
A Floristic Study of a Portion of the Pondoland Centre of
Endemism, Port St Johns, South Africa

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Abstract

A checklist of Port St. Johns with 1053 species, 582 genera and 164 families is presented. The flora is diverse at family and genus level, in contrast to the Drakensberg and Cape where fewer large families dominate the floras. An unusually large percentage of species at Port St. Johns is ferns (6%). In comparison with the Cape and Drakensberg, families from Port St. Johns that are surprisingly large are the Euphorbiaceae, Lamiaceae and Acanthaceae. Genera with unusually large numbers of species are *Plectranthus*, *Solanum* and *Hibiscus*.

Phytogeographic analysis of the Port St. Johns flora found that 3% of families are endemic to the Pondoland Centre of Endemism (PCE) or the eastern coastal region of South Africa including the escarpment, 2% are African and the rest range beyond Africa. At generic level one third are African, two thirds are cosmopolitan or widespread, 7% are South African and 3% are from the eastern coastal belt and the escarpment. Only two of the six genera endemic to Pondoland are found at Port St. Johns. At species level the flora of Port St. Johns can be considered to be a satellite of the PCE although fewer of the PCE endemics are present than at the other sites that were analyzed, probably reflecting the isolated position of the sandstone horst at Port St. Johns as well as the relatively small size of the sandstone outcrop.

Twenty-eight percent of the indigenous species represents elements endemic to the east coast of southern Africa and a further eleven percent range up the east coast and along the escarpment to the Soutpansberg. Another fifteen percent is widespread in southern Africa bringing the total confined to southern Africa to 55% of the species analyzed. One third of the species have distributions that range further north into Africa, representing a tropical African element. Ten percent range beyond Africa and amongst these there are much stronger generic and species links to the Old World than to Gondwana floras.

The area has been invaded by large numbers of aliens (about 10% of the flora) that reflect the most recent history of the area. The largest proportion of invaders is from South America and over half of the total are New World species. Aliens with the greatest

impact on the local vegetation are *Pereskia aculeata*, *Chromolaena odorata* and *Cestrum laevigatum*, a climber, a shrub and a small tree respectively. Alien plants are seen as the greatest threat to the indigenous plants at Port St Johns.

Analysis of the flora of the Pondoland Centre of Endemism (PCE) recorded 2253 species in the combined checklist of four sites (Port St. Johns, Mkambati, Umtamvuna and Oribi Gorge). Of these 196 species are endemic to Pondoland, representing 8.7% of the species, 15% of the genera and 26% of the families of the combined flora. Forty-four percent of the combined flora was only recorded from one locality (between 17% and 26% of each flora) and only 12% of the flora was present in all four localities. Of the endemics only sixteen (8%) occurred in all four sites thus each site had its own complement of unique endemics and 21% endemics were not recorded from any of the four sites. At species level the floras of Mkambati and Umtamvuna were the most similar, followed by that of Umtamvuna and Oribi Gorge. Port St Johns had the least in common with any of the sites, but more in common with non-neighbours Umtamvuna and Oribi Gorge than with its nearest neighbour Mkambati. Mkambati and Umtamvuna had the largest proportion of PCE endemics and Port St Johns had the lowest. The four sites are quite similar at family level, sharing thirteen families in the top ten family list between them, but much less similar at generic level.

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LIST OF ABBREVIATIONS

B	Berlin Herbarium
CFR	Cape Floristic Region
DAR	Drakensberg Alpine Region
FSA	Flora of southern Africa
FTEA	Flora of Tropical East Africa
FZ	Flora Zambesiaca
GRA	Selmar Schonland Herbarium, Grahamstown
J	Herbarium, Wits University, Johannesburg
K	Kew Herbarium
KEI	Herbarium, University of Transkei
MF	Msikaba Formation
NH	Natal Herbarium, Durban
NU	Herbarium, University of Natal
PCE	Pondoland Centre of Endemism
PRE	National Herbarium, Pretoria
PRU	Schweickerdt Herbarium, University of Pretoria
SAJB	South African Journal of Botany

1 CONTEXT, BACKGROUND AND LITERATURE REVIEW

1.1 CONTEXT OF THE STUDY

Early European explorers were the first to report the existence of related floras in continents separated by great oceans. Questions relating to the origin and composition of floras have subsequently intrigued the botanical community and with accumulation of fossil evidence of the antiquity of these relationships several schools of thought have arisen in an attempt to find explanations. The tasks of compiling inventories and the analysis of taxa and their patterns of distribution has been going on for centuries but is by no means complete, especially in the southern hemisphere.

Any floristic study is merely the observation of a phase in the development of a flora as there is no final end point in plant evolution, extinction and dispersal. Plants will always respond to external changes and natural selection will favour suitable variations. Meanwhile the processes of mutation, genetic drift and gene recombination will continue to produce new types regardless of external stimuli, which will then contribute by selecting and perpetuating the most advantageous of these new types. Simultaneously, the effects of climatic change, a pendulum of extremes in the last two million years, will shift the boundaries of individual species and, in changing these, reducing or even eliminating whole floras through the processes of extinction and dispersal.

Port St Johns lies at the mouth of the Mzimvubu River, in the Transkei region of the Eastern Cape Province of South Africa. It is an area of great natural beauty owed in large part to the extraordinary geological/geomorphological formations and the rich plant life. The flora has been known to be highly diverse for a long time but a complete inventory has not been attempted until now. Mt Sullivan and Mt Thesiger are outliers of the Msikaba Formation Sandstone, which is the underlying geology of the Pondoland Centre of Endemism (PCE). The substrate,

coupled with the geomorphology of the two mountains has created many different habitats and special niches. The location of Port St Johns along the eastern seaboard of southern Africa, a potential migration corridor and remnant of the boundary where continental plates sheared away during the breakup of Gondwana (Reddering pers. comm.), makes it an ideal site to study floristic clues to past vegetation history.

Port St Johns has been a popular holiday destination since the earliest European colonists arrived and there are currently plans for major new developments to cater for the expanding population and the tourist industry. Several areas have been claimed for informal settlements during the last decade and it is apparent that there will be increased pressure on the available land for further developments. As is true in many places, indigenous forests and grasslands will make way for urban and peri-urban spread. On a practical level, this study aims to highlight the uniqueness of the flora and hopefully to assist developers in their arduous task of planning for sustainable development in a rich and sensitive natural environment.

1.2 BIOGEOGRAPHY AND FLORISTICS

1.2.1 Evolution, Extinction, and Dispersal

There are three fundamental processes in biogeography: evolution, extinction and dispersal (Brown & Lomolino 1998)

The flora of a given area is not a random assemblage of taxa with similar ecological needs, but it displays patterns that are unique for that area. Thus the flora of tropical river basins may exhibit structural similarities, but for instance the species composition of the Amazonian and Congolian basins will be very different. The fossil record indicates that the flora of any given area has changed over time, presumably in response to the changing environmental conditions over the millennia. However, families and genera are generally old, the majority of

modern families having been in existence since the Tertiary (65 to 1.75 million years ago (Ma)).

It is clear that the distribution of any given plants species is not static even though the individuals are rooted in one place. At least one stage of the life cycle is mobile: seeds and pollen, or spores, are routinely dispersed away from the parent plant. The dispersal of propagules can be of three types, the first being dispersal of propagules within the area already occupied by the species (i.e. a process that takes place under normal circumstances and which accounts for the majority of dispersal events), the second being dispersal of propagules beyond the existing range of the species into contiguous habitat (i.e. that which results in range expansion) and the third type being the highly infrequent event when an existing barrier to dispersal is crossed (Myers & Giller 1988). The dispersal and distribution patterns of taxa have been disrupted over geological time by tectonic events and disjunctions have resulted. In addition, the migration of plants from one place to another raises an intriguing question that has generated much controversy: where are hypothetical places of origin of taxa and floras (Stott 1981, Myers & Giller 1988)?

A synthesis of the following sources of information is used to unravel the origin of floras: current distribution of taxa; taxonomic status; current and past ecological processes; historical distribution as seen in the fossil record; large scale geo-processes such as tectonic movements, eustatic changes in sea level, changes in climate and oceanic circulation; and local processes such as abiotic ones (fire, hurricanes, volcanoes) and biotic ones (evolutionary: adaptation/ speciation/ extinction; ecological: predation/ competition/ dispersal) (Myers & Giller 1988). Molecular evidence is being accumulated and in due course it may be possible to synthesize this data for an entire flora.

The identification of centers of origin is desirable in theory, but difficult and often suspect in practice (Stott 1981). Evidence is patchy and as evolution does not proceed logically, and can reverse trends depending on environmental cues, it

is difficult to interpret the fossil record. Accurate identification of fossil fragments has been a problem that is compounded by the uncertainty about the exact site where the live plants grew. Floods, wind and ocean currents can carry material for considerable distances thus reducing the value of locality information (Stott 1981). Micro-fossils, in particular, require sophisticated mathematical analyses before being acceptable as evidence. In addition, modern contamination of pollen has been found in southern African palaeontological sites (Scott, Anderson & Anderson 1997). Historical evidence needs to be corroborated from a variety of sources before being accepted.

1.2.2 Schools of biogeography

Biogeography is defined as ‘the study of organisms in a spatial and temporal context’ (Cox & Moore 1993) and several different schools of thought have arisen in an attempt to explain the present day distribution of organisms (Myers & Giller 1988).

- * Historical biogeography attempts to reconstruct the origin of taxa or floras (Brown & Lomolino 1998).
- * A branch of historical biogeography that interprets disjunction as evidence of jump dispersal over pre-existing barriers is known as dispersal biogeography.
- * Vicariance biogeography looks for distribution patterns of related taxa that suggest a common and simultaneous process of distribution. Panbiogeographers such as Croizat have outlined a number of dispersal tracks by analyzing large numbers of taxa from specific regions.
- * Hennig and other cladistic biogeographers use phylogenetic reconstructions to study origins of taxa (Myers & Giller 1988). Phylogeography (cladistic biogeography) has been given a large boost by the development of rapid genetic techniques that allow relationships to be traced between populations, species and higher taxonomic levels (Bermingham & Moritz 1998, Avise 1998, Baum *et al.* 1998).
- * Ecological biogeography ‘tries to account for distribution patterns in terms of interactions between organisms and their physical and biotic environment now and in the recent past’ (Myers & Giller 1988). Ecological Pattern

Analysis uses standard ecological association techniques to analyze inter-regional relationships (Conran 1995), and

- * Parsimony Analysis of Endemicity does parsimony analysis of distribution data (Conran 2000).
- * Narrative biogeography “constructs a hypothetical history for a taxon in isolation from other histories” (Linder & Crisp 1995).
- * Floristic plant geography aims to describe how current floras vary in composition, diversity and distribution patterns (Van Wyk & Smith 2001).
- * Modelling techniques offer a different approach to the study of plant distributions: statistical techniques are used to predict the potential distribution of problem species or to predict the effect of climate change on species distributions (Gibson 1995, Robertson, Caithness & Villet 2001).

Conran (2000) provides a concise overview of methods and literature used in the analysis of monocotyledon biogeography.

Brown & Lomolino (1998) consider it counterproductive to divide the field of biogeography into sub disciplines because both historical and ecological processes have influenced all patterns of distribution and diversity. More recent studies tend to use a synthesis of methods as described above (Bermingham & Moritz 1998, Avise 1998, Baum *et al.* 1998). It is also clear that phytogeographical studies can be approached from various viewpoints: narrow studies based on one or a few taxa, or diffuse studies that survey the entire flora of a region (many taxa).

1.2.3 Taxa and their distribution patterns

There are many definitions of the **species** concept, reflecting the questions that concern their authors. The result is that each definition can only be evaluated in terms of the purpose of a specific study (Templeton 1989). Cracraft (1989) argues that the species concept is mainly used for two different objectives: the first is to describe and catalogue biotic diversity and thus species are the “primary taxa of systematic biology”, while the second use is as “the basic entity of evolutionary theory”. However, there is no universal format for the

delimitation of species and each author draws an instinctive boundary between sets of related organisms when describing species. Comparison of species (and other taxonomic categories) is therefore to be done with caution, but in the absence of a more rigorous system, published species descriptions will be taken at face value to represent organisms that are roughly equivalent.

All **plant distributions** fall into one of three types according to Stott (1981): wide or continuous, broken or disjunct and local or endemic. These are all relative terms, which have to be interpreted in a particular context that should be stated. **Endemic taxa** are usually very rare plants with a narrow distribution pattern, and which characterize the floristic uniqueness of an area (Stott 1981). The use of endemics to compare floras can be misleading due to scale of area and also due to taxonomic relatedness. For instance, a taxon that is very similar to its nearest relative, found in the same area, should not carry the same weight as a taxon that is taxonomically (or phylogenetically) isolated from its nearest relatives especially if it is also geographically isolated from sister taxa. The terms neoendemic, palaeoendemic and holoendemic have been coined to describe different types of endemics. **Neoendemics** are taxa that have originated in the area in question, from which they have not spread and are assumed to have recent origins. **Palaeoendemics** are now confined to a smaller range than in the past whereas **holoendemics** are trapped in a small area due to the distribution of specialized habitat requirements (Van Wyk & Smith 2001). Cowling and Hilton-Taylor (1997) pose the question: are endemics a random assemblage with regard to habitat preferences, biological traits, phylogenetic lineages and age of origin? An attempt will be made to answer this relative to the flora of Port St Johns.

Floristic diversity is not spread evenly, but occurs in pockets of high diversity and endemism (Van Wyk & Smith 2001, Davis *et al.* 1994). The concept of an **area of endemism** has various definitions and different authors use different criteria ranging from :

- * the selection of boundaries to coincide with the distribution ranges of taxa with the narrowest non-overlapping ranges (Weston & Crisp 1994), to
- * a hierarchical model using parsimony analysis of endemism to aggregate quadrats into larger areas sharing at least two endemic species (Morrone 1994), to
- * the congruence approach which defines areas by approximate co-occurrence of large numbers of individual distributions (Crisp *et al.* 1995, Van Wyk & Smith 2001).

The evolutionary histories of individual taxa in an area of endemism may be very different and it is not possible to make any deduction as to their origin simply from current co-occurrence.

When populations of a taxon are widely separated geographically, whether or not suitable habitats exist between sites occupied by the taxon in question, the taxon has a **disjunct distribution**. The question of distance between populations has to be evaluated to decide whether two populations are disjunct. Scott-Shaw (1999) defines disjunct species as those where a distance greater than double the distribution range separates two subpopulations. Interpretation of cause and effect is difficult and controversial and similar disjunctions may be due to different causes. However, contemporary disjunctions are the result of historical events and though interpretations of the patterns are very complex they are not without some degree of underlying uniformity (White 1990). Under-studied areas may confuse the picture, but for some species the intervening areas have been adequately searched and they definitely have disjunct distributions.

Rarity and the potential for (or threat of) extinction are also relative terms and the meaning ascribed by the various publications that have been consulted to identify such taxa will be used. Scott-Shaw (1999) defines rarity as “a combination of abundance and distribution values, from a very narrow geographic distribution range with high abundance to a narrow range with low abundance to a broad (or wide) range with low abundance” Everard (1988)

provides a list of threatened plants of the eastern Cape, but does not define the term 'threatened'. Hall (1993) states "rarity has a variety of meanings ranging from locally endemic to extensive but thinly dispersed". Hilton-Taylor (1996) uses the IUCN Red Data categories (Davis *et al.* 1986) which are: Extinct, Endangered, Vulnerable, Rare, Indeterminate, Insufficiently known, Not threatened and No information to categorize the conservation status of over 4000 plants of southern Africa. Golding (2002) has revised the South African plant Red Data Lists using the new IUCN categories (IUCN 1994) and extended them to cover other southern African countries. The new categories do not use the term 'rare' but instead refer to threat of extinction. If a taxon has been listed as rare or threatened in a publication it will be categorized as such in this study. Taxa not listed in any publication, but satisfying the criteria as cited above were included. Rare taxa are not the same as endemic taxa, although a taxon could be both rare and endemic to a particular area. The concept of rarity is concerned with abundance whereas that of endemism is concerned with distribution range.

Vicariance refers to the situation where a specific area of distribution of a taxon is divided into two or more disjunct areas as a result of events such as continental drift or climatic shifts (Van Wyk & Smith 2001). A vicariance event for one species may have no effect whatsoever on another species so that one cannot generalize about floras. The resulting effects of the event will depend on the ecological tolerances of the affected species. It may not be a simple event, and the effects may be complicated or masked by continuing gene flow between populations as a result of intermittent long distance dispersal (Crisp *et al.* 1995).

White (1983) defines **relict taxa** as "taxonomically isolated, ecologically specialized and of restricted distribution". These taxa could also be called palaeo-holoendemic. The concept of **refugia** as geographic areas that have served as 'arks' for the survival of species during times of unfavourable environmental conditions was first put forward to explain the uneven spread of species in the Amazon basin (Lynch 1988). Initially the model focused on Pleistocene events as drivers in the process of range expansion and reduction in

tropical forest species, but it has been extended to include other geological periods and non-forest systems. Much debate about the validity of the theory has been generated, but the difficulty of testing it precludes a general consensus of acceptance or rejection (Lynch 1988, Huston 1994, Brown & Lomolino 1998). The intuitive nature of the model (Lynch 1988) makes it very appealing to view refugia as at least one option in the matrix of possibilities used to explain distributions of organisms.

Introduced species that spread and reproduce without the assistance of humans into natural habitats are **alien species**. Many of these have been deliberately introduced into an area for horticultural or agricultural purposes, but some are accidental introductions that then have the potential to colonize favourable habitats. The absence of competitors and natural enemies from their original territory may give them unfair advantage over local species (Richardson *et al.* 1997). This study recognizes a number of scenarios that could be viewed as if on a continuum with one extreme being alien plants that are present in the ecosystem as self-sustaining populations but in small numbers, and on the other extreme those that have a significant and detrimental effect on the ecosystem, the latter being called **invaders**.

1.2.4 Floras and their distribution

Patterns of plant distribution have usually been represented as hierarchical systems where smaller areas of relatedness are nested within successively larger areas (Takhtajan 1969). However, White (1983) has chosen to deviate from this in the description of the vegetation of Africa by isolating areas of high endemism surrounded by transition zones. These phytochoria as delineated by White (1983) have been validated by Linder (1998) after analysis of distribution patterns of a large number of species but Linder (1990) emphasizes that pan-African studies “illustrate the integrity of the African flora” a concept that stands in contrast to that of local areas of high endemism. McLaughlin (1992), after analysis of a large number of floras (101) of the western U.S.A. confirmed the hierarchical nature of these floristic areas. He explained his findings as follows:

The most likely explanation for the existence of a hierarchy of floristic areas is that it reflects geofloristic history. Vicariance events such as mountain building, glaciation, and climatic changes tend to divide biotas in a hierarchical manner. More recent vicariance events subdivide the biotas separated by previous events. We thus expect unrelated taxa in a region to show similar patterns of distribution if they have experienced the same geological-historical events that create barriers to dispersal, open migration routes, and shape ranges. This explanation requires that the different levels of the hierarchy have different ages: the smaller elements should be younger, and the larger elements should be older.

A related concept to refugia is that of **biodiversity hotspots**, which is conservation orientated. These are areas where 'exceptional concentrations of endemic species are undergoing exceptional loss of habitat' (Myers *et al.* 2000). Twenty-five such areas have been identified worldwide where 44% of all vascular plants and 35% of all species in four vertebrate groups occur on 1.4% of the land surface of the Earth. Requirements for inclusion are that at least 1500 plant species must be endemic to the area and at least 70% or more of the primary vegetation must be transformed. The aim of identifying these areas is to focus conservation efforts in areas that would conserve that largest number of species for the time, money and effort invested (Myers *et al.* 2000).

1.3 TAXONOMIC AND OTHER IMPEDIMENTS

It is difficult to classify plant life into distinct floras due to the problems of estimating floristic differences and relationships (Good 1974). There is no rigid or universal criterion for species limits, and this leads to author bias in defining these limits; thus comparison of species numbers must be viewed with some caution. Endemism is used as a measure of distinction between various floras but this concept does not help in deciding closeness of affinity; it only defines difference or distinctness (Good 1974). Endemism at different taxonomic levels is of interest and it is tempting to interpret it as giving an idea of the relative distance time-wise at which differentiation took place. No absolute statement can be made as the evolutionary clock of different taxa is obviously not the same, and any conclusion based on this would be gross speculation. It only expresses a greater degree of difference at taxonomic level.

Comparison of floras has the potential to be greatly influenced by information that is not yet available. Local floras vary in scope (total area and elevational range sampled), in the completeness of the sampling process, and in the accuracy of identifications (McLaughlin 1992). The limitations of current data should be duly noted and considered when interpreting statistical comparisons. Many areas of southern Africa are seriously under-collected whereas other areas have been intensively studied for more than two centuries. Compilation of inventories is a long-term activity and even in the areas in southern Africa that are considered to be well studied new species are still being documented. The number of species collected per quarter degree grid (Gibbs Russell 1987) in southern Africa has shown that there are gross discrepancies and an indication of this fact should be noted when comparing areas.

When floras from different sites are compared methodological problems could arise. Generally, diversity increases with size of area sampled until a stage is reached where it levels off or decreases (Brown 1988). Ideally one would only compare sites that are well collected and are of the same size, but in practice this is difficult to achieve as data are generally not complete and there are vast differences in scale of areas for which checklists have been compiled. A crude analysis, but one which is nevertheless being used as an indication of diversity, is the calculation of number of species per area (Cowling & Holmes 1992, Myers *et al.* 2000). Using this measure and interpreting the results must be done with a clear understanding of the methodological problems.

Biogeographic studies depend to a large degree on the recognition of differences between individual plants, expressed by the assignment to each of a species or infraspecific epithet. It also depends on the accuracy with which these names are applied. Both of these actions are fraught with difficulties due to the large flora of southern Africa and the lack of adequate herbarium material with which to compare rare taxa, i.e. the taxonomic impediment. In addition, recent and up to date taxonomic monographs are only available for a portion of the flora and in some cases the last monographs date back to the 19th century. There are too few

suitably qualified plant taxonomists to deal with the large flora of southern Africa and this has resulted in a lack of field studies with alpha taxonomy taking precedence in many cases. The recent revision of southern African *Gladiolus* serves as an example of the volume of basic taxonomic work that is ongoing and in many cases still waiting to be done. Lewis, Obermeyer & Barnard (1963) enumerated 103 species but after thirty-five years Goldblatt & Manning (1998) included an additional 60 species.

1.4 A BRIEF HISTORY OF THE BIOSPHERE, WITH SPECIAL REFERENCE TO THE EAST COAST OF SOUTHERN AFRICA

1.4.1 Geology

The theory of plate tectonics is now firmly established as a unifying paradigm for much of geology and biogeography (Brown & Lomolino 1998)

The earth, more than 4.5 billion years in age, has a surface that is in a continual state of change: continental masses can be separated into parts, or separate masses can be united; uplifting or subsiding of areas can take place; and latitudinal drift can occur (Raven & Axelrod 1974). These changes are generally slow and occur over very long periods, though volcanic activity can change landscapes abruptly. The geological development of an area plays a role in the subsequent development of landscape, soil type and climate.

Partridge (1997) identifies three major different geologic periods for southern Africa:

- * The first occurred during the Precambrian period, earlier than 540 million years ago (Ma) (Table 1) when a super-continent (Gondwana) encompassing South America, Africa, Antarctica, Australia, Arabia, Iran, New Guinea, New Zealand and India (Figure 1) assembled in the southern hemisphere.

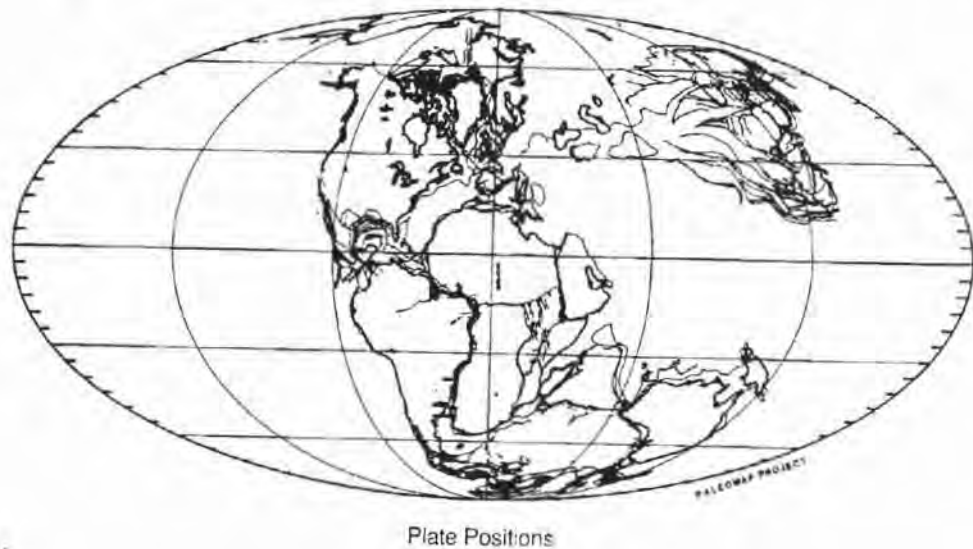


FIGURE 1. Gondwana as it is assumed to have appeared before the late Jurassic / early Cretaceous times (Behrensmeier *et al.* 1992)

- * The second occurred from the late Palaeozoic (540 Ma) to the mid-Mesozoic (135 Ma) as the super-continent drifted across the South Pole to a position in the subtropics. The sandstones of the Msikaba Formation, the underlying substrate of the study area (current extent shown in Figure 2) were formed during the Devonian (410 – 355 Ma) in a shallow, near-shore marine environment (Thomas *et al.* 1992) where they were deposited unconformably on intrusive granite and high-grade metamorphic gneiss of the Precambrian Natal-Namaqua Metamorphic Province (the oldest rocks of the Eastern Cape). The Msikaba Formation consists primarily of quartzitic sandstone (Hobday & Mathew 1974). Transkeian and Natal sandstones had been known as the 'Natal Group' and were considered the equivalent of the Palaeozoic Cape Supergroup (Table Mountain Group) (du Toit 1939, Reddering pers. comm.). Thomas *et al.* (1992) distinguish between the sandstones in Transkei and southern Natal (marine-deposited) and that of the rest of Natal (river-deposited) and suggest that "Natal Group" be used to refer

PHANEROZOIC	CENOZOIC	QUATERNARY		recent - 0.1	HOLOCENE	
				0.1 - 1.75	PLEISTOCENE	
		TERTIARY	Neogene		1.75 - 5.3	PLIOCENE
					5.3 - 23.5	MIOCENE
					23.5 - 34	OLIGOCENE
			Palaeogene		34 - 55	EOCENE
					55 - 65	PALEOCENE
					65 - 135	CRETACEOUS
					135 - 203	JURASSIC
	MESOZOIC		203 - 250	TRIASSIC		
			250 - 295	PERMIAN		
			295 - 355	CARBONIFEROUS		
	PALAEOZOIC		355 - 410	DEVONIAN		
			410 - 435	SILURIAN		
			435 - 500	ORDOVICIAN		
			500 - 540	CAMBRIAN		
		PRECAMBRIAN				

Table 1. Geological timetable (Ma) not to scale. Modified from Behrensmeier *et al.* (1992), and Van Wyk & Smith (2001)

to the latter and 'Msikaba Formation' to the former. Trace fossils (Hobday & Mathews 1974) and a lycopsid fossil from Port St Johns indicate that the Msikaba formation is about 365 Ma in age (Upper Devonian), thus about 150 million years younger than the Natal Group (Lock 1973, Anderson & Anderson 1985) and closely related to the Witteberg of the Cape Fold Belt (Thomas *et al.* 1992). A considerable time elapsed during which the Msikaba sandstone changed into hard quartzite as the supercontinent was positioned over the southern Polar Regions. Substantial erosion of the Msikaba Formation (at least 1 km) by continental ice sheets took place subsequently before glacial deposits known as the Dwyka Group were formed during the Permo-Carboniferous (355 – 250 Ma) (Reddering pers. comm.). The Dwyka formation consists of diamictite, a rock consisting of rock flour, sand, pebbles and cobbles, all produced by glacial scour. The Dwyka Group is lowermost of the Karoo Supergroup, which overlies the majority of the Eastern Cape with the Dwyka (glacial) conglomerate having its southernmost exposure just north of Port St Johns (du Toit 1939, Reddering pers. comm.). During the Permian (295 – 250 Ma) the Eccca (a deepwater lake deposit) and Beaufort (mostly river deposits) Groups were deposited over the Dwyka to complete the Karoo Supergroup. Organisms were fossilized in these systems, providing current evidence for the existence of the super-continent. The Karoo Supergroup was deposited until about 190 million years ago during the Jurassic when the volcanic basaltic lavas of the Drakensberg Group, making up the highlands of Lesotho and the northern part of the Eastern Cape, were extruded (Haughton 1969, Maud 1996).

* The third phase occurred from the Late Jurassic to the Early Cretaceous when the continents started to drift apart. Jurassic crustal extension subjected the whole Karoo Basin, including the study area, to igneous activity and dolerite intruded into the existing sediments. Dolerite is very common as sills in the Eccca and Beaufort Groups but is almost absent from the Msikaba and Dwyka Groups (Reddering pers. comm.). Large faults appeared along what are now continental margins and Africa rotated away

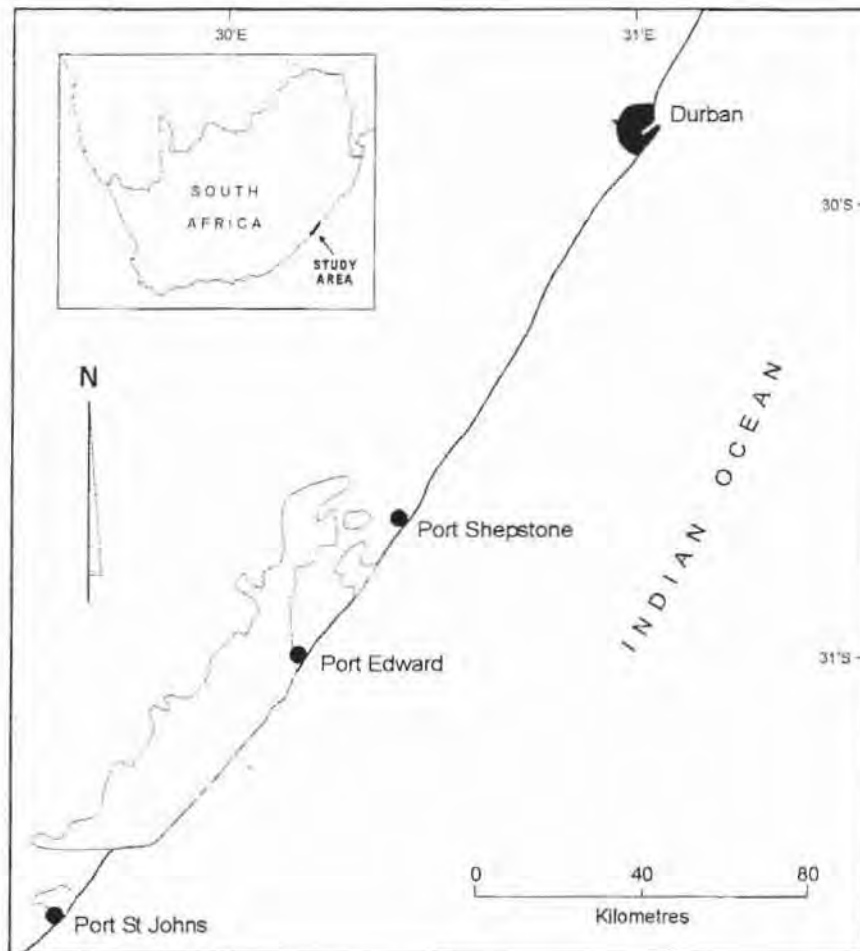


Figure 2. The Msikaba Formation (current boundaries)

from South America while Antarctica/Australia moved into a position closer to the South Pole between 129 and 121 Ma (Raven 1983, Partridge & Maud 2000). India separated from Africa by 100 Ma (Raven & Axelrod 1974). The fault that resulted in the separation of Africa from South America (the Agulhas-Falkland fracture zone) lies close to the edge of the narrow continental shelf off Port St Johns. Several other faults lying at an angle to the coast, such as the Egoza Faults that separate the Msikaba Formation from younger Karoo beds to the south and the faults that define the horst at Port St Johns, were formed during the same period (Reddering pers. comm.).

The southern portion of Africa has been isolated from South America far longer than the northwestern portion (Behrensmeyer *et al.* 1992) though initially (100 Ma) the Falkland Plateau and the Agulhas Plateau were in close contact (Pitman *et al.* 1993). The two South Atlantic plateaux seem to have remained adjacent to each other, blocking the opening of the South Atlantic to the Antarctic seas but probably without being an effective terrestrial migratory path between the two continents. The South Atlantic Ocean, lying between South America and southern Africa was a hypersaline inland sea surrounded by hyperarid land for the early part of its existence (Pitman *et al.* 1993). According to Coetzee (1993) Africa was effectively isolated by 84 Ma but Raven (1983) cites deep sea drilling evidence of possible shallow or emergent crust in the South Atlantic into the early Cenozoic (after 65 Ma).

It is clear that the geological history of the area, including the image of three or four major continental masses uniting to form a single supercontinent that was stable for aeons is largely speculative and some events and dates are in conflict with the overall theory of Gondwana. If the supercontinent was intact from the Precambrian to the late Mesozoic, and if the Msikaba Formation Sandstones were deposited in a shallow nearshore marine environment in the late Devonian, then the supercontinent had to have been breached by marine incursions, implying an open pathway to larger oceans at a time far earlier than commonly believed. Inland seas such as the early

South Atlantic tend to have high mineral concentrations, a fact that is not mentioned relative to the Msikaba Formation Sandstones.

During the Late Cretaceous and Early Cenozoic a level landscape developed in southern Africa that extended from the Great Escarpment to the sea (Reddering pers. comm.). Erosion from the interior of Gondwana down to sea level took place during this period, both by landward retreat of the escarpment and downward erosion. This exposed the Msikaba Formation north of the Egosa Fault, and the crest of the horst at Port St Johns. The Msikaba Formation resists weathering and erosion very well, unlike the surrounding Karoo Supergroup, and has probably had a flat land surface from Late Cretaceous times, although for most of this time it would have been below sea level. The flat tops of the two mountains at Port St Johns, Mt Thesiger and Mt Sullivan, are covered with marine deposits dating to the Miocene (23.5 – 5.3 Ma) (King 1963, Axerod & Raven 1978).

The margin of the continent was subjected to two episodes of uplift during the Neogene (23.5 – 1.75 Ma) (Partridge & Maud 2000, Haughton 1969), rising to 1800 m in the interior and 2350 m at the rift margins (King 1978). The first uplift occurred at ~ 18 Ma (150 – 300 m) and the second during the Pliocene (~2.5 Ma, 900 m) to form the eastern escarpment of southern Africa at a position some 120 to 150 km east of its present position (Partridge 1997). The coastal margins were flexed down towards the sea allowing steep gorges to be cut and products of erosion to accumulate offshore as marine sedimentary formations. The Msikaba Formation sandstones of the study area were not affected by this flexing and strata have remained in their original position (du Toit 1939). The series of vertical movements of the land, together with rising and falling of sea levels, occurred during the Late Tertiary and Quaternary along the east coast of southern Africa creating a series of wave-cut terraces. The uplift at 18 Ma would have exposed the Msikaba Formation above sea level for the first time, and the second uplift raised it even higher. At 380 m Mt Thesiger represents the highest point of

coastal uplift in southern Africa (Reddering pers. comm.). Lines of weakness in the Msikaba Formation, usually perpendicular to the coast, have been deeply dissected by impressive river gorges with spectacular waterfalls. The terrain has been mapped as table-lands and several flat plateaux step up from the coast to the inland margin. The uppermost plateau, lying between 250 m and 200 m a.s.l., is the largest.

1.4.2 Palaeoclimate

Of the three great natural patterns that dominate the earth's environment, viz patterns of climate, vegetation and soil, climate is inevitably perceived as the principal dynamic component and the obvious independent variable shaping the other two, especially vegetation, both at micro and sub-continental scales (Schultze 1997)

Schultze (1997) defines climate as the 'long range pattern of weather' and the most important climatic factors in vegetation development to be the interaction between light, temperature and moisture. Indirectly, climate influences soil conditions and fire, also major factors in vegetation development. Evidence of past climates is found in a variety of studies, many of them providing indirect evidence (pollen grains, glacial sediments, tree rings, etc). Direct evidence is only available for the most recent period, indicating that the following section is merely a reconstruction of past climate and not a factual account (Bell & Walker 1992). In addition, reconstructions of southern African climatic and biotic history are based disproportionately on an insufficient number of studies from sites that do not represent the whole area.

Causes of extreme variations in temperature and precipitation have been linked to solar output variations, geographical changes (mountain building events, ocean current variations, continental drift), atmospheric changes (volcanic dust, water vapour, carbon dioxide) and variations in the earth's axis and orbit (Bell & Walker 1992). Cycles associated with the earth's orbit, termed Milankovitch cycles, are periodic changes in eccentricity or ellipticity

of the orbit around the sun (period = 100,000 years), obliquity or orbital tilt of the earth's axis (41,000 years) and precession or pole wandering (22,000 years) (Brown & Lomolino 1998). The existence of these cycles assists in understanding and predictions of climatic patterns, including cycles of glaciation.

From the late Palaeozoic to the mid-Mesozoic the major girdles of world climate were similar to the current patterns (King 1978). During the Cretaceous the eastern part of southern Africa experienced a humid, tropical climate in spite of being some 14 degrees south of the present position (Partridge 1997, Tyson & Partridge 2000).

Significant cooling took place at the Cretaceous – Tertiary boundary (Figure 3) (Tyson & Partridge 2000). During this period massive volcanism in India had a major influence on global atmospheric movements (Partridge & Maud 2000). The early Tertiary seems to have been quite arid, but by the mid-Miocene (16 Ma) conditions became more humid. It seems as if the current east-west gradient of humidity of the subcontinent was established as far back as the early Cenozoic (Tyson & Partridge 2000).

The formation of the cold Benguela Current subsequent to the growth of the east Antarctic ice sheet at about 14 Ma reduced humidity during the Miocene. During two periods (5.1 to 4.2 Ma and 3.5 to 2.8 Ma) warming produced sea levels up to 110 m above current levels. By the late Pliocene a trend to warming ended with a major cooling at 2.8 Ma. Tectonic uplift of the east coast of southern Africa (700 – 900 m) at about this time caused increased rainfall to the east of the escarpment (Tyson & Partridge 2000). Warmer intervals seem to have had increased seasonality (Partridge 1997). Growth of ice sheets in the Arctic, coupled with variations in solar energy, exerted an influence on middle and low latitude climates. A period of repeated cycles of glaciation started during the Quaternary (Stott 1981, Axelrod & Raven 1978, Bell & Walker 1992, Partridge 1997). By 1.0 Ma a drier environment resulted

(Partridge 1997). In southern Africa glacial-age climate was drier and interglacial climate was wetter than present (Raven & Axelrod 1974, Livingstone 1993).

Evidence from European and North American studies show that local conditions did not always reflect global conditions, but that a general trend to cycles of cooling or heating was present in all sites surveyed (Bell & Walker 1992, Behrensmeier *et al.* 1992). The climate in the Cape seems to have been much milder with less severe swings than in Central Chile, southern Europe and North America where glaciers developed in the mountains. Goldblatt & Manning (2000) speculate that the large body of water to the south and west of the Cape would have had an ameliorating effect on the climate by preventing extreme conditions. It is probable that the warm Agulhas current that flows down the east coast of South Africa would have had an even larger effect by decreasing the temperature swings and maintaining rainfall patterns of the adjacent landmass.

At 125 000 BP the region experienced maximal global warming, with intermittent cooling thereafter (Tyson & Partridge 2000). The most recent glacial maximum occurred between 25 000 and 15 000 BP in southern Africa. Meadows & Linder (1993) postulate that the climate was cooler and drier than currently experienced. The climate changed rapidly after 15 000 BP and by 14 000 BP conditions were close to those experienced today. At 11 000 BP a sudden cooling took place, and then temperatures rose again (Tyson & Partridge 2000). A warmer and drier period occurred between 7000 and 4 500 BP and at 3 000 BP. At 2 000 BP and 650 - 370 BP two colder spells occurred, the latter called the Little Ice Age, after which warming took place again (Feely 1987).

