

# **Brackenridge Biodiversity Survey Report**

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**Photo 1. Old Fynbos vegetation in Brackenridge Estate near the ridgeline looking East.**

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## 1. Introduction and brief

Brackenridge Estate is a private residential development in Plettenberg Bay, which was established in 2000. According to the Record of Decision (RoD, dated 22/06/2000) the Estate comprises 280 single residential erven on 124.26ha (but indicated as 128ha in the brief). The residential erven are situated mainly along the prominent ridgeline, avoiding the steeper slopes, drainage lines and valleys, which are conserved as private open space along with other natural Fynbos areas. The open space areas comprise about half (54%) of the property. The Estate has the Piesang River Valley to the north, Plettenberg Bay Golf Course to the north and west, other erven to the west and south and the Klein Piesang River and Municipal Commonage as the majority of its eastern boundary.

Several environmental conditions of the 2000 RoD are now being addressed (Conditions 8-11). These are (8) a fire management plan to ensure the long-term survival of the indigenous fynbos, (9) an Environmental Control Officer (ECO) to implement the Environmental Management Plan (EMP), (10) an annual Environmental Audit, and (11) an Environmental Monitoring Committee (EMC) to detect deviations from the EMP.

The brief from the Environmental Management Subcommittee for the professional plant ecologist comprised three components:

- i. Conduct a biodiversity survey across Brackenridge
- ii. Conduct an Environmental Audit (EA) for Brackenridge
- iii. Analyse and update the current EMP.

This report addresses (i) the biodiversity survey. The detailed brief for this component was as follows:

*Conduct a biodiversity survey across Brackenridge, with particular focus on, but not restricted to the flora and fauna that characterise the 54% of unbuilt natural environment in the Estate. The purpose of this assessment is to gain an understanding of the overall biodiversity on the Estate, to identify particularly valuable, sensitive or endangered biomes, areas and vegetation, as well as to point out particular areas of concern. The latter may include landscaping elements found on individually owned properties which may pose a threat to the indigenous flora on the surrounding commonly owned areas.*

*Deliverable: A comprehensive report document in SWOT format, including plant lists and maps that detail biome types and the position of particularly valuable or problematic vegetation in the Estate.*

## 2. Methods

An initial desk-top study of the biophysical features of the Estate was conducted prior to the site visit. The field survey work took place over two days (August 17-18<sup>th</sup> 2023). Environmental Management Subcommittee members assisted by leading the consultant to most open space sections of the Estate and by facilitating access through some private properties.

Particular attention was paid to noting the following:

- I. vegetation and habitat types present
- II. abundance of invasive alien vegetation
- III. condition of the vegetation
- IV. indigenous and alien flora species.

Species were recorded photographically and GPS locations tracked using a hand-held GPS (Map 1). Species and localities were uploaded onto the iNaturalist platform (<https://www.inaturalist.org/>). Prof. Tony Rebelo later created a project called “Brackenridge Estate” where all the species recorded during the survey, as well as other observations made may be viewed (<https://www.inaturalist.org/projects/brackenridge-estate>).

### **3. Description and mapping of vegetation and habitat types**

#### **3.1 National vegetation types**

According to the South African National Biodiversity Institute (SANBI) vegetation map of South Africa, Lesotho and Swaziland (<http://bgis.sanbi.org/Projects/Detail/186>, Version 2018) the terrestrial areas of the Estate comprise Garden Route Shale Fynbos (Rebelo et al. 2006). The wetland area along the low-lying NE part of the valley bottom, associated with the Klein Piesang River, is mapped as “Estuarine Functional Zone” as it is located only 5m above sea level and connects to the estuary (Map 2). However, my survey indicated that the vegetation in this wetland is not estuarine, but more likely a non-saline, valley bottom floodplain wetland. Note that these large-scale vegetation units are mapped at a 1:250,000 scale and do not define small patches of different vegetation types or plant communities within a vegetation type.

Garden Route Shale Fynbos is considered Endangered in terms of the IUCN Red List of Ecosystems under criteria B1(i) Skowno et al. (2019). These criteria mean that Garden Route Shale Fynbos is narrowly distributed with high rates of habitat loss in the past 28 years (1990-2018), placing this ecosystem type at risk of collapse. According to Van Deventer et al. (2019), all inland wetland types are considered threatened and further wetland loss is not supported.

#### **3.2 Regional vegetation types**

A more detailed vegetation map is available for the Southern Cape, mapped at a 1:50,000 scale (Vlok et al. 2008, Box 1; <https://bgis.sanbi.org/SpatialDataset/Detail/393>). Here the terrestrial vegetation comprises two units: Roodefontein Grassy Fynbos and Piesang River Fynbos-Forest Mosaic (Map 3). Grassy Fynbos types contain a high proportion of graminoids, especially native grasses such as Rooigras, *Themeda triandra*. A “mosaic” vegetation type refers to a patchy vegetation cover with both elements of the type present at a scale too small to map as separate vegetation types. In this example the mosaic unit includes Fynbos and Forest patches as seen outside the Estate above the Piesang River. The floodplain wetland vegetation is mapped as Groot Brak River Floodplain.

#### **3.3 Western Cape Biodiversity Spatial Plan**

The Western Cape Biodiversity Spatial Plan indicates all conservation areas (including national parks and nature reserves) and identifies additional non-protected areas needed to ensure the continued existence and functioning of species and ecosystems, including the delivery of ecosystem services, across terrestrial and freshwater realms. The latter are shown as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) on the plan (CapeNature 2017). Map 4 indicates that the larger vegetation areas at Brackenridge Estate are included as CBAs or ESAs. CapeNature and other conservation partners endeavor to secure these additional areas in perpetuity through direct expansion of the formal protected area network or through mechanisms to assist landowners to conserve their natural habitats in perpetuity, such as the signing of Biodiversity Agreements through Stewardship, Conservation Easements or Servitudes.

### 3.4 Vegetation communities present at Brackenridge

The vegetation survey in August 2023 largely supports the large scale mapping of the terrestrial vegetation at Brackenridge as Shale Fynbos (Map 5). The entire site falls within the Fynbos Biome. At a smaller scale there are several different plant communities, as influenced by topographical features, including slope, aspect, ravines and hydrology. Unfortunately the plant communities currently are masked by the moribund state of much of the Fynbos owing to fire exclusion and tree invasion. Most of the Estate has not burnt in over 25 years, and probably much longer than this as indicated by historical aerial imagery. Fire exclusion in Fynbos allows Forest species (e.g. Cape Beech, *Rapanea melanophloes*) and Thicket (e.g. Bitou, *Osteospermum moniliferum*, Wild Currant, *Searsia lucida*) to invade and ultimately shade out and replace Fynbos species in the above ground vegetation. Such modified vegetation may be distinguished from natural Forest through the lack of typical Forest understorey flora.

Most Forest and Thicket species are dispersed by birds or mammals and are continuously brought into shrubland areas where they can germinate and grow up in the shade during the absence of fire. This is in contrast to Fynbos species which generally are not dispersed by birds, need fire to stimulate germination and full sun exposure to establish (as achieved post-fire). With regular Fynbos fire-cycles (10-20 years) Forest and Thicket species do not become dominant.

Although Forest and Thicket species are less flammable than Fynbos they can burn under severe conditions. A mix of moribund Fynbos and Thicket or Forest species will burn readily and will result in a severe fire owing to the much higher fuel load than a natural stand of Fynbos vegetation. Fynbos will recruit from long-lived soil-stored seed banks, except for those species that do not have soil-stored seeds and have been lost to the above-ground vegetation, such as *Protea* and *Leucadendron* species. The latter species store their seeds in cones above ground in their canopies until after a fire.

Based on the survey and aerial imagery, much of the Estate can be classified as Garden Route Shale Fynbos, with the grassier communities more prominent on the hotter and drier aspects and ericaceous communities on the wetter aspects. The Roodefontein Grassy Fynbos vegetation unit of Vlok et al. (2008; Box 1) broadly represents the observed vegetation, although the communities present at Brackenridge deviate from this in composition to some extent according to specific environments. Although it is not possible to accurately delineate plant communities owing to the moribund state of much of the vegetation, three main terrestrial Fynbos communities and one Forest community are proposed (Map 5):

- *Themeda triandra* – *Leucadendron salignum* Grassy Shale Fynbos (North-NW aspect, near Watsonia Heights and Protea Dale; Photo 1). Dominant species in this community include the shrubs *Metalasia pungens*, *Euryops virgineus*, *Passerina falcifolia* and graminoids such as *T. triandra* and *Restio triticeus*. Indicator species may include *T. triandra*, *L. salignum*, *Oedera calycina* and *Polygala levynsiana*. However most of the vegetation is old and shaded by tall shrubs and trees such as *Tarchonanthus littoralis*, *Searsia* species and *Diospyros dichrophylla* and the alien invader *Acacia cyclops* (Rooikrans).
- Ericaceous Shale Fynbos (East and South aspects, Erica Heath, Orchid Valley; Photo 2). This is a wetter community with several *Erica* species common, including *E. sparsa* and *E. peltata*. Other dominant species include the shrubs *Metalasia pungens*, *Cliffortia linearifolia*, *Selago villicaulis* and *S. corymbosa*, the buchus *Agathosma apiculata* and *A. ovata*, *Hippia fruticosa*, *Helichrysum cymosum*, *Struthiola hirsuta* and *Leonotis leonuris*. Here Forest and Thicket species have also invaded over time, especially *Osteospermum moniliferum* (Bietou).

