wetlands (Fig 13)

This is a small community which consists of two unused slimes dams in the central part of the Game Park. These slimes dams are covered with dense stands of *Phragmites* reeds. Because of the conditions that the slimes dams pose, there are virtually no other plants occurring there.

This plant community is characterised by species group 18 (Table 1). The diagnostic species is the dominant reed *Phragmites australis*.