Dramatic changes in climate were accompanied by changing sea levels, and levels somewhat higher and up to 125 m lower than current have been recorded during the past 140,000 years (Brown & Lomolino 1998). Rising or

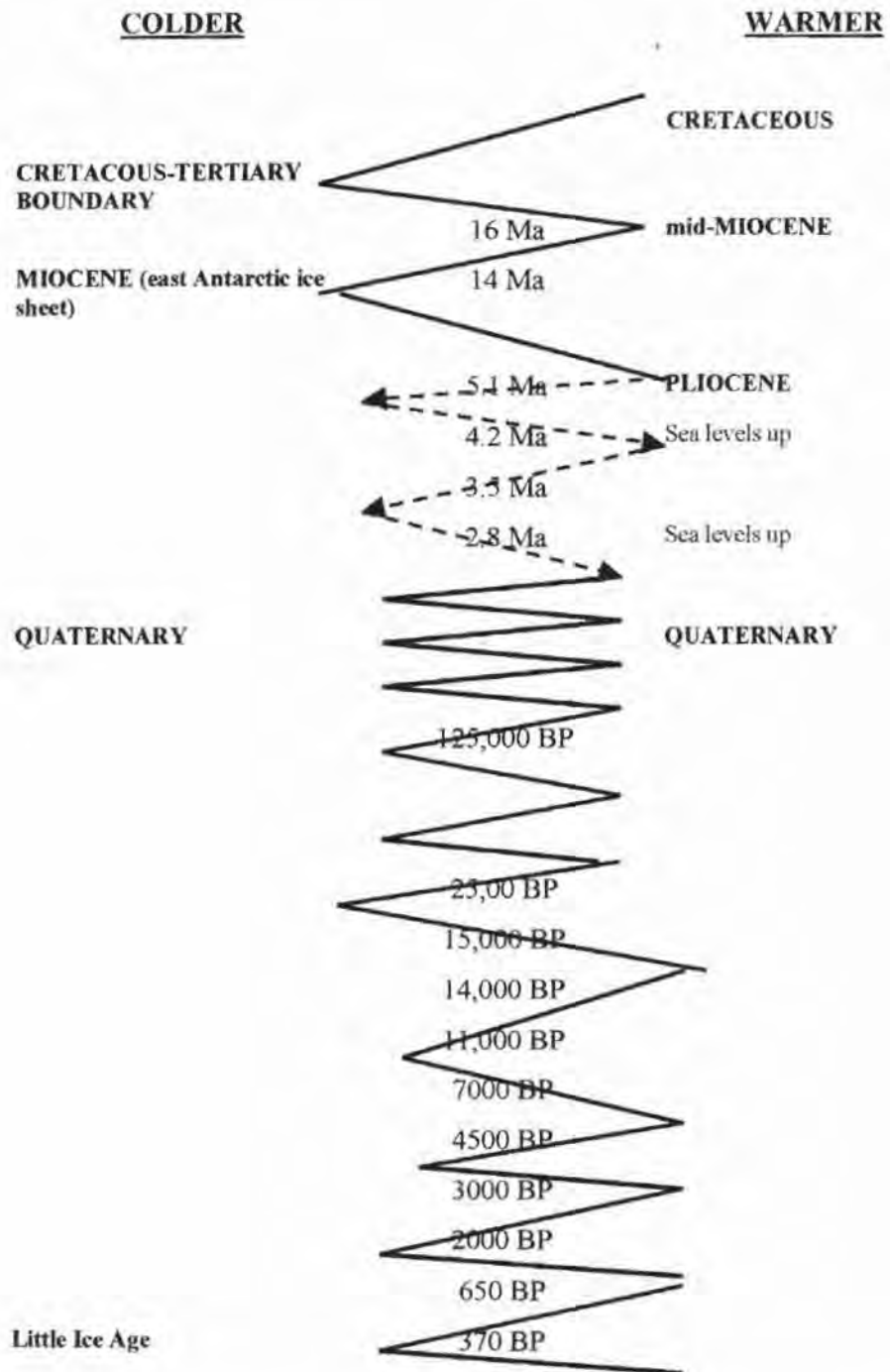


Figure 3. Graphical representation of climatic change over geological time (not to scale). The zig-zag line indicates climatic swings of greater or lesser magnitude and duration.

sinking of the land could also have effected local changes. In Transkei there are several terraces below 500m a.s.l. that are clearly abandoned marine terraces with the most extensive being the one at about 250 m above sea level. Feely (1987) speculates that this probably represents the landward margin of the continental shelf during the Neogene (23.5 to 1.75 Ma).

1.4.3 Vegetation history

The earliest life forms, including simple algae, came into existence more than three billion years ago. However, it was only after 600 Ma that multicellular organisms appeared in the fossil record (Levinton 1992). The earliest plant fossil assemblages imply that monospecific stands, or stands of low diversity, of herbaceous or semi-arboreal psilophytes and lycopods dominated the landscape but by 400 Ma a diverse land plant flora was in existence. In the same way as for the description of palaeoclimate, vegetation history is a reconstruction that makes many assumptions that are difficult to prove. One such is that taxonomic affinity between fossils and extant taxa implies that fossil relatives occupied the same ecological communities as their modern counterpart (Behrensmeyer *et al.* 1992).

Fossils from the later Paleozoic and the early Cretaceous give a good idea of the vegetation of Africa (Axelrod & Raven 1978). *Glossopteris* (seed fern) species were the dominant taxa of luxuriant forests in southern Africa during the Permian (295 to 250 Ma), with a shift from lycopods to Equisetales later during this period. Fossils from the Late Triassic (210 to 203 Ma) include ferns, cycads, ginkgos, gymnosperms and seed-ferns, found in a variety of vegetation types (Scott *et al.* 1997). Podocarpaceae first appeared during the Triassic, were abundant during the Cretaceous and declined during the Cenozoic (Bamford 2000). There is a very incomplete fossil record after the later Cretaceous and for the period 140–120 Ma little fossil evidence is available, mainly from the periphery of southern Africa: Bennettiales (cycad-like), ferns, cycads, and conifers have been recorded (Scott *et al.* 1997).

Many changes in floristic patterns were initiated during the Cretaceous. Angiosperm fossils dated to 100 Ma have been found (Scott *et al.* 1997), although Takhtajan (1969) speculates that the rise of angiosperms probably predates the Cretaceous (135 to 65 Ma) by several geological periods. Angiosperms came into existence before and during the breakup of Gondwana (Scott *et al.* 1997), an event that started at about 129 Ma and which by 64 Ma placed Africa 800 km from South America. The fossil record shows that the “most significant diversification of the angiosperms” happened during the mid-Cretaceous, and that the diversification of monocotyledons seems to have happened before the early Cretaceous (Gandolfo *et al.* 2000).

The late Cretaceous Mzamba beds on the border of Natal and the Eastern Cape have various gymnosperms and primitive angiosperm fossil trees, including Monimiaceae (*Xymalos*) which is mainly a South American family, as well as members of the Euphorbiaceae (Bamford 2000). Presumably there was much interchange between the constituent parts of the supercontinent before the breakup, and if modern dispersal events to isolated islands are an indication of possible past ones, there was considerable exchange of taxa even after the continents were quite far apart (Raven & Axelrod 1974, Baum *et al.* 1998). A majority of families, including many modern genera of angiosperms, had evolved by the Paleocene (65 to 55 Ma) when migration between Africa and South America, and Africa and Southeast Asia was still possible (Raven & Axelrod 1974, Raven 1983). Fossil records of the Late Cretaceous and Early Tertiary include 139 extant families (Coetzee 1993). However, at this stage cycads, cycadeoids, conifers and ferns still dominated fossil assemblages. The first macroplant angiosperm fossils from southern Africa, dated to the mid Cretaceous, are from a site in Botswana (Bamford 2000).

Vegetation zones of the Late Cretaceous-Palaeocene (75-55 Ma) are assumed to have been simpler, with lowland rainforest covering most of north and

west Africa (which straddled the equator at this time); savanna-woodland occurring in west-central Africa and sub-tropic rainforest in the rest of central and south Africa, except for the southern tip which was covered by sclerophyllous woodland (Axelrod & Raven 1978). Members of some modern families have been found in several southern African sites dating to the Cretaceous, including those from Mzamba in eastern Pondoland. No fossil macro-plants of Palaeocene age have been found in southern Africa (Bamford 2000). A microflora from Namaqualand dated between 71 and 64 Ma suggests drier forest types but also contains Proteaceae, Ericaceae and Restionaceae, all fynbos elements. Asteraceous pollen from a core drilled off the Namib coast has been dated to be of Eocene (55 to 34 Ma) age, earlier than the time when this family is commonly believed to have spread over the world (Scott *et al.* 1997). This implies either an African origin for the family, or an error in dating procedures, or that biogeographic theory about the spread of the family needs to be revised. An Eocene deposit from Namibia contains fossil woods of Balanitaceae, Burseraceae, Euphorbiaceae, Lauraceae, Leguminosae and Myrtaceae (Bamford 2000).

By the Oligocene-Miocene (30-25 Ma), Africa seems to have had a rich and diverse flora in largely humid forests (montane, lowland, and temperate rainforest) but macro-plant fossils are rare and vegetation scenarios are highly speculative. Sclerophyllous vegetation had shifted up the west coast of southern Africa and appeared along the Mediterranean highlands. The area previously occupied by sclerophyllous vegetation was then covered in temperate rainforest (Axelrod & Raven 1978, Behrensmeyer *et al.* 1992). These vegetation types represented the current southern African scenario but they differed in composition and exact localities.

The Neogene (Miocene-Pliocene) saw the development of the Benguela Current, which seems to have been responsible for triggering droughts that continued during Quaternary glaciations (Van Zinderen Bakker 1978), eliminating many taxa from the African mainland and leaving a relatively

impoverished flora (Raven & Axelrod 1974, Raven 1983, Linder *et al.* 1992). Other factors that are cited as contributing to the desiccation are tectonic uplift and Antarctic glaciation (Behrensmeyer *et al.* 1992). Sclerophyllous vegetation shifted inland along the West coast of South Africa, subtropic forest was spread along the south and east coast and the interior was covered by savanna-woodland. Rainforest and afro-alpine zones occupied montane areas. As the climate became drier, savanna, deciduous forest, thorn forest and sclerophyllous vegetation expanded. A major burst of speciation is assumed to have happened in response to the changing environment where many new niches opened up as a result of aridification and continental uplift (Axelrod & Raven 1978, Raven 1983, Linder *et al.* 1992, Scott *et al.* 1997).

Grasses spread rapidly during the past 18 Ma, and large grasslands developed all over the world (Behrensmeyer *et al.* 1992, Partridge 1997) especially after global aridification caused by the growth of high latitude ice-sheets between 3.0 and 2.6 Ma (Partridge & Maud 2000). There is some controversy over the age of contemporary southern African grasslands. Earlier ideas support the hypothesis that grasslands have spread greatly as a result of fire caused by humans, or by destruction of forests and woodlands (Acocks 1953). However, Meadows and Linder (1993) assert that Afromontane grasslands were widespread at least 12,000 BP, and consider the effects of climatic fluctuations to be greater than those of man. Pollen data supports the view that grasslands have been in their current localities since the Holocene and that they were often more widespread during the Pleistocene (Scott *et al.* 1997).

There are few studies that offer concrete data on the geologically recent (1.8 Ma) vegetation history of southern Africa, and even fewer that synthesize this data (Cowling 1983, Linder *et al.* 1992, Scott *et al.* 1997). It is apparent that glaciation-induced fluctuations in temperature, precipitation and seasonality caused considerable changes, especially at the southern end of the continent (Van Zinderen Bakker 1978). Pollen data suggests that moist forests were

widespread between 40 000 and 75 000 yr BP, but that a 5°C drop in temperature occurred by 18 000 yr BP and consequently vegetation zones were shifted downwards in altitude by about 1000 m, or northwards by up to 500 km. Rainfall was at a low point at 18 000 yr BP, as were temperatures by 14 000 yr BP, both showing a general increase since. By 7 000 yr BP biomes were more or less at their current positions, but small climatic fluctuations and consequent realignment of biome boundaries occurred throughout this period (Scott *et al.* 1997).

It is important to take note that the current distribution of a taxon is not necessarily the same as its past distributions (Stott 1981). In addition, a center of diversity cannot be assumed to be a center of origin for any taxon (Baum *et al.* 1998).

1.4.4 Edaphic conditions

Soil type has a marked influence on the flora it supports. Soil formation is a complex event that is influenced by parent material, climate, vegetation, soil fauna and time. Material from which a soil originates has often been processed by one or more cycles of weathering producing soils that are impoverished in minerals to a greater or lesser degree (Partridge 1997). Current vegetation patterns are more affected by present day climate, while soils are older, having been influenced by earlier climatic regimes, continental uplift, erosion and faulting (White 1983). Quartzitic sandstones give rise to infertile, acidic soils, which in South Africa are generally associated with floristic elements of the Cape Region. Limestone outcrops in the southern Cape support different plant associations with characteristic endemics (Goldblatt 1978, Goldblatt & Manning 2000). Soils derived from rocks with high levels of toxic minerals such as nickel, copper, and cobalt are likely to support many localized taxa (Brooks 1987).

1.5 VEGETATION, FLORA AND PHYTOGEOGRAPHY

The modern flora of the world has been grouped into a hierarchy of types by a number of authors (Good 1974, Tahktajan 1969). Six kingdoms, twelve subkingdoms and thirty-seven floristic regions have been delineated mainly at family level (Tahktajan 1969). It is apparent that the northern hemisphere flora is not as diverse as the southern hemisphere flora although it occupies a much larger land surface. The southern flora has been studied for less than 250 years while the northern flora has been recorded since the first written records (Good 1974). There is no doubt that indigenous peoples have used the southern flora since the earliest occupation of the area, but there has been no written, systematic record.

1.5.1 Africa

Africa has been classified into phytogeographical regions by a number of authors, the first being de Candolle in 1820. An overview by Iversen (1991) highlights the change from earlier hierarchical systems to that of White (1983) who did not use the traditional Kingdoms, Domains and Regions, which had sharply demarcated borders. White (1983) recognizes sixteen main vegetation types and eighteen major phytochoria in Africa. The scheme is built around the central concept of regional centres of endemism defined as having "more than 50 per cent of its species confined to it and a total of more than 1000 endemic species". There are seven regional centres of endemism: the Guineo-Congolian, Zambezi, Sudanian, Somali-Masai, Cape, Karoo-Namib and Mediterranean. Transition Zones or Regional Mosaics surround regional Centres of Endemism, and in addition, an Archipelago-like Centre of Endemism (Afromontane) and an Archipelago-like centre of Extreme Floristic Impoverishment (Afroalpine) are recognized (Fig. 4).

1.5.2 Southern Africa

Southern Africa has an exceptionally rich flora of which a very large number of taxa are endemic to the region. A total of 21 137 (> 60% endemic) indigenous species, 1930 (29% endemic) genera and 226 (8.7% endemic) families were

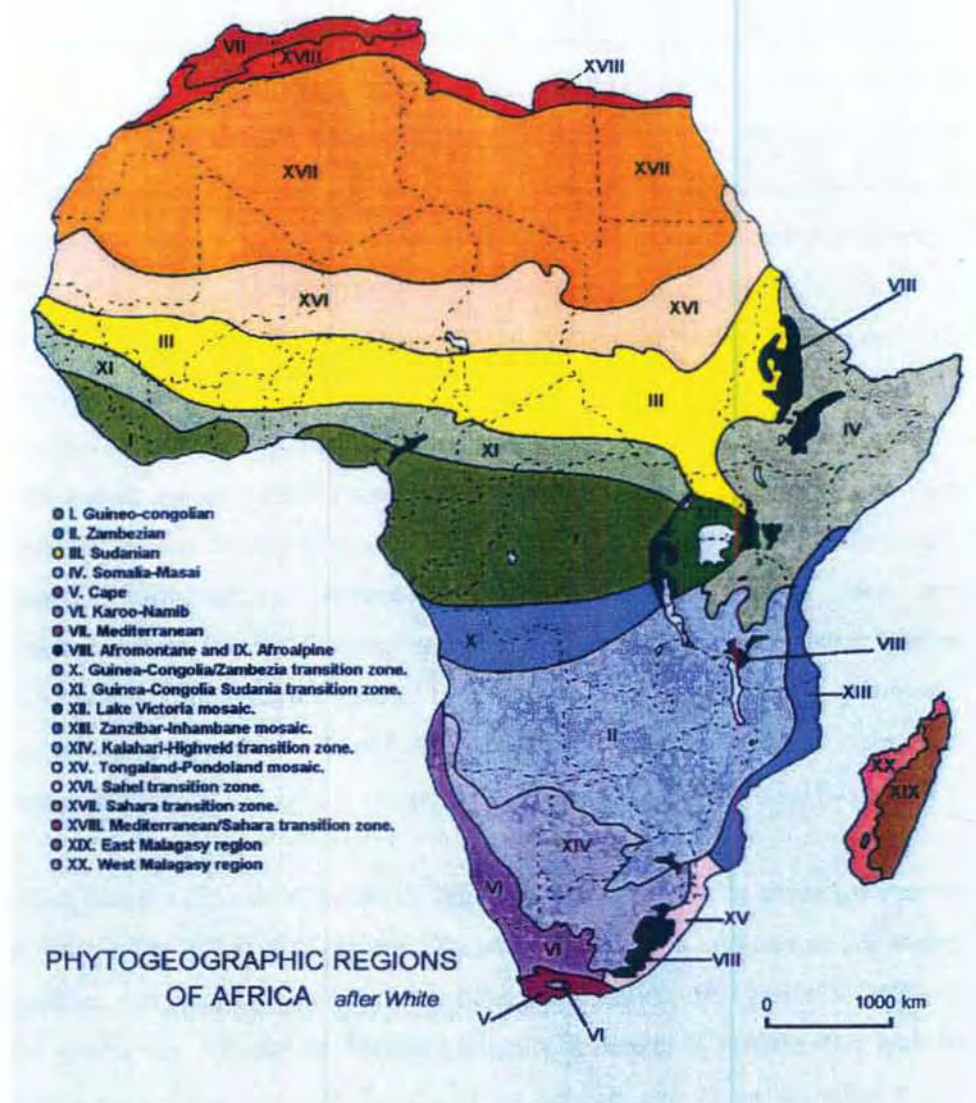


Figure 4. Phytochoria of Africa and Madagascar (after White, 1983).

recorded by 1993 (Arnold & De Wet 1993, Van Wyk & Smith 2001) and new species (mostly locally endemic) are continually being described. This is in contrast to other continental floras that are less diverse and with lower rates of endemism, and similar to island floras such as New Zealand and Hawaii (Goldblatt 1978, Cowling & Hilton-Taylor 1994, 1997). Species: genus ratios of southern Africa are the highest recorded worldwide and are on a par with oceanic islands. In addition, species density of the Cape region is one of the highest in the world (Cowling & Hilton-Taylor 1997). Ten to twelve families are endemic to southern Africa, the exact number depending on the taxonomy that one chooses to follow (Goldblatt & Manning 2000, Cowling & Hilton Taylor 1997). 560 genera are endemic to southern Africa and another 50 genera have their greatest species numbers there. The Asteraceae (> 80% endemic species), Mesembryanthemaceae, Iridaceae, Poaceae, Liliaceae *sensu lato* and Asclepiadaceae are the families with the largest numbers of endemic genera (Cowling & Hilton-Taylor 1997). Two families, the Asteraceae and Aizoaceae, contribute just less than 30% of South African species. The Fabaceae is the third largest family and has 74% of its species confined to the region (Goldblatt 1978).

Plant families found in southern Africa are mostly (76%) cosmopolitan or pantropical in distribution, as are 23% of the genera. In addition to the twelve families restricted to South Africa another ten families (5%) and 473 (25%) of the genera are African or African-Malagasy endemics. Ten families and 48 genera range from Africa to Eurasia, seven families and 23 genera range to the New-World and seven families and 23 genera are strictly austral or Gondwanan (Cowling & Hilton Taylor 1997).

Since early in the 18th century many attempts have been made to classify the flora and vegetation of southern Africa (Werger 1978). Acocks (1953) described 70 major vegetation types that have been widely adopted. White (1983) defined phytocoria based on floristic data and Rutherford & Westfall (1986) identified biomes on structural characteristics. Relatively recently the vegetation of southern Africa has been mapped and classified into seven biomes and 68

vegetation types (Low & Rebelo 1998). Van Wyk & Smith (2001) depart from the traditional classifications that attempt to be all-inclusive by mapping the flora according to areas of high endemism into three regions and 18 centres of endemism (Figure 5).

In a review of phytogeography, flora and endemism in southern Africa, Cowling and Hilton-Taylor (1997) conclude that endemism and species richness are higher in southern Africa than in tropical Africa and that the region is a distinct phytogeographical unit. They also find that there is a correlation between high species richness and high endemism. The rich flora of southern Africa is not evenly spread across the region but is concentrated in a number of smaller centres that are found mainly below the Great Escarpment (Cowling & Hilton-Taylor 1994, 1997).

It was recognized at an early stage of botanical exploration of the region that the Cape Region had a unique flora and this was the basis for according it Floristic Kingdom status while the rest of the subcontinent was included in the Palaeotropical Kingdom (Werger 1978, Good 1974). Subsequent authors have questioned the rank of Kingdom for the Cape, but all agree on the uniqueness of the large flora (9000 species, 68% endemics) (White 1983, Hilliard & Burtt 1987, Goldblatt & Manning 2000, Van Wyk & Smith 2001). In high lying areas the vegetation is characterised by sclerophyllous shrubs and evergreen graminoids belonging to the Restionaceae (fynbos), while renosterveld, which is dominated by *Elytropappus*, is found in the lowland areas. Afromontane forest occurs in wetter, protected sites and thicket is found along the eastern coast. There are seven endemic families and 198 endemic genera.

The Karoo-Namib regional centre of endemism as delineated by White (1983) has been defined more precisely as the Succulent Karoo Region including five Centres of endemism by Van Wyk & Smith (2001). A total of 5000 species of which 100 genera and 2000 species are endemic occur in the region. The area is

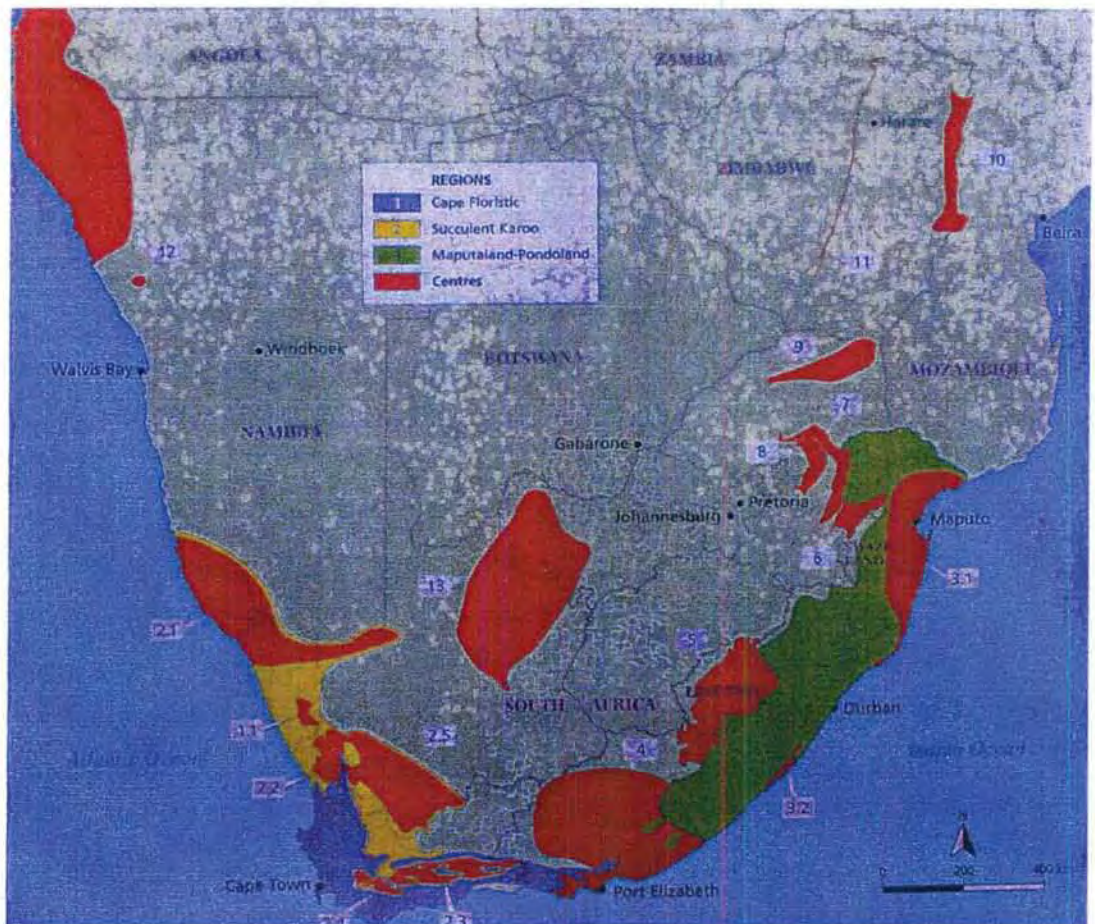


Figure 5. Regions and centres of endemism in southern Africa (Van Wyk & Smith 2001)¹

- | | |
|--------------------------------------|-------------------------------|
| 1. Cape Floristic Region | 4. Albany Centre |
| 1.1 Kamiesberg Centre | 5. Drakensberg Alpine Centre |
| 2. Succulent Karoo Region | 6. Barberton Centre |
| 2.1 Gariiep Centre | 7. Wokberg Centre |
| 2.2 Knersvlakte Centre | 8. Sekhukhuneland Centre |
| 2.3 Little Karoo Centre | 9. Soutpansberg Centre |
| 2.4 Worcester-Robertson Karoo Centre | 10. Chimanimani-Nyanga Centre |
| 2.5 Hantam-Roggeveld Centre | 11. Great Dyke Centre |
| 3. Maputaland-Pondoland Region | 12. Kaokoveld Centre |
| 3.1 Maputaland Centre | 13. Griqualand West Centre |
| 3.2 Pondoland Centre | |

very arid and 53.8% of the endemics are succulents. The vegetation is mainly dwarf succulent scrublands, with small areas of renoster-veld and fynbos.

White (1983) grouped all the montane "islands" of Africa into the Afromontane archipelago-like regional centre of endemism and the Afroalpine archipelago-like region of extreme floristic impoverishment on the highest ranges. In South Africa the eastern escarpment and the coastal forests (where latitude compensates for altitude) are included. At least 4000 species with a 75% endemic element have been recorded. Carbutt & Edwards (2001) provide an overview of literature pertaining to the Afromontane Phytochorion. Van Wyk & Smith (2001) delineate five montane areas in South Africa as Centres of Endemism i.e. the Drakensberg Alpine Centre, the Barberton Centre, the Wolkberg Centre, the Sekhukhuneland Centre (the last two possibly forming one centre with two sub-centres), and the Soutpansberg Centre. The Drakensberg Alpine Centre has 2200 species (18% endemic). It has strong floristic links with the Cape Region, as well as the Afromontane (sensu White) "islands" in Tropical Africa.

The extreme northern part of southern Africa falls in the Zambebian regional centre of endemism of White (1983). At least 8 500 species with some 54% endemics occur in the Zambebian region. There is a great diversity of vegetation types including dry forest, woodland, thicket, scrub woodland, and grassland. The closest floristic links are with the Sudanian Region. The vegetation is generally characterised by high diversity of Poaceae and Fabaceae (Cowling & Hilton-Taylor 1997).

The central parts of southern Africa are part of the Kalahari-Highveld regional transition zone (White 1983). Very few of the 3000 species are endemic. Four major phytochoria flank the Kalahari-Highveld zone, which has a complex vegetation profile.

White (1983) coined the term Tongaland-Pondoland Regional Mosaic for the eastern coastal region between Port Elizabeth and the Limpopo River, later

renamed the Maputaland-Pondoland Region, it encompasses the Maputaland, the Pondoland, and the Albany Centres of Endemism (sensu Van Wyk & Smith (2001)). Van Wyk & Smith (2001) also included the areas below 1800 m to the east of the Great Escarpment in KwaZulu-Natal and the northeastern part of the Eastern Cape in this region, which White (1983) had included in the Afromontane archipelago. Seven thousand species with about 25% endemism has been recorded in the region. The flora of the SE coast is essentially transitional between temperate and sub-tropical biological zones and numerous taxa have either their northernmost or southernmost distribution limits in this region (Van Wyk & Smith 2001). The vegetation is a mosaic of forest, thicket, savanna and grassland. Forest species have strong Zanzibar-Inhambane and Guinea-Congolian links, and xeric thicket in the southern part of the region has strong affinities with the Karoo-Namib flora (Cowling & Hilton-Taylor 1997).

1.5.3 Pondoland Centre of Endemism

The Pondoland Centre of Endemism (Figure 10, p 117) occurs in that part of the eastern coastal region of South Africa whose cultural identity is that of Pondoland, named after the Pondo people who occupy the area between Port Edward and the Umtata River. Confusion could arise as White (1983) designated the area between the Limpopo River and Port Elizabeth as the Tongaland-Pondoland regional mosaic, implying that the southern limit is at Port Elizabeth while Van Wyk & Smith (2001) have coined the term Pondoland Centre of Endemism for the area underlain by the Msikaba Formation which stretches from the Egosia Fault near Mboyti to the Mzimkulu River with outliers at Uvongo in the north and Port St Johns to the south. Hilliard (1994) includes sandstones north of the Msikaba Formation when she uses the term Pondoland Centre. The boundaries as defined by Van Wyk & Smith (2001) will be used in this study.

Van Wyk & Smith (2001) include the Egosso interval between the southern end of the main MF sandstones and Port St Johns in the Pondoland Centre. The geology of this area is complex and not strictly in accordance with their own definition of MF sandstone being the substrate underlying the system. Further

botanical exploration of this area should help to confirm or reject the inclusion of the Egosso interval in the PCE.

Soils in the Pondoland Centre have been mapped as sandy, dystrophic, highly leached and acidic with low available moisture capacity (Van Wyk & Smith 2001). Wood & Van Schoor's (1976) generalized soil map of the Transkei indicates red and yellow/brown soils with orthic epipedons on the sandstones. Hutton, Clovelly, Griffen, Kranskop, Magwa, Inanda and the cutanic Nomanci forms were identified. Rocky outcrops are a consistent feature of the landscape. CM Shackleton (1989) surveyed the soils of Mkambati Nature Reserve and identified the following three categories: deep soils with a well-developed subsoil; shallow undeveloped soils on rock; and coastal soils and sands. He found that the soil forms are generally arranged in a catenal sequence (Mispah – Clovelly – Pinedene/Katspruit – Champagne) and that most of the soils are sandy, acidic and dystrophic with few concretions. In addition the most extensive soil forms are Mispah (64.7%), Clovelly (15.9%) and Champagne (6.8%).

The climate is subtropical and humid with mild winters and warm summers. The warmest months are January and February and minimum temperatures occur during July and August. There is very little frost. Annual rainfall exceeds 1000 mm, the bulk of which falls in summer (September to April) but with no month without rain. There is a trend for rainfall to be higher along the coast than inland (Abbott *et al.* 2000). Rainfall maxima occur in two peaks, one in November and one in February-March. The weather systems are usually cyclonic but more convectional during summer. Relative humidity is high, ranging from a low of 60% to a high of 85%. Wind at Mkambati is predominantly from the southwest and northeast, with daily cycles of land and sea breezes (CM Shackleton 1989).

The earliest references to the unique nature of the flora of Pondoland are those of T.R. Sim :

Doubtless the flora is affected by the geological formations, which differ from those of the Transkei and Kaffraria ... There is thus a sandstone likely to bear what is usually recognised as a South Western flora in juxtaposition with the stratum bearing the normal Eastern flora.... This extraordinary medley of carroid and moisture-loving, temperate and sub-tropical, coast, alpine and intermediate plants, growing on the wind-swept flats above the rocks, at the bases of which are splendid forests containing an enormous number of species, and also showing a most unusual mixture of kinds which reach well inside the snow line on the Drakensberg, with others which are never found many miles from the coast, combined with the further medley created by the presence of a shale formation nearer St Johns renders the Egosa and neighbourhood botanically one of the most varied, interesting and instructive localities in existence (Sim 1900)

A belt of carboniferous Zuurberg sandstone extends from Grahamstown to the Fish River mouth and in a measure forms the western boundary of this region (the Eastern Region of the Cape Colony); it reappears east of Port St Johns and has an intimate relation to the very peculiar flora of the Egosa forest there (Sim 1907)

Acocks (1953), in a broad - based study of the agricultural potential of South Africa, mapped the vegetation of the Pondoland Centre as two types: below 300 m a.s.l. as Coastal Forest (veld type 1) and between 300 m and 450 m as Pondoland Coastal Plateau Sourveld (veld type 3). The first was based on the assumption that the grasslands were of recent anthropogenic origin. However, the vegetation is mainly dense grassland with forest patches in protected gorges and small patches of swamp forest in marshy areas of the grasslands. The grasslands are at least 10,000 years old (Feely 1987, Meadows & Linder 1993) and it is unlikely that the forests have been significantly larger than their current boundaries during that time, contrary to the perception that forest is the climax vegetation that has been destroyed by humans, a theory perpetuated by Acocks (1953). Grasslands above and below the 300 m a.s.l. boundary (as recognised by Acocks) are almost identical (SE Shackleton 1989). The grasslands are particularly dense (Acocks 1988) and can withstand a burning frequency of up to three times per annum (CM Shackleton 1989).

A preliminary report on the vegetation of a part of Pondoland, with recommendations for the establishment of a national park by Cawe *et al.* (1983)

cited vegetation units based on general observation and not on phytosociological analysis of plots as follows:

- Forest : tall closed forest
tall open forest
short closed forest
dune forest
marsh forest
mangrove forest
- Shrubland: *Acacia* shrubland
Protea shrubland
- Grassland: *Stenotaphrum secundatum* grassland
Themeda triandra grassland
Themeda-Aristida mixed grassland
Aristida junciformis grassland
- Other: *Cyperus* sedge community and
Prionium serratum community.

CM Shackleton (1989) studied the range in structure, species composition and the spatial distribution of the various grassland communities in Mkambati Nature Reserve. He sought correlations between these factors and biotic or abiotic factors for management purposes. The following vegetation types (and communities) were identified and mapped:

- Forest : dune
swamp
undifferentiated
mangrove
alien
- Scrub : *Stoebe-Athanasia*
Protea
alien
- Grassland : short
medium
tall
Aristida
- Terrace : *Strelitzia*
- Wetland : perennial
seasonal
reed
Prionium
streambank
beach pioneers

Shackleton found a strong correlation between the various grassland communities and specific edaphic and physiographic variables. For instance the *Tristachya leucothrix* – *Loudetia simplex* short grassland was associated with sandy soils of a lower nutrient status than the clayier soils of the *Cymbopogon validus* – *Digitaria natalensis* medium grassland community. These communities are extremely rich and up to 100 different species may be found in a 20 x 20 m patch in annually burnt firebreaks.

A survey of the forests of Transkei that recognized differences between coastal forests to the north and those to the south of Port St Johns was conducted by Cooper & Swart (1992). The Pondoland forests were given high priority ratings for conservation due to their rich and unique diversity of species. Cawe (1990) surveyed the timber potential of coastal forests in Transkei. The autecology of *Cymbopogon validus* in Mkambati was studied by SE Shackleton (1989) to “develop a predictive knowledge of the vital attributes and population dynamics to aid in management of the grass”. Prinsloo (2000) investigated the role of fire in the life cycle of *Leucadendron pondoense*, a Pondoland Centre endemic, in Mkambati Nature reserve.

Floristic surveys of Pondoland have been published for Umtamvuna (Abbott *et al.* 2000) and Oribi Gorge (Meter 1998). To date 1800 species have been recorded from the PCE with a 6.7% endemic or near-endemic element (Van Wyk & Smith 2001). The endemics include one monotypic family (Rhynchocalycaceae), six monotypic genera (*Dahlgrenodendron*, *Eriosemopsis*, *Jubaeopsis*, *Pseudosalacia*, *Pseudoscolopia*, *Rhynchocalyx*) and more than 130 endemic or near-endemic species of which about 100 are sub-shrubs and herbs. More than thirty of the endemics are woody species and many of these are believed to be palaeoendemics. Some of the endemics have a very restricted range, but some are widespread across the Pondoland Centre. Some endemics show a clear relationship with both the Cape flora and the Afromontane flora, these taxa tending to be the neoendemics (Van Wyk & Smith 2001). A comparison of species from Umtamvuna Nature Reserve and Oribi Gorge

Reserve showed that only 24% are shared and that only 40% of the Pondoland Centre endemics are common to both sites. Affinities of these two floras are with the Cape, Afromontane and tropical floras. The palaeoendemics appear to be the remnants of ancient floras that were probably forced out by geological and climatic changes (Meter 1998).

Carbutt & Edwards (2001) attempt to relate the floras of the Drakensberg Alpine Region (DAR) and the Pondoland Centre of Endemism (PCE) to that of the Cape Floristic Region (CFR), suggesting that the nutrient-poor substrates of both these areas are the critical link in the dispersion of Cape elements. They identify 52 genera that have a primary centre of diversity in the Cape and that are shared with the DAR and PCE, but only 14 of these that are shared between the CFR and PCE exclusively.

A.E. Van Wyk has been the driving force behind studies of the flora in Pondoland and he has tended to emphasize the uniqueness of the endemics. He has followed a convention that allows taxa that are centered in an area with only one or two outlying populations plus those that have a disjunct distribution to be classified as endemics.

2 AIMS AND OBJECTIVES

This study has arisen out of a desire to know more about the Port St Johns flora and the Pondoland flora, and how they are related to each other and to the regional flora. The primary data that was collected was for a critical checklist of Port St Johns, and in addition a less detailed set for a checklist of Mkambati Nature Reserve. Checklists from two published sources were used to facilitate the comparison of different sites in Pondoland. The study synthesizes existing collection data, adds new collection data, compares sites and attempts to establish relationships with other phytogeographic regions (floristic and narrative technique).

There are three aims:

Aim 1

Document the plants that occur at Port St Johns

Objective: Compile a checklist from as many sources as possible

Objective: Analyze the list for numbers of species, genera and families

Objective: Compare this list with other floras at a genus and family level

Aim 2

Analyze the phytogeographic relationships of the plant species in the checklist

Objective: Identify the endemics restricted to Port St Johns

Objective: Identify the PCE endemics at Port St Johns

Objective: Look for patterns of relatedness in distribution among the rest

Objective: Identify the Rare and Endangered component

Objective: Identify species with disjunct distributions.

Objective: Compare the checklist with others representing

1. The Cape Floristic Region
2. The Drakensberg
3. The Maputaland Centre of Endemism
4. The Tropical African flora

Objective: Identify the alien species

Aim 3

Analyze the flora of Port St Johns in the context of the PCE

Objective: Compile a checklist of Mkambati Nature Reserve

Objective: Compile a database comparing Port St Johns, Mkambati Nature Reserve, Umtamvuna Nature Reserve and Oribi Gorge Reserve

Objective: Compile a list of the known endemics of the PCE

Objective: Analyze the list of endemics

Objective: Analyze differences between sites

Objective: Determine PCE endemics not found in the four sites

Objective: Identify alien species

Objective: Calculate species density of the PCE flora

3 THE STUDY AREA

3.1 LOCALISATION AND EXTENT

Port St Johns lies at the mouth of the Mzimvubu River in the Eastern Cape Province of South Africa at 29°33'S 31°37'E. The area that was sampled (Figure 6) includes the two mountains on either side of the Mzimvubu River namely Mt Sullivan and Mt Thesiger, the area between the mountains and the sea, and the adjacent areas immediately influenced by the sandstone substrate. Figure 7 shows a vertical transect through the area marked B-C on Figure 6, clearly illustrating the summit, the vertical cliff faces and the steep flanks of both mountains. It is impossible to determine the exact surface area that was surveyed because of the many steep slopes of the sites. Values for projected/horizontal areas that can be cited are 2026 ha for Mt Thesiger Forest Reserve and 1835 ha for Mt Sullivan Forest Reserve (Mgudlwa, pers. comm.). However, not the full area of either Forest Reserve was surveyed as for instance Mt Thesiger Reserve includes Cakuba and Mgazi, which were outside of the study area, as they do not have Msikaba Formation sandstone as a substrate.

3.2 CLIMATE

Port St Johns has a warm temperate to warm and humid climate with mainly summer rainfall, but no month without rain. Rainfall data from the forest station on Mt Thesiger records that the yearly average is 1350 mm. 56% occurs between November and April in two peaks. (Figure 8) and a minimum of 38 mm is expected each month. Temperatures range between 13°C and 25°C, and there is no frost. The geomorphology leads one to postulate climatic variation over short distances, with definite rain shadows and some areas of exceptionally high rainfall. Relative humidity can reach 80% and does not drop below 50% (Cawe 1990).