- Fynbos-Thicket/Forest (North aspect, lower area only, close to entrance; Photo 3). This plant community is taller than the adjacent Grassy Fynbos, but it is not obvious whether it is former Fynbos that has been invaded by trees for longer than elsewhere, or if it is a genuine mosaic community as described by Vlok et al. (2008). Typical species recorded in this community include the trees: *Sideroxylon inerme*, *Apodytes* sp., *Gymnosporia* sp., *Buddleja saligna* and shrubs *Colpoon compressum*, *Searsia* spp., *Tecomaria capensis* and *Polygala myrtifolia*. The climber *Senecio deltooides* and parasite *Viscum rotundifolia* were present. As this plant community does not have *Strelitzia alba*, it may not qualify as the Vlok et al. (2008) Piesang River Fynbos-Forest mosaic unit that is limited to a small area around Plettenberg Bay.

**Box 1. Vlok et al. (2008) Grassy Fynbos & Roodefontein Grassy Fynbos Descriptions**

“In this habitat the overstorey proteoid shrubs are often uncommon, but ericoid shrubs are usually abundant, with the graminoid component always well developed. Restionaceae are uncommon and poor in species (mostly only *Hypodiscus striatus*, *Rhodocoma fruticosa*, *Restio triticeus* and *Thamnochortus cinereus*), but Poaceae and Cyperaceae are abundant and often also rich in species. Much of the habitat has been transformed and it is often difficult to reconstruct its former condition. In the past palatable grasses, such as *Digitaria eriantha*, *Eragrostis curvula*, *Eustachys paspaloides*, *Harpochoa falx* and *Themeda triandra* probably attracted many large herbivores, but these grasses are now often uncommon with only less palatable grasses (e.g. *Eragrostis plana*, *Pentasthitis* species and *Heteropogon contortus*) abundant. Especially along the coastal belt many areas have been protected against fire for long periods, which results in a dense overstorey of ericoid shrubs (e.g. *Erica sparsa*, *Phyllia axillaris*, *Passerina falcifolia*, etc.) that suppress the graminoids in the Grassy Fynbos.”

“Perhaps the most species rich and floristically interesting Grassy Fynbos unit is the **Roodefontein Grassy Fynbos**. It differs from all the other units in having *Leucadendron eucalyptifolium* and *Protea mundii* often abundant along drainage areas. The uncommon narrow-leaved variant of *Protea cynaroides* also occurs sporadically on moist south-facing slopes. Many small seasonal wetlands are also present in this unit. These sites are indicated by an abundance of *Cliffortia linearifolia*, often along with an abundance of *Stenotaphrum secundatum*. This unit is rich in geophyte species, usually with many *Watsonia knysnana* present, but also several orchid species (especially *Satyrium* species). Restios (especially *Restio triticeus*) are quite abundant and Cyperaceae less common than in other units. Ericoid shrubs (especially *Erica formosa*, *Erica sessiliflora*, *Erica sparsa* and *Erica versicolor*) are usually abundant. An interesting feature is the presence of several species that reach their westernmost distribution here, e.g. *Dierama pendula* and *Kniphofia praecox*.”

- *Nuxia floribunda*-*Rapanea melanophloes* Coastal Forest Community (East aspect in stream ravine; Photo 4). Other typical tree species recorded in this community include: *Apodytes* cf. *dimidiata*, *Canthium inerme*, *Sideroxylon inerme*, *Burchellia bubalina* and *Halleria lucida*. The shade-adapted herb *Knowltonia vesicatoria* is present in the understorey.



**Photo 1. *Themeda triandra* - *Leucadendron* Fynbos community in the fire belt NW of Watsonia Heights**



**Photo 2. Old Ericaceous Shale Fynbos community on SE aspects**



**Photo 3. Fynbos-Thicket-Forest community, N aspect near entrance gate**



**Photo 4. *Nuxia* – *Rapanea* Forest community in ravine, SE aspect, close to seasonal stream**



The ravine Forest is likely to be small, historical patches of Forest that developed where fires did not regularly penetrate. However, owing to fire exclusion in the surrounding Fynbos, the trees have spread outwards making it difficult to define the exact boundaries. The absence of a typical Forest understory is one indicator of recent expansion.

As much of the Fynbos vegetation is invaded by Thicket and Forest tree and shrub species, as well as invasive alien woody species, it is difficult to define plant community boundaries. However, after an ecological prescribed burning plan is implemented, it will be possible to delineate the different vegetation communities more accurately.

In addition, there are two non-terrestrial plant communities: Wetland Floodplain and Riparian. Note that the Brackenridge Estate extends to the Klein Piesang River despite this lying outside the East fence, therefore these areas also require management by the Estate:

- The Wetland Floodplain community covers the low-lying terrain ( $\leq 5$  masl) adjacent to the Klein Piesang River at the north-east end of the Estate (Photo 5). This area was waterlogged during the August 2023 survey, but may dry out in summer and represent a seasonal wetland. However, typical wetland species were not observed as it is invaded by both alien grasses species (e.g. *Cortaderia selloana*) and Thicket species.



**Photo 5. Floodplain, valley bottom wetland community (orange polygon) associated with the Klein Piesang River, NE corner of Estate. Alien Pampas Grass (*Cortaderia selloana*) and Thicket species have invaded the wetland.**

- Historically, a Fynbos Riparian Scrub community would have been found along the banks of the Klein Piesang River outside of the fenced Estate. This plant community is completely overwhelmed by invasive alien trees, especially *Acacia mearnsii* (Black Wattle) and *A. melanoxylon* (Black Wood), so it is difficult to define what the historical plant community would have looked like. However, given that the river banks are quite open, it is likely that fires used to sweep through the vegetation and thus it would have been fire-adapted Fynbos Riparian Scrub rather than a fire-avoiding Forest community. We noted the presence of *Diospyros dichrophylla*, but typical riparian scrub species may once have included: *Brachylaena neriifolia*, *Laurophyllus capensis*, *Cliffortia odorata*, *Psoralea affinis* and the pioneer, fire-adapted tree *Virgilia divaricata*. At present the vegetation poses a fire risk owing to the very high fuel loads of alien trees. This was also noted by the project team for the 2023 “Plett Botanical Park” proposal on the adjacent Municipal Commonage property which shares the river and spans the East bank. The proposal to restore the riparian zone in the Commonage provides an opportunity for collaboration between Brackenridge Estate and the Municipality.

#### 4. Condition of vegetation and habitats

Much of the natural vegetation occurring in the private open spaces at Brackenridge is in poor-moderate condition. Three main factors are responsible for this observed degradation and these are:

- Lack of fire
- Invasion by alien species
- Fragmentation of habitat.

The severe fragmentation effects of the housing development cannot be reversed. This has resulted in several small, isolated or narrowly connected fragments of Fynbos vegetation being surrounded by housing (i.e., natural areas less than 3ha, especially the narrow fragments or those with convoluted edges, such as the plateau fragment in Protea Dale of 1.68 ha). Without fire these small fragments will not support Fynbos conservation in the long-term. There are three options for such remnants:

- a) Conserve the Fynbos by conducting a prescribed warm season burn. In order to safely do this would require a large proportion of the fragment to be brush-cut as fire belts next to the housing, leaving only a small area to naturally burn. While not impossible to do, this would be resource-intensive and result in potential negative edge effects, such as incursion of weeds into the unburnt fire belt areas.
- b) Continue the status quo of allowing Thicket and Forest to invade over time and replace the more species-rich Fynbos. Fuel loads will gradually increase, which is not desirable from a fire-safety point of view, and would require a brush-cutting intervention in future.
- c) Conversion to parkland through brush cutting and mowing. This is not desirable from a biodiversity conservation point of view.

The other two main degradation factors, namely: lack of fire and invasion by alien species, are possible to address. For the larger remnants of natural vegetation, implementing a suitable prescribed fire regime as soon as possible is essential, both from fuel reduction (i.e., safety) and biodiversity management points of view. Invasive alien species, especially trees such as gums, wattles and pines, are mostly flammable, exacerbate the high fuel loads and outcompete the Fynbos species. An invasive species control programme should be implemented as soon as possible and

integrated with the fire management plan. If an integrated fire and invasive alien control management plan is implemented promptly, most areas of former Fynbos vegetation should self-restore post-fire from persistent soil-stored seed banks. However, if prescribed ecological burning is delayed further, active restoration may also be required, i.e., the re-introduction of species that have become locally extinct or scarce (Holmes et al. 2020).

Some other localized degradation factors affecting the vegetation were observed and these include the dumping of garden refuse into the veld – especially if including invasive species, such as Kikuyu (*Cenchrus clandestinum*) cuttings, localized soil erosion and sewage spills (see audit report for more details). In addition, any invasive alien garden plants should be removed (see Appendix 1 for species observed in the open spaces, such as alien Sword Fern, *Nephrolepis cordifolia*) or extra-limital Fynbos species likely to hybridize with closely related local species. At present, most planted Fynbos garden plants are hybrids and cultivars, e.g., showy Pincushions. These are unlikely to cause a problem unless locally indigenous Pincushions appear post-fire from the soil seed bank, e.g., *Leucosepermum cuneiforme*, which may have occurred in the area historically.

#### 4.1 Lack of fire

Indicators of severely altered fire regimes through overprotection from fire in Grassy Fynbos include an abundance of shrubs and trees such as *Osteospermum moniliferum*, *Grewia occidentalis*, *Rhamnus prinoides* and *Searsia lucida*, usually amongst rather moribund (old and dying) Fynbos plants (Vlok et al. 2008).