3.3 GEOLOGY AND GEOMORPHOLOGY

The 'horst' of PSJ is a fault-bounded block of sandstone that has been split into two, now separated by the estuary of the Umzimvubu River, and rises to a height

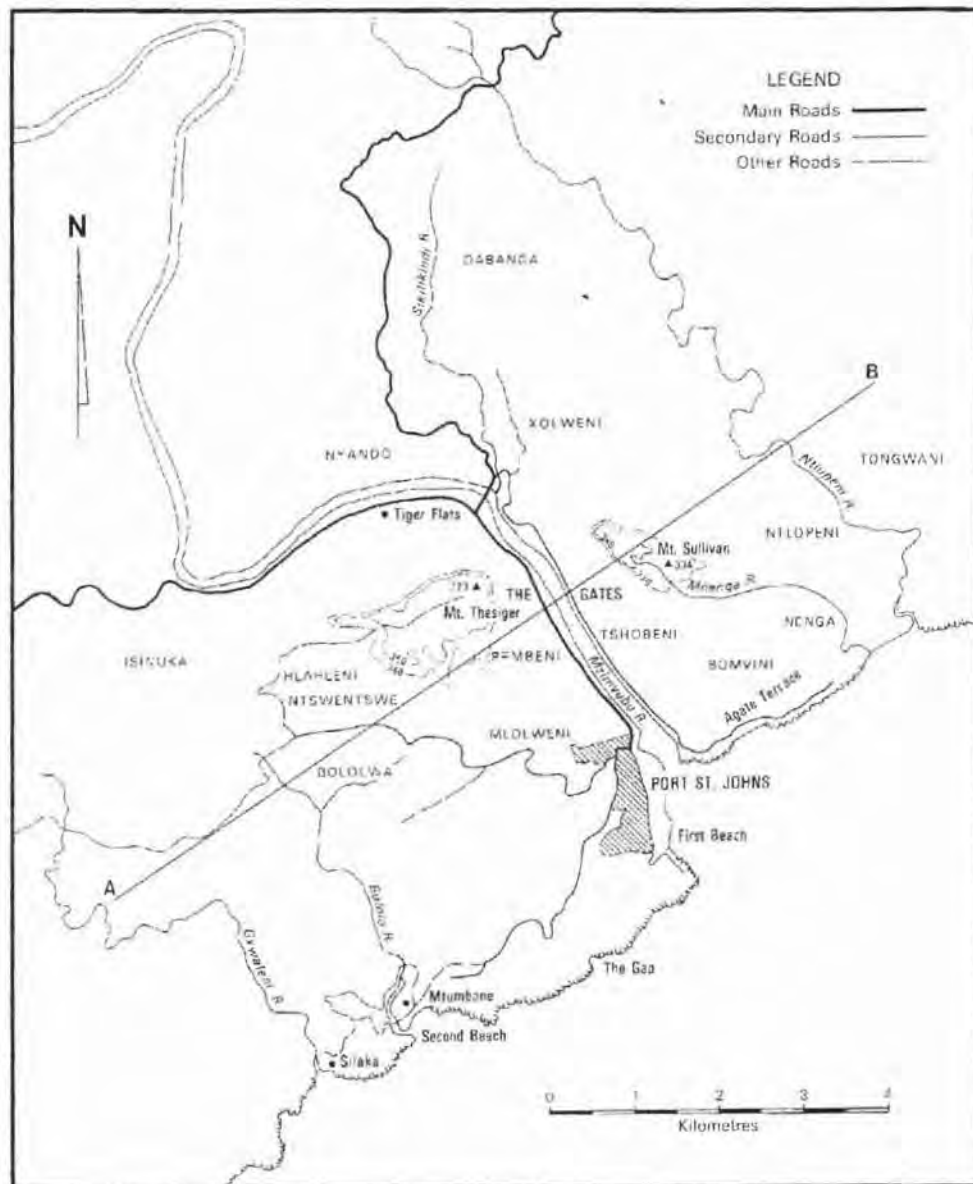


Figure 6. The study area at Port St Johns

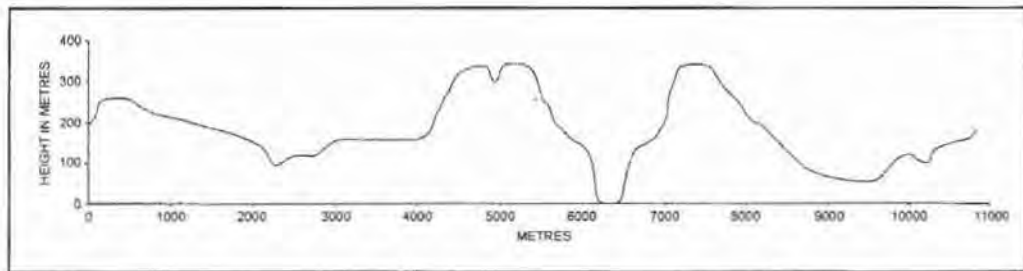


Figure 7. A vertical transect (A-B in figure 6) through the study area at Port St Johns

of 380 m above sea level. The sandstone strata lie nearly horizontally, whereas the Karoo beds on either side show a dip known as the coastal monocline. This implies that the St Johns block remained stable when warping of neighbouring strata took place during the Jurassic, because if it had been affected by the events that caused the coastal monocline and later thrust up there should be a seaward dip similar to the surrounding formations. The sandstones of Port St Johns are similar to beds of the main substrate north of the Egosa Fault (du Toit 1939, King 1963). Pockets of shale occur on the lower slopes of the mountains. A part of the study area that is mainly shale lies between Mt Thesiger and the sea. Shales are of Dwyka Formation or Eccca Group. The Dwyka Formation overlies the Msikaba Formation, and lies in contact to the north and east on both sides of the Mzimvubu River. This could show that the contact between the formations is glaciated (du Toit 1939, King 1963). In the south a fault contact brings the Msikaba Formation into lateral contact with the Eccca Group (formation unknown). The sandstone resists weathering much better than the surrounding shale and thus the Msikaba Formation sandstone block stands proud in the surrounding landscape (K. Reddering, pers. comm.).

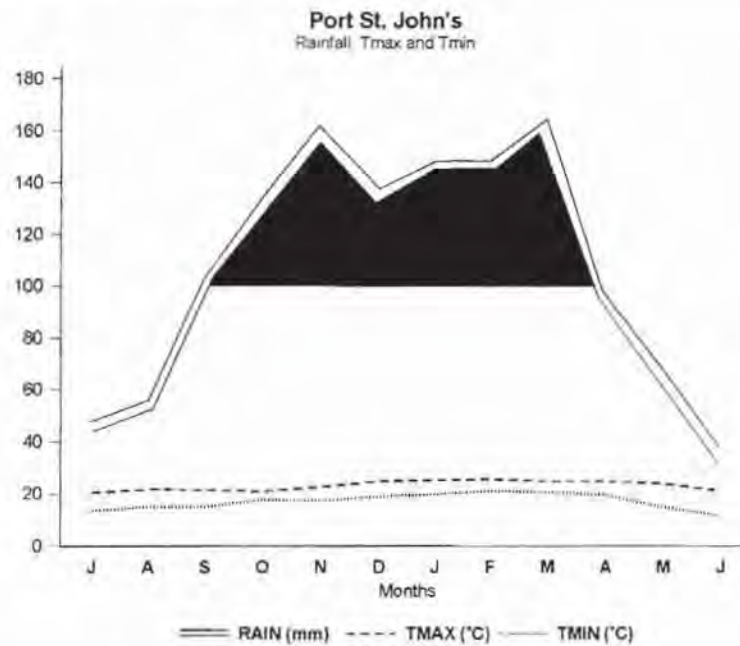


Figure 8. The climate of Port St Johns

3.4 SOILS

The soils of Port St Johns have not been mapped on a local scale and the geology, which in places changes over short distances, makes for soil profiles of some complexity. Soils derived from sandstone are shallow, sandy, acidic and poor in plant nutrients. Shales give rise to clayey soils. Both formations are sedimentary and consequently soils are impoverished, sandstone-derived soils more so than shale-derived.

3.5 VEGETATION

Forests, both moist and dry cover the slopes and foothills of the two mountains. These forests are not specifically described by Acocks (1953) but fall within his Coastal Tropical Forest Types, specifically veld type 1 (Typical Coast-belt Forest) for which he provides a list of higher plants. White (1983) describes the vegetation of the Tongaland-Pondoland regional mosaic as "a complex mosaic of forest, scrub forest, and evergreen and semi-evergreen bushland and thicket in a matrix of secondary grassland and wooded grassland". A list of species and their phytogeographical affinities is provided by these authors for each of these vegetation types.

S.G. Cawe has surveyed the forests of Transkei for several studies (Cawe *et al.* 1983, Cawe 1990, 1996) and a number of sites for his study of the timber potential of coastal forests of Transkei (Cawe 1990) are located at Port St Johns. The classification generated by this study identified associations that are not limited to one forest or, conversely stated, each forest had more than one type of association present and classification of forest types was difficult. Coastal subtropical forests were classified into five main categories: four coastal forest types and dune forest. However, Cawe's (1996) study for which different data (woody species listed by Cooper & Swart (1992)) was used, defined four types of coastal forest: three are typical coastal types and one is dune forest. Forest type A, or Moist Subtropical Forest, occurs along the coast from Port St Johns northwards and is confined to high rainfall areas. These forests are larger than

the other subtropical forest types. Indicator species are *Cola natalensis* and *Sapium ellipticum*. Large trees include *Albizia adianthifolia*, *Chrysophyllum viridifolium*, *Philenoptera sutherlandii* and *Macaranga capensis*. Shrubs and small trees include *Antidesma venosum*, *Bachmannia woodii*, *Colubrina nicholsonii*, *Mackaya bella*, *Mitriostigma axillare* and *Pachystigma macrocalyx*. Rare species include Pondoland endemics such as *Pseudosalacia polyantha*, *Rhynchocalyx lawsonioides* and *Rinorea domatiosa*.

The summit plateaux of the two mountains are covered by grassland (Mt Sullivan) and a patch of proteoid savanna is also present on Mt Thesiger. Ground orchids grow in profusion in the swampy grasslands occurring on the sandstone terraces of the plateau of Mt Thesiger. The two summits have been subjected to very different management regimes during the past 40 years. Mt Sullivan has been grazed regularly and is under control of the local village, which lies close by on a spur of the mountain. Grasses are mainly tussock types and soils have been eroded to reveal numerous boulders above ground level. Mt Thesiger Forest Reserve, one of the oldest in South Africa (Mukolwe 1999), and declared a nature reserve in 1976, was subsequently deproclaimed but continued to be a state forest under management by the military since 1987. It is currently a state forest managed by the Department of Water Affairs and Forestry and has only recently become accessible as grazing land for the Caguba community. Grass cover is more continuous with many herbs and geophytes, and few rocks are visible above the level of the soil.

Along the lower seaward slopes of the mountains, in addition to coastal forest, there are small patches of dune forest, some *Strelitzia nicolai* stands, some *Cymbopogon* dominated grasslands and some *Acacia* dominated thicket. A tree occurring along coastlines, often fringing estuaries and tidal rivers (*Hibiscus tiliaceus*), is found along the Mzimvubu River and other small streams, but there are no well-developed mangroves, probably due to the large volume of water that is discharged during floods.

3.6 PLACE NAMES

Over time the names and spelling of various places have change and those that are known are listed in Table 2.

Table 2. Name changes of localities from Port St Johns

Old names	New names
Third Beach	Silaka Nature Reserve;
East Gate	Mt Sullivan;
West Gate	Mt Thesiger.
S'nuka	Sinuka, Isinuka.
Bulolwe	Bulolo
Noxolweni forest	Xolweni forest.

3.7 HISTORICAL SETTLEMENT AND EXPLORATION OF THE AREA

Stone Age hunter-gatherers and pastoralists occupied the area known previously as the Transkei during historic times. From approximately the 6th century Early Iron-age farmers moved into the river valleys, gradually spreading southwards (Feely 1987). White colonial expansion of the 19th century was effectively blocked between the Great Kei River and the Umtamvuna River and only the occasional white shop owner and his immediate family were given permission to live and trade in the area. By 1825 the first white traders arrived in Port St Johns. An attempt to develop a harbour resulted in the name of the settlement. The first white missionaries arrived at Buntingville, inland of Port St Johns, during 1839. The British governor of the Cape Colony annexed the land south of Port St Johns in 1878 and in 1894 the Pondoland British Protectorate (the north bank of the Mzimvubu and further north) was annexed as well (Cawe *et al.* 1983). Port St Johns was not part of the Transkei administratively until 1976.

Only a few of the early scientific expeditions to South Africa traversed the Transkei. J.F. Drège joined an expedition from Port Elizabeth to the kraal of the Zulu king in 1832. They forded the Umzimvubu on 15 Feb at Ebb and Flow, Port St Johns and returned again on 18 May 1832. The party was large and included Dr. Andrew Smith, Carl Drège and Franz Drège. The Drège brothers' stated objective was to collect scientific specimens (Gunn & Codd 1981). Port St

Johns was only seen en route and specimens collected by Drège have not been located at the herbaria surveyed for this study.

On 12 June 1837 Miss M.C. Owen (specimens in TCD) crossed the Mzimvubu, but again it is not known whether she made any collections there. P.C. Sutherland (1822-1900) was appointed Surveyor-General of Natal from 1854 and made collections in Pondoland. His specimens were sent to Kew. During 1882 Miss Marianne North was in Port St Johns from where she took a steamer to Durban. Her paintings of South African plants are in Kew. H.J. Thode (1859-1932) passed through Pondoland in 1890. He collected extensively in the Cape and in Natal (specimens in Compton, PRE and NH) and sent some specimens to B. J.S. Henkel (1871-1962) joined the Cape Forestry Dept in 1888, was based in Umtata as Conservator in 1890 and was appointed Assistant Conservator of Forests, Eastern Region in 1905 and Conservator of Forests in Natal and Zululand from 1912 until 1918 (specimens in NU). F.E. Bachmann (1856-1916) spent a year (1887) in Pondoland as an agent for the Berlinsche Pondo Gesellschaft to survey the natural resources. 1700 collections by Bachmann are in B and K, but as he visited Port St Johns only briefly, it is not known how many of these are from the study area. Little is known of any of these collectors' activities in Port St Johns other than that they were there at some stage or other (Gunn & Codd 1981).

A certain Miss Wood collaborated with Selmar Schonland, curator of the Albany Museum Herbarium in Grahamstown (1889-1927) and collected for him in Port St Johns. Twenty-one names are listed under her name in a notebook found at GRA. Several other numbers without names are listed perhaps indicating that the plants could not be identified to species (T. Dold, pers. comm.). S. Schonland collected from Eagle's Nest, Mt Sullivan and roadsides during 1921. According to records from the National Herbarium in Pretoria (PRECIS 1997) the first serious collector in the area was E.E. Galpin. He lived in Queenstown from 1892 until 1917 and made at least three collecting trips to Port St Johns where he

collected at the following places: 1896 on Mt Thesiger, Mt Sullivan and at Isinuka; 1899 and 1929 at Tiger Flats, Isinuka and Mt Thesiger.

H.G. Flanagan and his wife collected in 1896 and it is presumably during this trip that they collected *Impatiens flanaganiae* Presl, which was named after Mrs Flanagan. Harry Bolus collected in Port St Johns with both Flanagan and Galpin (Gunn & Codd, 1981). H.A. Wager, Professor of Botany at the University of Pretoria, collected bryophytes and ferns at Port St Johns during 1900, 1921 and 1929. In 1910 Alice Pegler collected along the road to the lighthouse. C.J. Howlett collected from Eagles Nest and Mt Thesiger in 1924. Gwendolin Edwards (1888-1960) collected *Delosperma edwardsiae* in 1924. A.O.D. Mogg made a fairly large collection from Mt Sullivan, Xolweni forest, Fairview and the Bulolo River in 1933. Dr. Amy Jacot-Guillarmod made a few collections off Second Beach during 1935 and L.L. Britten made some in 1937. A.G. McLoughlin recorded a number of orchids and ferns from both mountains during 1940.

J.P.H. Acocks (1944), D.M. Gemmell (1941), R. Story (1946), I.B. Pole Evans (1952) and W. Marais (1955) each collected some specimens. The next sizable collection came from D.M. Comins (1960) who recorded plants from Mt Thesiger, Second Beach and roadsides. During 1966 M.J. Wells collected mostly in the vicinity of the town and along the river on the south bank. R.D.A. Bayliss collected several specimens from Second Beach, the Pondoland Bridge area and from one of the mountains during 1975. G. Germishiuzen collected near a hotel during 1978. Herr R.G. Strey made several collecting trips in Pondoland during the 1970s and lodged his specimens at the Natal Herbarium. A.H. Hutchings and C.T. Johnson from the University of Transkei made collections during the 1980's, some in conjunction with E.E. Plumstead. In 1984 K. Balkwill, J.C. Manning, F. Getliffe-Norris and A.H. Hutchings made an extended trip to Port St Johns. A.E. Van Wyk has been collecting in Pondoland for some time and has visited Port St Johns on several occasions. During the 1980s and 90s E.J. Van

Jaarsveld of Kirstenbosch National Botanical Gardens and various collaborators did a survey of the Lamiaceae with particular reference to *Plectranthus*.



4 FLORA OF PORT ST JOHNS

The fundamental datum of biogeography is the distribution of a taxon (Cowling 1983).

4.1 INTRODUCTION

Port St Johns occurs on a relatively small outlier of the Msikaba Formation Sandstone. It is known to have a rich flora but the exact composition and the relationships to both the PCE and other adjacent floristic regions are not clear. Floras to the north of Port St Johns have been studied in greater detail than those immediately to the south.

4.2 METHODS

4.2.1 Plant collection and fieldwork

Plant specimens were collected during repeated visits to Port St Johns between 1990 and 2002. Initially only fertile specimens were collected, but it became apparent that many species of trees would be omitted from the checklist if leaf specimens were not used. A determination of these sterile specimens is only included in the checklist if there is a reasonable degree of certainty about their identity. The staff of the National Herbarium in Durban (NH) identified a large proportion of the material and duplicates are housed there and in the herbarium of the University of Transkei (KEI).

The following sites were collected (Figure 6, page 42): Silaka (Gxwaleni river, dune forest, hillside between Silaka and Second Beach), Second Beach (Bulolo River, dune forest), Mtumbane, The Gap, The Lighthouse, Mt Thesiger (South flank, North flank, West flank, summit, Tiger Flats, Isinuka, Eagle's Nest), Mt Sullivan (Xolweni forest, North flank, summit, East flank, West flank, Nenga forest, Bomvini forest, Agate Terrace, Tshobeni forest, Noqwekwana forest).

4.2.2 Literature search

All available literature in the form of floras (FSA, FTEA, FZ), taxonomic monographs (e.g. *Streptocarpus*, *Dierama*, etc.) and journals (SAJB, Bothalia, Kew Bulletin) were searched to find specimens cited from Port St Johns, which were then added to the checklist.

4.2.3 Database Records

A download of the records from Port St Johns held by the National Herbarium in Pretoria (PRE) was obtained from the PRECIS (1997) database. Only those entries that had sufficient locality data to place them in the study area were selected. A manual search of the accession records of Natal Herbarium was done. The herbarium database of the University of Transkei was used to list any records collected prior to 1990, mainly those of A. Hutchings and Dr. C.T. Johnson. Prof. K. Balkwill provided a printout of the records in the database of the C.E. Moss Herbarium (J). Prof. A.E. Van Wyk provided names of plants collected from Port St Johns that are at the Schweickerdt Herbarium of the University of Pretoria (PRU).

4.2.4 Analysis

The checklist (Appendix 1) is arranged in five main groups: bryophytes, ferns, gymnosperms, dicotyledons and monocotyledons. Within each of these groups the families have been arranged alphabetically, within each family genera are arranged alphabetically and likewise species within genera. Initially the checklist was arranged according to the families and genera of Arnold & De Wet (1993) to facilitate comparison with other published checklists but the final form as printed follows that of Leistner (2000). Names of genera and species follow Arnold & De Wet (1993) except where more up to date taxonomic studies have been published (e.g. *Maytenus*, *Gymnosporia*, etc.). Exact localities (Figure 6) are given where possible.

The checklist is analysed according to number of taxa at different taxonomic levels. Families with more than ten species are extracted and the top ten are

compared to data of the southern Natal Drakensberg, Natal and the Cape (Hilliard & Burtt 1987). Genera with more than six species are extracted and the top ten genera are compared with the southern Natal Drakensberg, Natal and the Cape (Hilliard & Burtt 1987).

4.3 RESULTS

The checklist of the plants of Port St Johns (Appendix 1) records 166 families, 582 genera and 1053 species. Table 3 is a summary of the distribution of families, genera and species among the major plant groups.

Table 3. The flora of Port St Johns

	FAMILIES	GENERA	SPECIES
BRYOPHYTES	11	18	19
PTERIDOPHYTES	21	38	63
GYMNOSPERMS	4	4	5
ANGIOSPERMS			
Monocotyledons	27	124	239
Dicotyledons	103	399	727
TOTAL	166	583	1053

4.4 DISCUSSION

The number of bryophytes is not a true reflection of the flora as there was no active sampling of them for this study and the only records are those from the larger herbaria, and only those with good locality data were included. The Pteridophyta are well represented (63 species) and more than one quarter of the South African species were collected at Port St Johns. Gymnosperms are rare and only five species (out of 52 found in South Africa), four genera (eight in South Africa) and four families (seven in South Africa) were recorded.

4.4.1 Families

The ferns represent 6% of the local flora compared to 4% of the southern Drakensberg, 3.6% of Natal and 0.9% in the Cape (Hilliard & Burtt 1987).

Johnson & Hutchings (1989) recorded 23 fern families in the Transkei and of these 21 occur at Port St Johns. The ten largest families of the Angiospermae (Table 4) represent 43.2% of the flora of Port St Johns compared to 67% of the southern Drakensberg flora and 59% in the Cape. Port St Johns thus has fewer large families that dominate the flora than the other areas. The Asteraceae is the largest family, a situation similar to the Cape (Goldblatt & Manning 2000) and the southern Natal Drakensberg (Hilliard & Burtt 1987). The Fabaceae is the second largest family at Port St Johns and also in the Cape Flora. The Poaceae ranks third, whereas in the Cape it only ranks eleventh, although in the southern Natal Drakensberg flora it also ranks third. This reflects the similarities in the vegetation structure along the eastern seaboard in contrast to that of the fynbos. The Orchidaceae occupies the fourth place, is tenth in the Cape and also fourth in the southern Natal Drakensberg. The relatively important role of the Fabaceae and Orchidaceae could be attributed to the adaptive strategies utilized by members of the family to occupy nutrient poor niches, but also to the wide variety of microhabitats found at Port St Johns.

The presence of the Euphorbiaceae, the Acanthaceae and the Lamiaceae in the ten largest families is unusual. Neither rank in the Cape or the southern Natal Drakensberg but Euphorbiaceae is the ninth largest family in the Natal flora as a whole (Hilliard & Burtt 1987). The Lamiaceae, which lies at eighth place at Port St Johns occupies sixth place in the flora of the Sekhukhune-land Centre of Plant Endemism (Siebert 2001), which is also an edaphically defined centre. Should the Liliaceae in a broad sense be used as a family for comparison with earlier work in South Africa, it would rank as the fourth largest family at Port St Johns, compared to third in the southern Natal Drakensberg and fourth in Natal. The Rubiaceae is in the top ten in Port St Johns (7th) and in Natal (10th) and the Asclepiadaceae ranks 10th at Port St Johns and 5th in Natal.

Table 4. The families with more than ten species present at Port St Johns, and the ten largest families (expressed as percentage of the flora) for the Southern Drakensberg, Natal as a whole (Hilliard & Burtt 1987) and the Cape flora (Goldblatt & Manning 2000).

Port St Johns		Southern Drakensberg		Natal		Cape	
FAMILY	spp - %	FAMILY	%	FAMILY	%	FAMILY	%
Asteraceae	97 - 9.2	Asteraceae	21	Asteraceae	11.8	Asteraceae	11.5
Fabaceae	70 - 6.7	Poaceae	8.1	Fabaceae	8.4	Fabaceae	8.4
Poaceae	54 - 5.1	Liliaceae	6.3	Poaceae	7.6	Iridaceae	7.3
Orchidaceae	45 - 4.3	Orchid	6.2	Liliaceae	5.1	Aizoaceae	7.3
Euphorbiaceae	39 - 3.7	Scroph.	5.9	Asclepiad.	4.8	Ericaceae	7.3
Cyperaceae	37 - 3.5	Fabaceae	4.9	Orchidac.	4.5	Scroph.	4.6
Rubiaceae	36 - 3.4	Iridaceae	4.9	Cyperac.	4.1	Proteaceae	3.6
Lamiaceae	28 - 2.7	Cyperac.	4.4	Scroph.	3.6	Restionac.	3.5
Acanthaceae	24 - 2.3	Asclep.	3.3	Euphorb.	3.0	Rutaceae	3.0
Asclepiadaceae	24 - 2.3	Ericac.	1.9	Rubiaceae	2.5	Orchidac.	2.5
Iridaceae	20 - 1.9						
Solanaceae	18 - 1.7						
Malvaceae	16 - 1.5						
Asphodelaceae	14 - 1.3						
Celastraceae	13 - 1.2						
Scrophulariaceae	12 - 1.1						
Adiantaceae	12 - 1.1						
Hyacinthaceae	11 - 1.0						
Anacardiaceae	10 - 0.9						
Vitaceae	10 - 0.9						
Crassulaceae	10 - 0.9						

4.4.2 Genera

Five hundred and eighty-three genera were recorded at Port St Johns (Table 3). 18 bryophyte, 38 fern, 4 gymnosperm, 399 dicot and 124 monocot genera are present. A total of 67 fern genera have been cited for South Africa and 51 for the Transkei (Johnson & Hutchings 1989). Thus 57% of the South African fern genera are present at Port St Johns.

There are twenty-two genera with more than 6 species, representing 18.8% of the flora (Table 5). The largest ten genera comprise 11% of the flora, compared to 23.2% in the southern Drakensberg, 11.9% in Natal and 21.5% in the Cape. The species per family value for the various floras is: Port St Johns 6.7:1, southern Drakensberg 15.1:1, and Cape 52:1. The fact that there are fewer species per family implies that the flora is more diverse at a higher taxonomic rank. Six genera are endemic to the Pondoland Centre of Endemism and of these *Colubrina* and *Rhynchochalyx* are found at Port St Johns. A further six of the genera found at Port St Johns are endemic to the eastern seaboard: *Stangeria*, *Anastrabe*, *Podalyria*, *Noltea*, *Allocassine* and *Philenoptera*.

The most speciose genus (*Senecio*) at Port St Johns is predictably of the Asteraceae, and one other genus of this family (*Helichrysum*) also ranks in the top four. But an unusual situation exists where *Plectranthus* (Lamiaceae) and *Solanum* (Solanaceae) have as high a number of species as *Helichrysum*, namely fifteen. *Helichrysum*, together with *Senecio*, are usually the most speciose genera by far in many South African floras. In spite of the Asteraceae being the largest family in the Cape, it does not have genera that feature amongst the top ten genera for the Cape, unlike the other three floras where the top two genera are from this family.

Hibiscus also has an unusually large number of species (11) at Port St Johns but does not occur in the top ten genera of the other floras. *Crassula* is an important

Table 5. The genera with more than six species present at Port St Johns compared to the ten largest genera (expressed as a percentage of the flora) of the Southern Drakensberg, Natal (Hilliard & Burtt 1987) and the Cape (Goldblatt & Manning 2000)

PSJ		SD		N		C	
Genus	spp.-%	Genus	%	Genus	%	Genus	%
Senecio	16 - 1.5	Helichrysum	6.3	Senecio	2.7	Erica	7.3
Helichrysum	15 - 1.4	Senecio	5.7	Helichrysum	2.6	Aspalathus	3.0
Plectranthus	15 - 1.4	Erica	1.9	Crassula	1.1	Pelargonium	1.6
Solanum	15 - 1.4	Disa	1.8	Indigofera	1.0	Agathosma	1.6
Cyperus	11 - 1.0	Sebaea	1.4	Euphorbia	0.8	Phyllis	1.5
Hibiscus	11 - 1.0	Crassula	1.4	Aloe	0.8	Lampranthus	1.4
Crassula	9 - 0.9	Argyrolobium	1.3	Wahlenbergia	0.8	Oxalis	1.3
Eulophia	8 - 0.8	Moraea	1.2	Disa	0.7	Moraea	1.3
Rhus	8 - 0.8	Thesium	1.1	Erica	0.7	Cliffortia	1.3
Disa	8 - 0.8	Hypoxis	1.1	Tephrosia	0.7	Senecio	1.2
Indigofera	8 - 0.8						
Ficus	8 - 0.8						
Asparagus	8 - 0.8						
Hypoxis	8 - 0.8						
Asplenium	7 - 0.7						
Tephrosia	7 - 0.7						
Lycopodium	6 - 0.6						
Isoglossa	6 - 0.6						
Berkheya	6 - 0.6						
Maytenus	6 - 0.6						
Stachys	6 - 0.6						
Pavetta	6 - 0.6						

component of the floras of the southern Drakensberg, Natal and Port St Johns, but not of the Cape. *Disa* features in all three floras of eastern South Africa, but not in the Cape. Another orchid genus, *Eulophia* is also in the top ten in Port St Johns, but does not appear in the other lists. *Erica*, the most speciose genus in the Cape, is present in numbers in the Drakensberg and Natal, but not at Port St Johns.

No grass genera have many species at Port St Johns but two fern genera, *Asplenium* and *Lycopodium*, are in the top twenty-one. Five genera in the top ten at Port St Johns (*Senecio*, *Solanum*, *Cyperus*, *Hibiscus*, *Rhus*) have cosmopolitan distributions and five are either Old World genera (*Helichrysum*, *Plectranthus*, *Crassula*, *Eulophia*) or African with extension of the range into Arabia (*Disa*). *Crassula* has its centre of diversity in southern Africa.

5 FLORISTIC ANALYSIS I: INDIGENOUS SPECIES

The uniqueness of a rare species and the ecological community to which it belongs can only be experienced in a particular place within very limited boundaries. It is an experience that has been made possible by events and processes that have operated in that place, and no other, over millions of years (Kingdon 1990).

5.1 INTRODUCTION

Phytogeography is an imprecise science, one in which experimental manipulation is not possible and rigorous methodology is often difficult to apply. It draws heavily on both information and theory of various other disciplines such as ecology, taxonomy, palaeontology, geology and geography (Van Wyk & Smith 2001). Unraveling the relationships and origins of floras is fraught with difficulties such as lack of up-to-date taxonomic literature, too few phylogenetic studies and uncertainty about the exact distribution of taxa. The existence of radically different interpretations and methodologies implies that the field is still in an early phase and that there is much scope for refinement of theory and method (Meadows 1997). This chapter will analyze the phytogeography of the species of Port St Johns. The methodology that is used fits in with Van Wyk & Smith's (2001) definition of floristic plant geography as being predominantly flora-centred, looking at "global, contemporary patterns in floristic assemblages".

It is difficult to choose phytogeographic categories that are unique and unambiguous and an example is the use of the term 'Cape' to refer to a category. There are several genera that are very well represented in the Cape Region and have only a few outlying species such as *Leucadendron* and *Raspalia*. However, there are also genera that have a centre of diversity in the Cape but with secondary centres in other places, an example being *Pelargonium* (Hilliard & Burt 1987). These latter genera must either be left out of the analysis, or reassigned to another category that is often chosen on instinctive grounds.

This process has been used extensively in the characterization of African phytogeography and much of our terminology and basic game plan come from a

few visionaries like J.P.H. Acocks and F. White. The intuitive approach, when it is based on extensive experience and coupled with a critical outlook, a good eye and a good memory, has produced defensible biogeographic boundaries (Van Wyk & Smith 2001). Refinement and adjustment of White's proposed phytochoria is ongoing and for instance an argument to split the Zanzibar-Inhambane region into two new regions (the Swahelian Regional Centre of Endemism and the Swahelian-Maputaland Regional transition zone) has been put forward by Burgess & Clarke (2000).

The assemblage of species that is used by White & Moll (1978) and White (1983) to characterize the Afromontane Region², chosen on intuitive grounds, has been criticized by Hilliard & Burtt (1987). They query the use of these species, all of which are found in regions outside of the Afromontane areas. Their study concludes that a high proportion of species found in the Eastern Mountain Region of the Drakensberg are either endemic to the region or to South Africa and a smaller component of the flora ranges further north, these being the species with wide ranges and ecological tolerances, thus negating the concept of a group of taxa with similar distributions being the phytogeographic elements that characterize the region. In addition, the general definition of the Afromontane Region breaks down to a large degree in southern Africa (Geldenhuys 1992, Phillipson & Russell 1985) and White (1983) himself acknowledges this. Linder (1990) suggests that the non-endemic elements of the Cape Region and the Afromontane Region have strong links at generic level and that a temperate African region should be recognised. Within this region there are distinct centres of endemism such as the Cape Centre, the Drakensberg Centre and the Afromontane Centre. Cawe, Moll & Mc Kenzie (1994) maintain the division of forests in Transkei into a temperate Afromontane flora inland and a subtropical flora along the coast, but concede that afrotemperate elements descend to the coast. One explanation for the deviation from the pattern seen

² *Apodytes dimidiata*, *Halleria lucida*, *Ilex mitis*, *Kiggelaria africana*, *Nuxia congesta*, *N. floribunda*, *Ocotea bullata*, *Podocarpus falcatus*, *P. latifolius*, *Prunus africana*, *Rapanea melanophloeos* and *Xymalos monospora*

further across Africa has been that increase in latitude compensates for decrease in altitude and that elements that would be found higher up on mountains closer to the equator can be expected to move closer to the ocean as one moves further away. However, although forests in northeast tropical Africa conform to the classification by White (1983) the forests of Tanzania show “no clear boundary between lowland and montane tree species associations and there are affinities to the Guineo-Congolian region throughout the elevational range of the forests” (Lovett *et al.* 2000) thus questioning the role of altitude versus latitude. Cawe *et al.*'s (1994) study finds that the number of individuals of Afrotropical species is much lower in the coastal forests than in the montane ones, and that the coastal forests have a higher species diversity with few of these species showing the reverse trend i.e. occurring in the montane forests. This study maintains the distinction between the two types of forest in the Transkei region but does not show whether the indicator species used to characterise these forests function as such further north.

Reaching consensus about classes for comparisons of floras is a difficult process, and studies usually idiosyncratically create such categories. Hilliard & Burt (1987) use six classes in an analysis of the genera of the southern Natal Drakensberg flora: Eurasian, Afrotropical, African, Eastern Mountain Region, Cape and ‘Wides’. For their analysis of species distributions they create thirteen groups and several subgroups based on the distribution of the relevant species. Meter (1998) uses a relatively small sample of the Cape Floristic Region, so-called wide and ‘Cape’ Afromontane elements, and tropical elements to compare with species lists of two sites in Pondoland. Iversen (1991) uses multiple categories to classify the families (6 with 3 subgroups), genera (8 with 26 subgroups) and species (13 with 21 subgroups) of the Usambara Mountains, Tanzania.

The example given above (p. 58) using *Leucadendron* serves to illustrate another issue: can the current distribution of a genus truly be used to characterize all the species of that genus? The assumption is made that the radiation of

Leucadendron in the Cape is of greater significance for the history of that genus than the distribution of those species that are outside the Cape region and this is not necessarily true. The history of a taxon is often confused with the current distribution of the larger grouping it belongs to: it is hoped that phylogenetic studies will help to resolve this issue. Authors give weight to one part of a distribution range on an intuitive basis and then this gets perpetuated in the literature. For example, it might be assumed that *Leucadendron* originated and diversified in the Cape, with certain (more adaptable) species becoming dispersed as far as Pondoland, whereas it is possible that the genus originated in Pondoland and spread to the Cape and subsequently diversified. Biogeographic terminology still needs a considerable amount of debating to resolve all the issues to a satisfactory degree.

A high level of endemism in a flora is the result of three independent processes: speciation, failure of the new species to increase their range, and low extinction rates (Huston 1994). For speciation to take place, gene flow from related populations must be low or absent as even modest levels of gene flow may be sufficient to preclude local adaptation (Brown & Lomolino 1998). Topographic barriers such as mountains, gorges and rivers may be responsible for blocking gene flow, but they are not a requirement for high levels of endemism (Huston 1994). However, in the words of Brown & Lomolino (1998):

It may not be productive to search for single limiting factors and simple explanations for the geographic distributions of most species. Not only may a single species be limited by different factors in different parts of its range, but also even in one local area, several factors may interact in complex ways to prevent expansion of populations. Many species appear to be limited on one range margin by abiotic stress and on the other by biotic interactions; the last usually includes an area of greater biotic diversity

Many areas of high endemism are characterised by very low levels of soils nutrients, low light levels and/or soil water. The resultant low productivity of the vegetation could be responsible for limited gene flow and seed dispersal and low capacity for competition (Huston 1994). This is true, among others, of the fynbos where soils are low in nutrients (Cowling & Hilton-Taylor 1997), forest

floors in tropical forests where light is a limiting factor (Huston 1994) and serpentine soils where there are low levels of nutrients and high levels of toxic elements (Brooks 1987). Goldblatt & Manning (2000) compare genera with low levels and those with high levels of endemism in the Cape and conclude that low seed dispersability is typical of genera with high species numbers and high levels of local endemism.

This study departs from the traditional perspective and does not ascribe characters related to phytochoria either to taxa (e.g. Cape-centred) or to the flora (e.g. predominantly Afromontane affinities) (Meter 1998, White 1983), but concentrates more on the actual distribution patterns of as many taxa found at Port St Johns as possible as suggested by Van Rooy (2000). This is achieved by isolating groups of taxa according to their distributions and creating a set of nested endemic patterns. The delimitation of the endemic patterns were chosen intuitively, after compilation of as complete a set of distributions for the Port St Johns flora as possible within the constraints of this study (> 90% of all species recorded).

No attempt is made to define centres of endemism and it is likely that the lower levels of nested patterns reflect ecological conditions more than any other factor. The categories are purposely kept as simple as possible to pick up large groupings rather than detail and this unfortunately obscures some interesting biogeographic boundaries that repeatedly come up along the southern and eastern coast of South Africa such as the Kei River, the Sundays River, Uitenhage, Humansdorp, etc. but the number of taxa that are being plotted is too small to factor in all of these patterns.

Compromises of various natures had to be made to fit taxa into the chosen categories because a large number of individual patterns are being lumped together in a few groups. In addition, information about plant distributions is not complete and often not very detailed, especially in some revisions where the authors only cite a few representative specimens with full locality details. The

checklist of the Usambara Mountains in Tanzania (Iversen 1991) (representative of a tropical flora) has extended ranges of several taxa that are treated in the Flora of Southern Africa and that are not cited as having a presence outside this region and results thus have to be interpreted as tentative. The categories were chosen with the relationships of the flora of Port St Johns in mind and are not necessarily applicable generally.

A measure of the similarity of the flora of Port St Johns with four other floras will be calculated. These floras are representative of the Cape Region, the Drakensberg escarpment, the Maputaland coast and the Usambara Mountains of NE Tanzania. Floristic links between the PCE and these regions have been repeatedly suggested in phytogeographic studies of southern Africa (White 1983, Cowling & Hilton-Taylor 1994, Van Wyk & Smith 2001). In addition, the genera from Port St Johns will be compared with the list compiled by Carbutt & Edwards (2001) that summarizes the generic links between the Cape Floristic Region, the Drakensberg Alpine Centre and the PCE.

5.2 METHODS

5.2.1 Distributions of species, genera and families

A database was created using the checklist of Port St Johns (Appendix I), which was extended to include the distribution range of each species, genus and family. This information was generated by a search of all available taxonomic literature and to some extent verified in herbaria (GRA, J, KEI, NH, PRE). Phytogeographic categories that had been assigned to any taxon by authors encountered in the literature search were noted.

Port St Johns is in the region that White (1983) delimited as the Pondoland-Tongaland Regional Mosaic (Limpopo River to Port Elizabeth) and Van Wyk & Smith (2001) as the Maputaland-Pondoland Region. The definition of the eastern coastal region used for this study includes the area between the coast and the escarpment, including the immediately adjacent escarpment, from the Cape to

southern Mozambique. The inclusion of part of the Cape Region may seem anomalous but as the focus is the distribution of taxa centred at Port St Johns, the results will only include taxa that are already ranging beyond the Cape Region. Linder (1990, 1998) proposed recognition of an 'Afrotemperate Region' encompassing the Cape Floristic Region and the Afromontane areas of southern Africa because they are not clearly distinguishable on generic grounds and show ecological and floristic overlap. In addition, Van Wyk & Smith (2001) extended the concept of the Tongaland-Pondoland transition zone to that of the Maputaland-Pondoland Region, which includes the escarpment up to 1800 m, thus including many Afromontane forests. Links between Pondoland and the Cape Floristic Region have been highlighted by Carbutt & Edwards (2001) who found that 14 genera that are typical Cape elements are shared exclusively between these two areas. In addition another 52 genera are shared between the Cape Floristic Region, the Drakensberg Alpine Region and the PCE.

Treating the area as a unit for vascular plant distributions is an exploratory action in an effort to make sense of the overlap above. It is quite logical to expect forest species to follow this pattern as forests track the escarpment and the Soutpansberg with small outliers at the Magaliesberg and the Blouberg. The moisture-trapping effect of the escarpments is of great importance and Van Rooy (2000) cites seven local studies to support the contention that "a moisture gradient is the most important climatic variable determining the diversity and distribution of (vascular) plants in southern Africa".

Groups extracted from the database are:

1. Nested sets of endemics (families, genera and species)

Port St Johns

Pondoland Centre of Endemism

East coast and lower Drakensberg escarpment of southern Africa

East coast and the Drakensberg escarpment, extending to the Soutpansberg

Southern African region (FSA)

Africa

Wider than Africa

2. Disjunct species

3. Rare and endangered species as listed in Red Data List of Southern African Plants (Hilton-Taylor 1996), Rare and Threatened Plants of KwaZulu-Natal and neighbouring regions (Scott-Shaw 1999) and the Southern African Plant Red Data Lists (Golding 2002).

4. Alien species (Chapter 5).

5.2.2 Comparison with other floras

1. The flora of Port St Johns is compared with four other published floras

Species numbers in common with the southern Natal Drakensberg (Hilliard & Burt 1987), the Cape (Goldblatt & Manning 2000), the Greater St Lucia Wetland Park (Scott-Shaw 1994) and the Usambara Mountains, NE Tanzania (Iversen 1991) are tallied. The index of similarity of Sorenson between each of these floras and Port St Johns is calculated.

2. Generic links with the Cape Floristic Region as summarized in Carbutt & Edwards (2001) are explored.

5.3 RESULTS

5.3.1 Nested sets of endemics

The indigenous species of Port St Johns have distributions that range from strictly local to cosmopolitan. Ninety percent of the indigenous taxa were assigned to classes (Table 6) and it is apparent that of these 766 species (89.6%), 154 genera (32.7%) and 7 families (5%) are confined to Africa while 90 species (10.4%), 324 genera (67.3%) and 133 families (95%) range wider than Africa. Within Africa, 470 species, 33 genera and 4 families are confined to southern Africa but may have minor range extensions into southern Mozambique or Zimbabwe, and 296 species, 121 genera and three families range across Africa. Within southern Africa 133 species and 17 genera (no families) have wide distributions across the region. A further 96 species, 9 genera and two families show distributions that fall within an arc that encompasses the eastern seaboard

and the eastern escarpment of South Africa and may extend to the Soutpansberg or the Magaliesberg. In addition, 204 species, six genera and one family are confined to the eastern coastal regions of South Africa and thirty seven species, one genus and one family are confined to the Pondoland Centre of Endemism. Of these, three species occur only at Port St Johns, others are found in few other locations, all nearby, and the rest are found across Pondoland.

5.3.1.1 Endemics of Port St Johns

A number of taxa have been identified as endemic to the Port St Johns area of Pondoland both from literature and through collection for this study (Table 7). Two species of *Plectranthus* can with a degree of certainty be said to be truly endemic to the study site, and another species of *Plectranthus* has recently been found across the Egosso Gap in the Nsubane forest as well as being in Port St Johns. *Podranea ricasoliana* (Bignoniaceae) is endemic to the study area and its immediate surroundings. Two specimens of *Kniphofia* that cannot be satisfactorily determined using existing taxonomic treatments were collected and will be named after molecular and taxonomic studies on the genus (currently in progress) are completed (Ramdhani pers. comm.). Two different collections of *Delosperma* have to be identified after revision of the entire collection at PRE and could be one or possibly two new endemics, and the true identity of *D. edwardiae* should then also be clarified. An unusual sterile specimen of *Acalypha* has been collected more than once and it remains to be seen whether fertile material will confirm or reject it as a new species. A collection from J is named as *Drosanthemum* sp. and considering that there are undescribed taxa from a related genus (*Lampranthus*) further north in Pondoland it could be either a Pondoland Centre endemic or an undescribed species (P.Burgoyne, pers. comm.). An unusually small specimen of *Selaginella* could not be named after comparison with material at GRA or NH and has been forwarded to PRE for further investigation.

Table 6. Summary of distributions of the flora of Port St Johns classed as nested sets of endemism.

	FAMILIES	GENERA	SPECIES
SOUTHERN AFRICA	4	33	471
PONDOLAND CENTRE and PSJ	1	1	38
EASTERN SEABOARD	1	6	204
<i>S of PSJ/PCE*</i>		2	18
<i>N of PSJ/PCE to S Mozambique</i>		2	73
<i>N of PSJ/PCE to Zanzibar-Inhambane</i>			20
<i>Cape to Natal/ S Mozambique</i>	1	2	93
EAST COAST TO ESCARPMENT	2	9	96
<i>PSJ/PCE to escarpment</i>		1	25
<i>E Cape to escarpment</i>	1	7	51
<i>W Cape to escarpment</i>	1	1	20
SOUTHERN AFRICA WIDE		17	133
AFRICA (North of FSA region)	3	121	296
<i>Africa wide</i>	2	63	212
<i>South of the equator</i>		27	40
<i>Africa plus Madagascar</i>	1	31	45
AFRICA (total)	7	154	766
WORLDWIDE	133	324	90
<i>Wider than Africa</i>	12	20	
<i>Southern Hemisphere</i>	6	9	5
<i>Old World</i>	10	119	52
<i>Cosmopolitan</i>	105	176	33
TOTAL	140	478	857

* Port St Johns/ Pondoland Centre of Endemism

Table 7. Endemics and possible endemics of Port St Johns

TAXON	STATUS
<i>Podranea ricasoliana</i>	Endemic
<i>Plectranthus malvinus</i>	Endemic
<i>P. reflexus</i>	Endemic
<i>Delosperma</i> spp. (possibly 3)	Possible endemic
<i>Kniphofia</i> sp./spp.	Possible endemic
<i>Acalypha</i> sp.	Possible endemic
<i>Drosanthemum</i> sp.	Possible endemic
<i>Selaginella</i> sp.	Possible endemic
<i>Erythrococca</i> sp.	Possible endemic

5.3.1.1.1 *Plectranthus* species (Lamiaceae) from Port St Johns and Pondoland

The genus *Plectranthus* has produced several species with very narrow ranges along the eastern coast of South Africa, and eleven of these are confined to the Pondoland Centre of Endemism (Appendix 4). Fifteen species were recorded for this study and of these *Plectranthus reflexus* and *P. malvinus* are found only at Port St Johns. *P. praetermissus*, previously considered to be a Port St Johns endemic, has been found at one other locality across the Egosa Gap in the Nsubane forest. *P. hilliardiae*, a PCE endemic, has now been collected at Port St Johns.

Plectranthus reflexus is a semi-succulent shrub to 1,5 m high. Leaves are dark green, strigose, with capitate trichomes and irregularly crenate margins. The flowers are pale blue, with a long narrow tube that narrows even further to the mouth. The upper lip is reflexed. It differs from *P. hilliardiae* in habit, tube length, trichomes, height and the shape of the upper and lower lip of the flower (Table 8) (Van Jaarsveld & Edwards 1991). A number of populations have been found, one along a road at the base of Mt Sullivan, and several on Mt Thesiger where it favours footpaths, pipelines or other marginally disturbed sites in the forest (forest gaps).

Plectranthus malvinus is closely related to *P. ciliatus*, differing in flower colour and leaf under-surfaces. Flowers are similar, but smaller and mauve in *P. malvinus* compared to white with purple dots in *P. ciliatus*. Leaves are firm, succulent, ovate to obovate with densely pilose purple veins and are densely punctate underneath in *P. malvinus*, and dark green, densely hairy with purple under-surfaces in *P. ciliatus*. The two species grow in close proximity (Van Jaarsveld & Edwards 1997, Hankey 1999). Van Jaarsveld & Edwards (1997) report it to be growing on the western end of Mt Sullivan and it has been collected on the western slopes of Mt Thesiger.

Table 8. Comparison of four *Plectranthus* species from Port St Johns.

	<i>P. reflexus</i> ¹	<i>P. praetermissus</i> ²	<i>P. malvinus</i> ³	<i>P. hilliardiae</i> ⁴
Tube length	28–30 mm	12–13 mm	12 mm	23–27 mm
Tube width	3–1 mm	4 mm at base, 2 mm in throat	3–2 mm laterally compressed	4–3 mm
Tube shape	Saccate	Saccate	Saccate	Saccate
Habit	Erect	Decumbent	Decumbent	Erect
Anthocyanins	Present	Absent		Present
Trichomes	Capitate	Red, compound	Colourless, sunken, densely punctate	Transparent, sessile
Flower colour	Pale blue	Mauve, dark purple	Pink	Pale blue – mauve
Plant height	1–1,5 m			30–40 cm
Succulence	Semi – fleshy	Not succulent	Fleshy	Semi-fleshy
Upper lip	Reflexed, 4-lobed, 6–7 x 7 mm	Erect, 5 mm long	7 mm, 2-lobed Lateral lobes 3 mm longer	Erect 5–6 x 5 mm, Bi-lobed at apex, 2 lateral ear-like lobes, horizontal, deflexed
Lower lip	7 mm cymbidiform	4 mm boat shaped, spreading	5 mm boat shaped	4 mm boat shaped
Leaves	Softly succulent, dark green above, purple below, strigose, margin irregularly crenate	Dark green on both surfaces, thin textured, ovate, margin crenate- dentate	Stiff & fleshy, strigose, undersurface densely punctate with purple strigose hairs on the veins, margin serrate	Dark green above, paler below, coarse textured and strigose, margin dentate

1. Van Jaarsveld & Edwards (1991)

2. Codd (1979)

3. Van Jaarsveld & Edwards (1997)

4. Codd (1985)

P. praetermissus is closely related to *P. oertendahlii*, also a PCE endemic, from which it differs mostly in vegetative characters. *P. praetermissus* is a more robust plant with larger leaves which are dark green on both surfaces. The flower is distinct mauve with darker blotches on the corolla lobes whereas *P. oertendahlii* has white or pale mauve flowers, leaves that have purple under surfaces and veins that are paler than the lamina on the upper surfaces. In addition, the glands of *P. praetermissus* are a minute ring of red gland dots, in contrast to the simple honey-coloured glands of *P. oertendahlii* (Codd 1979).

5.3.1.1.2 *Podranea ricasoliana*

Podranea ricasoliana (Port St Johns creeper) presents an interesting case. It occurs on shale, not on sandstone, but only on shales in the immediate vicinity of Port St Johns and does not have a range of more than 20 km (Mgazi to Mtafufu).

It occurs where there are small pockets of shale on the slopes of the sandstone horst. A handsome, robust creeper with large inflorescences carrying pink trumpet shaped flowers, it requires a drier and sunnier habitat than the other endemics and is occasionally seen along roadsides. The nearest relative is *P. brycei* (Zimbabwe creeper), from tropical Africa where it occurs in a wide band across Angola, Zimbabwe and Malawi (Verdoorn 1961). *Podranea ricasoliana* is clearly very closely related to *P. brycei*, the differences being minor leaf and flower characters, and different habitat types (Table 9). Leistner (2000) suggests that they are possibly conspecific, but A.E. Van Wyk (pers. comm.) disagrees strongly. Disjunction is about 1500 km.

Table 9: Differences between *Podranea ricasoliana* and *P. brycei* (Verdoorn 1961)

Character	<i>Podranea ricasoliana</i>	<i>P. brycei</i>
Number of leaflets	7 to 9	11
Leaf length/width	broader	narrower
Leaf length	longer	shorter
Calyx	Lobes short and spreading Few glands	Lobes joined to midway, then revolute. Many glands.
Corolla tube	Funnel shaped. Not pilose.	Broadly campanulate, compressed in throat. Pilose.
Articulation on pedicel	Near base	Longer

Bignoniaceae is better represented on Madagascar than on the African mainland, this pattern being associated with effects of increasing aridity and consequent extinction on the mainland (Raven & Axelrod 1974, Gentry 1976).

The similarity between *P. ricasoliana* and *P. brycei* has generated a certain amount of speculation about the presence of a small population of the former occupying a very narrow range at Port St Johns. There are two possible explanations i.e. a vicariance event, or a long distance dispersal event. A vicariance event implies that a parent species, possibly one of the two currently recognized species, once occupied a larger range which has subsequently been contracted into two ranges, and that individuals of one of the two populations has been selected for slightly different characters by circumstances or pollinators

found in the narrower range. A long distance dispersal event requires propagules of the parent species to be moved across natural barriers to dispersal. Generally this is due to a natural event such as an unusually violent storm, but on occasion it is due to the interference of man.

A natural phenomenon known as the Hadley Cell (<http://www.atmosphere.mpg.de/enid/18z.html>) is a potential agent in the dispersal of tropical plants. Hot air rises and in a band of 10 to 15 degrees on either side of the equator air is known to rise to between 12,000 and 14,000 m from where it is deflected polewards on either side of the equator. This poleward stream is then deflected eastwards due to Corioliss force and at approximately 30 °S/N this mass of air subsides again. The Haldley cell is of great importance in the summer weather patterns of southern Africa and satelite photographs regularly show the cloud mass associated with it stretching across the interior and down to the coast of Transkei. *Podranea brycei* is located in a band across Africa at about 20°S and *P. ricasoliana* occurs at 30°S in a protected site with unusually high rainfall and where temperatures are very mild due to the influence of the Indian Ocean.

Speculations about the role of Arab traders in the dispersal of *Podranea* have been voiced from time to time (A.E. Van Wyk, pers. comm.). There is no direct evidence of the presence of Arab trade to the Eastern Cape, but in 1554 one Perestrello noticed red beads from India being worn by a chief near the mouth of the Umtata River and in 1593 a certain Lavanha who survived the wreck of the *Sao Alberto* noted that inhabitants of Umzimvubu wore red beads in their ears (Shaw & Van Warmelo 1974, Summers 1958). Beads were an important item of barter, at one stage being currency with which cattle could be bought. Lavanha assumed that the beads were from Lourenco Marques, brought there by the Portuguese, or perhaps the Arabs. These red beads came from Negapatam, India where they had been manufactured for many centuries and from where they had been exported until 1660 when the Dutch colonised Negapatam. The Arabs were renowned seafarers and traded widely with stations along the east coast of Africa.

Archaeological sites from the mouths of the Zambezi and Limpopo rivers indicate the presence of Middle Eastern traders by the eighth century A.D. However, Hall (1990) asserts that Arab traders did not trade inland of the coastal contact points and they did not occupy their trading stations permanently. This makes it highly unlikely that they were responsible for the spread of *Podranea* to the south of the range of *P. brycei* in which case one has to assume that either a natural long distance dispersal or a vicariance event is responsible for the disjunction between these two closely related species. This is particularly true in the case of a plant that is unlikely to have been transported/traded intentionally and which is not adapted to animal/human dispersal.

Gentry (unpublished manuscript/ after 1985) speculates that several genera of Bignoniaceae that display wind-dispersal reached Madagascar independently from continental Africa, implying many long-distance dispersal events. The likelihood of propagules being transported is miniscule but the situation as seen on Madagascar confirms that the possibility exists. At the same time, it is clear that Port St Johns has been influenced by many successive waves of plant migration due to shifting climatic conditions associated with glacial cycles and one has to assume that a vicariance event could also possibly be responsible for the presence of *Podranea* there. Resolution of the question of how *Podranea* came to display the current distribution pattern is not possible given the current state of information except to discount the likelihood of the role of humans.

During the analysis of other floras for comparison with that of Port St Johns it has become apparent that *Podranea ricasoliana* occurs at St Lucia in northern KwaZulu-Natal. It is the opinion of both A. Ngwenya of the Natal Herbarium and R. Scott-Shaw of the Natal Parks Board that this collection represents a garden escape and not a natural occurrence. The complex nature of plant distributions is highlighted by this discovery.

5.3.1.1.3 *Kniphofia* species (Asphodelaceae)

Two specimens of *Kniphofia* that were collected at different times from the same hillside to the southwest of The Gap key out to *K. coddiana* and *K. drepanophylla*, both Pondoland endemics. However, neither fits the relevant description very well and both have characters of other species (Table 10), all of which fall in Section 9 of the revision by Codd (1968). Codd (1968) uses flower colour as a character but this is not useful for plants from this site as plants with pure yellow flowers (no shades of red or orange at any stage of development) to plants with pure red and others with all possible variations in between were flowering at the time of collection of *Cloete 3217*. This problem has to be investigated further to see if it is a hybrid population of two or more species, or whether it is one or more new species.

In addition, other characters used for the revision are not clear-cut and for instance, the amount of exertion of stamens and the style from the perianth changes over the development phases of the flower. If they are all at the same position it is not possible to know whether it is early or late in the phenology. Codd (1968) notes that it is difficult to translate living material into good herbarium material but it is clear that a revision of the genus, using new characters that clearly distinguish each species, is needed (Ramdhani 2002). *Kniphofia* has a centre of distribution in the Eastern Cape and Kwa-Zulu Natal and at least two species are endemic to the PCE, an edaphically defined region. The geology of the site at Port St Johns is of some interest: it is an isolated ridge of shale lying between the sandstone horst and the sea where it has clearly been much influenced by the acidic sandstone. It is thus quite possible that this new locality can throw up one or more new species.

5.3.1.1.4 *Cyphia revoluta* (Lobeliaceae)

Port St Johns is the type locality for *Cyphia revoluta* and according to current literature (Wimmer 1968) it would be a PSJ endemic. However, specimens have recently been collected across the Pondoland Centre and the current revision of the genus will merge the species with two infraspecific taxa of *C. elata*, (*C. elata*

Harv. forma *depauperata* E.Wimm. and *C. elata* Harv. forma *flanagana* E. Wimm.). The geographic range of the new combination will be from

Table 10. A comparison of various characters of the two collections of *Kniphofia* with four possible parent species.

	<i>Kniphofia coddiana</i>	<i>K. drepanophylla</i>	<i>K. baurii</i>	<i>K. littoralis</i>	<i>Cloete 3217</i>	<i>Cloete 6328</i>
Leaf curvature	Erect to rarely recurved	Falcate, strongly recurved	Somewhat falcate or occasionally recurved	Variable	Erect, slightly recurved	Falcate, strongly recurved
Flowering time	Aug. to Oct.	Aug. to Oct.	Sept. to Nov.	Aug. to Oct.	Feb.	Oct.
Flower colour	Yellow to orange yellow	Lemon yellow	Greenish to greenish yellow	Pale yellow green	Red or yellow flowers	Yellow
Bracts	Broadly ovate to subrotund	Broadly oblong	Ovate to ovate-oblong	Ovate to ovate-oblong	Ovate	Oblong-ovate
Exertion of stamens at anthesis	Just Exserted	4-5 mm	2 mm	In throat or slightly exserted	Slightly Exserted	Exserted 5 mm
Exertion of stamens later	Withdrawn	Withdrawn	Withdrawn	Withdrawn	Withdrawn	Exserted 5mm
Exertion of style at anthesis	Subequal to anthers, then Exserted 4-5 mm	Subequal to anthers	Subequal to anthers	Equal to stamens	Exserted 3 mm	Not Exserted
Exertion of style later	Withdrawn	Exserted 6 mm	Exserted 3-5 mm	Exserted by 3-5 mm	Exserted by 6 mm	Exserted
Pedicels length	1-2 mm	3.5-5 mm	1-2 mm	1-1.5 mm	1 mm	1 mm
Perianth length	28-32 mm	35-40 mm	28-38 mm	28-34 mm	25 mm	23 mm

Willowmore district in the Eastern Cape to St Lucia in KwaZulu-Natal (P Phillipson, pers. comm.).

5.3.1.1.5 *Delosperma edwardiae* (Mesembryanthemaceae)

This species has long been considered an endemic of Port St Johns, but is now regarded as a synonym of the more widely occurring *D. rogersii*. However, it seems that the type specimen may be a mixed collection and the issue will only be clarified once the group has been revised (P. Burgoyne, pers. comm.). Two other specimens from Port St Johns have not been named to species but both are

of the genus *Delosperma*. The identity of specimens in the quick guide at PRE has recently been found to be incorrect and the entire collection has to be renamed after comparison with types in various herbaria (P. Burgoyne, pers. com.) after which the taxonomy of this group in Port St Johns will be clarified. *Delosperma* is a genus confined to the eastern coast of Africa ranging to Ethiopia and Arabia (Hartmann 1991). Several species-suspected to be undescribed *Delospermas* have been collected from the PCE (Meter 1998, Abbott *et al.* 2000).

5.3.1.2 Endemics and near-endemics of the PCE at Port St Johns

Thirty-four of the endemics of the PCE (Appendix 4) are present at Port St Johns (Table 11). The convention of describing true endemics, near endemics and taxa with disjunct distributions as endemic is followed here (Van Wyk 2001, Meter 1998). Four endemics are from the Rubiaceae, three from the Fabaceae, three from the Gesneriaceae, two each from the Lamiaceae and the Asphodelaceae and one from each of the following nineteen families: Icacinaceae, Sapindaceae, Asclepiadaceae, Rhamnaceae, Lauraceae, Asteraceae,

Table 11: PSJ endemics and near-endemics in common with the PCE ¹

<i>Anthospermum streyi</i>	<i>Memecylon bachmannii</i>
<i>Apodytes abbottii</i>	<i>Paulforstera patens</i>
<i>Atalaya natalensis</i>	<i>Paulforstera truncata</i>
<i>Canthium vanwykii</i>	<i>Pavetta bowkerii</i>
<i>Colubrina nicholsonii</i>	<i>Plectranthus hilliardiae</i>
<i>Cryptocarya wyliei</i>	<i>P. praetermissus</i>
<i>Delosperma rogersii</i>	<i>Podalyria velutina</i>
<i>Eugenia erythrophylla</i>	<i>Rhynchocalyx lawsonioides</i>
<i>Erythrococca</i> sp.	<i>Rinorea domatiosa</i>
<i>Ficus bizanae</i>	<i>Streptocarpus formosus</i>
<i>Grewia pondoensis</i>	<i>S. johannis</i>
<i>Helichrysum populifolium</i>	<i>S. haygarthii</i>
<i>Impatiens slanaganiae</i>	<i>Tephrosia bachmannii</i>
<i>Indigofera herrstreyi</i>	<i>Thunbergia purpurata</i>
<i>Kniphofia</i> sp. cf. <i>coddiana</i>	<i>Tricalysia africana</i>
<i>Kniphofia</i> sp. cf. <i>drepanophylla</i>	<i>Tritonia disticha</i> ssp. <i>disticha</i>
<i>Maytenus abbottii</i>	<i>Utricularia sandersonii</i>

¹ Families, distributions and literature references can be found in Appendix 4

Mesembryanthemaceae, Myrtaceae, Euphorbiaceae, Moraceae, Tiliaceae, Balsaminaceae, Celastraceae, Melastomataceae, Rhynchoalycaceae, Violaceae, Acanthaceae, Lentibulariaceae and Iridaceae. Meter (1998) discusses particulars of the PCE endemics and only additional facts related to Port St Johns will be discussed here.

5.3.1.2.1 *Rhynchoalycx lawsonioides*

This is a small tree of the monotypic family Rhynchoalycaceae, endemic to the PCE. It has only been recorded once at Port St Johns by A. Hutchings, and was not seen during the collection trips that sampled the area quite thoroughly in the fifteen years since her collection. It remains to be seen whether it will be found again or whether development may have destroyed the population.

5.3.1.2.2 *Colubrina nicholsonii* (Rhamnaceae)

Colubrina nicholsonii has been described as one of the rarest trees in southern Africa (Van Wyk & Schrire 1986). It is present in greater numbers on Mt Sullivan than anywhere else on the Msikaba Formation. Few seeds and no seedlings have ever been observed (T. Abbott, pers. comm.), which together with a discontinuous distribution led Van Wyk & Schrire (1986) to classify it as a palaeoendemic. It is not strictly endemic to the PCE sandstones, being present in Vernon Crookes Nature Reserve (Van Wyk & Smith 2001).

5.3.1.2.3 *Streptocarpus* species (Gesneriaceae)

Streptocarpus formosus is a taxon with problems relating to its distribution records and taxonomy. It was first described as a subspecies of *P. primulifolius* (Hilliard & Burt 1971). The collection number of the type specimen occurs on two sheets collected at two different dates in two different places, namely East London and Isinuka, Port St Johns; both sheets annotated in the handwriting of E.E. Galpin, the collector. Hilliard & Burt (1971) quote Mr. W.J.C. Lawrence who grew plants from both populations for genetical studies of the genus as saying that the plants from East London and PSJ are distinct and that the East London plants are probably a subspecies of *S. rexii*. However, they (Hilliard &

Burt) considered the two populations as the same species, but that the East London one has been introgressed by *S. rexii* and consequently described the subspecies. They cite several localities: Port St Johns, Umtamvuna, Vungu river and Oribi Gorge. The population at East London has been rediscovered but other than the collection made for this study (*Cloete 18*) the Port St Johns population has not been seen again despite quite extensive searches by various collectors (Hilliard & Burt 1971, D. Bellstedt pers. comm.). Weigand & Edwards (1994), who raised the subspecies to species rank, do not discuss the populations from East London that lie outside the Pondoland Centre of endemism. They consider the taxon to be endemic to the Msikaba Formation sandstones of Transkei and southern Natal.

A further taxonomic problem stems from the lack of breeding barriers in this genus (Weigand & Edwards 1994). *Streptocarpus* species frequently interbreed and several hybrid populations have been identified, including between *S. formosus* and *S. porphyrostachys*, and between *S. wilmsii* and *S. cyaneus*. These two crosses yield offspring that closely resemble each other and Hilliard & Burt (1987) conclude that hybridization and introgression are important factors in increasing species variability in the genus. The characters that distinguish *S. primulifolius* from *S. formosus* are colour stipples in the throat, corolla colour and the presence of yellow pigmentation in the throat of the latter (Weigand & Edwards 1994). When viewed against the variety of forms in the genus and the even greater variety of hybrid forms it is questionable whether mere colour variations are sufficient to characterize a species. These particular crosses (that yield very similar offspring) question the assignment of species status to a group of plants that are only differentiated by colour markings.

Streptocarpus johannis ranges narrowly beyond the limits of the Msikaba Formation sandstone, to Ngeli and Nsikeni, but is essentially centred in the Pondoland Centre of Endemism. It also shows variation in flower colour and size between populations. Meter (1998) identifies the white form of *S. haygarthii* as endemic to the Msikaba Formation sandstones.

5.3.1.2.4 *Tricalysia africana* versus *T. capensis* (Rubiaceae)

Six species of *Tricalysia* have been described from South Africa and three of these have been recorded at PSJ: *T. capensis*, *T. lanceolata* and *T. africana*. The key characters separating these three species are: the number of floral parts (6-merous in *T. capensis*, 4-merous in *T. africana*, and 5-merous in *T. lanceolata*), calyx shape (truncate or shortly toothed in *T. capensis*, a very short tube and distinct lobes in the other two, with narrowly triangular calyx lobes in *T. africana*, and broadly triangular to rounded lobes in *T. lanceolata*); hairiness of the corolla throat (glabrous in *T. capensis*, densely hairy in the other two); anther tips (obtuse in *T. capensis* and appendiculate in the other two), and fruit colour (red in *T. capensis*, black in the other two) (Robbrecht 1985, Pooley 1993).

T. africana has a very narrow distribution range, formerly only collected from Nsubane Forest, and now from Port St Johns. However, *Tricalysia* specimens collected from Port St Johns have been found to have flowers with several different numbers of floral parts in one plant, and this has been observed on several occasions. Figure 9 shows flowers with 5 or 6 or 7 petals that are on the same branchlet to illustrate the point. It is clear that this taxon is very plastic and the taxonomy of the group will have to be revised after thorough field studies to confirm that the characters mentioned above are sufficient to separate out the species.

5.3.1.2.5 *Impatiens flanaganiae* (Balsaminaceae)

Impatiens flanaganiae is a tuberous rooted perennial herb of the forest glades. As the tubers are not deeply rooted and the leaves are large the plants are prone to damage from wind, thus limiting the potential sites to either deep forest or well-protected forest edges. The habitat is threatened by overexploitation and by aliens, and the populations are not assured of protection. The nearest known related *Impatiens*, *I. tinctoria* aggregate, is found in the Ruwenzori Mountains in



Figure 9 *Tricalysia* flowers showing great variation in the number of petals.

central Africa (Grey-Wilson 1980). The group to which these species belong is distinguished from other *Impatiens* species by several features: a long-stalked racemose inflorescence, two pairs of lateral sepals, a navicular or narrowly bucciniform lower sepal which is constricted or gradually tapered to the spur, lateral united petals which have a small upper petal being about one-third the size of the lower, very large seeds compared to other African *Impatiens*, and no embellishment on the seed-coat (Grey-Wilson 1980).

Impatiens flanaganiae has been regarded as endemic to Port St Johns but is not so. It has been collected at three other sites (Magwa, Ismont and Dumisa). The site at Magwa in the Nsubane forest is at the base of Msikaba Formation sandstone cliffs, but the other two sites are on Natal Sandstone. It is present in large numbers at numerous sites at Port St Johns but only very small populations have been found at the other localities. There has also been some speculation about the exact origin of *Impatiens flanaganiae* and the possibility of it being an introduced species because of its horticultural potential has been raised. Indirect

evidence has been accumulated to try to resolve this question. *I. flanaganiae* was collected at Port St Johns by H.G. Flanagan in February 1896 and by E.E. Galpin in December of the same year. T.R. Sim made a collection from a cultivated specimen from 'Maritizburg'. It is undated but he collected approximately a century ago and it is clear that *I. flanaganiae* has been recognised for its horticultural potential from before that time. There has been speculation about the role of A.G.H. Rudatis in the introduction of this species since he spent three years collecting botanical and horticultural specimens in Cameroon before settling in South Africa. The two localities where *I. flanaganiae* is currently found in Natal are not that far from his farm at Umgai, near Dumisa where he collected specimens of this taxon. However, Rudatis arrived in South Africa after the first plants were collected in Port St Johns and this theory has to be discarded. It is possible that he took tubers and distributed them to friends (he started an indigenous plant nursery), but it is not very likely that he would have collected those same taxa as part of his professional activities when he made inventories of Dumisa, Fairfield and other sites and it is assumed that the presence of the populations are due to natural dispersal. An interesting point that has come up in the search for answers about the origin of *Impatiens flanaganiae* is that Herr Strey collected a yellow-flowered form in 1969 at Ismont.

An undescribed species of Chrysomelid beetle, *Iscadida* sp., has been found on *Impatiens flanaganiae* at Port St Johns. Adults live on the leaves and at times consume large parts of the laminae, doing quite a lot of damage to the plants especially in early autumn. Eggs have been observed that are laid on fruit of *I. flanaganiae*, a loculicidal capsule which opens elastically to eject the seeds and then coils up (Grey-Wilson 1980), probably around the eggs that are on the outer surface. Over several days of observation no other insects other than numbers of a long-proboscis bee-fly (*Psilodera confusa*) and a solitary bee (*Allodape* species) feeding on nectar, and a scarab beetle (*Rhadotis aulica* Fabricius) have been seen on plants and the eggs are probably those of *Iscadida* which is always present on the plants in numbers. Various stages of larval development have been observed on the stems and petioles of the plant and it is assumed that the

eggs drop to the ground immediately below where they are protected by the coiled capsule at first. The plant is dormant for at least six months and this implies that the eggs must also be dormant for some time. Other species of *Iscadida* beetles display a similar pattern of behaviour, living an entire life cycle on one species of plant (B. Grobblers pers. comm.) The presence of this rare beetle living most if not the entire life-cycle on *Impatiens flanaganiae* seems to imply that the plants have been at Port St Johns for much longer than humans and thus the distribution is more likely to be due to a natural long-distance dispersal or vicariant event. The beetles were not observed on other populations during this study and it could be that not all populations are due to natural dispersal.

5.3.1.3 Endemics of the eastern coastal regions

Two hundred and four of the species from Port St Johns that were classified show a distribution that falls within this range. Of these 18 have their northernmost limit at the study site, 73 have their southernmost limit there and range to Maputaland or just into southern Mozambique. Twenty occur from Port St Johns further up the coast than Maputo, but 93 are distributed from far to the south to Maputaland.

The eastern coastal region of southern Africa has one endemic family, the Stangeriaceae, and it is present at Port St Johns. *Stangeria eriopus* is the only species of the Stangeriaceae and occurs from the Eastern Cape to southern Mozambique. It is a stemless gymnosperm that is found on the forest floor and in grassland. Individuals of these two habitats are different, but a cline between the extremes makes it difficult to separate into two species. It seems as if the different forms may be in the process of adjusting to recent reductions in forest size.

Six genera are confined to this region: *Stangeria* and *Anastrabe* have wide boundaries ranging from far south to the northern limit; *Podalyria* and *Noltea* have their northernmost limit at Port Johns and the PCE and *Allocassinia* ranges

north from Port St Johns to Maputaland. *Philenoptera* is found to Maputaland and also in Botswana.

Eighteen species have their northernmost limit at Port St Johns or the PCE including *Clivia nobilis*, *Streptocarpus baudertii*, *Plectranthus lucidus* and *Schistostephium flabelliform*, (Eastern Cape species) and the following from genera that have strong links with the Cape region: *Euryops brachypodus*, *Falckia repens*, *Geranium ornithopodon*, *Droseranthemum* sp. *Noltea africana* and *Passerina rubra*. In contrast *Pyrrosia africana*, *Tylophora cordata*, *Indigofera stricta*, *Cussonia thyrsoiflora*, *Carex clavata*, *Cephalaria attenuata*, *Senecio purpureus* and *Euclea polyandra* are from wide ranging genera.

Seventy-three species that range between Port St Johns and northern KwaZulu-Natal or southern Mozambique represent probable Maputaland-Pondoland endemics. A number of these are trees or shrubs: *Allocassine laurifolia*, *Philenoptera sutherlandii*, *Phyllanthus cedrelifolius*, *Nectaropetalum capense*, *Baphia racemosa*, *Erythrococca berberidea*, *Carissa macrocarpa* subsp. *macrocarpa*, *Milletia grandis*, *Deinbollia oblongifolia*, *Cola natalensis*, *Anastrabe interrigitima*, *Vitellariopsis marginata*, *Allophyllus dregeanus*, *Teclea gerrardii*, *Mitriostigma axillare*, *Chionanthus peglerae*, *Bersama swinnyi*, *Cryptocarya latifolia*, *C. myrtifolia*, *Pavetta galpinii*, *P. natalensis*, *Oricia bachmannii*, *Acridocarpus natalitium* ssp. *natalitium*, *Salacia gerrardii*, *Erythroxylum pictum* and *Homalium rufescens*. Climbers and lianas include *Dioscorea crinita*, *D. diversifolia*, *Tylophora anomala*, *Zehneria parvifolia* and *Dalbergia multijuga*. A fern endemic from Port St Johns to Maputaland is *Pyrrosia africana*. Four species of *Isoglossa* and *Ruellia cordata* from the Acanthaceae plus many other forbs share this distribution: *Crimum moorei*, *Scadoxus multiflorus* subsp. *katherinae*, *Kniphofia laxiflora*, *Chlorophytum modestum*, *Aneilema dregeanum*, *Coleotrype natalense*, *Dietes butcheriana*, *Knowltonia brevistylis*, *Plectranthus zuluensis*, *P. saccatus* subsp. *saccatus*, *Tephrosia glomerulifera* subsp. *glomerulifera*, *Gladiolus oppositiflorus* subsp.

salmoneus, *Dierama dissimile*, *Aristea gerrardii*, *Hypoxis membranacea*, *Albuca fastigiata* and *Chlorophytum modestum* are a few examples.

Twenty species from Port St Johns that are found from that locality to the Zanzibar-Inhambane region are clearly coastal species that have strong tropical affinities and include *Clerodendrum myricoides*, *Casearia gladiiformis*, *Sideroxylon inerme*, *Ficus thonningii*, *Ficus natalensis* subsp. *natalensis*, *Trimeria grandifolia*, *Podocarpus henkellii*, *Eugenia capensis* and *Trichocladus ellipticus*.

Ninety-three species range widely along the coastal zone from the Cape to Maputaland or southern Mozambique (Note: not all reach the Cape or Maputaland, but range widely along the coastal corridor). There are a number of monocots in this group: *Haemanthus albiflos*, *Scadoxus membranaceus*, *Aloe ferox*, *Anthericum cooperii*, *Isolepis ovata*, *Cyperus brevis*, *C. textilis*, *C. pulcher*, *Eucomis autumnalis*, *Dierama igneum*, *Tritonia disticha* subsp. *rubrolucens*, *Watsonia meriana* and *W. pillansii*. Several genera that have radiated in the Cape flora are represented by one or more species: *Polygala myrtifolia*, *P. hottentotta*, *Cliffortia paucistaminea*, *Anthospermum galpinii*, *Protea simplex*, *Passerina rigida*, *Euryops chrysanthemoides*. Forest floor species include the following herbs: *Plectranthus ambiguus*, *Streptocarpus primulifolius*, *Begonia dregei*, *B. homonyma*, and the following understory and forest edge shrubs: *Pavetta revoluta*, *Tricalysia lanceolata*, *Englerodaphne ovalifolia*, *Trichocladus crinitus*, *Monanthes caffra* and *Acocanthera oblongifolia*.

A large group of grassland species occur in this class:

Osteospermum fruticosum, *Gazania linearis*, *G. rigens*, *Felicia erigeroides*, *Lobelia anceps*, *L. flaccida*, *Monosporis unidentata*, *Wimmerella bifida*, *Aptenia cordifolia*, *Solanum geniculatum*, *Passerina rigida*, *Gnidia calocephala*, *Grammatotheca bergiana*, *Geranium flanaganii*, *Chironia laxa*, *Acalypha peduncularis*, *A. ecklonii*, *Pachycarpus natalensis*, *Helichrysum longifolium*,

Silene primuliflora, *Tephrosia grandiflora*, *T. macropoda* var. *diffusa*, *Crassula multicava* subsp. *multicava*, *C. obovata* subsp. *obovata*, *C. orbicularis* and *C. natalensis*.

Among the trees are the following species: *Combretum bracteosum*, *Ficus burtt-davyi*, *Embelia ruminata*, *Rhus fastigiata*, *R. nebulosa*, *Dombeya tiliacea*, *Harpephyllum caffrum*, *Cordia caffra*, *Putterlickia verrucosa*, *Diospyros simii*, *Exoecaria simii* and *Erythrina caffra*.

5.3.1.4 Endemics of the east coast that extend to the escarpment and the

Soutpansberg

Ninety-six species, nine genera and two families from Port St Johns are endemic to this particular area. One family (Agapanthaceae) ranges from the Cape to the northern limit and one family (Achariaceae³) ranges from the Eastern Cape to the northern limit. Nine genera are endemic: *Agapanthus* is found from the Cape to the Limpopo Province (Soutpansberg) and *Clivia*, *Sandersonia*, *Prosphytochloa*, *Cerattiosicyos*, *Seemannaralia*, *Harpephyllum*, *Mackaya* and *Englerodaphne* from the Eastern Cape to the Limpopo Province. It is possible that *Burchellia* also fits in this category but it is not clear how widely spread it is inland of the escarpment. It must be borne in mind that there are several other genera that would be endemic to this phytogeographic group (eg. *Acharia*, *Guthriea*) but only those that occur in Port St Johns are analyzed here.

Nineteen species extend over the whole range, including two orchids (*Mystacidium capense*, *Angrecum pusillum*), three species of *Plectranthus* (*P. strigosus*, *P. ciliatus*, *P. ecklonii*), seven woody taxa (*Burchellia bubalina*, *Olea woodiana*, *Scolopia mundii*, *Gerrardina foliosa*, *Dovyalis rhamnoides*, *Ochna serrulata*, *Schlerochiton harveyanus*) and several climbers (*Riocreuxia torulosa*, *Ctenomeria capense*, *Tylophora lycioides*, *Jasminium multipartitum*). Only two

³ New data have considerably broadened the concept of the Achariaceae, including amongst others several genera from the Flacourtiaceae, but the old concept will still be adhered to in this study.

species represent a Cape family: *Pelargonium capitatum* and *P. grossularioides*.

Fifty-one species range from the Eastern Cape to the northern limit of this group. Three ferns (*Marattia fraxinea* var. *salicifolia*, *Polystichum transkeiense*, *Asplenium splendens*) together with five orchids (*Disa nervosa*, *Eulophia ensata*, *Habernaria pseudociliosa*, *H. tysonii*, *Stenoglottis fimbriata*), one grass (*Prospytochloa prehensilis* – a forest species) and nine other monocots (*Dioscoria retusa*, *Clivia miniata* var. *miniata*, *Chlorophytum krookianum*, *Sandersonia auriantiaea*, *Urginea capitata*, *Hypoxis acuminata*, *H. filiformis*, *Aneilema aequinoctiale*, *Commelina modesta*) have this particular distribution pattern. Grassland taxa include *Athrixia phyllicoides*, *Helichrysum acutatum*, *H. allioides*, *Schistostephium hepatolobum*, *Senecio decurrens*, *S. oxydontus*, *Eriosema cordatum*, *Silene caffra*, *Stachys natalensis* subsp. *natalensis*, *Conostomium natalense* var. *natalense*, *Hebenstreitia dura*, *Stoebe vulgaris*, *Erica woodii*, *Chamaecrista plumosa* var. *erecta* and *Protea roupelliae*.

Ceratiosycios laevis is a flimsy herbaceous climber that occurs in forest all along the Eastern Cape coast, reaching Duiwelskloof on the escarpment. It belongs to one of three monotypic genera of the Achariaceae. Other forest species include *Seemannaralia gerrardii*, *Rothmannia globosa*, *Pachystigma macrocalyx*, *Buxus macowanii*, *Protorhus longifolia*, *Mackaya bella*, *Tapinanthus gracilis*, *Duvernoia adhatodoides*, *Peddiea africana*, *Pavetta inandensis*, *P. lanceolata*, *Strophanthus speciosus*, *Adenopodia spicata* and the climbers *Secamone gerrardii* and *Coccinia palmata* that usually occur at forest edges.

Only twenty-five species range north from Pondoland to the northern escarpment of which the following are grassland species: *Aeollanthus parvifolius*, *Eriosema parviflorum*, *Desmodium dregeanum*, *Senecio macroglossoides*, *Helichrysum argyrolepis*, *Aristea woodii* and *Alepidea longifolia*. The majority are forest taxa such as *Abrus laevigatus*, *Plectranthus*

petiolaris, *Justicia campylostemon*, *Commiphora harveyii*, *Garcinia gerrardii*, *Cassinopsis tinifolia*, *Oxyanthus speciosus* and *Vangueria randii* subsp. *chartacea*.

5.3.1.5 Endemics and near endemics of the southern African region

One hundred and thirty-three species occur at PSJ and are widespread in southern Africa. Seventeen genera are strictly southern African: *Teedia*, *Behnia*, *Syncolostemon*, *Passerina*, *Burchellia*, *Wimmerella*, *Psoralea*, *Ctenomeria*, *Putterlickia*, *Lauridia*, *Heliophila* (nearly so), *Tenrhyina*, *Arctotheca*, *Stenostelma*, *Periglossum*, *Watsonia*, *Freesia* and *Haemanthus*. Thus only seven percent of the genera from Port St Johns are southern African and the rest range wider.

The group includes species for which only broad statements about their distributions could be traced in the available literature, and it is probable that a number of them will prove to fit into another group. These last include *Behnia reticulata*, *Cnestis polyphylla*, *Quisqualis parviflora*, *Cissus fragilis*, *Cyphostemma hypoleucum*, *Rhoicissus rhomboidea*, *Cynanchum ellipticum*, *Ochna natalitia*, and *Psychotria capense*. Species that are forest related but with the ability to withstand drought better are *Chaetacme aristata*, *Obetia tenax*, *Dais cotinifolia*, *Ehretia rigida*, *Leonotis leonurus*, *Rhus dentata*, *Plumbago auriculata*, *Diospyros dichrophylla*.

Species associated with grasslands feature strongly here and only a few will be named: *Dierama robustum*, *Tristachya leucothrix*, *Hypoxis rigidula*, *H. hemerocallidea*, *Helichrysum appendiculatum* *H. aureum*, *H. decorum*, *H. mixtum* var. *mixtum*, *H. spiralepis*, *Arctotheca populifolia*, *Aster bakeranus*, *Pachycarpus asperifolius*, etc.

Together with those species discussed above with narrower ranges within southern Africa, fifty-five percent of the species from Port St Johns are southern African in distribution.

5.3.1.6 Endemics of Africa

One hundred and fifty-four genera but only eight families from Port St Johns are confined to Africa. The families are: Alliaceae, Meliaceae, Melianthaceae, Ptaeroxylaceae and the four mentioned above that are endemic to South Africa (Stangeriaceae, Agapanthaceae, Achariaceae and Rhynchocalycaceae). Three hundred species (35%) from Port St Johns range beyond the FSA region into Africa and, in total, seven hundred and sixty-nine species (90%) of the flora of Port St Johns are confined to Africa. The distribution patterns range from those that are more or less confined to the eastern region of Africa, those that are confined to Africa south of the equator and those with very wide distributions reaching West Africa and North Africa. In addition, those that are common between Africa and Madagascar are listed under this category.

Of the species that do not cross the equator, many are grasses, orchids and other forbs. Fewer forest species range this far: *Podocarpus latifolius*, *Rapanea melanophloes*, *Ptaeroxylon obliquum*, *Englerophytum natalense*, *Halleria lucida*, *Vangueria infausta* subsp. *infausta*, *Grewia lasiocarpa*. Two hundred and eighteen species of those confined to Africa have very wide ranges that are quite difficult to classify into a few sub-groups. However, only a few make it into West Africa, many only as far as Cameroon: *Stephania abyssinica* var. *tomentella*, *Urera trinervis*, *Trichomanes inopiniatum*, *Cyathula cylindrica*, *Dolichos sericeus* subsp. *sericeus*, *Lonchocarpus discolor* subsp. *discolor*, *Celtis durandii*, *Aristea cognata*, *Sopubia simplex*, *Selago hyssopifolia*, *Margaritaria discoidea* var. *fagifolia*, *Sapium ellipticum*, *Trichilia dregeana*, *Xymalos monospora*, *Asparagus plumosus*.