The focus for the past two decades at Brackenridge has been the development of the housing component of the Estate. No prescribed veld fires have been conducted and there is no record of recent fires prior to the Estate being established. Much of the vegetation in the Estate could be in excess of four decades old based on aerial photography: this fire return interval is approaching the limit for Fynbos species' survival. As described in 3.4, in the absence of fire Fynbos becomes moribund and invaded by Thicket and Forest species. Long-term exclusion of fire eventually results in a Forest plant community with the loss of the species-rich Fynbos. This is not desirable considering that the Garden Route Shale Fynbos occurring on the Estate is considered nationally Endangered (Skowno et al. 2019). Natural Forest patches in the Fynbos Biome only become established in fire-free areas such as in steep ravines and other rocky areas protected from fires (particularly Berg Wind driven fires).

Fynbos vegetation is fire-adapted and fire-dependent. Once an area becomes isolated or fragmented in the landscape owing to developments it is necessary to replace the natural fire regime with prescribed ecological burns to conserve the Fynbos biodiversity in the long-term. It is recommended that a fire management plan is drafted and implemented as a matter of urgency. This should be integrated with the invasive alien vegetation management plan to ensure that resources are adequately deployed for both components, as many alien invader species are also fire-adapted. For example, it will be important to fell and potentially remove alien trees prior to burning to reduce fuel loads and to prevent spread of seeds from pines and hakeas after fire. Also there will be a flush of invader germination and growth from the soil seed banks (wattles and gums) immediately post-fire and this will require intensive follow-up control to prevent the invaders from re-establishing and out-competing the emerging Fynbos seedlings.

Some of the prominent invading Thicket species should be felled and dropped prior to the first prescribed burn in a fire management block, as they are less flammable than Fynbos and while green

may thwart efforts to achieve a clean burn (Photo 6). Examples include Bietou (*Osteospermum moniliferum*) and Wild Currant (*Searsia* spp., e.g. *S. lucida*).

#### 4.2 Invasive alien vegetation

Invasive alien vegetation is scattered throughout the Estate and is moderately dense in some areas. Prominent invader growth forms include trees, shrubs, forbs and grasses. Most of these species are documented on iNaturalist under the Brackenridge Estate Project (Appendix 1).

Trees such as pines, wattles, gums and hakeas are problematic in Fynbos as they are also fire adapted and can benefit from fires by dispersing and densifying further. The following invasive alien tree species were noted: *Acacia mearnsii* (Black Wattle), *A. melanoxylon* (Black Wood), *A. saligna* (Port Jackson Willow), *A. cyclops* (Rooikrans), *Pinus pinaster* (Cluster Pine), *P. radiata* (Monterey Pine), *Eucalyptus* species, *Solanum mauritianum* (Bugweed) and *Schinus terebinthifolia* (Brazilian Pepper). Those with animal-dispersed seeds can invade both Fynbos and Forest vegetation.



**Photo 6. Moribund Fynbos invaded by Thicket elements: Bietou (*Osteospermum moniliferum*) and Currant Bush (*Searsia* spp.). Note the extensive dead Fynbos plants – a major wild fire risk.**

Invasive alien shrubs recorded included *Hakea sericea* (Needlebush) and *Lantana camara* (Lantana, Cherry Pie).

The scrambling succulent, *Kalanchoe delagoensis* (Mother-of-Millions) was recorded close to the entrance and *Nephrolepis cordifolia* (Sword Fern) along the Eastern fence line. These two species are likely to be garden escapees.

Invasive alien grasses included *Cortaderia selloana* (Pampas Grass) which is especially invasive in the NE wetland and *Cenchrus clandestinus* (Kikuyu), usually escaped from gardens or from dumped garden refuse. Note that seeds of Pampas Grass can disperse widely by wind.

In addition, there are common annual weeds in disturbed areas, including *Vicia sativa* (Common Vetch) noted close to the Forest patch, *Sonchus aspera* (Prickly Sowthistle), *Hypochaeris radicata* (Wild Lettuce), *Stellaria media* (Common Chickweed) and alien annual grasses such as *Avena fatua* (Wild Oats). Although present, these do not pose a threat or fire risk and their control is not usually needed, or recommended. An ecological prescribed fire regime will usually control them in the natural areas.

The various invasive alien species may have different optimal control methods. For those that are strong resprouters, e.g., *Acacia saligna*, it is important to cut as low as possible and immediately apply the recommended herbicide to the stump. Alternatively, the plant should be rooted out. For strongly suckering species, such as *Acacia melanoxylon*, it is important NOT to cut the trees as this will result in dozens of new shoots from horizontal roots, but rather to ring-bark or frill the stem to cut off the food supply to the roots. Such treatments should kill the tree within the year. Some of the species, such as *Acacia cyclops* and *A. longifolia*, can simply be cut at ground level to kill the plants.



**Photo 7. Trees invading Fynbos along east fence, including alien wattles (*Acacia mearnsii*, *A. melanoxylon*), Thicket and Forest species.**

#### 4.3 Integrated fire and invasive species management

As prescribed ecological burns and invasive alien control are the key management interventions required to restore and conserve the Fynbos biodiversity on the Estate, the Environmental Management Plan should include a subsidiary “Integrated Fire and Invasive Species Management Plan”. Furthermore, this plan would need to address the current fire risk to housing and infrastructure on the Estate with a view to fuel and fire risk reduction. This will require adequate fire belts located in optimal positions and regularly maintained. Currently the fire belt system does not cover all the interfaces between the Fynbos vegetation and housing and in some areas the fire belts are positioned 20 m or more away from the edges of properties thus allowing the tall Fynbos-Thicket vegetation to abut gardens, posing a fire risk from embers spotting into them in the event of a wild fire, e.g., along sections adjacent to Orchid Valley.

The Estate should be divided into management blocks that from a biodiversity conservation viewpoint should be as large as possible in order to minimize the negative edge effects, such as brush cutting of fire belts, resultant small and cool fires, alien herb invasion and rodent predation of re-establishing seedlings. This would simultaneously minimize operational costs and discomfort to residents (i.e., from number of burn days). Fortunately Brackenridge Estate is a member of the “Southern Cape Fire Protection Association, Plett South Fire Management Unit” and this will facilitate cooperation among member organizations to assist in implementing the ecological and fuel reduction prescribed burns.



**Photo 8. Port Jackson Willow (*Acacia saligna*) invading Ericaceous Shale Fynbos**

Sufficient resources would need to be earmarked for invasive species control both prior to the burn (chain-saw and frilling work, removal of large biomass) and in the years post-fire to remove alien seedlings and saplings (pulling, lopping and popping work); this will be most intensive in the first two years post-fire. Follow-up control should be manual as far as possible to reduce the need for herbicides that can negatively impact on Fynbos seedlings.

It is highly recommended to include a Monitoring Plan for each management block. This could simply comprise a few fixed point photograph locations for repeat photography so that the developing Fynbos community can be tracked through time. In addition all species recruiting after fire should be photographed and uploaded onto the iNaturalist platform ([www.inaturalist.org](http://www.inaturalist.org)) as a record of species diversity on the Estate (this may be done using the iNaturalist app on a smart phone). Several post-fire specialist species are likely to be seen for the first time. Residents interested in nature could volunteer to assist both in monitoring the seasonal post-fire succession and in hand-pulling the aliens and thereby play a positive role in restoring the Estate's biodiversity. Data for monitoring and feedback to residents may be obtained from iNaturalist using the Brackenridge Estate project link.

## 5. Species observed during the field surveys

Analysis of data uploaded onto iNaturalist for Brackenridge Estate to date, plus additional casual observations during the two-day survey of the Estate (e.g. bird calls), yielded the following species counts (Appendix 1):

- Indigenous plants: 235 species in 66 families, with Asteraceae (Daisies) as the dominant family with 37 species, followed by Fabaceae (Peas) with 17 species and Celastraceae with 10 species.
- Alien plants: 39 species in 20 families, with Asteraceae and Fabaceae as the dominant alien plant families with 7 species each.
- Vertebrates: 2 frogs, 5 reptiles, 25 birds and 7 mammal species.
- Spiders: 4 species.
- Insects: 20 species.
- Fungi (including lichens): 7 species.

Note that the flora list is an under-representation of the Fynbos communities as most areas are moribund and in need of a burn. Fynbos species have a variety of life-histories, with some only appearing post-fire (e.g. Fire Lilies, annuals) and others only flowering and noticeable in the first few years post-fire (many geophytes). Other shrub and graminoid species have variable life-spans, with some dying back to the seed bank after 5 years, others 10 or 15 years. The most species-diverse phase in the fire-cycle is in the first five years post-fire when the majority of species are visible. All these groups were largely absent during the survey, and will need to be surveyed after the prescribed burns. Residents will be able to observe the most spectacular of the Fynbos flowering species during the first five years post-fire which to date have been dormant or non-flowering owing to the moribund state of the veld.

There are likely to be several Red List species, i.e., those species that are threatened with extinction according to the IUCN criteria, as many Fynbos species are range-restricted or have had their habitats greatly reduced through developments. A current list is maintained by the SANBI Threatened Species Unit (<http://redlist.sanbi.org/>). To date two threatened species have been observed on the Estate: *Selago villicaulis* (Dune Bitterbush; see also Kennedy (2023)) and *Ficinia*

*fastigiata* (Vlei Clubrush), both assessed as Vulnerable (VU). *Selago villicaulis* is fairly widespread, but the *F. fastigiata* was noted in a seepage area near the Forest Patch and is likely restricted to wetland habitats.