Forty seven species (5%) range to Ethiopia or Sudan and those that just extend into Arabia have been included in this group rather than in the Eurasian or Old World group. The following trees and shrubs obviously have a very wide north-south range in Africa: *Ziziphus mucronata* subsp. *mucronata*, *Oncinotis tenuiloba*, *Antidesma venosum*, *Hibiscus vitifolius* subsp. *vitifolius*, *Helinus*

integrifolius, *Acacia ataxacantha*, *A. karroo*, *Phoenix reclinata*, *Euclea natalensis* subsp. *natalensis*, *Bridelia micrantha*, *Macaranga capensis*, *Strychnos henningsii*, *Ficus ingens* var. *ingens*, *Cassipourea gerrardii*, *Keetia guenzii*, *Suregada procera*. Other forest species are *Coccinia adoensis*, *Adenia gummifera* subsp. *gummifera*, *Selaginella mittenii*, *Pteris catoptera*, *Impatiens hochstetteri* subsp. *hochstetteri*, *Clusia abyssinica*, *Dietes iridoides*, *Ranunculus multifidus*. The remaining species in the group are all grassland related.

Forty-five species (5%) are common between Africa and Madagascar. Ferns make up a very large part of this group: *Adiantum capillus-veneris*, *Cheilanthes bergiana*, *Dryopteris inaequalis*, *Asplenium dregeanum*, *Davallia chaerophylloides*, *Hypolepis sparsisora*, *Thelypteris melanotrichum*, *Elaphoglossum acrostichoides*, *Mohria caffrorum*, *Selaginella kraussiana*, *Vittaria isoetifolia*, *Cheilanthes viridis* var. *viridis*, *C. viridis* var. *glauca*, *Cyrtomium caryotideum* var. *micropterum*, *Asplenium prionitis*, *Gleichenia polypodioides*, *Lycopodium dacrydioides*, *L. gnidioides*, *Lygodium kerstenii*, *Schizaea pectinata*. Grasses and forbs include: *Eragrostis racemosa*, *Sporobolus pyramidalis*, *Melinis nerviglumis*, *Panicum aequinerve*, *Eleocharis limosa*, *Commelina africana*, *Cyanotis speciosa*. Trees from Port St Johns that are common between Africa and Madagascar are: *Cassipourea gummiflora* var. *verticillata*, *Rinorea angustifolia*, *Faurea macnaughtonii* and *Rhus natalensis*.

5.3.1.7 Species with a wider distribution than Africa and Madagascar

The majority of both families (133/140 or 95%) and genera (323/480 or 67%) found in Port St Johns range wider than Africa and Madagascar. In contrast, only 89 (10.3 %) of the 858 species that were assigned to classes occur outside of Africa and Madagascar. However, this number is still quite large considering that the study site is towards the southern end of the African continent where there is no direct contact with floras from other continents and the species with these ranges must either represent a fraction that has

good dispersal abilities or alternatively that has been in existence for a considerable amount of time. Nine genera and five species are confined to the southern hemisphere: *Podocarpus*, *Bulbine*, *Dietes*, *Bulbophyllum*, *Conula*, *Wahlenbergia*, *Drosera*, *Zornia* and *Grammatotheca*; and *Todea barbara*, *Thelypteris interrupta*, *Carpobrotus dimidiatus*, *Juncus exertus* and *J. kraussii*. Of interest is that *Dietes* is centred in southern Africa with a single species (*D. robinsoniana*) occurring on Lord Howe Island east of Australia.

One hundred and nineteen genera and fifty-two species can be considered Old World species or Eurasian in distribution. Nine are ferns: *Pellaea calomelanos*, *Asplenium erectum*, *Pteridium aqualinum*, *Microsorium punctatum*, *Lycopodium cernuum*, *Marsilea capensis*, *Thelypteris dentata*, *T. pozoi*. Seven are grasses: *Eleusine coracana* subsp. *africana*, *Eulalia villosa*, *Hyparrhenia filipendula* var. *pilosa*, *Themeda triandra*, *Cymbopogon validus*, *Eragrostis capensis*, *Ischaemum fasciculatum*. Only four are woody species (*Trema orientalis*, *Ficus sur*, *Maesa lanceolata* and *Pittosporum viridiflorum*) and the rest are non-woody, mostly grassland species: *Utricularia inflexa*, *U. stellaris*, *Sarcostemma viminale*, *Cuscuta cassyoides*, *Ipomoea wightii*, *Momodica balsamina*, *Sanicula elata*, *Torilis arvensis*, *Desmodium repandum*, *Oldenlandia herbacea* var. *herbacea*, *Ethulia conyzoides*, *Mikania cordata*, *Sebaea grandis*, *Achyranthes aspera* var. *aspera*, *Isolepis fluitans*, *I. prolifer*, *Mariscus congestus*, *Pappalia lappacea* var. *lappacea*, *Phyllanthus maderaspatensis*, *Asparagus falcatus* var. *falcatus*, *Gloriosa superba*, *Celosia trigyna*, *Hibiscus surattensis*, *Solanum nigrum*, *Hewittia malabarica*, *Solanum incanum*, *Neonotonia wightii* and *Calanthe sylvatica*.

The last species have a less defined distribution as a group. Some have truly worldwide distributions (*Ludwigia octovalvis* subsp. *sessiliflora*, *Amaranthus hybridus*, *A. spinosus*, *Phragmites australis*, *Equisetum ramosissimum*, *Cystopteris fragilis*, *Berula erecta* subsp. *thunbergii*, *Gomphocarpus fruticosus* and *Triglochin striata*); some have a pantropical distribution

(*Ipomoea indica*, *Doryopteris concolor*, *Commelina diffusa*, *Peperomia blanda* var. *leptostachya*, *Vigna vexillata* var. *ovata*, *Echinochloa colona*, *Eragrostis ciliaris*, *Oplismenus hirtella*, *Centella asiatica*, *Crotalaria pallida* var. *pallida*, *Pycreus polystachyos* var. *polystachyos*, *Gerbera piloselloides*); while some are tropical but not necessarily pantropical (*Echinochloa crus-gavonis*, *Pleopeltis macrocarpa*, *Microgramma lycopodioides*, *Xyris capensis*, *Hibiscus tiliaceus*). *Osmunda regalis* is a fern of cooler regions of the world and *Lycopodium carolinianum* var. *carolinianum* and *L. verticillatum* occur in Africa, America and Madagascar. *Utricularia livida* is found in Africa, Madagascar and Mexico.

5.3.2 Disjunct species

Diospyros simii is reported to be disjunct between King Williams Town/Kentani and the Zululand/Kranskop area (De Winter 1963), but has now been collected at Port St Johns and at three other sites in Pondoland and is probably rare rather than disjunct. *Helichrysum acutatum* has been collected from the escarpment near Umtata at Baziya and ranges to the Soutpansberg in the Limpopo Province. Closely related plants occur in tropical Africa but until the taxonomy is sorted out it is not certain whether they are disjunct or only closely related (Hilliard 1977). *Rhus carmulosa* is found from East London to Oribi Gorge and then again in northern Natal and Zululand (Moffett 1993). *Philenoptera sutherlandii* is common in forests of the Pondoland Centre and then jumps to Dhlinda and Ngoye forest in Zululand as well as forests of Swaziland. *Phyllanthus cedrelifolius* also displays this disjunction.

Ptaeroxylon is a monotypic genus with *P. obliquum* being the only species. White (1990) groups the distribution into three disjunct areas of different size in Africa south of the equator: the Angolan site on the west coast, the coastal zone along the east coast including the extension into the northern part of South Africa, eastern Botswana and southwestern Zimbabwe, and the West Usambara Mountains in Tanzania. The distribution occurs across five of the regional phytocoria delimited by White (1983): the Zambezian Regional

Centre of Endemism, the Somalia-Masai Regional Centre of Endemism, the Afromontane archipelago-like Regional Centre of Endemism, The Kalahari-Highveld Regional Transition Zone and the Tongaland-Pondoland Regional Mosaic. *Ptaeroxylon* is found in a wide variety of vegetation types ranging from semi-evergreen bushland and thicket to montane, coastal and mopane forest and is classed as a chorological and ecological transgressor. At Port St Johns *Ptaeroxylon* is found in coastal forest. *Strychnos henningsii*, *S. mitis*, the genera *Brachylaena* and *Obetia*, and the cactoid tree *Euphorbias* (the latter not recorded at Port St Johns) show the same disjunction across the Barotseland-Kalahari interval as *Ptaeroxylon*.

5.3.3 Rare and endangered

Seventy-six of the taxa (Table 12) in the checklist are listed in the **Red Data List of Southern African Plants** (Hilton-Taylor 1996), **Rare and Threatened Plants of Kwazulu-Natal and neighbouring regions** (Scott-Shaw 1999) and the **Southern African Plant Red Data Lists** (Victor 2002), or have been found to satisfy the criteria of these documents. Of these, several species are rare Pondoland endemics.

Table 12. Taxa from Port St Johns listed as rare and endangered by various publications.

TAXON	Scott-Shaw (1994) ¹	Hilton-Taylor (1996) ²	Victor (2002) ³	PCE endemic
<i>Anthospermum streyi</i>	V (B1, B2bcd, D2)	V		#
<i>Apodytes abbotii</i>	LR -lc			#
<i>Asclepias patens</i> (= <i>Paulforstera patens</i>)	V(B1, B2bcd, D2)	V		#
<i>Atalaya natalensis</i>	LR -nt	R		#
<i>Begonia dregel</i>	LR -nt	R		
<i>B. homonyma</i>	V (A1cd)			
<i>Bonatea speciosa</i> var. <i>speciosa</i>		nt	LR-lc	
<i>Calanthe sylvatica</i>		nt	LR -lc	
<i>Canthium vanwykii</i>	LR -lc			#
<i>Celtis durandii</i>	LR -lc			
<i>Clivia miniata</i>	LR -nt	nt	LR	
<i>Clivia nobilis</i>		nt	LR	

<i>Colubrina nicholsonii</i>	E(C2a, D1)	R		#
<i>Commiphora harveyi</i>		R-nt		
<i>Cotyledon orbiculata</i> var. <i>oblonga</i>		nt		
<i>Crassula multicava</i> ssp. <i>floribunda</i>	DD			
<i>Crinum moorei</i>	LR-lc			
<i>Cryptocarya myrtifolia</i>	LR-lc			
<i>C. wyliei</i>	LR-lc	nt		#
<i>Delosperma edwardiae</i> ⁵	Not Evaluated	.		
<i>Delosperma</i> sp. 1 and 2	Not evaluated			
<i>Dierama tysonii</i>	LR-lc			
<i>Dietes butcheriana</i>		nt		
<i>Dioscorea sylvatica</i>	LR-nt			
<i>D. similis</i>				
<i>Disa caffra</i>		nt	LR-lc	
<i>D. stachyioides</i>		nt	LR-lc	
<i>Encephalartos villosus</i>	LR-lc	nt-R		
<i>Englerodaphne ovalifolia</i>	LR-lc			
<i>Eugenia erythrophylla</i>	LR-lc	R		#
<i>Eugenia zeyheri</i>		R		
<i>Eulophia speciosa</i>	LR-lc	nt		
<i>Excoecaria simii</i>	LR-lc	R		
<i>Faurea macnaughtonii</i>	LR-lc	R		
<i>Ficus bizanae</i>	LR-lc	R		#
<i>Gardenia thunbergia</i>		R-nt		#
<i>Gladiolus oppositiflorus</i> subsp. <i>salmonaeus</i>		R-nt		
<i>Grewia pondoensis</i>	LR-lc	R		#
<i>Habenaria tysonii</i>				
<i>Helichrysum populifolium</i>	LR-lc			#
<i>Homalium rufescens</i>		K-R		
<i>Impatiens slanaganiae</i>	V (D2)	R		#
<i>Indigofera herrstreyi</i>	LR-lc			#
<i>Kniphofia coddiana</i>	LR-nt	R		#
<i>Maytenus abbotii</i>	V (C2a)	V		#
<i>Maytenus cordata</i>	LR-lc			
<i>Oxalis purpurata</i>		K		
<i>Olyra latifolia</i>	LR-lc			
<i>Pachycarpus natalensis</i>	LR-lc			#
<i>Pavetta bowkeri</i>	LR-lc			#
<i>Philoptera sutherlandii</i>	LR-lc			
<i>Phyllanthus cedrelifolius</i>	LR-lc	nt		
<i>Plectranthus hilliardiae</i>	LR-nt	R		#
<i>P. praetermissus</i>		E		#
<i>P. reflexus</i>				#
<i>P. lucidus</i>				
<i>P. malvinus</i>				#
<i>Podalyria velutina</i>	LR-nt	I		#
<i>Podranea ricasoliana</i>	LR-lc			#
<i>Psilonotum nudum</i>		nt		

<i>Rhychocalyx lawsonioides</i>	V (A1c, B1, B2abcd)	V		#
<i>Rinorea domatiosa</i>	LR-lc	K		#
<i>Sandersonia auriantica</i>	Lr-cd	R		
<i>Scilla natalensis</i>	V (A1acd, A2cd)	V		
<i>Schizochilus zeyheri</i>		nt	LR-lc	
<i>Seemannaralia gerrardii</i>	LR-lc			
<i>Stangeria eriopus</i>	LR-cd	R		
<i>Stenoglottis woodii</i>	DD#			
<i>Streptocarpus formosus</i>		R		#
<i>S. johannis</i>	LR-lc			#
<i>S. haygarthii</i>				#
<i>Suregada procera</i>		R		
<i>Tephrosia bachmannii</i>	DD	I		#
<i>Tinnea galpinii</i>	LR-lc			
<i>Tricalystia africana</i>	LR-lc	E		#
<i>Trichocladus ellipticus</i>		nt?		
<i>Wimmerella bifida</i>			DD	

Explanation of symbols

1. Scott-Shaw (1994) used a combination of IUCN (1994) and IUCN (1999) symbols for ranking. In brief E = Endangered, V = Vulnerable, LR = Lower risk, DD = Data deficient, cd = conservation dependent, nt = near threatened, lc = least concern.
2. Hilton-Taylor (1996) used IUCN (1994). In brief E = Endangered, V = Vulnerable, R = Rare, I = Indeterminate, K = Insufficiently Known, nt = not threatened, ? = no information.
3. Victor (2002)
4. New revision to sink it into *Cyphia elata* subsp. *depauperata* (P. Phillipson pers. comm.)
5. Has been sunk into *D. rogersii* (P. Burgoyne pers. comm.)

Three species, *Impatiens flanaganiae*, *Podranea ricasoliana* and *Plectranthus praetermissus*, are found in few other localities, and two species, *Plectranthus reflexus* and *P. malvinus*, are strictly endemic to the two sandstone mountains of Port St Johns. *P. malvinus* grows in large groups with many rooted nodes, but *P. reflexus* grows in small groups of a few individual erect plants and is clearly more vulnerable to disturbance. For reasons described above (Section 1.3) the status of *Delosperma* and *Kniphofia* spp. await taxonomic clarification. It is obvious from the above table that the latest assessment of South African plants (Victor 2002) is incomplete and misleading.

5.3.4 Comparison with other floras

The flora of Port St Johns is more similar to that of the St Lucia heritage site than the other three sites used in this comparison (Table 13) supporting the placement of the two in the same phytocorion by White (1983) and Van Wyk & Smith (2001). The values calculated for the Southern Natal Drakensberg and the Usambara Mountains of

Tanzania are in a similar range but with the former narrowly larger. The Cape Floristic Region is the least similar to that of Port St Johns.

Comparison of the list from Port St Johns with the list of Carbutt & Edwards (2001) found 27 genera that are shared by both the Drakensberg Alpine Centre and the PCE with the Cape Region, two genera that are shared by the Drakensberg and the Cape Region, and two that are shared by the PCE and the Cape Region at Port St Johns. These are not strictly confined to the three (or two) regions, but the majority of species from these genera are centred in the Cape Region and thus they could reflect a strong relationship with the latter flora. The two genera that Carbutt & Edwards (2001) associate with the Drakensberg and not with Pondoland but that are present at Port St Johns are *Passerina* and *Phyllica*.

Table 13 . Index of similarity^{1,2} between floras of Port St Johns and other sites.

Sites compared	Number of species in flora	Number in common with Port St Johns	Index of similarity with Port St Johns ²
Southern Natal Drakensberg ³	1375	159	0.116
Cape Floristic Region ⁴	8888	277	0.053
Usambara Mountains ⁵	3094	227	0.098
St Lucia Heritage site ⁶	1762	478	0.145

¹ 1. Index of similarity of Sorenson ($\frac{2a}{2a+b+c}$) where a = species in common, b and c = species totals of sites

2. Maximum score for two floras of the same size and with complete correspondence is 0.5

3. Hilliard & Burt (1987)

4. Goldblatt & Manning (2000)

5. Iversen (1991)

6. Scott-Shaw (1994)

5.4 DISCUSSION

When comparing the ranges of species, genera and families, it is obvious that the majority of species have more local ranges than genera and families. Only five percent of the families (7) are restricted to Africa and thus it is of significance that one family from Port St Johns is confined to the Pondoland Centre of Endemism. Six genera are confined to the eastern coastal region. A total of 32 genera are endemic to southern Africa, and 153 are endemic to Africa. Thus two thirds of the genera range beyond Africa whereas only ten percent of the species do. The distributions of species from Port St Johns fall into three groups: those that are confined to South Africa (the majority), those that are confined to Africa (one third) and those that range outside Africa (ten percent).

All six of the genera from Port St Johns that are endemic to the eastern coastal region are woody. A further five woody genera are restricted to the coastal area plus the escarpment or to the FSA region and all of these are probably palaeoendemic. The families confined to the eastern coastal regions are probably also palaeoendemic: Stangeriaceae is one of few gymnosperms in Africa and thus likely to be relictual, whereas Rhynchocalycaceae is a woody, taxonomically isolated member of the Myrtales (Johnson & Briggs 1984). In addition, both are monotypic, a character associated with palaeoendemism.

It is clear that there are many taxonomic problems that have to be investigated and resolved. Some are related to taxa that are actively speciating, mainly the neo-endemic fraction (*Streptocarpus*, *Plectranthus*) and there would be no easy resolution of these, but some are due to lack of field studies before species descriptions were undertaken (*Tricalysia*) and others, such as the re-naming of the quick-guide of *Delosperma*, are of an organisational nature or due to lack of adequate taxonomic literature.

It is quite a riddle that the Fabaceae, usually favoured by the impoverished sandstone soils, are not represented amongst the endemics of Port St Johns. Instead, the Lamiaceae, *Plectranthus* in particular, has three endemics/near endemics. This must

point to the plasticity of the local species, regardless of the selective advantage that adaptations such as mycorrhizal symbiosis may give species on the low nutrient soils. In addition, the effect of low gene flow among populations in under-storey forest habitats clearly has a role. The drivers of speciation are obviously different at different places and times, and it is clear that at Port St Johns the plants in low light, under-storey forest conditions are the most likely to speciate.

Less than four percent of the species from Port St Johns are PCE endemics, a figure less than the average reported in the literature (Meter 1998, Van Wyk & Smith 2001). According to island biogeographic theory (Cox & Moore 1993) island area, accessibility and richness of source of colonizers are three of the factors that influence the species numbers of island floras. One could speculate that Port St Johns lies on a relatively small, isolated outcrop of the host substrate, that many of the endemics have very narrow ranges and the Egosa Interval between Port St Johns and the Magwa escarpment is a likely biogeographic barrier for these endemics.

Begonia dregei is a small herbaceous perennial with a succulent caudex that occurs in a few localities in forests at Port St Johns. It is a rare plant that is endemic to coastal forest of eastern South Africa. Each population has a characteristic leaf shape (McLellan 2000) and on Mt Sullivan there are at least 5 different populations, each with less than 50 plants. Matolweni *et al.* (2000) analyzed 15 enzyme loci across a number of populations and found that among-population gene differentiation accounts for > 90% of the genetic variation, which indicates restricted gene flow. They see this as consistent with limited dispersal abilities of *Begonia dregei* and in addition, as evidence of a once wider distribution of which only isolated populations now remain after the fragmentation of once more continuous forest into smaller patches. However, it is unlikely that the dispersal mechanism or the pollination system has changed significantly after the fragmentation of forests, otherwise there would be observable differences related to these aspects. It is likely that *B. dregei* has been in small isolated populations for much of its historic existence.

The Angiosperm Phylogeny Group (Stevens 2003) suggests that the Achariaceae (Malpighiales) should be enlarged to accommodate several other genera and families. The original delimitation of the family meant that it was confined to the eastern parts of South Africa but this will change when the new classification is implemented. There is weak support for monophyly of the new family, but should it be confirmed it would change several biogeographic statistics because the bulk of the Flacourtiaceae, the Kiggelariaceae and the Oncobaceae (minus *Oncoba*) will be included in the enlarged family.

Many of the taxa from Port St Johns that are in common between Africa and Madagascar are ferns, orchids, grasses and sedges: all taxa with very light spores and seeds and thus good candidates for long distance dispersal. In contrast, few trees from Port St Johns are common between Africa and Madagascar, which could be interpreted as an indication that many taxa in common between the two are as a result of long-distance dispersal events and not of vicariance events. This supports the contention of Gentry (1985) that several long-distance events were responsible for the presence of Bignoniaceae on Madagascar.

The species in the group that are distributed widely in South Africa are those with greater ability to withstand drier conditions, but the group also includes species for which only broad statements about their distributions could be traced in the available literature, and it is probable that a number of them will also prove to fit into the group tracking the escarpments. Several taxa had distributions that extended to the Chimanimani Mountains of Zimbabwe, which are probably a habitat extension of the southern African escarpments. Such taxa that have a range that extends far south are not necessarily tropical species, but rather temperate species that penetrate the tropical areas.

The future of all of the R& E species depends on habitat protection and considering that serious problems are being experienced due to an influx of people, as well as problems caused by natural population growth in the area, it is important to have off site cultivation as well as adequate protection for local populations. Port St Johns

endemics have been in cultivation for some time and *Podranea ricasoliana* is a well-known horticultural species, having been grown in Grahamstown for more than a hundred years (Verdoorn 1961). *Plectranthus* species are promoted by the National Botanic Gardens and both *P. malvinus* and *P. retroflexus* are growing at Kirstenbosch (Van Jaarsveld & Edwards 1997).

Delimitation of disjunctions can be problematic as the following examples show. *Disa similis* is rare along the coast of Transkei and Natal, but has also been recorded in Zambia and Angola; *Habernaria tysonii* is a very rare species which has been recorded from only a few sites in the Eastern Cape, Northern Natal, Zimbabwe and Zambia (Stewart *et al* 1982). Are they simply rare and have not been recorded in the intervals, or are they rare and disjunct?

The flora of Port St Johns is clearly more similar to its nearest neighbours, the St Lucia Heritage site and the southern Natal Drakensberg, than to the floras of more distant areas. Port St Johns shows least similarity with the flora of the Cape in spite of the Usambara Mountains being much further away. The flora of the Usambara Mountains shows a similarity of similar magnitude, albeit smaller, than that of the southern Drakensberg. Considering the distance between the two floras the result must be an illustration of the strong tropical affinity of Port St Johns. This finding that the southern Natal Drakensberg is more similar to Port St Johns than the Cape is does not support Meter (1998) who found that the Cape flora had a greater influence on both sites that she surveyed in Pondoland than the Afromontane flora did.

6 FLORISTIC ANALYSIS II: ALIEN SPECIES

..the point has now been reached which makes it seem doubtful whether, in future, any considerable proportion of new geographical records can be accepted simply at their face value (Good 1974).

6.1 INTRODUCTION

Invasive alien organisms have the potential to disrupt local ecosystems to varying degrees. The resultant breakdown in the web of life histories of plants, insects, birds, reptiles, fish and mammals subsequently makes the region even more susceptible to new invasions. Soils and the water table may also be affected, and in the worst-case scenario, such as has been seen with invasions in fynbos, local habitats are completely destroyed. Alien invasions are a major threat to biodiversity, possibly causing local extinctions. In a region where endemics often have very narrow ranges this is a serious cause for concern.

In the Fynbos Biome the effects of invasive trees and shrubs include “the alteration of coastal sediment movements patterns, the acceleration of river bank erosion, a reduction in stream flow, changes in fire regime, and the alteration of the composition of natural plant and animal communities” (Richardson *et al.* 1992). Huston (1994) asserts that invading species possibly affect the hydrology and nutrient cycles of entire ecosystems. The greatest impact of invaders in South Africa has been in fynbos and the majority of studies have been focused there (Richardson *et al.* 1997).

Wells *et al.* (1986) identified 47 species in southern Africa that “change the character, condition, form or nature of a natural ecosystem over a substantial area” and coined the term transformer species to describe them. Henderson (2001) distinguishes between environmental weeds and ruderal/agrestal weeds in South Africa. Ruderal weeds invade mainly acutely disturbed sites. Four types of environmental weeds invade natural or semi-natural sites (Henderson 2001):

1. Transformers, as described above, forming mono-stands.
2. Potential transformers.
3. Special effect weeds, which may not dominate the landscape but could for example replace indigenous plants, or be poisonous, or highly allergenic.

4. Minor weeds that invade and persist in an ecosystem but do not form monospecific stands.

In southern Africa introduction of alien species has mainly taken place since the arrival of European settlers 350 years ago as a result of the trade in horticultural and agricultural species. However, some species were accidental introductions. Not all alien species can establish self-perpetuating populations in the wild, and of those that achieve this only a few become of ecological and economic importance. Species with a long history of presence will probably have reached equilibrium with the indigenous vegetation and local environmental conditions by this stage. In contrast, new invasions are still expanding their range. It is unknown how long it takes to build up a significant enough store of seed to capitalize on momentary favourable conditions for rapid expansion, the so-called plant invasion window (Richardson *et al.* 1992). Presumably it is after this opportunity that the numbers of an alien species typically show near-exponential growth rates during a period of rapid range expansion (Brown & Lomolino 1998). However, some species such as *Chromolaena odorata* do not show any time-lag before spreading rapidly (von Senger 2002) thus posing an even greater threat to the environment.

Aliens are mainly found along roadsides, in towns, plowed fields, in plantations and along rivers. Plant invasions have generally been associated with some form of disturbance of the natural vegetation that facilitates germination and establishment of the outsiders. Disturbance can be caused by fire, agricultural practices such as plowing or grazing, urban activities, floods along riverbanks and drought. Many hypotheses have been put forward to explain invasions and studies have addressed physiological and life history adaptations to the physical environment, dispersal mechanisms, species interactions and other factors. Richardson *et al.* (1992) have investigated the "inherent invasibility" of fynbos, by looking at patterns and processes of invasion at different levels of organization (biome [broad-scale distribution patterns], landscape [rates and patterns of invasion of a single species in a catchment], community [relationship between non-equilibrium dynamics and invasibility] and organism [life history strategies and functional groups of invaders]). They found that the abundance of the seven most important tree and shrub species in fynbos positively correlated with agricultural lands.

Watercourses in fynbos are major sources of seed dispersal for certain *Acacia* species. Invasive trees in fynbos have an advantage over local species in that they can exploit the environment after fires more quickly. Seeds of some aliens have various advantageous strategies such as those that are nutrient-rich and give the seedlings a competitive edge. Not all invasions are from distant areas and South African taxa like *Aptenia cordifolia* and *Crocasmia aurea* that occur along the east coast have become weedy in the Cape region (Goldblatt & Manning 2000).

Predictive modeling of distributions of invasive organisms is a tool that is being developed for the understanding and management of problem species. Distribution models for *Lantana camara*, *Ricinus communis* and *Solanum mauritianum* show that they can be expected to be found at Port St Johns (Robertson *et al.* 2001). All three can be expected to occur in the Savanna and Forest biomes.

This study is concerned with the floristic and biogeographic aspects of alien invasives in Port St Johns, followed by a narrative account of individual taxa.

6.2 METHODS

A literature survey was conducted to identify all the alien species from the checklist of Port St Johns (Appendix 2). The following general sources were consulted:

1. **Plants of southern Africa: names and distribution** (Arnold & De Wet 1993)
2. **Manual of cultivated plants** (Bailey 1954)
3. **Problem plants of South Africa** (Bromilow 1995)
4. **Plant invaders of Southern Africa** (Henderson 1995)
5. **Alien weeds and invasive plants** (Henderson 2001)
6. **A Catalogue of Problem Plants in Southern Africa** (Wells *et al.* 1986)
7. **Grasses of Southern Africa** (Gibbs Russell *et al.* 1990)

6.3 RESULTS AND DISCUSSION

Ninety-six species of alien plants were recorded from Port St Johns (Appendix 2) representing 83 genera and 42 families. Seven families contribute 56% of the invaders. They are, in order of size: Asteraceae, Poaceae, Solanaceae, Fabaceae, Myrtaceae,

Amaranthaceae and Verbenaceae. The weeds and invader plants listed in Regulation 15 of Act 43 of 1983 (Henderson 2002) belong to 196 species of 112 genera and 48 families. Of these the seven largest families contribute 118 species or 60% (Fabaceae, Myrtaceae, Asteraceae, Cactaceae, Pinaceae, Poaceae, Solanaceae).

It is apparent that the Asteraceae (17 species or 20%) contributes by far the largest proportion of aliens in Port St Johns, unlike the situation on a national level where Poaceae is the largest family followed by Asteraceae and Fabaceae. Henderson (2002) lists six species of the tribe Eupatorieae as being amongst the most invasive species in southern Africa. Four of these, viz. *Ageratum conyzoides*, *A. houstonianum*, *Campuloclinium macrocephalum* and *Chromolaena odorata* occur locally at Port St Johns. Both species of *Ageratum* is widely encountered at forest edges, but do not form monospecific-stands, and it seems as if the maximum extent of invasion in this region has been reached. *Campuloclinium macrocephalum* is rarely seen, but *Chromolaena odorata* is still in the stage of expanding its range and every year new areas are invaded and more plants are produced. However, *Campuloclinium* is also expanding rapidly in South Africa and the situation in Port St Johns needs to be monitored (L. Henderson, pers comm.).

Of the aliens approximately 60% are ferns, grasses and herbs, and 40% are climbers, trees and shrubs. Grasses and sedges form 10% of the aliens group while herbs contribute 43%. There are 15 shrub (16%), 10 climber and 15 tree species. In the fynbos herbaceous alien species occur in larger numbers than tree and shrub species, especially in nutrient-rich sites and where the disturbance is most severe. However, 88% of the 33 taxa that are considered most important in terms of their effects on fynbos are trees and shrubs, two are woody creepers and only two are herbaceous (Richardson *et al.* 1992). At Port St Johns the plant with the largest effect on forests is a climber (*Pereskia*), and shrubs and small forest edge trees are the others that do extensive damage. Thirty-eight species (40%) occur in forest habitats and of these 84% are found at the forest edge. Thirty-four species (37%) are associated with grasslands and eight (9%) need moist areas or riverbanks. Nine species (10%) favour disturbed sites and three species invade only coastal bush or shrubby areas.

Analyzed according to country of origin it is apparent that the New World contributes more than half of the invading species and of these more than half are from the southern hemisphere. The invaders with the greatest ecological impact at Port St Johns are all South American. Huston (1994) cites Eurasia as being the area of origin of the most successful invaders around the world but at Port St Johns-only thirteen species (14%) are from Eurasia and none of them are present in large numbers. Of these four are grasses that have probably been imported for pastures. Australia only contributes three species and five are from Africa. Temperate weeds include *Plantago major*, *Chenopodium album*, *Solanum nigrum*, *Echinochloa crus-galli* and *Paspalum distichum*. Tropical weeds that are widely distributed include *Achyranthes aspera*, *Ageratum conyzoides*, *Amaranthus spinosus*, *A. crispus*, *Bidens pilosa*, *Commelina diffusa*, *Eleusine indica*, *Galinsoga parviflora*, *Heteropogon contortus*, *Sigesbeckia orientalis*, *Solanum aculeatissimum* and *Tithonia diversifolia* (Good 1974).

Seven species (7%) are declared invaders (Category 3)¹. These are plants that may not be sold in South Africa and no new plants may be planted. Existing plants may remain where they are except for those within 30 m of the 1:50 year flood line of rivers or wetlands. Five species (5%) are classed as Category 2 declared invaders and these may only be grown within demarcated areas after the issue of a permit. All other specimens outside of this area have to be destroyed. Twenty-six species (27%) are Declared Weeds (Category 1) that are prohibited on any land or water surface in South Africa and have to be controlled or eradicated where possible (Henderson 2001).

Some of the aliens at Port St Johns are an important feature of the landscape and have done serious damage to the indigenous vegetation, but the majority is present in insignificant numbers and cannot be termed invasive. The earliest record of a plant invader is a collection of *Ageratum houstonianum* Mill. made in 1896 by E.E. Galpin (PRECIS 1997). Letters written in the 1860's by Sydney Turner clearly indicate that settlers imported many horticultural and agricultural species to Port St Johns (Child

¹ Henderson (2001) lists proposed weeds and invaders

1980). This is mirrored in the rest of South Africa where the majority of invasive aliens arrived between 1800 and 1950, some as regular imports and others accidentally (Wells *et al.* 1986). It is also apparent that not all invaders have been brought to Port St Johns intentionally as for instance *Chromolaena odorata* is naturally increasing its range from introductions in neighbouring regions to the north. *Pereskia aculeata* was first reported to have reached Port St Johns by 1991 (Kluge & Caldwell-1991), but had obviously been there for some time as the authors report “numerous dense, impregnable stands occurring in the indigenous forests”.

Residents of Port St Johns have incorporated several alien species into the local culture and economy. *Solanum mauritianum* is used as a veterinary medicine. Seeds of *Canna* sp. cf. *glauca* are used as beads for jewelery that is made by crafters and sold to the tourist market. Some residents grow the plants and sell seeds to the crafters; other crafters collect seeds from the wild. Seeds of *Coix lacrima-jobi* and *Ricinus communis* are collected from the forests for a similar purpose. *Psidium guajava*, *Solanum nigrum*, *Bidens* spp., *Chenopodium ambrosoides* and *Amaranthus hybridus* are used as foods and make an important contribution to the diet of the lowest income groups (Wehmeyer & Rose 1983). *Cestrum laevigatum* is widely used in the basket industry because the saplings are supple, make good struts and they have a pleasing white colour. *Solanum mauritianum* is also used for struts in baskets as the wood holds nails very well and produces strong baskets (Dekker, pers comm.). Removal of these species from the forest would automatically increase pressure on other indigenous species that do not regenerate as fast as the aliens. Many subsistence farmers plant *Cestrum laevigatum* as hedges around their homestead gardens. It is fast growing and provides a dense screen to keep cattle out. Subsistence farmers do not like spiny hedges, contradicting the report by Henderson (1987), which states that “presence of spines, prickles or thorns is an ideal characteristic for a barrier plant” to keep out unwanted animals and humans. Farmers are concerned that spines will damage eyes of livestock. *Psidium guajava* is eaten by birds and monkeys and it also provides fruit to local people who harvest it for themselves and to sell. The wood is very useful for implement handles, being soft and workable when newly harvested, but rock hard when seasoned. It is used for poles for building, as it is

very durable. *Lactuca indica* has been used for medicinal and recreational purposes. It is reported to have a strong sedative effect.

The greatest perceived influence exerted on the vegetation at Port St Johns comes from a few species: *Pereskia aculeata*, *Chromolaena odorata*, *Lantana camara*, *Solanum mauritianum*, *Cestrum laevigatum* and *Montanoa hibiscifolia*. *Pereskia aculeata* is the only species that has invaded and totally destroyed undisturbed forest. It is a vigorous climber that weighs down large forest trees, forming such a complete cover that no sunlight can penetrate to the trees, which inevitably die and collapse. *Pereskia* is a primitive member of the cactus family and is indigenous to Mexico, the West Indies and Central and South America. It has been present in South Africa at least since 1858 when it was introduced as a barrier plant (Klein 1999). It has fleshy leaves and fruits, making it well adapted to deal with the regular short droughts that occur along the coast. Birds and monkeys disperse the bright orange fruit that are borne in profusion. Vegetative reproduction is highly successful as even a 10 mm section of stem, or a leaf, can produce a new plant (Kluge & Caldwell 1991). Several populations have been sighted, and where they have been cleared, there is barren earth and rock where once there was mature coastal forest. Mountain slopes with loose screes are consequently unstable and present a danger to people, roads and buildings. Management of this plant is extremely difficult and costly due to its thorny shoots, vigorous growth, large amounts of bird dispersed fruits and remarkable ability to regenerate from scraps of plant parts. Plants are cut down and burnt but no permanent solution has been found and testing of new chemicals is eagerly awaited (Mgudlwa, pers comm.). Three biological control agents have been released, but success has been limited and it seems as if *P. aculeata* still has the potential to expand its range in South Africa. However, further insect species targeting stems, seeds and seed production have been identified for trials against *Pereskia* (Klein 1999).

Chromolaena odorata is still in the phase of exponential range expansion. It was first reported in South Africa during 1940 in Natal. By 1983 it appeared south of Umtamvuna (Henderson 2001) and by 1991 the first corridor of plants along a road was recorded at Port St Johns (Kluge & Caldwell 1991). It seems to favour drier slopes than the other aliens, and invades shrubby areas, mainly on shale. However, young plants have been

sighted in forest gaps in the Bulolo river valley recently. Dense stands of shrubs up to 4 m high crowd out indigenous vegetation and several areas that have been totally invaded have been seen. Each plant can reproduce vegetatively and, in addition, also produces vast amounts of wind-borne seed. Chemical control is expensive and not a long-term solution. Biological control agents have been selected and should be released into the wild soon (Zachariades pers comm.). There is little morphological variation between populations in South Africa but the South African plants are distinctly different from those found further north in Africa as well as those that have invaded other continents. An attempt was made to locate the geographic origin of the populations in South Africa using genetic markers (von Senger 2002) and a high amount of genetic variation was found within the South African population leading her to speculate that there may have been several separate introductions in South Africa, a fact that may have consequences for the success of biocontrol agents.

Lantana camara is a serious problem in a few areas, notably on the lower west-facing slopes of Mt Sullivan and some spots on Mt Thesiger. Oddly enough there is not a lot of *Lantana* elsewhere in Port St Johns although plants occur near roads.

The department of forestry introduced *Pinus radiata* to the plantations on Mt Thesiger and subsequently they invaded grasslands nearby. Mature trees have been removed from the proteoid savanna on the summit of the mountain from areas that had been protected in a nature reserve for many years. The only disturbance would have been fire, a factor that predisposes fynbos to invasion by *Pinus* (Richardson *et al.* 1997). Plants still occur along the Mzimvubu River where the main disturbance is flooding, but with some effects of road construction. This species was introduced to the Cape Province in 1680 and occurs there in all vegetation types (Richardson *et al.* 1992).

Solanum mauritianum and *Cestrum laevigatum* are found at forest edges, both being bird dispersed trees. Especially the latter has had a serious effect on forest edge dynamics and is present in large numbers. It was initially introduced as the 'ink berry' and settlers used the berries for this purpose. *Montanoa hibiscifolia* is found along roadsides where it grows to a height of about 4 m each season. The pretty white daisy flowers make a

handsome display and it is clearly one of the horticultural imports. Plants die back after flowering but the mature plants exclude all other vegetation in the zone where they occur.

Robertson (2001) has proposed a prioritisation system for the management of weeds in South Africa. It is clear that the system is not aimed at local level (Port St Johns) but at regional level (South Africa) as the most destructive plant at Port St Johns (*Pereskia aculeata*) is only ranked seventeenth in the list. However, *Chromolaena odorata* is ranked as second, and *Cestrum laevigatum* as fifth, both of these plants being of significance locally. *Lantana camara*, ranked number one nationally is of importance locally, but less so than the above. *Montanoa hibiscifolia* does much damage to forest edges locally but is not ranked at all in the national list.

Rubus rosifolius has formed dense, impregnable stands on old military training grounds in the upper reaches of the Bulolo river. Elsewhere it is relatively rare and of no great ecological importance. *Solanum hispidum* occurs in the same area as *Rubus rosifolius* and these two spiny plants, one a low shrub and one a single-stemmed shrub to 3 m high, form a formidable barrier. *S. hispidum* is also spreading along roads in a few places. It is of interest that this plant is advocated by sangomas as a plant that protects against lightning strikes and it is actively propagated by people from the Drakensberg escarpment to the coast. At the first signs of thunder it is severely beaten and bruised with the aid of a knobkierie (Gqwabaza, pers. comm.)

Areas that are particularly affected by multiple invasive species are the banks of the Mzimvubu River, roadsides and urban areas. Upstream from the Pondoland Bridge the riverbank is very badly invaded by a variety of species: *Eucalyptus*, *Pinus*, *Phragmites*, *Lantana*, *Chromolaena*, *Montanoa* and *Datura*. It is clear that regular flooding of the Mzimvubu, which can be very destructive to the vegetation on the bank, predisposes the area to invasion by aliens.

Begonia cucullata, a South American plant that has been hybridized for horticultural purposes has spread from gardens to two small populations in the forests on Mt Sullivan (McLellan *et al.* 1994). It is in close contact with the indigenous *B. dregei* and it remains

to be seen whether it is going to out-compete it or possibly hybridize with it. The populations seem quite old although they were only reported in 1992 and hopefully they are not a threat to local forest floor plants. *Passiflora edulis* has also spread into forest, but in very small numbers and plants are isolated from each other. It is a climber that is probably spread by monkeys. *Coix lacrima-jobi* is a pan tropical weed (Good 1974). It occurs in small numbers in the forest, usually near streams. Local residents use the seeds for beads and thus there is some form of control. They have reported that the resource is getting scarce and that they have to search longer to find seeds to use as beads (Anonymous, Second Beach, pers comm.)