Season also plays a role as flowers and/ or fruits are needed to positively identify most plant species. There are many observations on iNaturalist that need identification to species level, but this will only be possible once photographs showing these diagnostic features are uploaded.

Note that animal lists are very preliminary. More than two days and special sampling techniques are required for comprehensive listings. It can be anticipated that a comprehensive insect listing, using a wide array of sampling techniques, will be about 5 times larger than the comprehensive plant list.

## **6. Environmental viability of a proposed solar plant**

Brackenridge Estate proposes to build a one hectare solar plant to supplement electricity supply from Eskom and mitigate the impacts of Eskom load-shedding.

In terms of flora conservation, the potential negative impacts of losing habitat to a solar plant could be high, as the vegetation comprises an Endangered Fynbos vegetation type which is typically species-rich. However, as discussed above, much of the vegetation is moribund and needs fire to reveal its full floral composition. It is currently not possible to identify the least sensitive area from a flora perspective.

From an ecological point of view the solar plant infrastructure would require protection from fire, therefore all flammable vegetation would need to be removed from within the solar panel area and from under any pylons or above-ground electrical wiring. Additional areas around the one hectare plant would need to be maintained as fire belts, further reducing the remaining natural area on the Estate and potentially complicating the ecological prescribed burning programme.

The proposed solar plant position lies west of the main entrance to the Estate in vegetation that is a mix of dense Fynbos and Thicket. In order to minimize the negative ecological impacts of such infrastructure, the plant should be located immediately adjacent to existing infrastructure and roads to reduce further fragmentation through the loss of natural remnant and the extent of fire belt required. Alternatively, using another small, fragmented remnant that cannot easily be maintained by fire for biodiversity conservation would minimize the long-term negative impact on the Estate's natural ecosystems.

## **7. Conclusions and recommendations**

I summarize the main findings and recommendations of the Brackenridge Estate biodiversity survey as a "SWOT Analysis".

### **Strengths**

- Assessment of the flora and vegetation as predominantly Endangered Garden Route Shale Fynbos, with small patches of indigenous Forest, shows the importance of the Estate for biodiversity conservation.



- The assessment revealed that for most areas, the moribund Fynbos has good potential for spontaneous recovery (i.e., passive restoration) once a suitable Integrated Fire and Invasive Species Management Plan is implemented.
- Implementation of the above plan will result in younger, less moribund Fynbos vegetation with lower fuel loads, thus simultaneously reducing risks of a severe wild fire occurring that could damage infrastructure.
- Implementation of the above plan will reveal plant community boundaries more clearly: among the different Fynbos communities, between Fynbos and Thicket-Forest communities and between Fynbos and Forest communities. Riparian communities currently are overwhelmed by invasive alien trees and the flood plain wetland is invaded by shrubs.
- Keen interest by residents in the natural biodiversity of the Estate was good to witness; such support will be essential to enable the implementation of the management plan and to encourage other residents who enjoy the outdoors to become volunteers in restoring the biodiversity and documenting its recovery.

### **Weaknesses**

- Currently it is not possible to accurately delineate plant community boundaries owing to the moribund state, and extent of invasion, of the Garden Route Shale Fynbos vegetation and wetland and riparian vegetation types.
- The lack of an implemented Operational Phase Environmental Management Plan (2021) for open space areas of the Estate to date, and especially an Integrated Fire and Invasive Species Management Plan, may have lulled many residents into accepting the current situation of moribund and degraded vegetation as “the norm”. There may therefore be some resistance to initiating the required changes in ecological management unless a concerted effort is made by management to raise awareness among the residents on the necessity to do so.

### **Opportunities**

- Contribute to South Africa’s national conservation targets by restoring the Endangered Fynbos and managing the Estate’s open areas to support biodiversity conservation as far as possible.
- Initiating invasive alien species control and ecological prescribed burning to trigger Fynbos recovery and displays of wild flowers not seen for several decades on the Estate. This should encourage more residents to take an interest in their local biodiversity and appreciate the need to implement actions to maintain the ecological processes, such as fire, to conserve this biodiversity.
- Brackenridge Estate membership of the “*Southern Cape Fire Protection Association, Plett South Fire Management Unit*” will facilitate cooperation among member organizations to assist in implementing the ecological and fuel reduction prescribed burns.
- Post-burn areas will allow for easier access to address issues such as erosion runnels, invasive alien species control, path maintenance etc.

### **Threats**

- Current high vegetation fuel loads resulting from woody tree and Thicket species invasions in Fynbos pose a risk to infrastructure in the event of a wild fire occurring during severe weather conditions.
- Insufficient resources allocated to implement an Integrated Fire and Invasive Species Management Plan would result in the status quo, or increasing invasion by alien trees, Thicket and Forest woody species, thus exacerbating the fire risks and loss of Endangered Fynbos

biodiversity. According to Planning Partners (2001) the Home Owners Association is responsible for raising the necessary funding as part of the levy system.

- Potential lack of support from residents to implement aspects of the Integrated Fire and Invasive Species Management Plan, e.g., fire belts cut against boundary fences, removal of flammable vegetation near houses, removal of invasive species in gardens, prescribed ecological burning of the Fynbos blocks.

## **Conclusion**

In order to address the main shortcomings of open space management, especially Fynbos management, it is recommended that an Integrated Fire and Invasive Species Management Plan be drafted as a subsidiary plan to the updated Environmental Management Plan and implemented as soon as possible. This plan will require inputs from the Estate Management, the Environmental Management Subcommittee and other stakeholders. It will be important to involve the Southern Cape Fire Protection Association in both the planning and implementation of fire management. Experienced operational alien control and Fynbos ecological burning contractors would need to be appointed to implement the plan.

## **8. Acknowledgements**

Brackenridge residents are thanked for their warm welcome and assistance in orientating me during the field survey. Thanks to Chris Meister, Steve Harcourt-Cooke and Debbie Constant for accompanying me in the field. Boet Grobler provided additional background information on Estate management and Steve Ritky communicated useful information on fire readiness and protocols. An initial meeting with Board Chairman Peter Hawkes and Board members Nico Westraat and Boet Grobler helped to put the project into perspective. Tony Rebelo assisted in species photography and identifications as well as setting up a Brackenridge Estate project on the iNaturalist platform.