Only one very small population of *Opuntia monacantha* has been found and it does not seem to be spreading. Four tree species that have established themselves are *Spathodea campanulata*, *Tibouchina granulosa*, *Citrus* sp. and *Grevillea robusta*. *Spathodea* grows in gardens below Tiger Flats, along the west bank of the Mzimvubu and a single tree has sprouted along the new road that was completed after the floods of 1987. *Tibouchina* grows in the garden and immediate vicinity of Cremorne on the east bank of the river. One tree can be seen when it flowers across the river at the base of the cliff face on Mt Sullivan. It is in undisturbed forest and is clearly an escape. *Citrus* sp. has been seen in the Gxwaleni and Bulolo catchments and is spread from a grove that was planted in Silaka before it was declared a reserve. Currently they are either spread by people or monkeys. They are not very successful and most plants are quite small, but they do seem able to survive for long periods and bear fruit. *Grevillea* was collected at the edge of the Xolweni forest, behind Devils' Peak at the base of Mt Sullivan in an undisturbed forest.

Ferns are an unusual component of the alien invaders list. *Nephrolepis exultata* has obviously been in the area for many years and has formed a number of dense stands, some on banks at the edge of forest and some along roadsides. Where it takes hold it forms monospecific-stands that exclude all other species, clearly an untenable situation. The alien *Lygodium japonicum* has only been collected from one locality, and the indigenous *Lygodium kerstenii* has been collected as well, also from only one locality, which is near Cremorne. There seems to be some confusion with the identifications and these two collections are probably from the same plant, which is still growing next to the

road that runs along the riverbank. Whether it is the alien *L. japonicum* or the indigenous *L. kerstenii*, it seems to have been introduced as a garden plant. *Pityrogramma* occurs very rarely in grassland and along roads, and *Adiantum raddianum* is found in forests with the main populations near the garden of Cremorne. Stags' horn ferns (*Platycerium* sp.) have spread onto an avocado tree in town near one of the shops. It is not known how long they have been there and the situation should be regularly monitored to see if they spread to indigenous trees.

Four collections have yet to be named to species level. Of these two are only tentatively named (cf. *Asarum*, cf. Solanaceae) but both have several characteristics of an alien and are assumed to be such. The first is present in patches that exclude all other plants and the second, of whom only one plant has ever been seen, is likely to be a horticultural import because it is a handsome plant with unusual flowers and the vegetative parts are characteristic of a well-known weedy genus, *Solanum*. An understory herb in the Bulolo river valley has provisionally been identified to *Asarum* sp. cf. *shuttleworthii*, a member of the Aristolochiaceae. It has formed a couple of patches of 3 to 5 m² where extensive, but shallow, root systems have developed and where it excludes all other plants. No flowers have been seen in spite of several visits to the site. The entire population is in an area of less than 200 m by 50 m. Plants are in cultivation privately and at Kirstenbosch and hopefully identification will be possible once they flower. *Asarum* is commonly known as wild ginger and is a perennial acaulescent herb with slender aromatic branched rootstalks (Bailey 1954). Twelve species occur in north temperate regions. The other unidentified species is tentatively named as a member of the Solanaceae. It occurs in deep shade in undisturbed forest in the Bulolo valley. A single stemmed shrub to 3 meters tall with very large leaves of up to 50 cm by 15 cm, it has flowers of 1 cm diameter borne in small clusters in the leaf axils. The flowers are shell pink and waxy with bright yellow anthers in a staminal column. Both the stem and leaves are softly hairy. The specimen is at PRE awaiting identification.

Kalanchoe paniculata was collected at a roadside where it grew in a small population. It is very likely an introduced species, and although its range extends to the northeast of the Eastern Cape, no other specimens were seen growing in undisturbed areas. *Dombeya*

burgessiae (indigenous north of Durban) was collected in Port St Johns by YN Dazana in the early 1980's. It is either a misidentification, or it is yet another garden escape, probably from the garden at Cremorne where Mrs. Turner created a beautiful and alien landscape situated in a glade above the Mzimvubu River and immediately below indigenous forest on Mt Sullivan.

The distribution of *Olyra latifolia* is not known with certainty and there is some uncertainty about its biogeography. It is listed as an alien by Arnold & De Wet (1993) and as a rare and endangered indigenous plant by Scott-Shaw (1999). Gibbs Russell *et al.* (1990) note that it occurs in Tropical America and Africa and that one species is indigenous or possibly naturalized in Natal and the Cape Province.

6.4 CONCLUSION

It is of some interest that more Australian species of *Acacia* and *Eucalyptus* are not found here. There are a few individuals, but they are clearly not going to pose a major threat to the environment at Port St Johns, unlike the situation in fynbos where they are at times dominant (Richardson *et al.* 1992). It seems that species imported or introduced accidentally will find their most receptive habitats in regions with a similar climate to that of their origin. One would have expected the substrate to play a role, but although the main geology at Port St Johns is sandstone, allied to that of the Witteberg, it does not seem to be of major importance in predisposing the region to those aliens that are successful in colonizing the fynbos.

Many alien species are established at Port St Johns, but only a few of those that have invaded have a particularly severe impact. The aliens with the greatest impact on the local vegetation are *Pereskia aculeata*, *Chromolaena odorata* and *Cestrum laevigatum*. They are a climber, a shrub and a small forest edge tree respectively. This is in contrast to the situation in fynbos where tree species are the most destructive invaders. Loss of forest ecotone has led to a serious local reduction of species richness. Intact forest has been completely destroyed and consequently the steep slopes of Mt Sullivan are unstable and present a danger to roads, buildings and people. In spite of the threat of both formal

and informal development alien plant species are currently perceived as the biggest problem facing the flora of Port St Johns (M. Hill, pers. comm.)

7 THE FLORA OF PORT ST JOHNS IN THE CONTEXT OF THE PCE

A rare thing embodies both the fragility of existence and the uniqueness of all life, so when a single locality supports large numbers of rare species, both our concern and the need for explanations acquire an intense focus (Kingdon 1990).

7.1 INTRODUCTION

The Pondoland Centre of Endemism (PCE) was only identified relatively recently (Van Wyk 1990, Van Wyk & Smith 2001) and compilation of plant distributional records for this area is in the beginning stages. Information currently available reports one endemic family and six endemic genera in this area of 1800 square kilometers along the coast of Transkei and southern KwaZulu Natal. The approximately one hundred and twenty endemic and near endemic species documented to date are found in grassland and in forest, and both neo-endemics and taxonomically isolated palaeoendemics have been identified. Floristic affinities are biased towards a tropical element, but links also exist with the Cape and Afromontane floras (Van Wyk & Smith 2001).

The objective of this part of the project is firstly to collate additional species lists of the Pondoland Centre and secondly to analyze these lists in relation to each other. In addition, an update of the list of endemics, near-endemics and disjunct taxa will be provided, which will then be analyzed floristically and also relative to the species lists of the four sites.

Three studies of relevance are those by Carbutt & Edwards (2001), Meter (1998) and Geldenhuys (1992) who all compared floras of different sites, including ones in Pondoland. Meter (1998) concentrated on floristic relationships, growth forms and the influences of various phytochoria in two floras of the Pondoland Centre (Umtamvuna Nature Reserve and Oribi Gorge Reserve). Geldenhuys (1992) looked at floristic patterns, growth forms and ecological aspects in an attempt to explain the distribution patterns of plants in fourteen forests across southern Africa. Carbutt & Edwards (2001) analysed the floras of the Drakensberg Alpine Region (DAR), the

Cape Floristic Kingdom (CFK) and the Pondoland Centre of Endemism for similarities at generic level and attempted to look for unifying patterns in the floras and also in the abiotic conditions.

Meter (1998) found that Umtamvuna Nature Reserve and Oribi Nature Reserve are similar at family level (top ten families) and at generic level (top ten genera), but very different at species level. Only 24% of the total species count occurs at both sites, as do only 41.2% of PCE endemics. Hilliard and Burtt (1987) similarly found that "in the Drakensberg no two valleys are floristically quite alike", but they do not quantify the similarity or difference. The tropical element makes the largest contribution to both sites in Pondoland, being better represented in Oribi Gorge Reserve, the northernmost site, and the Cape element makes the second largest contribution to both sites, being better represented in Umtamvuna Nature Reserve, the southernmost site. The Afromontane element makes a relatively small contribution to both sites, but shows a large degree of overlap between sites. A criticism of Meter's (1998) study is that rather small samples of representative taxa from each phytochorion were the basis for broad conclusions.

Geldenhuys (1992) used multiple regression modeling to identify the number of dispersal corridors, the proximity to other forests and the mean altitude range as major factors contributing to the variation in the number of woody species. Herbaceous species varied according to the influence of landscape types and dispersal corridors. All forests had high proportions of unique taxa, both woody and herbaceous. The shared taxa gradually reduced in a southward trend, having both Afromontane and Indian Ocean Coastal elements, these mixing to a greater degree in the forests of Umtamvuna than anywhere else in the study.

Carbutt & Edwards (2001) identified that the most important Cape elements that are restricted to the Pondoland Centre are from the Proteaceae and Fabaceae. The life forms most frequently found among Cape elements in Pondoland are mesic shrubs, ericoid and geophytic herbs, but few trees. They list 76 genera that are Cape elements occurring in both the PCE and the DAR.

Checklists for two sites have been published to date: by Abbott *et al.* (2000) for Umtamvuna Nature Reserve and by Meter (1998) for Oribi Gorge Reserve. These will be compared with additional lists for Port St Johns and Mkambati Nature Reserve compiled for the present study.

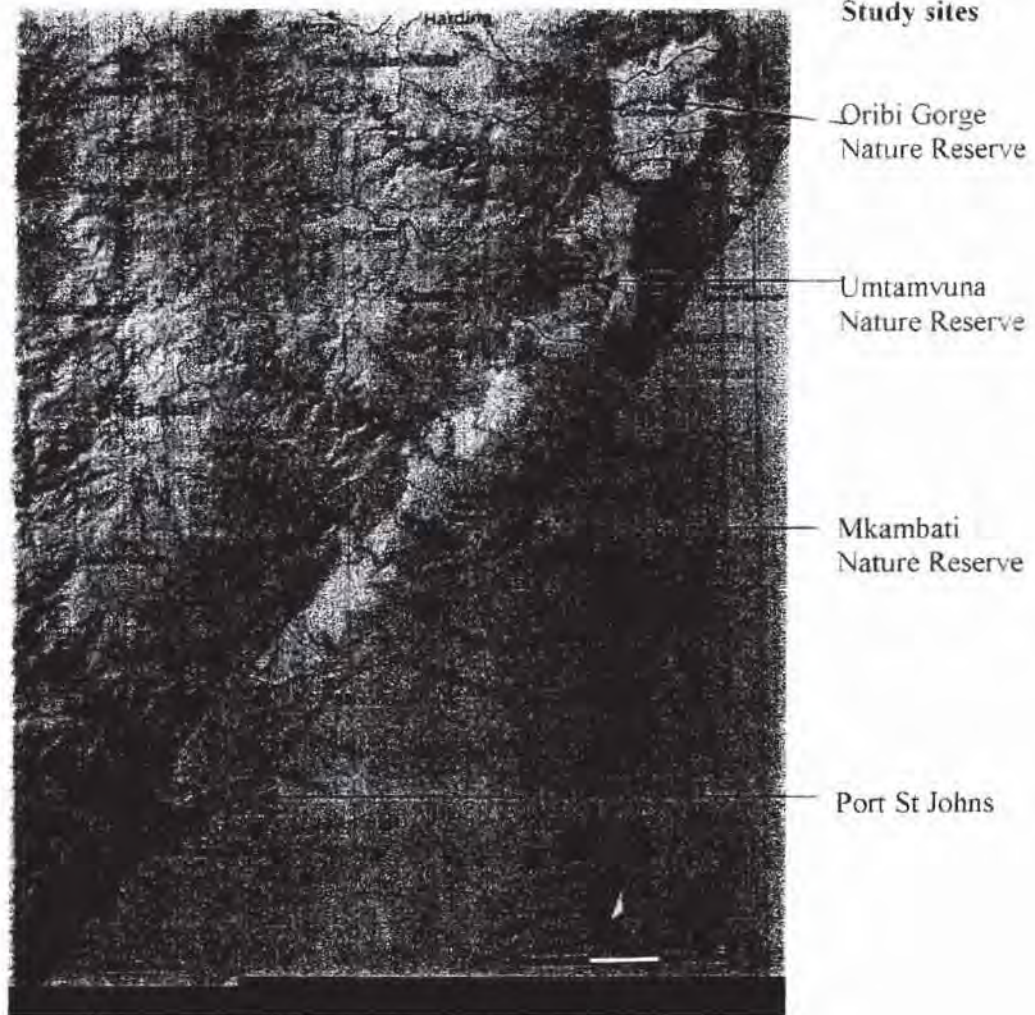
7.2 THE STUDY SITES IN PONDOLAND

As described in the Literature Review (Chapter 1) the boundaries of the Pondoland Centre of Endemism coincide with the limits of the Msikaba Formation Sandstone, which is distinct from the other sandstones of KwaZulu-Natal. Four sites (Figure 10) have been chosen for comparison of their floras on the basis of existing checklists for two of them (Umtamvuna and Oribi), and newly compiled lists (this study) for the remaining two. Three of the sites are nature reserves and are likely to be representative of the relevant section of the Pondoland flora (Oribi Gorge Reserve, Umtamvuna Reserve, Mkambati Reserve). Port St Johns includes a proclaimed nature reserve (Silaka) and one area was a nature reserve and more recently (approximately 1976 to 1994) a military reserve (Mt Thesiger). In addition the forests in Transkei have been officially protected since 1888 as either demarcated or headmen's forests (Sim 1907).

7.2.1 Port St Johns

The area commonly known as Port St Johns encompasses the two sandstone mountains on either side of the estuary of the Mzimvubu River in the Transkei. The study site, an area of approximately 2500 to 3000 ha, is described on page 42 of this thesis.

Figure 10. The Pondoland Centre of Endemism (Van Wyk & Smith 2001) showing the four study sites.



7.2.2

7.2.2 Mkambati Nature Reserve

Mkambati is on the north-eastern Pondoland coast, bounded by the Mtentu river in the north and the Msikaba river in the south. It ranges from sea level to 300 m asl. and is 7720 ha in area. The topography is generally a flat, grassy plateau except where river courses cut through and create minor to steep gorges. Soils are acidic, dystrophic and sandy. Three broad categories of soils were identified by C.M. Shackleton (1989): deep soil with a well-developed subsoil (Clovelly, Hutton, Katspruit, Champagne, Pinedine, Kroonstad); shallow undeveloped soils on rock (Mispah and Glenrosa) and coastal soils and sands (including KwaZulu-Natal red sands of the Berea Formation). The climate is humid and temperate with average rainfall of 1200 mm of which over 60% falls in spring and summer, but with no month without rainfall and no frost. Grasslands cover the plateau areas, with small patches of swamp forest in low-lying areas and forests along the gorges (Shackleton *et al.* 1991).

7.2.3 Umtamvuna Nature Reserve

The reserve is located near Port Edward in southern KwaZulu-Natal. It is 3257 ha in size and is located along the eastern bank of the Umtamvuna river gorge which has many vertical cliff faces and ranges in depth from 240 m to 100 m. The reserve meanders along the river for about 25 km from 5 km away from the coast to 18 km inland. The climate is sub-tropical with summer rainfall from 1373 mm near the coast to 1098 mm at the station furthest inland. A narrow strip of plateau grassland is included in the reserve and many forested streams drain into the gorge (Abbott *et al.* 2000). No data is available on soils.

7.2.4 Oribi Gorge Reserve

Oribi Gorge Reserve covers 1600 ha and lies between the Oribi and Murchison Flats along the Umzimkulwana River, twenty-one kilometers from Port Shepstone in KwaZulu-Natal. Altitude ranges from 150 m to 517 m. The mean annual rainfall is 1100 mm, mainly from October to March. Three main soils forms occur in the reserve: Cartref on the plateau near the line of cliffs, Longlands near the river and the Baboon's Spruit, and Glenrosa on the eastern side of the reserve along the river.

Forest, evergreen riverine thicket, evergreen and deciduous thicket, evergreen sclerophyllous shrubland, open woodland, dwarf-shrub grassland, grassland and lithophytic communities occur in the reserve (Meter 1998).

7.3 METHODS

The following data was compiled:

1. A checklist for Mkambati Nature Reserve was compiled for this study. Information generated during a fieldtrip held in 1986, organized by the Botany Department of the University of Transkei, together with several hundred collections made by myself during fieldtrips to the reserve between 1991 and 1998 formed the basis of the list but further additions are from a provisional list by Tony Abbott (pers. comm.) and literature surveys.
2. Species lists of four sites [Port St Johns (Appendix 1), Mkambati (Appendix 3), Umtamvuna Reserve (Abbott *et al.* 2000) and Oribi Gorge Reserve (Meter 1998)] were used to develop a spreadsheet using Microsoft Excel 2000. The spreadsheet was electronically sorted in multiple ways to extract the results. Initially it was arranged according to the families and genera in Arnold & De Wet (1993) to facilitate comparisons with the earlier analyses of the flora of Pondoland (Meter 1998, Abbott *et al.* 2000, Van Wyk & Smith 2001) and most of the results were based on that arrangement. However, the final version as presented is arranged according to the families and genera in Leistner (2000)⁵.

⁵ The most significant changes that have been implemented by the classification of Leistner (2000) and which are relevant to this study are as follows:

Centella and *Hydrocotyle* have been transferred from the Apiaceae to the Araliaceae
Avicennia has been removed from the Verbenaceae to its own family, the Avicenniaceae
The Periplocaceae and Asclepiadaceae have been sunk into the Apocynaceae
Nuxia and *Buddleja* have been moved from the Loganiaceae to the Buddlejaceae
Strychnos has been moved from the Loganiaceae to the Strychnaceae
Myrica is now known as *Morella*
Clerodendrum (Verbenaceae) has been transferred to the Lamiaceae
Chamaesyce hirta has been moved to *Euphorbia hirta*
Ctenomeria has been moved to *Tragia*
Agapanthus is now in its own family, the Agapanthaceae
Likewise, *Anthericum* is now in the Anthericaceae
Mariscus has been sunk into *Cyperus*

3. Endemics of the PCE: A literature survey was done to compile a list of all known endemics, near-endemics and disjunctions of the Pondoland Centre of Endemism.
4. Analysis of endemics
 - a. Endemic families
 - b. Families of endemic species
 - c. Endemic genera
 - d. Genera of endemic species
 - e. Endemic species
5. Comparison of physical data on each site
6. Flora statistics of the combined list
7. Similarities and differences between floras of the four sites
8. Total species
9. Endemics
10. Relative importance of families across sites
11. Relative importance of genera across sites
12. PCE endemics not found in the four sites
13. Aliens
14. Species density as a characteristic of the PCE flora

7.4 RESULTS

7.4.1 Checklist for Mkambati Nature Reserve

The checklist for Mkambati is presented in Appendix 3. It has less detail than the list for Port St Johns due to time constraints and the fact that it is only relevant to this section of the research. Nine hundred and seventy-two species, five hundred and ninety-seven genera and one hundred and thirty-six families were recorded (Table 19).

7.4.2 Species lists of four sites

The total number of species recorded for the four floras is two thousand two hundred and fifty-three (2253), and is presented in Appendix 3 showing presence and absence of each taxon at each site. The taxa are listed in five groups: Bryophytes,

Pteridophytes, Gymnosperms, and the Angiosperms as Dicotyledons and Monocotyledons. Within those groups families are in alphabetical order, genera within families are alphabetical and species within genera also alphabetical. Nomenclature follows the families as in Leistner (2000) and species in Arnold & De Wet (1993) except in those cases where more recent revisions are available. Taxa (from all sites) that have not been determined conclusively have been excluded.

7.4.3 Endemics of the PCE

One hundred and ninety-six endemics, near-endemics and disjuncts are tabulated in Appendix 4. Dicotyledons and Monocotyledons are listed alphabetically according to family, genus and species. The source of each item of information is supplied, as is an indication of presence or absence in the four sites surveyed for this study. If the range of the taxon is known it is supplied. True endemics are listed in Table 1 (Appendix 4). Near-endemics of Pondoland are listed in Table 2 (App. 4) and species with disjunct distributions are listed in Table 3 (App. 4). The contents of these three tables will be referred to collectively and all three are included when the term 'endemics' is used, unless otherwise specified. This is in accordance with usage in current literature on the Pondoland Centre (Meter 1998, Van Wyk & Smith 2001).

7.4.4 Floristic analysis of the Endemics of the PCE

7.4.4.1 Endemic families:

There is one endemic family centred on the Msikaba Formation Sandstone: the monotypic Rhynchoalycaceae, a taxonomically isolated member of the Myrtales (Johnson & Briggs 1984). No information is available for reconstructing its past distribution patterns and it is assumed that it is a palaeoendemic family on the basis that it is taxonomically isolated (Meter 1998). This family has been recorded from all four sites but it is very rare at Port St Johns where it has only been collected once.

7.4.4.2 Families of endemic species:

The largest number of endemic species in the Pondoland Centre is from the Fabaceae (Table 14), followed by the Asteraceae and the Asclepiadaceae. The last two occur primarily in grassland and the Fabaceae is well represented in both grassland and

forest, but with the endemic species mainly being in grassland. The Mesembryanthemaceae and Iridaceae are also grassland families and the rest of the families (Lamiaceae, Myrtaceae, Celastraceae, Gesneriaceae and Rubiaceae) are primarily forest taxa.

Table 14. Ten most taxon-rich families amongst the PCE endemics

FAMILY	Number of species
FABACEAE	19
ASTERACEAE	17
ASCLEPIADACEAE	13
LAMIACEAE	12
MYRTACEAE	10
CELASTRACEAE	9
GESNERIACEAE	8
MESEMBRYANTHEMACEAE	7
RUBIACEAE	6
IRIDACEAE	6

7.4.4.3 Endemic genera:

Dahlgrenodendron J.J.M. Van der Merwe & Van Wyk, *Eriosemopsis* Robyns, *Jubaeopsis* Becc., *Pseudosalacia* Codd, *Pseudoscolopia* Gilg, and *Rhynchoalix* are all monotypic endemic genera. Meter (1998) provides a comprehensive list of literature regarding the endemic genera. Only one endemic genus, *Rhynchoalix*, occurs in Port St Johns. *Jubaeopsis* only occurs in Mkambati Reserve, having a very narrow distribution range. *Pseudosalacia* does not occur in Oribi Gorge Reserve, and Mkambati is thus the only site with all of the endemic genera present. *Dahlgrenodendron*, *Eriosemopsis* and *Pseudoscolopia* occur in Mkambati, Umtamvuna Reserve and Oribi Gorge Reserve.

7.4.4.4 Genera of endemic species

Two of the most taxon-rich genera of the endemics (Table 15) are *Plectranthus* and *Streptocarpus*. Several new taxa of these genera have been discovered but not yet named. Both genera show quite a large degree of infraspecific variation and several hybrid populations of *Streptocarpus* have been identified (Hilliard & Burt 1971). Two other genera, *Eugenia* and *Gymnosporia*, are woody forest taxa and the other six genera are herbaceous grassland taxa.

Table 15. Ten most taxon-rich genera amongst the PCE Endemics.

GENUS	FAMILY	No. of species
<i>Plectranthus</i>	LAMIACEAE	10
<i>Eugenia</i>	MYRTACEAE	8
<i>Streptocarpus</i>	GESNERIACEAE	8
<i>Indigofera</i>	FABACEAE	7
<i>Senecio</i>	ASTERACEAE	7
<i>Delosperma</i>	MESEMBRYANTHEMACEAE	5
<i>Gymnosporia</i>	CELASTRACEAE	4
<i>Eriosema</i>	FABACEAE	4
<i>Watsonia</i>	IRIDACEAE	4
<i>Brachystelma</i>	ASCLEPIADACEAE	4

7.4.4.5 Endemic species:

The one hundred and ninety-six endemics (Appendix 4, Table 1, 2 & 3) are from fifty-seven families and one hundred and twenty-five genera (Table 16). In total the endemics represent 8.4% of the species of the Pondoland Centre, 15% of the genera and 26% of the families. Twenty-four monocotyledons, with six species from the Iridaceae, are endemic but the majority of endemics (86.7%) are dicotyledons.

Table 16. The families, genera and species of the PCE endemics

	Gymnosperms	Monocotyledons	Dicotyledons	Total
Species	1	24	164	196
Genera	1	20	102	115
Families	1	8	48	57

7.4.5 Comparison of physical data on each site

The four sites are all on Msikaba Formation sandstone but they differ in size (16 to 77.2 km²) and altitude range (0 to 500 m). Two sites (Port St Johns and Mkambati) are adjacent to the coast and two are further away with Oribi Gorge being furthest and also being the only site that does not descend to sea level. Rainfall is in a similar range for all the sites, but all have steep cliff face/gorges and thus there are likely to be steep rainfall gradients within each site. Port St Johns and Oribi Gorge have relatively small areas that are not covered by forest. Mkambati has the largest area of grassland and Umtamvuna the second largest (Table 17).

Table 17. Selected characteristics of the four sites

	PORT ST JOHNS	MKAMBATI¹	UMTAMVUNA²	ORIBI GORGE³
Area (Km ²)	30*	77.20	32.6	16
Altitudinal ranges	0 to 380 m	0 to 300 m	0 to 300 m	150 to 517 m
Rainfall	1380 mm	1230 mm	1098 – 1373 mm depending on distance from coast	1100 mm
% Grassland	Low	80%	40%	Low

1. Prinsloo (2000), Shackleton (1989)

2. Abbott *et al.* (2000)

3. Meter (1998)

*The exact area is not known but it is in the region of 25 to 30 square kilometers

7.4.6 Flora statistics of the combined list

It is unwise to read too much into facts and figures relating to numerical distribution of species (Good 1974).

A total of two thousand two hundred and fifty-three (2253) species and infra-specific taxa (including aliens) were recorded for the four sites (Table 18). This comprises 30 bryophytes, 103 ferns, 11 gymnosperms, 1579 dicots and 532 monocots. Thirteen families, 23 genera and 30 species of bryophytes were recorded. 103 fern taxa of 49 genera and 24 families occur in the four sites. Port St Johns boasts the largest number of fern species (62) and this represents the largest proportion of the four floras (6.1%). Of the 11 gymnosperm taxa, seven occur at Oribi Gorge Reserve. Four families with four genera of gymnosperms account for the eleven species. One alien gymnosperm occurs at Port St Johns.

Table 18. Number (and percentage) of species per site, and number of genera and families of major plant groups across sites.

	PORT ST JOHNS	MKAM- BATI	UMTAM- VUNA	ORIBI GORGE	TOTAL
BRYOPHYTA spp.	18 (1.8%)	6 (0.6%)	12 (1.0%)	-	30
genera	18	5	12	-	23
families	11	5	9	-	13
PTERIDOPHYTA spp.	62 (6.1%)	26 (2.7%)	56 (4.1%)	59 (5.3%)	103
genera	38	18	31	36	49
families	21	16	17	20	24
GYMNOSPERMS spp.	5 (0.48%)	6 (0.6%)	6 (0.46%)	7 (0.63%)	11
genera	4	3	3	3	4
families	4	3	3	3	4
DICOTYLEDONS spp.	722 (69.5%)	682 (70%)	959 (73%)	824 (74%)	1579
genera	398	341	445	389	560
families	102	90	111	106	118
MONOCOTYLEDONS spp.	242 (22.9%)	252 (25.9%)	284(21%)	222 (20%)	532
genera	125	132	140	118	189
families	25	22	26	26	28
TOTAL spp.	1050	972	1317	1112	2253
genera	583	597	630	546	825
families	163	136	166	155	187

The dicotyledons are very diverse with 1579 species, 560 genera and 118 families across sites. The area with the largest proportion of dicotyledons in its flora is Oribi Gorge (74%), and that with the lowest is Port St Johns (69.5%). Twenty-eight families, 189 genera and 532 species represent the monocotyledons. Mkambati has the lowest number of monocotyledonous families, but the highest proportion (26%) of monocot species in its flora. Oribi Gorge has the lowest number of monocot genera and species, but the highest number of families.

The species per genus ratio is highest at Umtamvuna (2.1) and lowest at Mkambati (1.6) and species per family ratio is also highest at Umtamvuna (7.9) but lowest at Port St Johns (6.4).

7.4.7 Concordance between sites

7.4.7.1 Total species

Nine hundred and thirteen taxa were recorded at only one site (Table 19) and between 17% and 26% of each flora was unique, totaling 44% of the combined number of taxa. A total of 281 taxa (12.5%) occurred in all four localities. Of these, 16 are endemics of the Pondoland Centre (11% of those endemics found in the four localities and 8% of the total number of endemics). Among the 281 shared taxa, over 60% are trees, shrubs or climbers and less than 40% are herbs, grasses, sedges and ferns. The largest four families in the shared group are the Fabaceae (24 taxa), Rubiaceae (21), Asteraceae (17) and Poaceae (17), accounting for 28% of this group.

Table 19. Species unique to each area, expressed as percentage of local flora and of PCE flora.

AREA	Total taxa	Taxa unique to this area	Expressed as% of local flora	Expressed as% of PCE flora
Port St Johns	1050	276	26	12
Mkambati	972	163	17	7
Umtamvuna	1317	314	24	14
Oribi Gorge	1112	260	23	11

The spread of taxa across Pondoland is not even and for example Port St Johns has more taxa in common with both Umtamvuna and Oribi Gorge than with Mkambati, its nearest neighbour (Table 20). The largest group of taxa exclusive to two sites are those that are common to Mkambati and Umtamvuna (141 taxa). These two sites are located within the larger area of the Msikaba Formation Sandstone. However, Port St Johns and Oribi Gorge, located on outliers of the Msikaba Formation, and being furthest apart of the four sites, still have 530 taxa in common and share 87 taxa that have not been recorded from Umtamvuna and Mkambati. At the same time Port St Johns has the largest proportion of taxa not recorded anywhere else in the study (26%) and the lowest number of PCE endemics (38). Calculation of Sorenson's index of similarity support the observation that the flora of Mkambati and that of Umtamvuna Reserve are more similar than any of the others (Table 21) followed by

those of Umtamvuna and Oribi Gorge. Port St Johns is more similar to Umtamvuna and Oribi Gorge than to Mkambati, its nearest neighbour.

Table 20. Taxa in common between various sites

	Port Johns	St Mkambati	Umtamvuna	Oribi Gorge
Total number of taxa	1050	972	1317	1112
Spp/genus	1.8	1.6	2.1	2.0
Spp/family	6.4	7.1	7.9	7.2
Taxa exclusive to this site (% of the flora of this site)	276 26.3%	163 16.8%	314 23.8%	260 23.4%
Endemics exclusive to this site	6	4	30	5
PCE Endemics in total	38	94	116	59
Endemics as% of local flora	3.6%	9.6%	8.8%	5.3%
Taxa shared with Port St Johns		461 (52)*	588 (100)*	530 (87)*
Taxa shared with Mkambati			666 (141)*	526 (49)*
Taxa shared with Umtamvuna				671 (113)*

* Exclusive to these two sites.

Table 21. Index of similarity across sites¹

	MKAMBATI	UMTAMVUNA	ORIBI GORGE
PORT ST JOHNS	0.31	0.33	0.33
MKAMBATI		0.37	0.34
UMTAMVUNA			0.36

1. Index of similarity of Sorensen ($\frac{2a}{2a+b+c}$) where a = species in common, b and c = species totals of sites

7.4.7.2 Endemics

The endemics show a similar trend and at least 45 species (23%) are found only in one site, spread as follows: Port St Johns 6, Mkambati 4, Umtamvuna 30 and Oribi Gorge 5 (Table 20). Only sixteen PCE endemics occur in all four sites, and the total number at each site is as follows: Port St Johns 38, Mkambati 94, Umtamvuna 116 and Oribi Gorge 59. When calculated as a percentage of the local flora, the total number of PCE endemics of each site also echo a trend discussed above: the two sites on the main block of Msikaba Formation sandstone have a higher proportion of PCE endemics (Mkambati 9.6% and Umtamvuna 8.8%), and Port St Johns has the lowest (3.6%) proportion.

7.4.7.3 Relative importance of families across sites.

When looking at families, the four floras are similar but not the same, having thirteen families represented in the list of ten most taxon-rich families of each site (Table 22). Six families, Asteraceae, Poaceae, Fabaceae, Orchidaceae, Rubiaceae and Euphorbiaceae, are present in all four lists. Two families, Iridaceae and Scrophulariaceae, feature only once as a top ten family, at Umtamvuna and Mkambati respectively. Asclepiadaceae features twice (Port St Johns & Umtamvuna) and the following families occur three times each: Lamiaceae (not Umtamvuna), Celastraceae (not Port St Johns), Acanthaceae (not Mkambati) and Cyperaceae (not Umtamvuna). However the relative importance of the families at each site reveal differences that beg explanation. The three largest families in all four sites are the same: Asteraceae, Poaceae and Fabaceae, in that order except at Mkambati where the Poaceae rank first and Asteraceae third. Rubiaceae ranks fourth in three lists but only seventh at Port St Johns. Orchidaceae ranks fourth at Port St Johns but lower in the other floras. Euphorbiaceae ranks fifth in three lists but seventh at Mkambati. The combined importance of the ten most taxon-rich families in each flora differs between sites. The lowest value is from Port St Johns where they represent 42% and the highest is Mkambati at 48.2%.

Table 22. The ten most taxon-rich families in the Port St Johns, Mkambati Nature Reserve, Umtamvuna Nature Reserve and Oribi Gorge Nature Reserve floras (indicating rank order and including the percentage contribution to each respective flora):

	PORT ST JOHNS	MKAMBATI	UMTAMVUNA	ORIBI GORGE
Asteraceae	1 - 9.2%	3 - 7.3%	1 - 11.2%	1 - 10.4%
Fabaceae	2 - 6.5%	2 - 8.2%	2 - 7.7%	2 - 7.8%
Poaceae	3 - 5.1%	1 - 9.5%	3 - 6.6%	3 - 5.3%
Orchidaceae	4 - 4.3%	6 - 4.2%	6 - 3.2%	9 - 2.2%
Euphorbiaceae	5 - 3.7%	7 - 3.2%	5 - 3.7%	5 - 3.7%
Cyperaceae	6 - 3.5%	5 - 4.6%		6 - 3.3%
Rubiaceae	7 - 3.4%	4 - 5.2%	4 - 4.0%	4 - 3.9%
Lamiaceae	8 - 2.7%	10 - 1.9%		8 - 2.6%
Acanthaceae	9 - 2.3%		9 - 2.3%	7 - 3.2%
Asclepiadaceae	9 - 2.3%		9 - 2.3%	
Celastraceae		8 - 2.3%	8 - 2.4%	10 - 2.0%
Scrophulariaceae		9 - 2.0%		
Iridaceae			7 - 2.5%	
TOTAL	41.2%	48.5%	44.3%	44.6%

Table 23. The largest genera per site (rank order plus number of species in brackets):

	PORT ST JOHNS	MKAMBATI	UMTAMVUNA	ORIBI GORGE
Senecio	1 (16)	2 (14)	2 (25)	1 (24)
Helichrysum	2 (15)	1 (22)	1 (34)	2 (22)
Indigofera	8 (8)	3 (11)	3 (16)	6 (12)
Crassula	7 (9)	10 (7)	6 (12)	3 (18)
Plectranthus	2 (15)		6 (12)	4 (17)
Solanum	2 (15)			
Euphorbia		7 (8)	4 (13)	9 (9)
Cyperus	5 (11)	7		6 (12)
Tephrosia		4 (9)		8 (10)
Rhus	8 (8)	4 (9)	4 (13)	5 (15)
Polygala		4 (9)	6 (12)	
Hibiscus	5 (11)			
Eugenia		7 (8)		
Hypoxis	8 (8)	7 (8)	9 (10)	
Vernonia			9 (10)	
Eragrostis		7		9 (9)
Eulophia	8 (8)	7		
Disa	8 (8)			
Ficus	8 (8)	7		
Asparagus	8 (8)			
Pavetta		7		
Scleria		7		

7.4.7.4 Relative importance of genera across sites

Two genera (*Helichrysum*, *Senecio*) are the most speciose in all four sites, but differ in order of importance with *Helichrysum* occupying the first place at Mkambati and Umtamvuna and second place at Port St Johns and Oribi Gorge (Table 23). Compilation and interpretation of the rest of the table was difficult because seven genera from Port St Johns each have eight species, and seven genera from Mkambati each have seven species.

7.4.8 PCE Endemics not found in the four sites

Forty-one known PCE endemics (21%) were not recorded in any of the four checklists (Table 24). These are species that have very narrow distribution ranges such as *Brachystelma kerznerii* which has only been collected on the golf course at Mzamba and *Plectranthus* spp. nov. that have been found in isolated forests between the Msikaba River and Fraser Gorge. Ten of these taxa belong to the family Asclepiadaceae. Three genera each have three taxa in this group: *Aspidoglossum*, *Eriosema* and *Eugenia*.

7.4.9 Aliens

Analysis of the alien component of the four floras records 5 ferns, 1 gymnosperm, 16 monocotyledons and 104 dicotyledons, a total of 126 species. Three of the alien ferns occur in Umtamvuna, one in Oribi Gorge and none in Mkambati while all five occur at Port St Johns. Only Port St Johns has an alien gymnosperm, *Pinus radula*. Of the sixteen monocots, eleven are grasses that are presumably spread either directly or indirectly through agriculture: thirteen occur at Port St Johns, four at Mkambati, eight at Umtamvuna and six at Oribi Gorge. One hundred and five dicot species representing 32 families were recorded: 77 at PSJ, seven at Mkambati, 38 at Umtamvuna and 23 at Oribi Gorge. The percentage of each flora that is alien is: Port St Johns: 9.2%, Mkambati: 1.1%, Umtamvuna: 3.8% and Oribi Gorge: 2.6%.

Table 24. PCE endemics not found in the four sites (ranges and references in Appendix 4).

1.1	FAMILY	TAXON
	AMARYLLIDACEAE	<i>Cyrtanthus mackenii</i> var <i>mackenii</i>
	CYPERACEAE	<i>Fimbristylis variegata</i>
		<i>Tetraria robusta</i>
	ASCLEPIADACEAE	<i>Aspidoglossum peltigera</i>
		<i>A. uncinatum</i>
		<i>A. virgatum</i>
		<i>Brachystelma kerzneri</i>
		<i>B. tenellum</i>
		<i>Huernia hystrix</i> var. <i>parvula</i>
		<i>Orbea speciosa</i>
		<i>Asclepias peltigera</i>
		<i>Paulforstera truncata</i>
		<i>Riocrexia alexandrina</i>
	ASTERACEAE	<i>Berkheya pondoensis</i>
		<i>Cineraria atriplicifolia</i>
		<i>Senecio dregeanus</i>
		<i>S. poseideonis</i>
	CONVOLVULACEAE	<i>Ipomea</i> sp.
	CRASSULACEAE	<i>Andromischus cristatus</i> var. <i>zeyheri</i>
	ERICACEAE	<i>Erica</i> sp. (Prinsloo 2000)
	FABACEAE	<i>Eriosema latifolium</i>
		<i>E. luteopetalum</i>
		<i>E. gogosa</i>
		<i>Podalyria burchelli</i>
	GESNERIACEAE	<i>Streptocarpus modestus</i>
		<i>S. sp.</i> (Cloete sn, Mkambati)
		<i>S. sp.</i> (=liliputana, in press, Lupatana)
	LAMIACEAE	<i>Plectranthus</i> sp. (Belstedt pers. comm.)
		<i>P. sp.</i> (Belstedt pers. comm.)
	MESEMBRYANTHEMACEAE	<i>Delosperma pondoense</i>
	MYRTACEAE	<i>Eugenia</i> sp. nov.
		<i>E. sp. nov. A</i>
		<i>E. sp. nov. B</i>
		<i>Syzygium</i> sp. nov. (Abbott 1209)
	PERIPLOCACEAE	<i>Raphionacme palustris</i>
	PROTEACEAE	<i>Leucadendron pondoense</i>
	ROSACEAE	<i>Cliffortia odorata</i>
	RUTACEAE	<i>Agathosma</i> sp.
	THYMELEACEAE	<i>Struthiola anomala</i>
	VITACEAE	<i>Cyphostemma rubroglandulosa</i>

Port St Johns has an unusually large number of alien species when compared to the rest of the region. Of the 127 aliens recorded from the four sites in the PCE, 36 are common to Port St Johns and at least one of the other sites that were analyzed and 30 did not occur in Port St Johns, but did in one or more of the other sites. Thus almost half of the aliens (61 species) were only found at Port St Johns. Mkambati has the smallest number of alien species (11) but several are present in moderate numbers in the reserve. These are remnants of plantations created for use of the hospital when Mkambati was a leper colony. However, there are very few self-sustaining populations and management of the reserve is slowly eradicating the existing plantations.

7.4.10 Species richness as a characteristic of the PCE flora

When comparing sites (Table 25) it is apparent that certain areas of the Cape region are by far the most diverse, but the PCE flora displays a value of a similar magnitude to Knysna and the Agulhas Plain. However, these sites are far more diverse per area than Hawaii, New Zealand, Australia, California and South Africa, which are all considered to have exceptionally diverse floras.

Table 25. A comparison of species per 10^3 km^2 in a number of sites

	AREA (10^3 km^2)	Spp numbers	Spp/ 10^3 km^2
SOUTH AFRICA ¹	2 573	21 000	9.6
CAPE Region ^{1,4}	90	8888	99
Cape Peninsula ¹	0.5	2256	4512
Cape Hangklip ²	0.24	1383	5762
Agulhas Plain ²	1.6	1751	1094
Knysna ²	2.1	1316	626
CALIFORNIA ¹	324	4452	14
HAWAII ¹	16.6	1897	114
NEW ZEALAND ¹	268	1996	7
AUSTRALIA ¹	7 716	15 000	2
PONDOLAND ³	1.8	2255	1250

1. Cowling, Holmes & Rebelo (1992)
2. Cowling & Holmes (1992)
3. This study
4. Goldblatt & Manning (2000)

7.4.11 Mesembryanthemaceae in the Pondoland Centre

The literature search that was done to identify the PCE endemics has revealed that a number of species of *Delosperma* have been recorded in Pondoland, several as supposed endemics; others are species that purportedly occur there but which are more widespread. It is commonly believed that there are several undescribed species present in the PCE (Meter 1998, Van Wyk & Smith 2001). Table 4 of Appendix 4 lists these species, the source of the information and the known range (plus the type locality where known). The majority of *Delosperma* specimens collected from the PCE have been sent to PRE for identification, but problems with the quick guide make it difficult to do more than list the range of names that have been used and critical taxonomic evaluation of these is lacking.