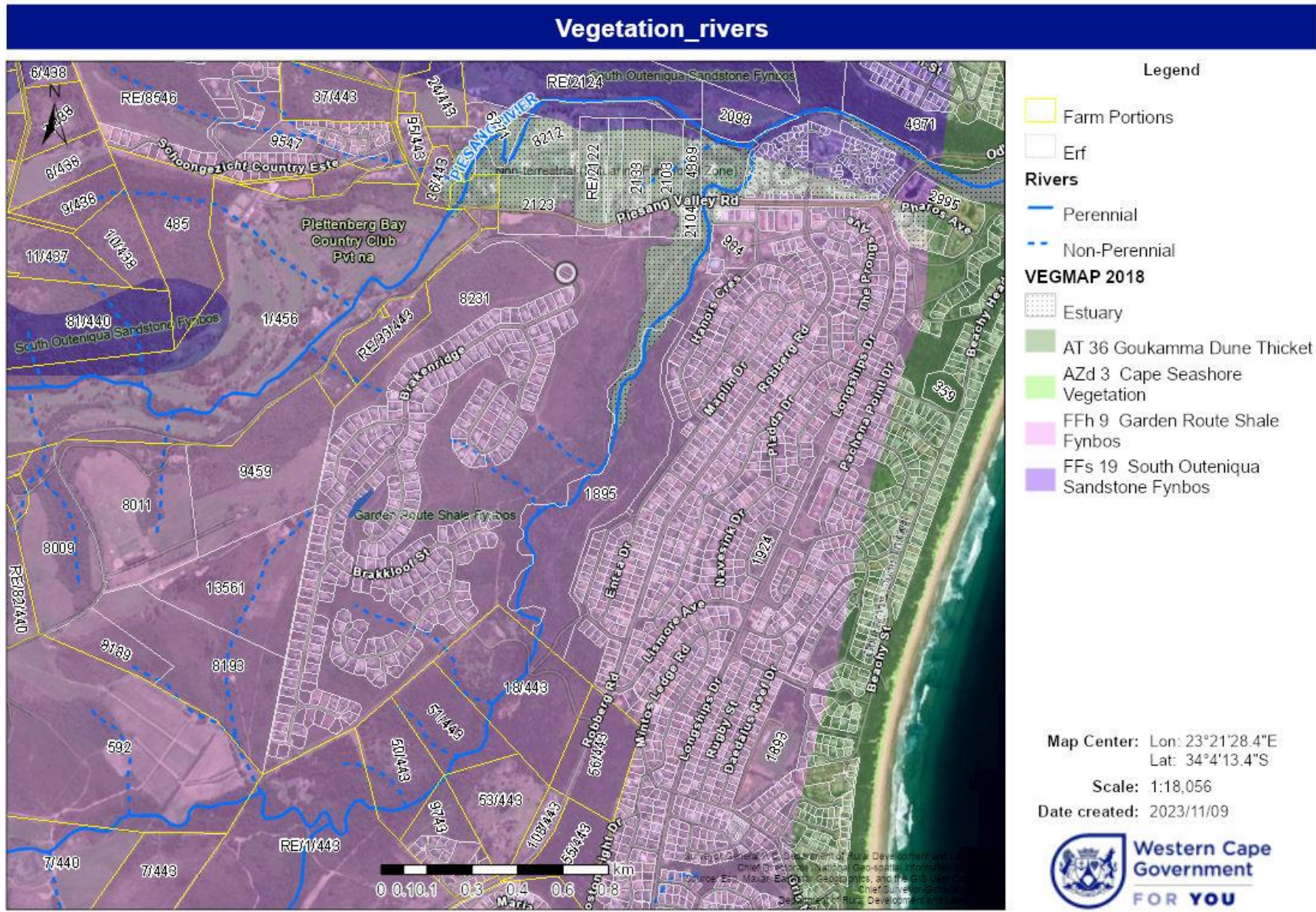
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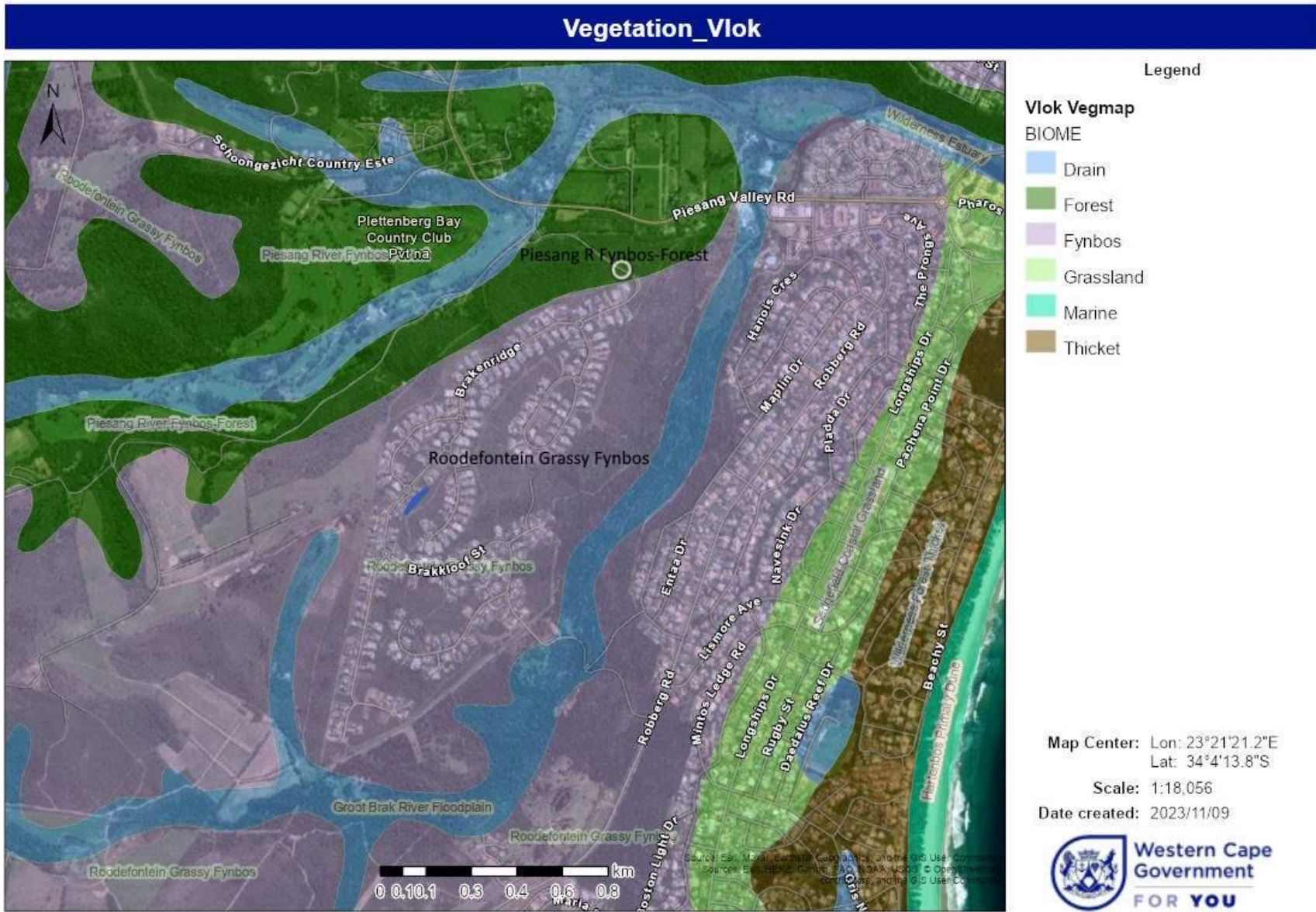
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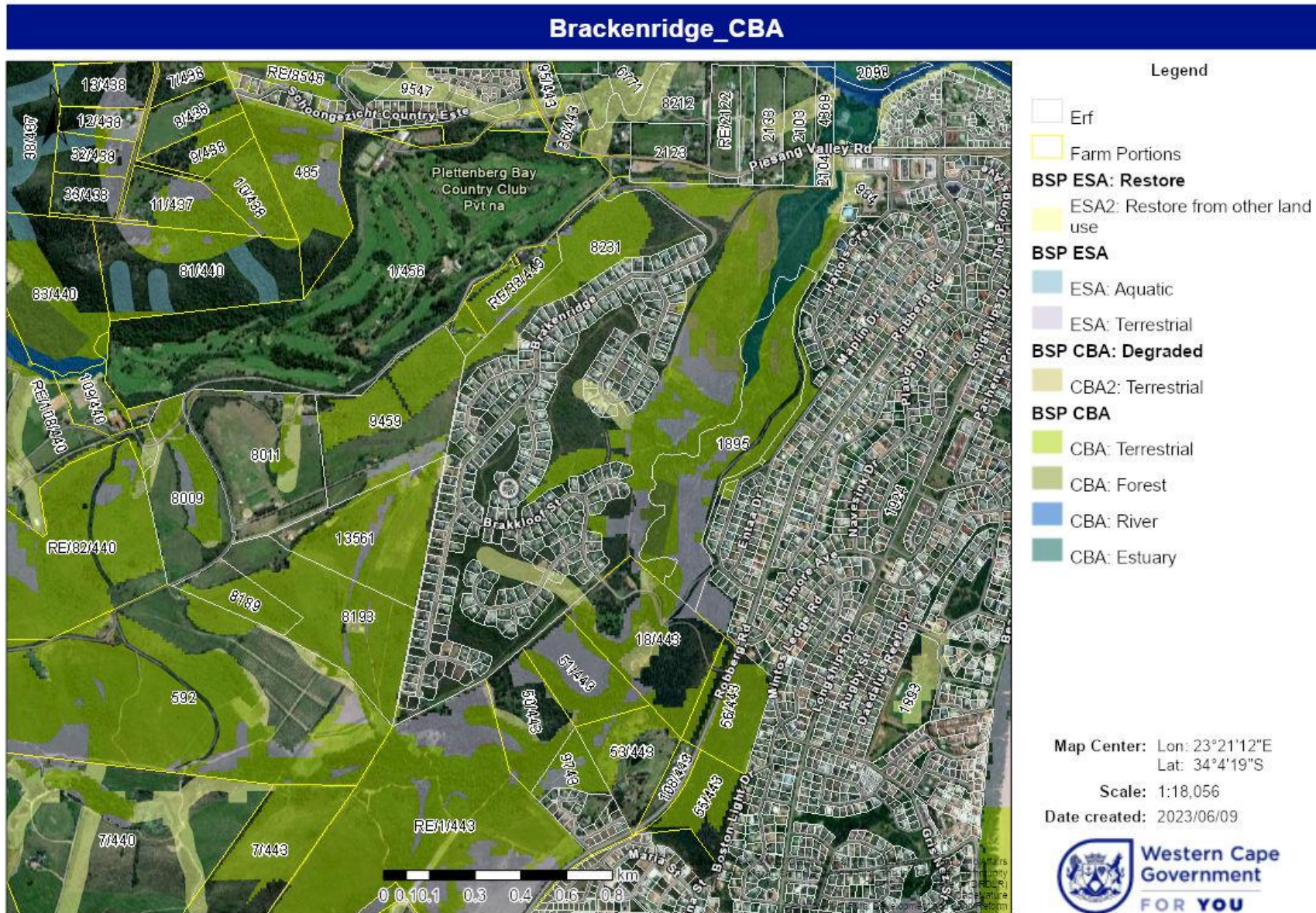
**Map 1. Extent of the Brackenridge Estate Project on iNaturalist, showing the main routes walked during the August 2023 survey. Green pins indicate plants, blue vertebrates, orange invertebrates and pink lichens or fungi that have been recorded.**



Map 2. Brackenridge national vegetation types and rivers: Terrestrial vegetation is Garden Route Shale Fynbos (pink); floodplain wetland mapped as estuarine.



Map 3. Vlok 2008 vegetation types: two terrestrial, Roodefontein Grassy Fynbos and Piesang River Fynbos-Forest Mosaic, and Piesang River Floodplain wetland.



Map 4. Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA) indicated on the Biodiversity Spatial Plan for the Western Cape.



**Map 5. A recent Google Earth image of Brackenridge Estate indicating the main vegetation blocks and plant communities identified in August 2023: orange = Fynbos; yellow = Forest; blue = wetland. Note that the western banks of the Klein Piesang River outside of the fence are also part of the Estate and historically would have comprised a Fynbos Riparian Scrub plant community.**



**Appendix 1. List of Plant, Animal and Fungi Species Recorded at Brackenridge Estate. Red List status:  
VU = Vulnerable**

<b>FAMILY</b>	<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>
<b>PLANTS - INDIGENOUS</b>		
Acanthaceae	<i>Acanthaceae sp.</i>	Acanthus family
Acanthaceae	<i>Dyschoriste costata</i>	
Acanthaceae	<i>Thunbergia alata</i>	Blackeyed Susan vine
Aizoaceae	<i>Carpobrotus deliciosus</i>	Delicious Sourfig
Aizoaceae	<i>Delosperma sp.</i>	Sheepfigs
Aizoaceae	<i>Tetragonia sp.</i>	Seacorals
Amaranthaceae	<i>Atriplex sp.</i>	Saltbushes
Amaryllidaceae	<i>Agapanthus praecox</i>	Bluelily
Amaryllidaceae	<i>Haemanthus sanguineus</i>	Smooth Bloodlily
Anacardiaceae	<i>Searsia chirindensis</i>	Red Currantrhus
Anacardiaceae	<i>Searsia crenata</i>	Bluefruit Currantrhus
Anacardiaceae	<i>Searsia glauca</i>	Blue Kunirhus
Anacardiaceae	<i>Searsia lucida</i>	Glossy Currantrhus
Anacardiaceae	<i>Searsia pallens</i>	Ribbed Kunirhus
Apiaceae	<i>Arctopus echinatus</i>	Landmine Bearpaw
Apiaceae	<i>Centella sp.</i>	Capepurses
Apiaceae	<i>Notobubon laevigatum</i>	Common Blisterbush
Apocynaceae	<i>Carissa bispinosa</i>	Num-num
Apocynaceae	<i>Cynanchum sp.</i>	Buckhorns
Apocynaceae	<i>Gomphocarpus physocarpus</i>	Balloonplant
Araceae	<i>Zantedeschia aethiopica</i>	Common Arum
Asparagaceae	<i>Albuca virens</i>	Green Tamarak
Asparagaceae	<i>Asparagus setaceus</i>	Common Asparagus Fern
Asparagaceae	<i>Eriospermum dielsianum</i>	Wool seeds
Asphodelaceae	<i>Aloe arborescens</i>	Krantz Aloe
Asphodelaceae	<i>Aloe ferox</i>	Cape Aloe
Asphodelaceae	<i>Kniphofia sp.</i>	Pokers
Aspleniaceae	<i>Asplenium rutifolium</i>	Buchu Spleenwort
Asteraceae	<i>Arctotheca prostrata</i>	Prostrate Capeweed
Asteraceae	<i>Athanasia dentata</i>	Tooth Kanniedood
Asteraceae	<i>Cineraria lobata</i>	Smooth Cineraria
Asteraceae	<i>Cotula australis</i>	Common Cotula
Asteraceae	<i>Delairea odorata</i>	Cape-ivy
Asteraceae	<i>Dicrothamnus rhinocerotis</i>	Renosterbush
Asteraceae	<i>Euryops virgineus</i>	Virgin True-Eye
Asteraceae	<i>Felicia aethiopica</i>	African Felicia
Asteraceae	<i>Felicia echinata</i>	Dune Felicia
Asteraceae	<i>Gazania linearis linearis</i>	Narrow Wedding Gazania
Asteraceae	<i>Gazania rigens uniflora</i>	Greenleaf Trailing Gazania
Asteraceae	<i>Gerbera sp.</i>	Gerberas
Asteraceae	<i>Helichrysum cymosum</i>	Fume Everlasting
Asteraceae	<i>Helichrysum dasyanthum</i>	Fynbos Everlasting

Asteraceae	<i>Helichrysum foetidum</i>	Stinking Everlasting
Asteraceae	<i>Helichrysum nudifolium nudifolium</i>	Yellow Hottentot Tea
Asteraceae	<i>Helichrysum petiolare</i>	Silver Everlasting
Asteraceae	<i>Hilliardiella capensis</i>	Blue-leaf Vernonia
Asteraceae	<i>Hilliardiella elaeagnoides</i>	Bicolour Vernonia
Asteraceae	<i>Hippia frutescens</i>	Scrambling Stinkals
Asteraceae	<i>Metalasia acuta</i>	Pointy Blombush
Asteraceae	<i>Metalasia densa</i>	Fynbos Blombush
Asteraceae	<i>Metalasia pungens</i>	Stink Blombush
Asteraceae	<i>Nidorella ivifolia</i>	Ovenbush
Asteraceae	<i>Oedera calycina</i>	
Asteraceae	<i>Osteospermum moniliferum</i>	Bietou
Asteraceae	<i>Osteospermum polygaloides</i>	Common Boneseed
Asteraceae	<i>Plecostachys serpyllifolia</i>	Petite-Licorice
Asteraceae	<i>Pteronia sp.</i>	Resin Daisies
Asteraceae	<i>Senecio deltoideus</i>	Climbing Ragwort
Asteraceae	<i>Senecio erubescens</i>	Blushing Ragwort
Asteraceae	<i>Senecio ilicifolius</i>	Kowanna Ragwort
Asteraceae	<i>Senecio purpureus</i>	Purple Ragwort
Asteraceae	<i>Senecio rigidus</i>	Hard Ragwort
Asteraceae	<i>Seriphium plumosum</i>	Common Snakebush
Asteraceae	<i>Tarchonanthus littoralis</i>	Coastal Camphorbush
Asteraceae	<i>Ursinia trifida</i>	Trifid Paraseed
Bignoniaceae	<i>Tecomaria capensis</i>	Cape Honeysuckle
Campanulaceae	<i>Delostemon sp.</i>	Twobract Lobelias
Campanulaceae	<i>Lobelia chamaepitys</i>	Flatpine Lobelia
Campanulaceae	<i>Lobelia coronopifolia</i>	Crownleaf Lobelia
Campanulaceae	<i>Monopsis unidentata</i>	Wild Oneye
Celastraceae	<i>Cassine peragua barbara</i>	Coastal Spoonwood
Celastraceae	<i>Cassine peragua peragua</i>	Forest Spoonwood
Celastraceae	<i>Elaeodendron sp.</i>	
Celastraceae	<i>Gymnosporia buxifolia</i>	Common Spikethorn
Celastraceae	<i>Gymnosporia nemorosa</i>	White Forest Spikethorn
Celastraceae	<i>Lauridia tetragona</i>	Climbing Saffron
Celastraceae	<i>Maytenus procumbens</i>	Dune Koko Tree
Celastraceae	<i>Pterocelastrus tricuspidatus</i>	Candlewood
Celastraceae	<i>Putterlickia pyracantha</i>	Bastard Spikethorn
Celastraceae	<i>Robsonodendron maritimum</i>	Dune Saffronwood
Colchicaceae	<i>Colchicum eucomoides</i>	Green Men-in-a-Boat
Crassulaceae	<i>Crassula multicava</i>	Fairy Stonecrop
Cyperaceae	<i>Cyperus textilis</i>	Mat Sedge
Cyperaceae	<i>Ficinia fastigiata (VU)</i>	Vlei Clubrush
Cyperaceae	<i>Ficinia marginata</i>	Common Annual Clubrush
Cyperaceae	<i>Fuirena hirsuta</i>	Hairy Hippo-Sedge
Cyperaceae	<i>Isolepis sp.</i>	
Cyperaceae	<i>Schoenus sp.</i>	Veldrushes

Cyperaceae	<i>Tetraria sp.</i>	Tetrars
Dennstaedtiaceae	<i>Pteridium aquilinum</i>	Common Bracken
Didiereaceae	<i>Portulacaria afra</i>	Common Spekboom
Droseraceae	<i>Drosera cistiflora</i>	Roseflower Sundew
Ebenaceae	<i>Diospyros dichrophylla</i>	Poison Starapple
Ericaceae	<i>Erica canaliculata</i>	Hairy Grey Heather
Ericaceae	<i>Erica discolor speciosa</i>	Garden Route Discolorous Heath
Ericaceae	<i>Erica glandulosa glandulosa</i>	Common Glandular Heath
Ericaceae	<i>Erica leucopelta</i>	Whiteshield Heath
Ericaceae	<i>Erica peltata</i>	Shield Heath
Ericaceae	<i>Erica scabriuscula</i>	Grit Heath
Ericaceae	<i>Erica sparsa</i>	Spartan Heath
	<i>Aspalathus angustifolia</i>	
Fabaceae	<i>angustifolia</i>	Common Spearleaf Capegorse
Fabaceae	<i>Aspalathus ciliaris</i>	Fringe Capegorse
Fabaceae	<i>Dipogon lignosus</i>	Okie Bean
Fabaceae	<i>Indigofera heterophylla</i>	Diverse Indigo
Fabaceae	<i>Indigofera poliotetes</i>	
Fabaceae	<i>Indigofera stricta</i>	Uniform Indigo
Fabaceae	<i>Indigofera stricta</i>	Uniform Indigo
Fabaceae	<i>Indigofera verrucosa</i>	Warty Indigo
Fabaceae	<i>Otholobium sp.</i>	Cape Dotty Peas
Fabaceae	<i>Podalyria myrtilifolia</i>	Myrtle Capesweetpea
Fabaceae	<i>Psoralea acuminata</i>	Longsepal Dottybea
Fabaceae	<i>Psoralea axillaris</i>	Violet-flash Fountainbush
Fabaceae	<i>Psoralea sericea</i>	Silky Dottybea
Fabaceae	<i>Rhynchosia caribaea</i>	Common Snoutbean
Fabaceae	<i>Tephrosia capensis</i>	Cape Hoarybea
Fabaceae	<i>Tephrosia grandiflora</i>	Grand Hoarybea
Fabaceae	<i>Virgilia divaricata</i>	Gardenroute Keurboom
Gentianaceae	<i>Chironia baccifera</i>	Christmas Berry
Gentianaceae	<i>Chironia tetragona</i>	Coastal Chiron
Geraniaceae	<i>Monsonia emarginata</i>	Rabas Dysentery-Herb
Geraniaceae	<i>Pelargonium alchemilloides</i>	Mantle Storksbill
Geraniaceae	<i>Pelargonium candicans</i>	Velvet Storksbill
Geraniaceae	<i>Pelargonium capitatum</i>	Common Storksbill
Geraniaceae	<i>Pelargonium grossularioides</i>	Coconut Storksbill
Geraniaceae	<i>Pelargonium lobatum</i>	Vineleaf Storksbill
Hypoxidaceae	<i>Hypoxis villosa</i>	Shaggy Stargrass
Hypoxidaceae	<i>Pauridia sp.</i>	Capestars
Iridaceae	<i>Aristea pusilla</i>	
Iridaceae	<i>Babiana sambucina sambucina</i>	Rock Sweet Bobbejaantjie
Iridaceae	<i>Bobartia aphylla</i>	Garden Route Rushiris
Iridaceae	<i>Chasmanthe sp.</i>	Cobralilies
Iridaceae	<i>Dietes sp.</i>	Wood Irises
Iridaceae	<i>Freesia leichtlinii</i>	Dune Kammetjie