7.5 DISCUSSION

One of the important issues to resolve is the question of how different these sites are in terms of physical/ecological conditions. The same substrate underlies all four, but Port St Johns has several small areas of shale that are not found in the others. In addition, two of the sites, Mkambati and Umtamvuna, are located within the larger area of Msikaba Formation sandstone whereas Oribi Gorge and Port St Johns are on outliers of this substrate. All four have a variety of habitat types: two are steep-sided, long, narrow gorges; Port St Johns straddles two flat-topped mountains while Mkambati is an area of table lands bounded by two steep river gorges. Plateau areas, cliffs and steep areas facing in various directions are a feature of all the sites though they have different proportions in each one. Annual precipitation is similar, ranging from 1098 to 1380 mm but Port St Johns and Mkambati are immediately adjacent to the coast where there is higher humidity. Altitude and altitude range are different but they all fall within five hundred meters of sea level and all have part of their range between 150 and 300 m a.s.l.: a considerable overlap. Parts of Port St Johns have been actively farmed for almost two centuries but Umtamvuna and Oribi Gorge are declared nature reserves surrounded by commercial agriculture. Mkambati was a leper colony but is now a declared nature reserve in a remote and relatively sparsely populated part of a tribally administered area. The sites are spread out on a latitudinal

and longitudinal gradient of less than one degree either way, hardly representing a major climatic shift.

Analysis of the flora of Pondoland has highlighted the following trends:

* Increase in total species known from the Pondoland Centre

The addition of species lists from two new sites to the flora of the Pondoland Centre has increased the total number of species as cited by Van Wyk & Smith (2001) by 455. One hundred and twenty-six species of the combined list are alien and thus the indigenous species count has increased by 18% (329) from 1800 to 2129. The new sites are relatively small compared to the rest of the Pondoland Centre (about 6% of the area) but they triple the area that has been well surveyed, illustrating the principle of diminishing returns. In total the four sites represent less than 9% of the PCE and one is tempted to speculate that the flora could still be enlarged once the rest of Pondoland is thoroughly surveyed. However, the level of disturbance of the vegetation would clearly play a role in survival of narrow endemics and rare species, and any number may have been lost already.

* Increase in number of endemics

Survey of a wide array of literature sources has revealed that a number of endemics have been overlooked in the past. A figure of >120 endemic species is cited by Van Wyk & Smith (2001) but the total number of endemics, near-endemics and disjunct taxa from the PCE has been increased to 196 species. Percentage endemism increases from 6.7% to 8.7%.

* Uneven distribution of species

There is a clear pattern of uneven distribution of species in all the plant groups. In total one hundred and three fern species were recorded from only two hundred and three collections across the four sites and it is clear that these sites differ greatly in fern species. Although only 27 fern species were collected from Mkambati compared to 62 from Port St Johns and although Mkambati is mostly covered by grassland, the relatively large size of the reserve means that there is probably a comparable area

covered by forests. The monocotyledons are also not evenly spread across the sites, as illustrated by the fact that more than 40% of them were collected only once and a mere five percent occurred in all four sites. One thousand site records of monocotyledons from four sites yielded 532 species. Dicotyledons echo this trend, as do the endemics of which almost one quarter were not recorded at all in the four sites. Each site has its own component of taxa, both endemics and non-endemics that are exclusive to it, illustrating the narrow ranges of a number of the endemics and the wide variety of taxa that can potentially populate the Pondoland Centre. This finding supports those of both Geldenhuys (1992) who found that forests in South Africa all had a high proportion of unique species and Meter (1998) who found that the floras of Umtamvuna Reserve and Oribi Gorge Reserve shared only 24% of the species and 41% of the PCE endemics.

* The floras are different: more so at species level, but also at genus level. Bryophytes were not actively collected at all the sites and it would be inappropriate to compare figures. However, the records that are available were added to the list for future comparisons. The Bryophyta of Pondoland are discussed by Van Rooy (2000) who concludes that it is a secondary centre of moss diversity in southern Africa.

Gymnospermae are quite rare in Pondoland, there being only eleven species across the four sites. *Encephalartos* is represented at Port St Johns by one species and at Oribi Gorge by four species. This is probably due to the lower rainfall and higher altitude of Oribi Gorge in contrast to higher humidity at Port St Johns. *Podocarpus latifolius*, *Stangeria eriopus* and *Encephalartos villosus* occur at all four sites and are clearly a feature of the Pondoland forests.

Mkambati has the second largest number of species of monocots but the lowest number of families, presumably due to the presence of large numbers of grasses, sedges and orchids from the large grasslands, these being families of plants which tend to have genera with many species. Oribi Gorge has far fewer species of monocots than Umtamvuna but the same number of families and thus a lower species per family ratio.

* Similarity between sites lies in the presence of Pondoland Endemics

Although only seventeen PCE endemics occurred in all four sites, each site had a fair representation of this group and very few sites outside the PCE have any of them. The two sites included in the main body of the Msikaba Formation sandstone have the largest number and the largest proportion of PCE endemic species in their floras, implying that sites on outliers are more influenced by the surrounding vegetation and are less rich in PCE endemics. In addition, the sites off the main block of Msikaba Sandstone are relatively poorer in endemic genera than those on it, with only one of the six recorded from Port St Johns.

* There is no clear geographical cline among the sites

Many species are common between non- adjacent sites but absent from the intervening sites. Studies based on woody/forest taxa have reported an erosion of species from north to south along the coastal belt (Geldenhuys 1992), i.e. a geographical cline, but this observation now has to be re-evaluated, especially with regard to the forests in Pondoland. It is true that this study does not quantify anything other than presence or absence of species, and even this is not reliable considering that completed species lists are not possible in the short term as under-collection is a factor at all sites. This observation should however be borne in mind for new studies on the Pondoland flora.

* No clear dominance of flora by one or more groups

In the Cape Floristic Region (CFR) several genera (eg *Erica*, *Pelargonium*, *Protea*) have radiated and make an unusually large contribution to the flora. The same cannot be said for the flora of these four sites where the top ten genera only contribute 12% compared to the situation in the CFR (21.5%)(Goldblatt & Manning 2000) and the southern Natal Drakensberg (23.2%)(Hilliard & Burtt 1987). There are also no families that dominate the flora, however, at 12:1 the species:family ratio is higher than at Port St Johns (6.3:1), but lower than the southern Natal Drakensberg (15:1) and the CFR (52:1)(Goldblatt & Manning 2000). At the same time there is no single species dominance in plant communities as both forests and grasslands are very diverse and it is unusual to see many individuals of one species in one place.

* Composition of Endemic flora

Two types of endemics have been identified: palaeoendemics and neoendemics (see discussion in Chapter 1). Families that are likely to have palaeoendemic taxa are the Myrtaceae, Celastraceae and Rubiaceae, all predominantly woody taxa. Taxa from the Lamiaceae and Gesneriaceae are generally understory herbs and probably represent a neoendemic fraction that is actively speciating. The Fabaceae, Asteraceae, Asclepiadaceae, Mesembryanthemaceae and Iridaceae are all predominantly grassland taxa, reflecting the presence of a large number of endemics in that habitat. Only *Tephrosia pondoensis* and *Philenoptera sutherlandii* (formerly *Milletia sutherlandii*) of the Fabaceae occur in forest. The presence of the Mesembryanthemaceae in the top ten families is surprising as it is a succulent Karroid family with only a few genera occurring outside the region of greatest diversity.

* Endemic family and genera are allied to forests

As discussed by Van Wyk & Smith (2001) and Meter (1998) the endemic, near endemic and disjunct genera of the PCE are all woody taxa and only one (*Eriosemopsis*) is not associated with forests. Together with the six woody endemic genera from the eastern coastal area that are not PCE endemics there are thus 11 woody genera that are restricted to the eastern coastal region.

* Independent processes are involved in selection of taxa for speciation and in the survival of the endemic species and those in the general flora. The list of endemic families does not correspond with the list of ten most-taxon rich families in the PCE flora,

* Alien presence is related to disturbance and probably to the site of introduction.

Port St Johns is clearly more affected by larger numbers of aliens that represent a greater proportion of the total species count than the other three sites. Commercial agriculture and horticulture/forestry has been practiced at or around three of the sites (Port St Johns, Umtamvuna and Oribi Gorge) for approximately an equal amount of time. By implication, the low levels of aliens at Mkambati reflect the relatively

undisturbed surroundings. However, Port St Johns still has more than double the percentage of aliens recorded from Umtamvuna and more than three times that of Oribi Gorge so there are clearly other factors that have to be considered. One could speculate that since many of the aliens from Port St Johns are horticultural species there had to have been more influence from gardens there than at the other sites that are not associated with urban development. The species that are the most destructive to the local environment in PSJ do not occur elsewhere, except for *Chromolaena odorata* and one is tempted to conclude that Port St Johns has been the port of entry for some of these that would have been brought in by avid gardeners such as Mrs. Turner of Cremorne Estate.

8 GENERAL DISCUSSION AND CONCLUSIONS

8.1 REVISITING THE AIMS AND OBJECTIVES

This study set out to document the plants from the sandstone horst of Port St Johns, to analyze the phytogeographical relationships of these taxa and to assess this flora in the context of the PCE.

The first aim, to document the plants from the sandstone horst of Port St Johns, was successfully achieved albeit with minor reservations:

- * The study site was defined as the area underlain by Msikaba Formation Sandstone and the area between the horst and the sea. The geological formations overlap in many places at Port St Johns and uneven erosion has exposed some sandstone that is surrounded by pockets of shale, making it impossible to conform to the definition at all times. This anomaly is probably responsible for *Podranea ricasoliana* occurring on Mt Thesiger although it is usually found on shale.

- * Compiling the checklist presented some difficulties because the locality data of early collections was often vague and many taxa had to be left out for this reason. Additional sources of information about collectors and their collections such as those housed in the herbarium of Natal University, Pietermaritzburg and overseas herbaria were not utilized because of time and financial constraints.

- * An attempt was made to collect during all seasons, but the large number of sites meant that some were only visited once or twice. Considering the richness of the flora, ephemerals, such as geophytes and annuals, may have been overlooked.

- * Collecting plants is a time consuming activity and due to the limited number of field visits one has to assume that some plants would have been overlooked. The compilation of a checklist is ongoing and this problem will be overcome as other collectors add more information in future. The list as presented in this thesis is not complete but it is a fair reflection of the taxa that occur at Port St Johns.

- * A weakness of this checklist is that I did not critically identify all taxa myself. Choices had to be made early in the process as it was clear that it would not be possible to access all the information, collect all the plants, critically identify

all specimens and compile and analyze the lists in the time available. The herbarium with the best representation of PCE endemics and coastal species is Natal Herbarium (NH) in Durban where most of the taxa for previous studies (notably those of A.E. Van Wyk and A. Abbott) were identified. The majority of specimens were sent there for identification, but I personally identified about one third of the total at the Selmar Schonland Herbarium (GRA) in Grahamstown and at Natal Herbarium. Travel costs and time constraints prevented me from spending more time in Durban and most of my identifications were done in Grahamstown where it soon became apparent that there was a serious lack of specimens from Pondoland. Not only were there few, if any, examples of the endemics, but also of the general flora of the Natal-Transkei coastal belt. The expertise and knowledge of Mr. Alfred Ngwenya of Natal Herbarium give me confidence to say that very few misidentifications are expected.

* It is standard practice (Goldblatt 1978, Hilliard & Burtt 1987, Meter 1998) to compare the top ten families and genera of a variety of floras even though it is a relatively coarse measure. Comparison of the flora of Port St Johns with other regional floras at higher taxonomic level has some flaws, notably that there are several genera with the same number of species making it impossible to isolate the top ten genera. The size of the Cape Region and the richness of the flora compared to both size and richness of the other sites make interpretation of the table suspect. However, it does illustrate some differences such as the lack of domination of the Port St Johns flora by any one family or genus (cf. *Erica* in the Cape flora).

The second aim was to analyze the biogeographic relationships of taxa from Port St Johns. This was achieved within several constraints:

* Extracting endemics of Port St Johns and the PCE had problems related to specimens that could not be successfully identified to species. Final determinations are dependent on further collections, detailed analysis by sophisticated methods that are beyond the scope of this project or identification by specialists in particular groups. This last issue relates to the richness of the southern African flora and the lack of up-to-date revisions in many groups.

* The method that was used to look for patterns of relatedness among the rest of the taxa (i.e. those that are not endemic to the PCE or Port St Johns) was an exploratory action using nested endemism. The small size of the sample precludes critical evaluation of the results, but it seems to confirm the concept of a temperate Africa flora as put forward by Linder (1990). One third of the taxa from Port St Johns are confined to the coastal platform plus the extension of the escarpment to the Soutpansberg (discounting those that extend to Mozambique) and more than half are confined to the southern African region. This last figure is less than that cited by Cowling & Hilton-Taylor (1997) (80%) or by Van Wyk & Smith (2001) (60%) for the southern African region.

* Disjunction is difficult to define and until more complete distribution patterns of all species can be mapped with accuracy this will remain a problem for species such as orchids that occur infrequently.

* Use of the term 'rare' in this thesis is contentious considering that the new IUCN categories (Golding 2002) avoid it and instead use a set of terms related to the threat of extinction at a global level. The most comprehensive assessment of the plants of Pondoland i.e. **Rare and Threatened Plants of KwaZulu-Natal and neighbouring regions** (Scott-Shaw 1999) uses the IUCN categories but does not discontinue use of the word 'rare' and his lead is followed here. Resolution of the preferred terminology is beyond the scope of this work. Detailed evaluation of each species was not attempted in compilation of the list, as it was a literature search to represent the taxa that are considered to be at risk by various authors plus those taxa that were identified by this study to be worthwhile additions.

* Comparison of the checklist with others representing various other regions gave results that have to be interpreted with caution. One can assume that the checklist of the Cape Region (Goldblatt & Manning 2000) is close to complete in the sense that it is one of the better collected parts of the country even though more new species come out of the Cape every year than other parts of South Africa but it is not known how much collecting work remains to be done in the other areas. The list of the Cape Region represents a much larger area than the list of the southern Natal Drakensberg and the formula used does not take this into account.

* Alien species were identified as far as possible but two collections still have to be named. No attempt was made to map or in any way quantify the distributions of aliens for two reasons: time constraints made it difficult to follow every potential avenue opened by the study but more importantly a programme to eradicate aliens has been initiated by the Department of Forestry in Port St Johns and it will be some years before the ultimate effect of this programme is apparent. The final tally of aliens is close to the maximum number recorded for any one site in South Africa and the implications for the future of the indigenous flora are clearly a cause for great concern.

The third aim, namely to analyze the flora of Port St Johns in the context of the PCE, was only partially met. All of the objectives were met but it is clear that the data lends itself to further investigation for which there was no time available.

* Compilation of the checklist of Mkambati Nature Reserve and the database of the four sites in Pondoland and southern Natal proved to be very time consuming, as did the compilation of the list of all known endemics of the PCE. These are basic sets of information without which further analysis would not have been possible and there was no choice involved in the time spent on them. The checklist of Mkambati is only a first approximation of the flora of that area. The grasslands are better represented than the forests as a result of several studies that focused on the former. Information contained in the database of the four checklists is obviously only as good as the lists and although three of the four can be assumed to be fair representations of the respective floras, it is to be expected that Mkambati will still contribute many more taxa to the overall list as time goes by.

* The list of endemics is as close to complete as is possible at this stage but probably includes a few taxa that should be classed as sandstone endemics and not as PCE endemics.

* Those endemics not found in any of the four protected area sites should serve as a challenge to confirm whether they are there or not, but for now it is assumed that they are not present at the four sites.

* As stated in the background chapter, the calculation of species density is not a very reliable statistic and should be interpreted with caution. It does, however, give an indication of just how rich the flora of Pondoland is.

8.2 FUTURE STUDIES

This has been a first attempt at collating and interpreting the floristic data for Port St Johns, and the most complete attempt for the PCE as a whole. Data gathering proved to be very time-consuming and consequently less time was available for analysis of this data. Using nested sets of distributions has revealed some useful information, but the same data could be analyzed in different ways and compared with the current results. The categories of analysis for this study were very broad, and it would be useful to look for greater detail when choosing biogeographic groups in future studies. Several localities repeatedly came up as southern or northern limits along the coastal belt and it needs to be clarified whether they are artifacts of collecting bias (i.e. originating from one or more studies on particular sites that contribute a large part of the data set) or whether they are true biogeographic boundaries. In some cases the localities referred to above represent hot, dry river valleys and in some they are associated with geological or climatic factors.

Statistical analyses whereby distributions are sorted according to various criteria (1/4° grid, habitat, phytochoria, etc.) will provide information of higher value. A regression analysis comparing the sites in Pondoland could help to explain the role of various habitat factors. Additional analysis that would be of value would be comparison of the four floras in Pondoland with regard to their life forms to see whether the tree species decrease in a southward trend as reported in the literature. It would then be useful to know whether the change south of Port St Johns is of a similar magnitude by comparison with floras further south in the Transkei. The distributions of the Port St Johns taxa can yield more useful results by having more detailed information about each species instead of broad statements (Mpumalanga /Swaziland /etc) and it would certainly be of value to extend the analysis to the entire flora of Pondoland.

The taxa that have not been recorded at each of the four sites should be actively searched for to support or reject the findings of this thesis. For instance a search for *Hippobromus pauciflorus* at Port St Johns, done in conjunction with a knowledgeable forest guard, failed to reveal this species at Port St Johns, but it was found about 20 km away at Tombo on a site that is neither on sandstone nor in the direction of the main sandstone block. *Hippobromus pauciflorus* is classed as a near-endemic of the Tongaland-Pondoland Regional Mosaic by White (1990).

No work on the absence of key species of the eastern coastal belt on the Msikaba Formation sandstones has been done to date. The soils are seen as impoverished and possibly an edaphic trap but they support a very rich flora that seems to be representative of surrounding vegetation together with unique endemics. It would be of interest to know whether any particular taxa are excluded by the impoverished soils.

At a species level it would be informative to know whether the various populations of the local endemics, such as *Impatiens flanaganiae*, are genetically variable. Either enzyme comparisons or DNA/RNA studies would have to be done to clarify the issue. In addition, it would be interesting to know whether the beetle *Iscadida* sp. occurs on populations in KwaZulu-Natal. Other understorey genera that each has several PCE endemics (*Streptocarpus*, *Begonia*) are already under investigation to attempt to map relationships (Bellstedt pers. comm., Matolweni *et al.* 2000).

8.3 CONCLUSIONS

The study has shown that the flora of Port St Johns is rich and varied, especially with respect to the diversity of ferns. It is composed of taxa with various phyto-geographical affinities of which a very small number are endemic to the study site and a relatively small proportion to Pondoland (4%). Not surprisingly, the flora is more similar by a far greater degree to the sites close by in the PCE than to floras of Maputaland, the Drakensberg, the Usambara Mountains and the Cape (decreasing similarity in that order) and it can be considered a satellite flora of the PCE. This finding supports the delimitation of the PCE on geological grounds because the study site lies on an isolated outcrop of the same substrate.

The inclusion of those taxa found along the coastal platform into a single group with subgroups ranging variously from the Cape, the eastern Cape or Pondoland either to the study site or some point north of it, and creating another group along the same lines but including the escarpment to the Soutpansberg instead of following either the phytochoria of White (1983) or centres of endemism as defined by Van Wyk & Smith (2001) gives a different perspective on relationships of taxa endemic to southern Africa. It echoes the finding by Van Rooy (2000) that a mesic moss flora is distributed in a horseshoe-shaped arc “along and below the Great Escarpment” in southern Africa. The complexity of the phytogeographic relationships within this arc is apparent from the number of centres of endemism that have been defined over the years, but so now is the existence of a component that bridges that complexity, probably representing the elements associated with older floras as suggested by McLaughlin (1992). The existence of a potential migration route during times of climatic fluctuation along the coastal corridor and the resulting influence on floras is highlighted. However, further analysis of large data sets of non-endemic elements is required to fully understand the phytogeographical affinities of the region.

Port St Johns has a somewhat smaller percentage of taxa that are endemic to southern Africa (55%) than figures for the southern African region as supplied by Cowling & Hilton-Taylor (1997) (80%), or Van Wyk & Smith (2001) (60%) and this is probably due to the influence of the high rate of endemism in the Cape Region, which skews the total figures. One third of the indigenous taxa are found further north in Africa and thus establish a strong link with northern floras. Ten percent have ranges outside of Africa: only five species are from Gondwana floras but 52 are Eurasian, a trend that is also seen in the genera and families and it is clear that links of current species with South America are very limited. Only five species and nine genera are confined to the Southern Hemisphere compared to 52 species and 119 genera that are classified as Old World in distribution. Just less than ten percent of the total number of taxa from Port St Johns represents introduced species of which the majority is New World in origin.

The most interesting issues to emerge from a comparison of four sites in Pondoland are the richness of the region, coupled with the uneven distribution of species and the low number of both endemics and other species that are common to all the sites. The fact that no geographical cline has been detected implies that there is a large species pool that can potentially populate each site.

It remains to be seen whether the narrow range of many endemics is due to their inability to colonize other sites (competition from other species, adaptation to local conditions) or whether it is early in their existence and they are still in the process of range expansion. Questions that still have to be resolved include the origin and history of the so-called palaeoendemic taxa of Pondoland. If the MF sandstones were submerged until the end of the Neogene (uplift of 900 m at 2.5 Ma and sea level fluctuations up and down since then), then the potential host substrate was simply not available until the most recent uplift for what we now view as MF sandstone endemics of great age. Where and when did these taxa (1 family, 6 genera) originate? If they existed before the sandstones were available, why are they now trapped on the sandstone? In addition, if the coastal margin was 120–150 km east of its present position, and if it was eroded rapidly to the present position, was the sandstone covered by another formation or was it eroded simultaneously? Is it possible that the so-called palaeoendemic taxa, especially the endemic family, are not that old and are possibly exceptions to the stated assumption that the higher the taxonomic rank the older the taxon.

REFERENCES

- ABBOTT, A., VAN WYK, A.E., JOHNSON, D.N. & SCOTT-SHAW, R. 2000. Checklist of the macrofungi, lichens, bryophytes and vascular plants of the Umtamvuna Nature Reserve, South Africa. *Lammergeyer* 46.
- ABBOTT, A. 1997. Endemics of Pondoland. Unpublished list.
- ACOCKS, J.H.P. 1953. Veld Types of South Africa. *Mem. Bot. Surv. S. Afr.* 28: 1-192. (3rd edition with updated names and illustrations published in 1988 as *Mem. Bot. Surv. S. Afr.* 57: 1-146).
- ANDERSON, J.M. & ANDERSON, H.M. 1985. *Palaeoflora of Southern Africa: Prodrum of South African megaflores, Devonian to Lower Cretaceous*. A.A. Balkema, Rotterdam.
- ARNOLD, T.H. & B.C. DE WET. 1993. Plants of southern Africa: names and distribution. *Mem. Bot. Surv. S. Afr.* 62: 1-825.
- AVISE, J.C. 1998. The history and purview of phylogeography: a personal reflection. *Molecular Ecology* 7: 371-379.
- AXELROD, D. I. & RAVEN, P.H. 1978. Late Cretaceous and Tertiary vegetation history of Africa. In: Werger, M.J.A. (ed.), *Biogeography and ecology of southern Africa*. Dr. W. Junk Publishers, The Hague.
- BAILEY, L.H. 1954. *Manual of cultivated plants*. The Macmillan Company, New York.
- BAMFORD, M.K. 2000. Cenozoic macro-Plants. In: Partridge, T.C. & Maud, R.R. (eds.), *The Cenozoic of Southern Africa*. Oxford University Press, Oxford.
- BAUM, A.D., SMALL, R.L. & WENDEL, J.F. 1998. Biogeography and Floral Evolution of Baobabs (*Adansonia*, Bombacaceae) as Inferred from Multiple Data Sets. *Systematic Biology* 47(2): 181-207.
- BEHRENSMEYER, A.K., DAMUTH, J.D., DIMICHELE, W.A., POTTS, R., SUES, H-D., WING, S.L. 1992. *Terrestrial Ecosystems Through Time*. University of Chicago Press, Chicago.
- BELL, M. & WALKER, M.J.C. 1992. *Late Quaternary Environmental Change*. Longman Scientific and Technical, Essex UK.
- BERMINGHAM, E. & MORITZ, C. 1998. Comparative phylogeography: concepts and applications. *Molecular Ecology* 7: 367-369.
- BROOKS, R.R. 1987. *Serpentine and its vegetation, a multidisciplinary approach*. Croom Helm Ltd, London.

- BROMILOW, C. 1995. *Problem plants of South Africa*. Briza Publications, Arcadia Pretoria.
- BROWN, J.H. 1988. Species diversity. In: Myers, A.A. & Giller, P.S. (eds.), *Analytical Biogeography*. Chapman & Hall, London/New York.
- BROWN J.H. & LOMOLINO, M.V. 1998. *Biogeography*. Second Edition. Sinauer Associates, Massachusetts.
- BURGESS, N.D. & PHILIP CLARKE, G. (eds). 2000. *Coastal Forests of Eastern Africa*. IUCN, Gland, Switzerland & Cambridge, UK.
- CARBUTT, C. & EDWARDS, T. 2001. Cape elements on high-altitude corridors and edaphic islands: historical aspects and preliminary phytogeography. *Syst. Geogr. Pl.* 71: 1033-1061.
- CAWE, S.G. 1990. Coastal forest survey: a classification of the coastal forests of Transkei and an assessment of their timber potential. Unpublished report, University of Transkei, Umtata.
- CAWE, S.G., MOLL, E.J. & MCKENZIE, B. 1994. An evaluation of the phytochorological classification of the forests of Transkei. In: SEYANI, J.H. & CHIKUNI, A.C. *Proc. XIIIth Plenary Meeting AETFAT 2*: 1043-1059.
- CAWE, S.G. 1996. A floristic classification of the indigenous forests of Transkei, South Africa. In: van der Maesen, L.J.G., van der Burgt X.M. & van Medebach de Rooy, J.M. (eds.), *The biodiversity of African Plants*. Kluwer Academic Publishers, Dordrecht, Netherlands.
- CAWE, S.G., MCKENZIE, B. & GRANGER, E. 1983. A reconnaissance vegetation survey of part of Pondoland. Unpublished report, University of Transkei, Umtata.
- CHILD, D. 1980. *Portrait of a pioneer: the letters of Sidney Turner from South Africa 1864-1901*. Printpak, Cape Town.
- COATES PALGRAVE, K. 1983. *Trees of southern Africa*. Struik Publishers, Cape Town.
- CODD, L.E. 1968. The South African species of *Kniphofia* (Lilliaceae). *Bothalia* 9, 3 & 4: 363-511.
- CODD, L.E. 1979. *Plectranthus praetermissus*. In: Killick, D.J.B. (ed.) *The Flowering Plants of Africa* 45,4: 1791.
- CODD, L.E. 1985. *Plectranthus hilliardiae*. In: Killick, D.J.B. (ed.), *Flowering Plants of Africa* 48,3 & 4: 1904.

- COETZEE, J.A. 1993. African Flora since the Terminal Jurassic. In: Goldblatt, P. (ed.), *Biological Relationships between Africa and South America*. Yale University Press, New Haven and London.
- CONRAN, J.G. 1995. Family distributions in the Liliiflorae and their biogeographical implications. *Journal of Biogeography* 22: 1023-1034.
- CONRAN, J.G. 2000. Biogeographic studies in the monocotyledons: an overview of methods and literature. In: Wilson, K.L. & Morrison, D.A. (eds.), *Monocots: Systematics and Evolution*. CSIRO Publishing, Collingwood, Australia.
- COOPER, K.H. & SWART, W. 1992. *Transkei Forest Survey*. Wildlife Society of Southern Africa, Durban.
- COWLING, R.M. 1983. Phytocorology and vegetation history of the south-eastern Cape, South Africa. *J. of Biogeogr.* 10: 393-419
- COWLING, R.M. & HOLMES, P.M. 1992. Flora and vegetation. In: Cowling, R.M. (ed.), *The Ecology of Fynbos. Nutrients, Fire and Diversity*. Oxford University Press, Oxford.
- COWLING, R.M., HOLMES, P.M. & REBELO, A.G. 1992. Plant diversity and endemism. In: Cowling, R. (ed.), *The Ecology of Fynbos. Nutrients, Fire and Diversity*. Oxford University Press, Oxford.
- COWLING, R.M. & HILTON-TAYLOR, C. 1994. Patterns of plant diversity and endemism in southern Africa: an overview. In: Huntley, B.J. (ed.), *Botanical diversity in southern Africa. Strelitzia 1*, National Botanical Institute, Pretoria.
- COWLING, R.M. & HILTON-TAYLOR, C. 1997. Phytogeography, flora and endemism. In: Cowling, R.M., Richardson, D.M. & Pierce, S.M. (eds.), *Vegetation of Southern Africa*. Cambridge University Press, Cambridge, UK.
- COWLING, R.M., RICHARDSON, D.M., SCHULTZE, R.E., HOFFMAN, M.T., MIDGELEY, J.J. & HILTON-TAYLOR, C. 1997. Species diversity at the regional scale. In: Cowling, R.M., Richardson, D.M. & Pierce, S.M. (eds.), *Vegetation of Southern Africa*. Cambridge University Press, Cambridge, UK.
- COX, C.B. & MOORE, P.D. 1993. *Biogeography – an ecological and evolutionary approach*. Blackwell, Oxford.
- CRACRAFT, J. 1989. Speciation and its ontology: The empirical consequences of alternative species concepts for understanding patterns and processes of differentiation. In: Otte, D. & Endler, J.A. (eds.), *Speciation and its consequences*. Sinauer Associates, Massachusetts.

- CRISP, M.D., LINDER, H.P. & WESTON, P.H. 1995. Cladistic Biogeography of plants in Australia and New Guinea: congruent pattern reveals two endemic tropical tracks. *Systematic Biology* 44,4: 457-473.
- DAVIS, S.D., DROOP, S.J.M., GREGERSON, P., HENSON, L., LEON, C.J., VILALOBOS, J.L., SYNGE, H. & ZANTOVSKA, J. 1986. *Plants in danger: what do we know?* IUCN, Gland, Switzerland.
- DAVIS, S.D., HEYWOOD, V.H. & HAMILTON, A.C. (eds.) 1994. *Centres of plant diversity, A guide and strategy for their conservation*. Volume 1: Europe, Africa, South West Asia and the Middle East. IUCN Publications Unit, Cambridge, U.K.
- DE VOS, M.P. 1999. Ixioidae. *Flora of southern Africa* 7,2.
- DE WINTER, 1963. Ebenaceae. *Flora of southern Africa* 26.
- DU TOIT, A.L. 1939. *The Geology of South Africa*. London: Oliver and Boyd.
- EVERARD, D.A. 1988. Threatened plants of the eastern Cape: a synthesis of collection records. *Bothalia* 18,2: 271-277.
- FEELY, J.M. 1987. *The early Farmers of Transkei, Southern Africa*. Cambridge Monographs in African Archaeology 24. BAR International Series 378. Oxford, England.
- GANDOLFO, M.A., NIXON, K.C. & CREPER, W.L. 2000. Monocotyledons: a review of their early Cretaceous record. In: Wilson, K.L. & Morrison, D.A. (eds.), *Monocots: Systematics and Evolution*. CSIRO Publishing, Collingwood, Australia.
- GELDENHUYS, C.J. 1992. Richness, composition and relationships of the floras of selected forests in southern Africa. *Bothalia* 22,2: 205-233.
- GENTRY, A.H. After 1985. Distribution and Evolution of the Madagascar Bignoniaceae. Unpublished manuscript.
- GENTRY, A.H. 1976. Relationships of the Madagascar : a striking case of convergent evolution. *Plant Syst. Evol.* 126,3: 255-266.
- GIBBS RUSSELL, G.E. 1987. Preliminary floristic analysis of the major biomes in southern Africa. *Bothalia* 17,2: 213-227.
- GIBBS RUSSELL, G.G., L. WATSON, M. KOEKEMOER, L. SMOOK, N. BARKER, H.M. ANDERSON & M.J. DALLWITZ. 1990. Grasses of Southern Africa. *Mem. Bot. Surv. S.A.* 58
- GIBSON, D. 1995. Modelling the distribution of *Portulacaria afra* in the Eastern and Western Cape Provinces, South Africa, in relation to environmental variables

- and the normalised difference vegetation index. Honours dissertation, Rhodes University, Grahamstown.
- GOLDBLATT, P. 1978. An analysis of the flora of southern Africa: its characteristics, relationships and origins. *Ann. Missouri Bot. Gard.* 65: 369-436.
- GOLDBLATT, P. (ed.). 1993. *Biological Relationships between Africa and South America*. Yale University Press, New Haven and London.
- GOLDBLATT, P. & MANNING, J. 1998. *Gladiolus in southern Africa*. Fernwood Press, Vlaeberg, Cape Town.
- GOLDBLATT, P. & MANNING, J. 2000. Cape Plants, A conspectus of the Cape Flora of South Africa. *Strelitzia* 9. NBI, Pretoria & MBG, Missouri.
- GOLDING, J.S. (ed.) 2002. Southern African Plant Red Data Lists. *Southern African Botanical Diversity Network Report No. 14*. SABONET, Pretoria.
- GOOD, R. 1974. *The Geography of the Flowering Plants*. 4th Edition, Longman, London.
- GREY-WILSON, C. 1980. *Impatiens of Africa*. A.A.Balkema: Rotterdam.
- GUNN, M. & CODD, L.E. 1981. *Botanical exploration of Southern Africa*. AA Balkema: Cape Town
- HALL, A.V. 1993. Setting conservation priorities for threatened species: a joint grouping and sequencing method. *S. Afr. J. Bot.* 59,6: 581-591.
- HALL, M. 1990. *Farmers, kings, and traders: the people of southern Africa, 200–1860*. University of Chicago Press, Chicago.
- HANKEY, A. 1999. The genus *Plectranthus* (Lamiaceae) in South Africa. Diagnostic characters and simple field keys. *PlantLife* 21: 5-15.
- HARTMANN, H.E.K. 1991. Mesembryanthena in Pondoland. *Plantlife* 5: 19-20.
- HAUGHTON, S.H. 1969. *Geological History of Southern Africa*. Geological Society of South Africa, Cape Town.
- HENDERSON, L. 1995. *Plant invaders of Southern Africa*. Agricultural Research Council, Pretoria.
- HENDERSON, L. 1987. Barrier Plants of Southern Africa. *Mem. Bot. Surv. S.A.* 55. Botanical Research Institute, Pretoria.
- HENDERSON, L. 2001. *Alien weeds and invasive plants*. Agricultural Research Council, Pretoria.

- HENDERSON, L. 2002. Invasive alien plants in southern Africa, Part 3: The Daisies (Asteraceae). *Sabonet News* Vol. 7 No 1: 32-34.
- HILLIARD, O.M. 1977. *Compositae in Natal*. University of Natal Press, Pietermaritzburg.
- HILLIARD, O.M. 1994. *The Manulaceae – a tribe of Scrophulariaceae*. Edinburgh University Press, Edinburgh.
- HILLIARD, O.M. & BURTT, B.L. 1971. *Streptocarpus: an African Plant Study*. University of Natal Press, Pietermaritzburg.
- HILLIARD, O.M. & B.L. BURTT. 1987. *The Botany of the Southern Natal Drakensberg*. National Botanic Gardens, Kirstenbosch, SA.
- HILTON-TAYLOR, C. 1996. Red Data List of South African Plants. *Strelitzia* 4. National Botanical Institute, Pretoria
- HOBDDAY, D.K. & MATHEW, D. 1974. Depositional environment of the Cape Supergroup in the Transkei. *Trans. Geol. Soc. S. Afr.* 77, 223-227.
- HUSTON, M.A. 1994. *Biological Diversity: the coexistence of species on changing landscapes*. Cambridge University press, UK.
- IUCN. 1994. *IUCN Red List categories*. Prepared by the Species survival Commission. IUCN, Gland, Switzerland.
- IVERSEN, S.T. 1991. The Usambara Mountains, NE Tanzania: Phytogeography of the Vascular Plant Flora. *Acta Universitatis Upsaliensis, Symbolae Botanicae Upsaliensis* XXIX: 3. Almqvist & Wiksell International, Stockholm – New York.
- JOHNSON, L.A.S. & BRIGGS, B.G. 1984. Myrtales and Myrtaceae – a phylogenetic analysis. *Ann. Missouri Bot. Gard.* 71: 700-756.
- JOHNSON, C.T. & HUTCHINGS, A. 1989. A contribution to the pteridophyte flora of Transkei. *Bothalia* 19,2: 183-188
- KING, L.C. 1963. *South African Scenery: A textbook of geomorphology*. New York: Hafner Publishing Co.
- KING, L. 1978. The geomorphology of central and southern Africa. In: Werger, M.J.A. *Biogeography and ecology of southern Africa*. Dr. W. Junk Publishers, The Hague.
- KINGDON, J. 1990. *Island Africa*. Collins, London.

- KINGSLEY, C.S. 1975. A new stratigraphic classification implying a lithofacies change in the Table Mountain Sandstone in southern Natal. *Trans. Geol. Soc. S. Afr.* 78: 43-55.
- KLEIN, H. 1999. Biological control of three cactaceous weeds, Miller, (Labouret) Britton and De Candolle in South Africa. *African Entomology Memoir* No. 1: 3-14.
- KLUGE, R.L. & CALDWELL, P.M. 1991. Alarming new records of *Pereskia*. *Veld & Flora*, June.
- LEISTNER, O.A. (ed.) 2000. Seed plants of southern Africa: families and genera. *Strelitzia* 10. National Botanical Institute, Pretoria.
- LEVINTON, J.S. 1992. The Big Bang of Animal Evolution. *Scientific American* 52-59.
- LEWIS, G.J., OBERMEYER, A.A. & BARNARD, T.T. 1963. A revision of the South African species of *Gladiolus*. *J. of S.A. Bot. Suppl.* Vol. no 10.
- LINDER, H.P. 1990. On the relationship between the vegetation and floras of the Afromontane and the Cape Regions of Africa. *Proceedings of the twelfth plenary meeting of AETFAT. Mitt. Inst. Allg. Bot. Hamburg.*
- LINDER, H.P. 1998. Numerical analyses of African plant distribution patterns. In: Huxley, C.R., Lock, J.M. & Cutler, D.F. (eds.). *Chorology, Taxonomy and Ecology of the Floras of Africa and Madagascar*. Royal Botanic Gardens, Kew.
- LINDER, H.P. & CRISP, M.D. 1995. Nothofagus and Pacific Biogeography. *Cladistics* 11: 5-32.
- LINDER, H.P., MEADOWS, M.E. & R.M. COWLING. 1992. History of the Cape flora. In: Cowling, R. *The Ecology of Fynbos. Nutrients, Fire and Diversity*. Oxford University Press, Oxford.
- LIVINGSTONE, D.A. 1993. Evolution of African Climate. In: Goldblatt, P. (ed.), *Biological Relationships between Africa and South America*. Yale University Press, New Haven and London.
- LOCK, B.E. 1973. The Cape Supergroup in Natal and the Northern Transkei. *Geological Magazine* 110(5): 485-486.
- LOVETT, J.C., HANSEN, J.R. & HÖRLYCK, V. 2000. Comparison with Eastern Arc Forests. In: Burgess, N.D. & Philip Clarke, G. (eds.), *Coastal Forests of Eastern Africa*. IUCN, Gland, Switzerland & Cambridge, UK.
- LOW, B & REBELO, A. 1998. *Vegetation of Southern Africa, Lesotho and Swaziland*. Dept of Environmental Affairs and Tourism, Pretoria.

- LYNCH, J.D. 1988. Refugia. In: MYERS, A.A. & GILLER, P.S. *Analytical Biogeography*. Chapman & Hall, London/New York.
- MATOLWENI, L.O., BALKWILL, K. & MCLELLAN, T. 2000. Genetic diversity and gene flow in the morphologically variable, rare endemics *Begonia dregei* and *Begonia homonyma* (Begoniaceae). *American Journal of Botany* 87(3): 431-439.
- MCLAUGHLIN, S.P. 1992. Are floristic areas hierarchically arranged? *Journal of Biogeography* 19: 21-32.
- MCLELLAN, T. 2000. Geographic variation and plasticity of leaf shape and size in *Begonia dregei* and *B. homonyma* (Begoniaceae). *Botanical Journal of the Linnean Society*, 132 : 79-95.
- MCLELLAN T., E.C. CLOETE & A.J.N. BOSHA 1994. Naturalization of *Begonia cuculata* in the Port St Johns region, Transkei. *S.Afr. J. Bot.* 60(2): 136-137.
- MEADOWS, M.E. 1997. Biogeography: adaptive radiation of a discipline. *Progress in Physical Geography* 21,4 :583-592.
- MEADOWS, M.E. & LINDER, H.P. 1993. A Palaeoecological Perspective On The Origin Of Afromontane grasslands. *Journal of Biogeography* 20, 345-355.
- METER, E.B. 1998. A Synfloristic Comparison of Oribi Gorge and Umtamvuna Nature reserves. M.Sc. thesis, University of Natal, Pietermaritzburg.
- MIDGLEY, J.J., COWLING, R.M., SEYDACK, A.H.W. & VAN WYK, G.F. 1997. Forest. In: Cowling, R.M., Richardson, D.M. & Pierce, and S.M. (eds.), *Vegetation of Southern Africa*. Cambridge University Press, Cambridge, UK.
- MOFFETT, R.O. 1993. *Rhus*. *Flora of southern Africa* 19,3: 1-129.
- MORRONE, J.J. 1994. On the identification of areas of endemism. *Systematic Biology* 43: 438-441.
- MUKOLWE, M.O. 1999. The potential of agroforestry in the conservation of high value indigenous trees: a case study of Umzimvubu district, Eastern Cape. M.Sc. thesis, University of Natal, Pietermaritzburg.
- MYERS, A.A. & GILLER, P.S. 1988. *Analytical Biogeography*. Chapman & Hall, London/New York.
- MYERS, N., MITTENMEIER, R.A., MITTENMEIER, C.G., DA FONSECA, G.A.B. & KENT, K. 2000. Biodiversity hotspots for conservation priorities. *Nature* 403: 853-858.