Iridaceae	<i>Ixia orientalis</i>	Eastern Kalossie
Iridaceae	<i>Romulea rosea</i>	Rosy Froetang
Iridaceae	<i>Watsonia pillansii</i>	Orange Watsonia
Lamiaceae	<i>Coleus neochilus</i>	Mosquito Spurflower
Lamiaceae	<i>Leonotis leonurus</i>	Common Lionspaw
Lamiaceae	<i>Stachys aethiopica</i>	African Woundwort
Lauraceae	<i>Cassytha ciliolata</i>	Devil's Tresses
Linaceae	<i>Linum aethiopicum</i>	African Flax
Linaceae	<i>Linum africanum</i>	Half-mast Flax
Malvaceae	<i>Grewia occidentalis</i>	Common Crossbery
Malvaceae	<i>Hermannia flammea</i>	Flaming Dollsrose
Malvaceae	<i>Hermannia hyssopifolia</i>	Fat Dollsrose
Malvaceae	<i>Hibiscus trionum</i>	Flower-of-an-hour
Malvaceae	<i>Pavonia sp.</i>	Swampmallows
Metteniusaceae	<i>Apodytes dimidiata</i>	White Pear
Montiniaceae	<i>Montinia caryophyllacea</i>	Pepperbush
Myricaceae	<i>Morella humilis</i>	Shy Waxberry
Myrtaceae	<i>Syzygium cordatum cordatum</i>	Umdoni
Ochnaceae	<i>Ochna sp.</i>	
Oleaceae	<i>Chionanthus sp.</i>	Fringetrees and allies
Oleaceae	<i>Jasminum multipartitum</i>	Wild Jasmine
Oleaceae	<i>Olea capensis</i>	Black Ironwood
Oleaceae	<i>Olea europaea cuspidata</i>	African Olive
Oleaceae	<i>Olea exasperata</i>	Dune Olive
Orchidaceae	<i>Satyrium coriifolium</i>	Orange Satyre
Orchidaceae	<i>Satyrium longicolle</i>	Storksbill Satyre
Orchidaceae	<i>Satyrium membranaceum</i>	Membrane Satyre
Orchidaceae	<i>Satyrium parviflorum</i>	Devil Satyre
Oxalidaceae	<i>Oxalis algoensis</i>	Algoa Sorrel
Oxalidaceae	<i>Oxalis imbricata</i>	Tile Sorrel
Oxalidaceae	<i>Oxalis incarnata</i>	Forest Sorrel
Oxalidaceae	<i>Oxalis latifolia</i>	Garden Pink-sorrel
Oxalidaceae	<i>Oxalis purpurea</i>	Purple Sorrel
Oxalidaceae	<i>Oxalis stellata</i>	Star Sorrel
Peraceae	<i>Clutia sp.</i>	Cluts
Phyllanthaceae	<i>Lachnostylis hirta</i>	Coalwood
Pittosporaceae	<i>Pittosporum viridiflorum</i>	Cape Cheesewood
Poaceae	<i>Cenchrus clandestinus</i>	Kikuyu
Poaceae	<i>Cynodon dactylon</i>	Quick Grass
Poaceae	<i>Melinis sp.</i>	Red Tops
Poaceae	<i>Phragmites australis australis</i>	Common Reed
Poaceae	<i>Stenotaphrum secundatum</i>	Buffalo Grass
Poaceae	<i>Themeda triandra</i>	Red Grass
Podocarpaceae	<i>Afrocarpus falcatus</i>	Outeniqua Yellowwood
Polygalaceae	<i>Muraltia alopecuroides</i>	Foxy Purplegorse
Polygalaceae	<i>Polygala levynsiana</i>	

Polygalaceae	<i>Polygala myrtifolia myrtifolia</i>	Septemberbush
Polygalaceae	<i>Polygala virgata</i>	Broom Falsepea
Polygalaceae	<i>Polygala virgata</i>	Broom Falsepea
Pottiaceae	<i>Trichostomum brachydontium</i>	moss
Primulaceae	<i>Rapanea melanophloeos</i>	Cape Beech
Proteaceae	<i>Leucadendron salignum</i>	Common Sunshine Conebush
Pteridaceae	<i>Cheilanthes viridis</i>	Green Cliff Brake
Pteridaceae	<i>Pteris sp.</i>	Brakes
Ranunculaceae	<i>Clematis brachiata</i>	Travellers Joy
Ranunculaceae	<i>Knowltonia vesicatoria</i>	Common Burnleaf
Ranunculaceae	<i>Ranunculus multifidus</i>	Wild Buttercup
Restionaceae	<i>Elegia sp.</i>	Goldreeds
Restionaceae	<i>Hypodiscus aristatus</i>	Bristly Pineapplereed
Restionaceae	<i>Restio triticeus</i>	Wheat Capereed
Rhamnaceae	<i>Scutia myrtina</i>	Cat-Thorn
Rosaceae	<i>Cliffortia filicaulis</i>	Finestem Caperose
Rosaceae	<i>Cliffortia linearifolia</i>	Stream Caperose
Rosaceae	<i>Cliffortia serpyllifolia</i>	Tangle Caperose
Rosaceae	<i>Cliffortia stricta</i>	Staid Caperose
Rosaceae	<i>Rubus rigidus</i>	White Bramble
Rubiaceae	<i>Anthospermum aethiopicum</i>	Tall Flowerseed
Rubiaceae	<i>Burchellia bubalina</i>	Wild Pomegranate
Rubiaceae	<i>Canthium inerme</i>	Turkeyberry
Rubiaceae	<i>Galopina circaeoides</i>	
Rutaceae	<i>Agathosma apiculata</i>	Garlic Buchu
Rutaceae	<i>Agathosma ovata</i>	False Buchu
Rutaceae	<i>Coleonema pulchellum</i>	Sweet Capemay
Salicaceae	<i>Scolopia mundii</i>	Red Pear
Salicaceae	<i>Trimeria grandifolia</i>	Roundleaf Wild-Mulberry
Santalaceae	<i>Colpoon compressum</i>	Cape Sumach
Santalaceae	<i>Viscum capense</i>	Cape Mistletoe
Santalaceae	<i>Viscum rotundifolium</i>	Redberry Mistletoe
Sapindaceae	<i>Allophylus sp.</i>	
Sapindaceae	<i>Dodonaea viscosa angustifolia</i>	Sand Olive
Sapotaceae	<i>Sideroxylon inerme inerme</i>	Southern White Milkwood
Scrophulariaceae	<i>Buddleja saligna</i>	False Olive
Scrophulariaceae	<i>Chaenostoma sp.</i>	Skunkbushes
Scrophulariaceae	<i>Jamesbrittenia sp.</i>	Jaybees
Scrophulariaceae	<i>Nemesia sp.</i>	Lionfaces
Scrophulariaceae	<i>Oftia africana</i>	Lazybush
Scrophulariaceae	<i>Selago cinerea</i>	
Scrophulariaceae	<i>Selago corymbosa</i>	Stiff Bitterbush
Scrophulariaceae	<i>Selago villicaulis (VU)</i>	Dune Bitterbush
Stilbaceae	<i>Halleria lucida</i>	Tree Fuchsia
Stilbaceae	<i>Nuxia floribuna</i>	Wild Elder
Thelypteridaceae	<i>Cyclosorus interruptus</i>	Swamp Shield-fern

Thymelaeaceae	<i>Gnidia sp.</i>	Cape Saffrons
Thymelaeaceae	<i>Passerina corymbosa</i>	Common Gonna
Thymelaeaceae	<i>Passerina falcifolia</i>	Weeping Gonna
Thymelaeaceae	<i>Passerina rigida</i>	Beach Gonna
Thymelaeaceae	<i>Struthiola hirsuta</i>	Shaggy Capespray
Typhaceae	<i>Typha capensis</i>	Cape Bulrush
Vitaceae	<i>Rhoicissus digitata</i>	Baboon Grape
<b>ALIEN PLANTS</b>		
Asparagaceae	<i>Yucca gigantea</i>	Spineless Yucca
Anacardiaceae	<i>Schinus terebinthifolia</i>	Brazilian Pepper
Asteraceae	<i>Bidens pilosa</i>	Common Black Jack
Asteraceae	<i>Erigeron sumatrensis</i>	Tropical Horseweed
Asteraceae	<i>Helminthotheca echioides</i>	Bristly Oxtongue
Asteraceae	<i>Hypochaeris radicata</i>	Hairy Wild Lettuce
Asteraceae	<i>Sonchus asper</i>	Prickly Sowthistle
Asteraceae	<i>Sonchus oleraceus</i>	Common Sow-thistle
Asteraceae	<i>Tanacetum parthenium</i>	Feverfew
Brassicaceae	<i>Cardamine hirsuta</i>	Hairy Bittercress
Caryophyllaceae	<i>Cerastium glomeratum</i>	Sticky Mouse-ear Chickweed
Crassulaceae	<i>Kalanchoe delagoensis</i>	Mother-of-Millions
Fabaceae	<i>Acacia cyclops</i>	Redeye Wattle
Fabaceae	<i>Acacia mearnsii</i>	Black Wattle
Fabaceae	<i>Acacia melanoxylon</i>	Blackwood
Fabaceae	<i>Acacia saligna</i>	Port Jackson Wattle
Fabaceae	<i>Lathyrus sp.</i>	Sweet peas and vetchlings
Fabaceae	<i>Medicago polymorpha</i>	Bur Clover
Fabaceae	<i>Vicia sp.</i>	Vetches
Lamiaceae	<i>Coleus barbatus grandis</i>	Grand Woolly Plectranthus
Myrtaceae	<i>Eucalyptus sp.</i>	Gums
Nephrolepidaceae	<i>Nephrolepis cordifolia</i>	Fishbone (or Sword) Fern
Papaveraceae	<i>Fumaria muralis</i>	Wall Fume
Pinaceae	<i>Pinus pinaster</i>	Cluster Pine
Pinaceae	<i>Pinus radiata</i>	Monterey Pine
Plantaginaceae	<i>Plantago lanceolata</i>	Ribwort Plantain
Poaceae	<i>Avena fatua</i>	Wild Oat
Poaceae	<i>Cenchrus clandestinus</i>	Kikuyu Grass
Poaceae	<i>Cortaderia selloana</i>	Pampas Grass
Polygonaceae	<i>Persicaria sp.</i>	Snakeroots
Primulaceae	<i>Lysimachia arvensis</i>	Scarlet Pimpernel
Primulaceae	<i>Lysimachia loeflingii</i>	Blue Scarlet Pimpernel
Proteaceae	<i>Hakea sericea</i>	Silky Needlebush
Scrophulariaceae	<i>Myoporum laetum</i>	New Zealand Manatoka
Solanaceae	<i>Physalis peruviana</i>	Cape Gooseberry
Solanaceae	<i>Solanum mauritianum</i>	Bugweed
Verbenaceae	<i>Lantana camara</i>	Lantana

Verbenaceae	<i>Verbena bonariensis</i>	Purpletop Vervain
Verbenaceae	<i>Verbena incompta</i>	Purpletop Vervain
<b>INSECTS</b>		
Apidae	<i>Xylocopa flavorufa</i>	Giant Carpenter
Apidae	<i>Apis mellifera capensis</i>	Cape Honeybee
Nymphalidae	<i>Pseudonympha magus</i>	Silver-bottom Brown
Pieridae	<i>Pontia helice helice</i>	Southern African Meadow White
Gryllidae	<i>Cophogryllus sp.</i>	Mute Cricket
Monophlebidae	<i>Icerya purchasi</i>	Cottony Cushion Scale
Cecidomyiidae	<i>Dasineura rubiformis</i>	Black Wattle Gall Midge
Apidae	<i>Allodape sp.</i>	Colourful Stem Bees
Apidae	<i>Allodapula sp.</i>	
Cecidomyiidae	<i>Dasineura dielsi</i>	Rooikrans Gall Midge
Cecidomyiidae	<i>Dasineura rubiformis</i>	Black Wattle Gall Midge
Acrididae	<i>Acanthacris ruficornis</i>	Garden Locust
Lasiocampidae	<i>Bombycomorpha bifascia</i>	Barred Eggarlet
Scarabaeidae	<i>Hopliini</i>	Monkey Beetles
Cecidomyiidae	<i>Dasineura dielsi</i>	Rooikrans Gall Midge
Coccidae	<i>Ceroplastes</i>	Wax Scales
Termitidae	<i>Termitidae</i>	Higher Termites
Cercopidae	<i>Rhinaulax analis</i>	
Pentatomidae	<i>Antestiopsis thunbergii</i>	Antestia Bug
Lasiocampidae	<i>Bombycomorpha bifascia</i>	Barred Eggarlet
Apidae	<i>Allodape</i>	Colourful Stem Bees
Cecidomyiidae	<i>Cecidomyiinae</i>	Gall Midges
Lasiocampidae	<i>Eutricha bifascia</i>	Barred Lappet
Cerambycidae	<i>Litopus latipes latipes</i>	
Pyrgomorphidae	<i>Phymateus leprosus</i>	Leptous Milkweed Locust
<b>SPIDERS</b>		
Theraphosidae	<i>Harpactira</i>	Common Baboon Spiders
Theraphosidae	<i>Theraphosidae</i>	Baboon Spiders
Pisauridae	<i>Pisauridae</i>	Nursery Web Spiders
Sparassidae	<i>Palystes superciliosus</i>	Common Rain Spider
<b>AMPHIBIANS</b>		
Bufoidea	<i>Sclerophrys capensis</i>	Raucous Toad
Hyperoliidae	<i>Hyperolius marmoratus verrucosus</i>	Spotted Painted Reedfrog
<b>REPTILES</b>		
Scincidae	<i>Trachylepis homalocephala</i>	Red-Sided Skink
Testudinidae	<i>Stigmochelys pardalis</i>	Leopard Tortoise
Viperidae	<i>Causus rhombeatus</i>	Rhombic Night Adder
Colubridae	<i>Crotaphopeltis hotamboeia</i>	Red-lipped Herald
Viperidae	<i>Bitis arietans</i>	Puffadder

**BIRDS**

Muscicapidae	<i>Melaenornis silens</i>	Fiscal Flycatcher Southern Greater Double-collared Sunbird
Nectariniidae	<i>Cinnyris afer afer</i>	Southern Double-collared Sunbird
Nectariniidae	<i>Cinnyris chalybeus</i>	Common Fiscal
Laniidae	<i>Lanius collaris collaris</i>	Speckled Mousebird
Coliidae	<i>Colius striatus</i>	Common Cape Wagtail
Motacillidae	<i>Motacilla capensis capensis</i>	Cape Weaver
Ploceidae	<i>Ploceus capensis</i> <i>Chalcomitra amethystina amethystina</i>	Southern Amethyst Sunbird
Nectariniidae	<i>Streptopelia semitorquata</i>	Red-eyed Dove
Columbidae	<i>Sturnus vulgaris</i>	Common Starling
Sturnidae	<i>Melaenornis silens</i>	Fiscal Flycatcher
Muscicapidae	<i>Pycnonotus capensis</i>	Cape Bulbul
Pycnonotidae	<i>Andropadus importunus</i>	Sombre Greenbul
Pycnonotidae	<i>Melaenornis silens</i>	Fiscal Flycatcher
Muscicapidae	<i>Colius striatus striatus</i>	Cape Speckled Mousebird
Coliidae	<i>Motacilla capensis capensis</i>	Common Cape Wagtail
Motacillidae	<i>Ploceus capensis</i>	Cape Weaver
Ploceidae	<i>Numida meleagris coronatus</i>	Southern Helmet Guineafowl
Numididae	<i>Bubo africanus africanus</i>	African Spotted Eagle-owl
Strigidae	<i>Chrysococcyx klaas</i>	Klaas's Cuckoo
Cuculidae	<i>Bostrychia hagedash</i>	Hadedda Ibis
Threskiornithidae	<i>Laniarius ferrugineus</i>	Southern Boubou
Malaconotidae	<i>Tauraco corythaix</i>	Knysna Touraco
Musophagidae	<i>Zosterops virens</i>	Cape White-eye
Zosteropidae	<i>Buteo rufofuscus</i>	Jackal Buzzard
Accipitridae		

**FUNGI**

Clathraceae	<i>Aseroe rubra</i>	Star Stinkhorn
Coprinaceae	<i>Coprinus comatus</i>	Shaggy Inkcap
Cladoniaceae	<i>Cladonia confusa</i>	Fuzzy Reindeer Lichen
Parmeliaceae	<i>Usnea</i>	Beard Lichens
Raveneliaceae	<i>Uromycladium morrisii</i> <i>Lecanoromycetes</i>	PJ Gall Rust Common Lichens
Parmeliaceae	<i>Parmelioideae</i>	Typical Shield Lichens
Cladoniaceae	<i>Cladonia</i>	Pixie Cup Lichens

**MAMMALS**

Muridae	<i>Rhabdomys pumilio</i>	Cape Striped Fieldmouse
Herpestidae	<i>Herpestes pulverulentus</i>	Cape Grey Mongoose
Chrysochloridae	<i>Chrysochloridae</i>	Golden Moles
Bathyergidae	<i>Bathyergidae</i>	African Molerats



Suidae	<i>Potamochoerus larvatus</i>	Southern Bushpig
Suidae	<i>koiropotamus</i>	Wild Boar
Bovidae	<i>Sus scrofa</i>	Cape Grysbok
	<i>Raphicerus melanotis</i>	