- NICHOLAS, A. 1999. A Taxonomic reassessment of the subtribe Asclepiadinae (Asclepiadaceae) in southern Africa. Ph.D. thesis, University of Durban-Westville, Durban.
- PALMER, A.R. 1990. A qualitative model of vegetation history in the eastern Cape midlands, South Africa. *J. of Biogeography* 17: 35-46.
- PARTRIDGE, T.C. 1997. Evolution of landscapes. In: Cowling, R.M., Richardson, D.M. & Pierce, S.M. (eds.), *Vegetation of Southern Africa*. Cambridge University Press, Cambridge, UK.
- PARTRIDGE, T.C. & MAUD, R.R. 2000. Macro-Scale Geomorphic Evolution of Southern Africa. In: Partridge, T.C. & Maud, R.R. (eds.), *The Cenozoic of Southern Africa*. Oxford University Press, Oxford.
- PHILLIPSON, P.B. & RUSSELL, S. 1985. Phytogeography of the Alexandria Forest (Southeastern Cape Province). *AETFAT proceedings*,
- PITMAN, W.C. III, CANDE, S., LABRECQUE, J. & PINDELL, J. 1993. Fragmentation of Gondwana: The Separation of Africa from South America. In Goldblatt, P. (ed.), *Biological Relationships between Africa and South America*. Yale University Press, New Haven and London.
- POOLEY, E. 1998. *A Field Guide to Wild Flowers of KwaZulu-Natal and the Eastern Region*. Natal Flora Publication Trust, Durban.
- POOLEY, E. 1993. *The Complete Field Guide to Trees of Natal, Zululand and Transkei*. Natal Flora Publications Trust, Durban.
- PRECIS. 1997. Computer Information System, National Herbarium, Pretoria. Download of information on 3129 CD.
- PRINSLOO, D.W. 2000. The role of fire in the lifecycle of . MSc thesis, University of the Free State.
- RAMDHANI, S. 2002. Systematics and Biogeography of *Kniphofia* Moench (Asphodelaceae). Seminar, Dept of Botany, Rhodes University, Grahamstown.
- RAVEN, P.H. 1983. The migration and evolution of floras in the southern hemisphere. *Bothalia* 14,3 & 4: 325-328.
- RAVEN, P.H. & AXELROD, D.I. 1974. Angiosperm biogeography and past continental movements. *Annals of Missouri Bot. Gard.* 61,3: 539-673.
- RICHARDSON, D.M., MACDONALD, I.A.W., HOFFMAN, J.H. & HENDERSON, L. 1997. Alien plant invasions. In: Cowling, R.M., Richardson, D.M. & Pierce, S.M. (eds.), *Vegetation of Southern Africa*. Cambridge University Press, Cambridge, UK.

- RICHARDSON, D.M., MACDONALD, I.A.W., HOLMES, P.M. & COWLING, R.M. 1992. Plant and animal invasions. In: Cowling, R. (ed.), *The Ecology of Fynbos. Nutrients, Fire and Diversity*. Oxford University Press, Oxford.
- ROBBRECHT, E. The identity of *Diplospora africana* (Rubiaceae). *S.Afr. J. Bot.* 51(5): 331-334.
- ROBERTSON, M.P., CAITHNESS, N. & VILLET, M.H. 2001. A pca-based modelling technique for predicting environmental suitability for organisms from presence records. *Diversity and Distribution* 7: 15-27.
- ROMERO, E.J. 1993. South American Paleofloras. In: Goldblatt, P. (ed.), *Biological Relationships between Africa and South America*. Yale University Press, New Haven and London.
- RUTHERFORD, M.C. & WESTFALL, R.H. 1986. Biomes of southern Africa: an objective categorization. *Memoirs of the Botanical Survey of South Africa* 54.
- SCHULTZE, R.E. 1997. Climate. In: Cowling, R.M., Richardson, D.M. & Pierce, S.M. (eds.), *Vegetation of Southern Africa*. Cambridge University Press, Cambridge, UK.
- SCOTT, L., ANDERSON, H.M. & ANDERSON, J.M. 1997. Vegetation history. In: Cowling, R.M., Richardson, D.M. & Pierce, S.M. (eds.), *Vegetation of Southern Africa*. Cambridge University Press, Cambridge, UK.
- SCOTT-SHAW, C.R. 1994. Flora of the Greater St Lucia Wetland Park: an abridged list of seed plants. Unpublished list.
- SCOTT-SHAW, C.R. 1999. *Rare and threatened plants of Kwa-Zulu Natal and neighbouring regions*. Kwa-Zulu Natal Nature Conservation Service, Pietermaritzburg.
- SHACKLETON, C.M. 1989. An Ecological survey of a selected area of Pondoland sourveld with emphasis on its response to the management practices of burning and grazing. Unpublished report, University of Transkei, Umtata.
- SHACKLETON, C.M., GRANGER, J.E., MCKENZIE, B. & MENTIS, M.T. 1991. Multivariate analysis of coastal grasslands at Mkambati Game Reserve, northeastern Pondoland, Transkei. *Bothalia* 21,1: 91-107.
- SHACKLETON, S.E. 1989. Autecology of *Cymbopogon validus* (Stapf) Stapf ex Burt Davy in Mkambati Game Reserve, Transkei. Unpublished M.Sc. thesis, Univ. of the Witwatersrand, Johannesburg.
- SHAW, E.M. & VAN WARMELO, N.J. 1974. The Material culture of the Cape Nguni, Part 2 Technology. *Annals of the South African Museum* 58,2: 190

- SIEBERT, S.J. 2001. Vegetation on the ultramafic soils of the Sekhukhuneland Centre of Endemism. Unpublished Ph.D. thesis, University of Pretoria, Pretoria.
- SIM, T.R. 1900. Botanical observations on forests of Eastern Pondoland. *Agricultural Journal No 28*: 1-35, Dept. of Agriculture, Cape of Good Hope.
- SIM, T.R. 1907. *The Forests and Forest Flora of the Colony of the Cape of Good Hope*. Taylor & Henderson, Aberdeen.
- STEVENS, P.F. 3 February 2003. Angiosperm Phylogeny Website. Version 3 May 2002. <http://www.mobot.org/MOBOT/research/Arweb/>.
- STEWART, J., H.P. LINDER, E.A. SCHELPE & A.V. HALL. 1982. *Wild Orchids of Southern Africa*. Macmillan: Johannesburg.
- STOTT, P. 1981. *Historical Plant Geography*. George Allen & Unwin, London.
- SUMMERS, R. 1958. *Inyanga: Prehistoric settlements in southern Rhodesia*. Cambridge University Press, Cambridge.
- TAKHTAJAN, A.L. 1969. *Flowering plants, origin and dispersal*. Oliver & Boyd, Edinburgh.
- TEMPLETON, A.R. 1989. The meaning of species and speciation: a genetic perspective. In: Otte, D. & Endler, J.A. (eds.), *Speciation and its consequences*. Sinauer Associates, Massachusetts.
- THOMAS, R.J., C.G.A. MARSHALL, M.K. WATKEYS, F.J. FITCH & J.A. MILLER. 1992. K-Ar and Ar/Ar dating of the Natal Group, Southeast Africa: a post Pan-African molasse? *Journal of African Earth Sciences* 15,3 & 4: 453-471
- TYSON, P.D. & PARTRIDGE, T.C. 2000. Evolution of Cenozoic Climates. In: Partridge, G.T.C. & Maud, R.R. (eds.), *The Cenozoic of Southern Africa*. Oxford University Press, Oxford.
- VAN JAARSVELD, E.J. & EDWARDS, T.J. 1991. *Plectranthus reflexus*. In: Codd, L.E. (ed.), *Flowering Plants of Africa* 51,2: 2034.
- VAN JAARSVELD, E.J. & EDWARDS, T.J. 1997. Notes on *Plectranthus* (Lamiaceae) from southern Africa, *Bothalia* 27,1: 1-6.
- VAN ROOY, J. 2000. Diversity and phytogeography of the moss flora of southern Africa. Unpublished Ph.D. Thesis, University of Pretoria, Pretoria.

- VAN WYK, A.E. 1990. The sandstone regions of Natal and Pondoland: remarkable centres of endemism. In: Heine, K. (ed.), *Paleoecology of Africa*. A.A. Balkema, Rotterdam.
- VAN WYK, A.E. & SCHRIRE, B. 1986. A remarkable new species of *Colubrina* (Rhamnaceae) from Pondoland. *South African Journal of Botany* 52,4: 379-382.
- VAN WYK, A.E. & SMITH, G.F. 2001. *Regions of Floristic Endemism in Southern Africa*. Umdaus Press, Pretoria.
- VAN ZINDEREN BAKKER, E.M. 1978. Quaternary vegetation changes in southern Africa. In: Werger, M.J.A. (ed.), *Biogeography and ecology of southern Africa*. Dr. W. Junk Publishers, The Hague.
- VERDOORN, I. 1961. (Tanf.) Sprague. *The Flowering Plants of Africa* 34: Plate 1347 & 1348.
- VICTOR, J.E. 2002. South Africa. In: Golding, J.S. (ed.), Southern African Plant Red Data Lists. *Southern African Botanical Diversity Network Report No. 14*. SABONET, Pretoria.
- VON SENGER, I. 2002. An Assessment of the genetic diversity and origin of the invasive weed (*L.*) King & Robinson in South Africa. Unpublished M.Sc. thesis, Rhodes University, Grahamstown.
- WEHMEYER, A.S. & ROSE, E.F. 1983. Important indigenous plants used in the Transkei as food supplements. *Bothalia* 14,3 & 4: 613 – 615.
- WEIGEND, M. & EDWARDS, T.J. 1994. Notes on *Streptocarpus primulifolius* (Gesneriaceae). *South African Journal of Botany* 60,3: 168-169.
- WELLS, M.J., BALSINHAS, A.A., JOFFE, H., ENGELBRECHT, V.M., HARDING, G. & STIRTON, C.H. 1986. A Catalogue of Problem Plants in Southern Africa. *Mem. Bot. Surv. S.A.* 53.
- WERGER, M.J.A. 1978. Biogeographical division of southern Africa. In: Werger, M.J.A. (ed.), *Biogeography and ecology of southern Africa*. Dr. W. Junk Publishers, The Hague.
- WESTON, P.H. & CRISP, M.D. 1994. Cladistic biogeography of waratahs (Proteaceae: Embothrieae) and their allies across the Pacific. *Australian Systematic Botany* 7: 225-249.
- WHITE, F. 1983. *The vegetation of Africa*. Unesco: Switzerland.
- WHITE, F. 1983a. Long distance dispersal, overland migration and extinction in the shaping of tropical African floras. *Bothalia* 14, 3 & 4: 395-403

- WHITE, F. 1990. (Ptaeroxylaceae), some other disjuncts, and the Quaternary history of African vegetation. *Bull. Museum Hist. nat., Paris 4' ser., 12, section b, Adansonia*, 2: 139-185.
- WHITE, F. & MOLL, E.J. 1978. The Indian Ocean coastal belt. In: Werger, M.J.A. (ed.), *Biogeography and ecology of southern Africa*. Dr. W. Junk Publishers, The Hague.
- WIMMER, F.E. 1968. Campanulaceae – Lobelioideae supplementum et Campanulaceae – Cyphioideae: 811-1024. In: A. Engler (ed.) *Das Pflanzenreich*, IV.276c Berlin.
- WOOD & VAN SCHOOR. 1976. *The agricultural potential of Transkei*. Dept. Bantu Admin., Pretoria.

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Appendix 1 Port St Johns

Acokanthera

oblongifolia (Hochst.) Codd, AH 593 Mt Sullivan

oppositifolia (Lam.) Codd, JNP 146 Second Beach

Carissa

bispinosa (L.) Desf. ex Brenan subsp. bispinosa, AH & CTJ 1143 Mt Thesiger

macrocarpa (Eckl.) A. DC., EC 477 Silaka, EC 5518 Mzimvubu River, EC 6052 Mt Thesiger

wyliei N.E. Br., AH 1726 Mt Sullivan, EJVJ 3839, Mt Thesiger

Ceropegia

sp., EC 4327 Mt Sullivan

Cynanchum

ellipticum (Harv.) R.A.Dyer, EC 4662 Silaka

natalitium Schltr., Bayliss & Bayliss 1503 Second Beach

obtusifolium L. f. var. obtusifolium, AH 1179 Silaka

Gomphocarpus

fruticosus (L.) Aiton f., EC 3035 Mt Sullivan

physocarpa E. Mey., EC & AJNB 3035 Mt Sullivan, EC 3717 Silaka

Oncinotis

tenuiloba Stapf, AB et al. 2259 Mt Sullivan, EC 6025 Bulolo

Pachycaris

albans (E. Mey.) Nicholas & Goyder., SV & PJV 176 Near sea level

Pachycarpus

asperifolius Meisn., EC 5473 Mt Thesiger; GH 51 Mt Sullivan, EC 5473 Mt Thesiger

natalensis N.E. Br., AH & EEP 2065 Mt Thesiger

Paulforstera

patens N.E. Br., EEG 3446 West Bank

Periglossum

angustifolium Decne., HAW sn. Open woodland

Raphionacme

galpinii Schltr., EC 6383 Mt Sullivan

Rauvolfia

caffra Sond., EC 2013 Mt Sullivan

Riocreuxia

torulosa Decne., EC 3248 Mt Sullivan, EC 5490 Bulolo River

Sarcostemma

viminale (L.) R.Br., EC & AJNB 3023 Mt Sullivan

Schizoglossum

atropurpureum E.Mey. subsp. virens (E.Mey.) Kupicha, MES 57995 Foot of West Gate

cordifolium E.Mey., EC 6399 Mt Sullivan

Secamone

alpinii Schultes, EC & AJNB 3027 Mt Sullivan, EC 5513 Mzimvubu River

filiformis (L. f.) J.H. Ross, EC & AJNB 3170 Mt Sullivan

gerrardii Harv. ex Benth., Killick & Marais 2033 7 miles from town.

Strophanthus

Appendix 1 Port St Johns

speciosus (Ward & Harv.) Reber, AH 574 Mt Thesiger, EC 6005 Bulolo

Telosma

africana (N.E.Br.) N.E.Br., EC 4810 Mt Sullivan

Thevetia

peruviana (Pers.) K.Schum. *, EC 5498 Mt Thesiger

Tylophora

anomala N.E. Br., EC & AJNB 3071 Silaka

cordata (Thunb.) Druce, KB 1797 Silaka, EC 5974 Bulolo

flanagani Schltr., EC & AJNB 3190 Mt Sullivan, EC 5974 Bulolo

lycioides (E. Mey.) Decne., EC 2169 Mt Sullivan, EC 5460 Bulolo

Xysmalobium

involucratum (E. Mey.) Decne., AH & EEP 1552 Mt Thesiger, EC 3220 Second Beach, EC 6340
Mt Sullivan

ARALIACEAE

Centella

asiatica (L.) Urb., AB et al. 2135 Mt Thesiger

glabrata L. var. glabrata, AB et al. 2184 Mt Thesiger; KB et al. 1739 Mt Thesiger

Cussonia

spicata Thunb., KB et al. 1744, Mt Thesiger; AH & CTJ 1126, Mt Thesiger

thyrsiflora Thunb., KB et al. 1799, Silaka

zuluensis Strey, EC et al. 3713 Silaka

Schefflera

umbellifera (Sond.) Baill., AB et al. 2194 Mt Thesiger

Seemannaralia

gerrardii (Seemann) Harms, AEW 10141 Mt Sullivan

ARISTOLOCHIACEAE

Cf. Asarum

sp. cf. shuttleworthii *, EC sn. Bulolo

ASCLEPIADACEAE see Apocynaceae

ASTERACEAE

Acanthospermum

hispidum DC. *, EC & AJNB 3449 Mt Sullivan

Adenostemma

viscosum J.R. Forst. & G. Forst., EEG 2888 Upper Plateau

Ageratum

houstonianum Mill. *, EC 454 Second Beach

Ambrosia

artemisifolia L. *, EC & AJNB 3061 Mt Sullivan

Arctotheca

populifolia (Berg.) T. Norl., EC & AJNB 3057 Mt Sullivan

Appendix 1 Port St Johns

Artemisia

afra Jacq. ex Willd., EC 3286 Mt Sullivan

Aster

bakeranus Burt Davy ex C.A. Sm., EC 3725 Mt Thesiger

Athrixia

phylicoides DC., EC 455 Second Beach, EC 6403 Mt Sullivan

Berkheya

bergiana Soederb., EC 467 Mt Thesiger

bipinnatifida (Harv.) Roessl. subsp. bipinnatifida, EC 3290 Mt Sullivan

erysithales (DC.) Roessl., EC 791 Port St Johns

rhapontica (DC.) Hutch. & Burt Davy, AH & EEP 1551 Mt Thesiger

robusta Bohmen ex Roessl., SS 3960 East Gate

speciosa (DC.) O. Hoffm. subsp. speciosa, EEG 2847 Isinuka

Bidens

bitemata (Lour.) Merrill & Scherff *, EC 4650 Silaka

pilosa L. *, EC 6117 Silaka

Brachylaena

discolor DC. subsp. discolor, AH & CTJ 1149 Mt Thesiger, EC 3056 Mt Sullivan

elliptica (Thunb.) DC., Boshoff 3474 Pungwane Forest, EC 6107 Silaka

glabra (L. f.) Druce, AEvW 10130 Mt Sullivan

uniflora Harv., RDAB 1499 Second Beach

Campuloclinum

macrocephalum Less. *, YND 7 Mt Thesiger

Chromolaena

odorata (L.) R.M. King & H. Robinson*, EC 5179 Isinuka

Chrysanthemoides

monilifera (L.) T. Norl., EC 476 Silaka

Cineraria

deltoidea Sond., EEG 2890 West Gate

Conyza

albida Spreng*, EC 4258 Mzimvubu River

bonariensis (L.) Cronq. *, AODM 13026 Port St Johns

chilensis Spreng *, EC et al. 3261 Mt Sullivan

pinnata (L. f.) Kuntze, SS 4340 Around Port St Johns

scabrida DC., EC 469 Silaka; KB 1751 Mt Thesiger, EC 5180 Isinuka

Cotula

nigellifolia (DC.) Bremer & Humphries var. nigellifolia, AODM 13074 Noxolweni Forest, EC 6243 Mt Thesiger

Crassocephalum

crepidioides (Benth.) S. Moore, MJW 3407 1 Mile from town

Dichrocephala

integrifolia (L. f.) Kuntze subsp. integrifolia, EEG 2887 Wooded kloof above town

Ethulia

conyzoides L. f., ABMV & EC 2272 Mt Sullivan

Appendix 1 Port St Johns

Euryops

brachypodus (DC.) B. Nord., EC 3297 Mt Thesiger
brevipapposus M.D. Henderson, AB et al. 2275 Mt Sullivan
chrysanthemoides (DC.) B. Nord., EEG 3466 Isinuka

Felicia

erigeroides DC., EEG 10964 5 Miles on Lusikisiki road

Galinsoga

parviflora Cav. *, MJW 3378 1 Mile from town

Gazania

krebsiana Less. subsp. krebiana, AB et al. 2233 Mt Sullivan
krebiana Less. subsp. serrulata Roessl., EC 4345 Mt Sullivan
linearis (Thumb.) Druce var. linearis, FB 15 Near coastal forest, EC 6220 Mt Thesiger
rigens (L.) Gaertn. var. uniflora (L. f.) Roessl., EC & AJNB 3039 Mt Sullivan

Gerbera

ambigua (Cass.) Sch. Bip., AB et al 2232 Mt Sullivan
piloselloides (L.) Cass., AH 589 Mt Thesiger, EC 3683 Silaka

Helichrysum

acutatum DC., EC 6223 Mt Thesiger
allioides Less., AH 1211 The Gap
appendiculatum (L. f.) Less., CTJ 287 Mt Thesiger, EC 3696 Silaka
argyrolepis MacOwen, CTJ 1130 Mt Thesiger
aureum (Houtt.) Mer., AH & CTJ 1131 Mt Thesiger
cymosum (L.) D. Don subsp. cymosum, MJW 3427 First Beach, EC 6082 Mt Thesiger
decorum DC., EC 223 Silaka
herbaceum (Andr.) Sweet, AB et al 2144 Mt Thesiger, EC 3282 Mt Sullivan
longifolium DC., EC et al. 3338 Mt Thesiger
mixtum (Kuntze) Moeser var. mixtum, EC 31 Mt Sullivan
nudifolium (L.) Less., EC 6323 The Gap
panduratum O. Hoff. var. panduratum, EC & AJNB 3017 Mt Sullivan, EC 3202 Second Beach
pilosellum (L. f.) Less., EC 4346 Mt Sullivan
populifolium DC., AEvW 10039 Mt Sullivan, AB et al. 2167 Mt Thesiger
spiralepis Hilliard & B.L. Burt, EC 3724 Mt Thesiger

Lactuca

indica L. *, EC 4257 Mzimvubu River

Melanthera

scandens (Schumach. & Thonn.) Roberty, EC 222 Silaka

Mikania

cordata (Burmam f.) B.L. Robinson, EC 468 Silaka, AH & CTJ 1124 Mt Thesiger

Montanoa

hibiscifolia Benth. *, AH 581 Mt Thesiger, EC 5196 Port St Johns

Osteospermum

caulescens Harv., KB 1801 Silaka
fruticosum (L.) T. Norl., EC & AJNB 3060 Mt Sullivan, EC 4680 Silaka

Schistostephium

Appendix I Port St Johns

- flabelliforme Less., EC 6159 Silaka
heptalobum (DC.) Oliv. & Hiern., EEG 3438 Isinuka
- Senecio**
affinis DC., AEVW 8384 Mt Thesiger
albanopsis Hilliard, KB et al. 1781 Mt Thesiger
barbatus DC., EEG 3463 West Gate
chrysocoma Meerh., EC 6286 Mt Thesiger
decurrens DC., EC 6347 Mt Thesiger, EC 4634 Silaka
erubescens Ait. var. erubescens, EC 6381 Mt Sullivan
latifolius DC., AH & CTJ 1121 Mt Thesiger
macroGLOSSOIDES Hilliard, EC 4329 Mt Sullivan
madagascariensis Poir., FVB 2 Coastal forest
oxydontus DC., EEG 2883 West Gate
oxyriifolius DC., AB et al. 2242 Mt Sullivan, EC 6282 Mt Thesiger
polyanthemoides Sch. Bip., EC 470 Silaka; AEVW 10071 Mt Sullivan
purpureus L., KB 1778 Mt Thesiger
rhyncholaenus DC., KB et al. 1740 Mt Thesiger; EC 1908 Mt Sullivan
sandersonii Harv., EC 6201 Mt Thesiger
speciosus Willd., AB et al. 2223 Mt Sullivan, EC 3207 Second Beach
umgeniensis Thell., KB et al. 1791 Mt Thesiger
- Siclospermum**
leptophyllum (Pers.) Sprague, EC 4644 Silaka
- Sigesbeckia**
orientalis L. *, EC 2130 Silaka
- Spilanthes**
mauritanica (Pers.) DC., EC 2122 Silaka, EC 6068 Mt Thesiger
- Stoebe**
vulgaris Levyns, KB et al. 1762 Mt Thesiger
- Tagetes**
minuta L. *, EC & AJNB 3453 Mt Sullivan
- Tarchonanthus**
camphoratus L., EC 475 Silaka; AH 592 Mt Sullivan, EC 6261 Mt Thesiger
- Tenrynea**
phylicifolia (DC.) Hilliard & Burt, AB et al. 2165 Mt Thesiger
- Tithonia**
diversifolia (Hemsl.) A.Gray. *, EC 6192 Isinuka
rotundifolia (mill.) Blake *, ECc 5178 Isinuka
- Urospermum**
picroides (L.) Scopoli ex F.W. Schmidt*, EC 4648 Silaka
- Vernonia**
angulifolia DC., EC 2190 Mt Sullivan, EC 4677 Silaka
hirsuta (DC.) Sch.Bip., EC 6327 The Gap
neocorymbosa Hilliard, EC 220 Silaka
- Xanthium**

Appendix 1 Port St Johns

spinosum *L.**, EC 5506 Bulolo River Estuary

AVICENNIACEAE

Avicenna

marina (*Forssk.*) *Vierh.*, RDAB 1528 Near Port St Johns

BALSAMINACEAE

Impatiens

flanaganae *Hemsl.*, EC 29 Mt Sullivan; EC 102 Silaka

hochstetteri *Warb. subsp. hochstetteri*, EC 1792 Second Beach

BASELLACEAE

Anredera

cordifolia (*Ten.*) *Steenis* *, EC 5445 Mt Thesiger

BEGONIACEAE

Begonia

cucullata *, EC 2975 Mt Sullivan

dregei *Otto & Dietr.*, EC 225 Silaka

homonyma *Steud.*, SS 4185 Eagles Nest

BIGNONIACEAE

Podranea

ricasoliana (*Tanf.*) *Sprague*, AEvW 10136 Mt Sullivan

Spathodea

campanulata *, EC 6137 Mzimvubu River

Tecoma

capensis (*Thunb.*) *Spach subsp. capensis*, SGC 190 Mt Sullivan

stans (*L.*) *H.B.K.* *, EC 5498 Bulolo River Estuary

BORAGINACEAE

Cordia

caffra *Sond.*, DMC 1935 First Beach

Cynoglossum

geometricum *Baker & Wright*, EC 3285 Mt Sullivan

lanceolatum *Forssk.*, MCG 1257 Kloof above Port St Johns

Ehretia

rigida (*Thunb.*) *Druce*, AEvW 10105 Mt Sullivan, EC 4668 Silaka

BRASSICACEAE

Heliophila

scandens *Harv.*, DMG sn. Second Beach

Rorippa

nudiuscula *Thell.*, EC 5964 Bulolo

Appendix 1 Port St Johns

BUDDLEJACEAE

Nuxia

congesta R.Br.ex Fresen. EC 6152 Silaka
floribunda Benth., EC 3336 Mt Thesiger

BURSERACEAE

Commiphora

harveyi (Engl.) Engl., EC 3069 Silaka
woodii Engle., EC 6099 Silaka, EC 6336 Nenga River

BUXACEAE

Buxus

macowanii Oliv., EC 6111 Silaka
natalensis (Oliv.) Hutch, EC 841 Mt Sullivan, EC 5497 Mt Thesiger

CACTACEAE

Opuntia

vulgaris Mill *, EC & AJNB 3032 Mt Sullivan

Pereskia

aculeata Mill *, EC & AJNB 3450 Mt Sullivan

Rhipsalis

baccifera (J. Mill.) Stearn, EC 1899 Mt Sullivan, EC 6096 Silaka

CAMPANULACEAE

Wahlenbergia

krebsii Cham, *subsp.* *krebsii*, EC 4344 Mt Sullivan

CAPPARACEAE

Capparis

tomentosa Lam., EC 461 Second Beach; AH 588 Mt Thesiger

Maerua

racemulosa (A. DC.) Gilg & Ben., EC 848 Mt Sullivan, EC 5983 Bulolo
triphylla A.Rich. *var.* *pubescens* (Klotsch) DeWolf, EC 4343 Mt Sullivan

CARYOPHYLLACEAE

Drymaria

cordata (L.) Willd. *subsp.* *diandra* (Blume) J. Duke, EC & AJNB 3006 Mt Sullivan

Silene

bellidioides Sond., SS 3985 East Gate
caffra Fenzl, KB et al. 1955 The Gap
primuliflora Eckl. & Zeyh., EC 3681 Silaka

CELASTRACEAE

Appendix 1 Port St Johns

Allocassine

laurifolia (Harv.) N.K.B.Robson, EC sn. Port St Johns

Cassine

aethiopica Thumb., AEW 10062 Mt Sullivan, EC 6072 Mt Thesiger
papillosa (Hochst.) Kuntze, AEW 10099 Mt Sullivan, EC 5988 Bulolo

Gymnosporia

grandifolia (Davison) M.Jordaan, EC 3449 Mt Sullivan

Lauridia

tetragona (L.f.) R.H.Archer, EC 2007 Mt Sullivan

Maytenus

abbottii vanWyk, AEW 10171 Mt Sullivan
acuminata (L. f.) Loes. var. *acuminata*, HGF 2563 Port St Johns
cordata (E. Mey. ex Sond.) Loes., AEW 4212 Mt Sullivan
mossambicensis (Klotzsch) Blakelock var. *rubra* (Harv.) Blakelock, AEW 10138 Mt Sullivan
peduncularis (Sond.) Loes., EC 3656 Second Beach
procumbens (L.f.) Loes, RDAB 1494 Second Beach, EC 5549 Port St Johns

Putterlickia

verrucosa (E. Mey. ex Sond.) Szyszyl., KB et al. 1823, Silaka

Salacia

gerrardii Harv., KB et al. 1748 Mt Thesiger

CHENOPODIACEAE

Sarcocornia

natalensis (Bunge ex Ung.-Sternb.) A.J.Scott, EC 3700 River mouth

CLUSIACEAE

Garcinia

gerrardii Harv. ex Sim, AEW 10093 Mt Sullivan, EC 6104 Silaka

COMBRETACEAE

Combretum

bracteosum (Hochst.) Brandis ex Engl., EC 2112 Silaka, EC 6165 Silaka
erythrophyllum (Burch.) Sond., RDAB 1511 Second Beach
kraussii Hochst., EC & AJNB 3000 Mt Sullivan, EC 3337 Mt Thesiger

Quisqualis

parviflora Gerr. ex Harv., AEW 10059 Mt Sullivan; AB et al. 2216 Mt Sullivan

CONNARACEAE

Cnestis

polyphylla Lam., KB et al. 1883 Umzimvubu Valley, EC 6373 Silaka

CONVOLVULACEAE

Cuscuta

campestris Yunck. *, EC sn. Mt Thesiger, EC 4649 Silaka

Appendix 1 Port St Johns

cassytoides *Nees ex Engelm.*, *AEvW 10173* Mt Sullivan

Falkia

repens *L. f.*, *KB et al. 1960*

Hewittia

malambarica, *AH 1221* The Gap

Ipomoea

alba *L. **, *EC & AJNB 3049* Mt Sullivan

bolusiana *Schinz subsp. pinnatipartita Verdc.*, *DMC 1929* Second Beach

indica (*Burm.f.*) *Merr. **, *EC 2154* Mt Sullivan

wightii (*Wall.*) *Choisy*, *MJW 3387* 1 Mile from town, *EC 4673* Silaka

CRASSULACEAE

Cotyledon

orbiculata *L. var. oblonga (Haw.) DC.*, *EC 4330* Mt Sullivan

Crassula

alba *Forssk. var. alba Eckl. & Zeyh.*, *AB et al. 227* Mt Sullivan

multicava *Lem. subsp. floribunda Friedr. ex Toelken*, *EC & AJNB 3024* Mt Sullivan

multicava *Lem. subsp. multicava*, *KB et al. 1810* Silaka

obovata *Haw. var. obovata*, *AB et al 2229* Mt Sullivan; *AB et al 2185* Mt Thesiger

orbicularis *L.*, *EC 5550* Between Silaka and Second Beach

orbiculata *L. var. oblonga (Haw.) DC.*, *EC 3025* Mt Sullivan

pellucida *L. subsp. brachypetala (Drege ex Harv.) Toelken*, *EC & AJNB 3058* Mt Sullivan

perfoliata *L. var. heterotricha (Schunz.) Tolken*, *EC 4331* Mt Sullivan

setulosa *Harv. var. setulosa*, *AH & GH 2200* Mt Sullivan

CUCURBITACEAE

Coccinia

adoensis (*Hochst. Ex A. Rich.*) *Cogn.*, *EC 5459* Bulolo

palmata (*Sond.*) *Cogn.*, *AB et al 2179* Mt Thesiger, *EC 3172* Mt Sullivan, *EC 5458* Bulolo

rehmannii *Cogn.*, *EC 2078* Mt Sullivan

Lagenaria

sphaerica (*Sond.*) *Naud.*, *AH & EEP 1565* Agate Terrace

Momordica

balsamina *L.*, *AODM sn.* Port St Johns

Peponium

mackenii (*Naud.*) *Engl.*, *AODM 1311* Fairview

Zehneria

parvifolia (*Cogn.*) *J.H. Ross*, *EC 17* Mt Sullivan

DIPSACACEAE

Cephalaria

attenuata (*L.f.*) *Roem. & Schult.*, *EC 3735* Mt Thesiger

DROCERACEAE

Appendix 1 Port St Johns

Drosera

natalensis *Diels, EC sn.* Mt Thesiger

EBENACEAE

Diospyros

dichrophylla (*Gand.*) *De Winter, EC 456* Second Beach; *KB et al. 1893* Mt Sullivan

natalensis (*Harv.*) *Brenan subsp. natalensis, EC 2104* Silaka, *EC 3653* Mt Sullivan

simii (*Kuntze*) *De Winter, AEW 10066* Mt Sullivan

villosa (*L.*) *De Winter var. villosa, EC 6392* Mt Sullivan

Euclea

natalensis *A. DC. subsp. natalensis, EC 474* Silaka

polyandra (*L.f.*) *E.Mey. ex Hiern, RDAB 1533* Second Beach

ERICACEAE

Erica

dracomontana *E.G.H. Oliver, KB et al. 1903*

natalitia *H. Bolus var. brevipedicellata Dulfer, KB et al. 1895* Agate Terrace

woodii *E.G.H. Oliver, EC 5480* Mt Thesiger

ERYTHROXYLACEAE

Erythroxylum

emarginatum *Thom., RDAB 1504* Second Beach

pictum *E. Mey. ex Sond., EC 3260* Mt Sullivan, *EC 6313* Silaka

Nectaropetalum

capense (*Bolus*) *Stapf & Boodle, TRS 2586* Port St Johns, *EC 5446* Mt Thesiger

EUPHORBIACEAE

Acalypha

ecklonii *Baill., MJW 3408* 1 Mile from town

glabrata *Thumb., var. glabrata, EC 2077* Mt Sullivan

peduncularis *E. Mey. ex Meisn., GCT 1591* N of Umzimvubu River, *EC 6365* Mt Thesiger

punctata *Meisn. var. punctata, EC 3693* Silaka

sp. *EC 6365* Eagles Nest

Adenocline

acuta (*Thumb.*) *Baill., EC 4640* Silaka

Antidesma

venosum *E.Mey. ex Tul., EC 6258* Mt Thesiger

Bridelia

micrantha (*Hochst.*) *Baill., EC 6359* Mt Thesiger, *EC 6391* Mt Sullivan

Clusia

abyssinica *Jaub. & Spach var. abyssinica, KB et al 1770* Mt Thesiger, *EC 6073* Mt Thesiger

pulchella *L. var. frankisiae Prain, AB et al. 2192* Mt Thesiger, *EC 1788* Second Beach, *EC 3173*

Mt. Sullivan

pulchella *L. var. pulchella, AODM 13077* Noxolweni Forest

Appendix 1 Port St Johns

Croton

sylvaticus *Hochst.*, EC 2166 Mt Sullivan, EC 3067 Silaka, EC 6022 Bulolo

Dalechampia

capensis *Spreng. f.*, EC 855 Isinuka, AH 568 Mt Thesiger

Drypetes

arguta (*Muell. Arg.*) *Hutch.*, EC 6134 Silaka

gerrardii *Hutch.*, EC 5453 Mt Sullivan

Erythrococca

berberidea *Prain, AB et al.* 2201 Mt Sullivan

sp. EC 5876 Bulolo

Euphorbia

dumosa *E.Mey. ex Boiss.*, EC 3697 Silaka

heterophylla *L.*, MJW 3430 First Beach

hirta (*L.*) *Millsp.*, SS 3937 East Gate

kraussiana *Bernh. var. erubescens N.E. Br.*, EC 1785 Second Beach

kraussiana *Bernh. var. kraussiana, KB et al.* 1819 Silaka

striata *Thunb. var. striata, EC et al.* 3326 Mt Thesiger

Excoecaria

simii (*Kuntze*) *Pax*, AA 4213 Mt Sullivan, AB et al 2198 Mt Sullivan, EC 5981 Bulolo

Heywoodia

lucens *Sim, EEG* 3486 Left bank of river, EC 2975 Mt Sullivan, EC 6105 Silaka

Macaranga

capensis (*Baill.*) *Benth. ex Sim*, EC 2161 Mt Sullivan, EC 6233 Mt Thesiger

Manihot

*sp.cf. dulcis Pax **, EC et al. 3284 Mt Sullivan

Margaritaria

discoidea (*Baill.*) *Webster var. discoidea, AB et al.* 2207 Mt Sullivan

discoidea (*Baill.*) *Webster var. fagifolia, EC* 6240 Mt Thesiger

Micrococca

capensis (*Baill.*) *Prain, AH & EEP* 1568 Mt Thesiger, EC 3189 Mt Sullivan

Phyllanthus

cedrelifolius *Verdoorn*, EC 6023 Bulolo

maderaspatensis *L.*, EC 6334 Mt Sullivan

myrtaceus *Sond.*, EC 1789 Bulolo

Ricinus

communis *L. **, EC 3041 Agate Terrace

Sapium

ellipticum (*Krauss*) *Pax, AEvW* 10050 Mt Sullivan; *KB et al.* 1773 Mt Thesiger

integerrimum (*Hochst.*) *J. Leonard, TRS* 2422 Port St Johns

Suregada

procera (*Prain*) *Croizat*, 3648 Mt Sullivan, EC 6315 Silaka

Tragia

capensis (*Thunb.*) *Harv. ex Sond.*, *KB et al.* 1958 Silaka

Appendix 1 Port St Johns

glabrata (Mull. Arg.) Pax & K.Hoffm. var. glabrata, JH 1756 Near sea

FABACEAE

Abrus

laevigatus E.Mey., EC 6089 Mt Thesiger

precatorius (L.) subsp. africanus Verdc., EC5471 Mt Thesiger

Acacia

ataxacantha DC., EC 6158 Silaka

caffra (Thunb.) Willd., EC 6259 Mt Thesiger

karroo Hayne, EC 21 Mt Sullivan; EC 458 Second Beach

Adenopodia

spicata (E. Mey.) Presl, EC 1730 Mt Sullivan; EEG 2674 Tiger Flats, EC 5505 Mt Thesiger

Aeschynomene

uniflora E.Mey. var. uniflora, HGF 2561 St Johns Mouth

Albizia

adianthifolia (Schumach.) W.F. Wight, EC sn. Mt Thesiger

Alysicarpus

rugosus (Willd.) DC. subsp. perennirufus, EEG 3408 West Gate

Argyrolobium

rotundifolium T.Edwards, EC 6321 The Gap

tomentosum (Andr.) Druce, AEvW 10017 Port St Johns, EC 4664 Silaka

Baphia

racemosa (Hochst.) Baker, EC 5871 Bulolo

Caesalpinia

decapetala (Roth) Alston *, AH 585 Mt Thesiger, EC 6158 Bulolo

Canavalia

bonariensis Lindl., EC 6350 Agate Terrace

Cassia

sp. EC 4256 Mzimvubu River

Chamaecrista

mimosoides (L.) Greene, EC et al. 3345 Mt Thesiger

plumosa E.Mey. var. erecta (Schorn & Gordon-Gray) Lock, CJH 33 Eagle's Nest

Crabia

zimmermannii (Harms) Dunn, JNP 145 Second Beach, EC 5143 Noqwekwana

Crotalaria

capensis Jacq., AB et al 2163 Mt Thesiger, EC 6051 Mt Thesiger

macrocarpa E. Mey. subsp. macrocarpa, AH 1727 Mt Sullivan

natalensis Bak.f., EC 6132 Silaka

pallida Aiton var. pallida, EC 4254 Port St Johns

virgulata Klotzsch subsp. grantiana (Harv.) Polhill, KB et al. 1813 Silaka

Dalbergia

multijuga E. Mey., EC 5471 Mt Thesiger, EC 6120 Silaka

obovata E. Mey., AB et al 2160 Mt Thesiger, EC 4266 Port St Johns, EC 5450 Bulolo

Desmodium

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APPENDIX 1

Port St Johns

Collectors: The following abbreviations were used:

AA=A Abbott, AB=A Bean, AEvW=AE van Wyk, AGM=AG McLoughlin, AH=A Hutchings, AJNB=AJN Bosa, AP= Anton Pretorius, AODM=AOD Mogg, BdW =B de Winter CB =C Battle, CEM = CE Moss, CJH=CJ Howlett, CJW= CJ Ward, CTJ=CT Johnson, DM= D. Moshe, DMC=DM Commins, DMG= DM Gemmell, EAB=EA Bruce, EACLES=EACLE Schelpe, EC=E Cloete, EEG=EE Galpin, EJvJ =EJ van Jaarsveld, EEP=EE Plumstead, FVB=FV Baker, FML=FM Leighton, GCT =GC Theron, GG=G Germishuizen, GH =G Hutchings, HAW =HA Wager, HGF =HG Flanagan, IBPE = IB Pole-Evans, JNP =JN Pienaar, JEB =JE Burrows, JH =J Hutchinson, JHPA =JHP Acocks, JLS =JL Sidney, JPJ =JP Jessop, JS =J. Singh, JvR =J van Rooy, KB =K Balkwill, LED =LE Davidson. LEWC =LEW Codd, LLB =LL Britten, MCG = MC Gillett, MEB = ME Blenkinson, MES = ME Stutterheim, MQ =M Qokweni, MW= M Webb, PJV =PJ Vorster, RGS =RG Strey, RS =R Story, RW =R White, SE =S Eliovson, SR =S Russell SS =S Schonland, SV =S Venter, THA =TH Arnold, TM =T McLellan, TRS =TR Sim, WM =W Marais, WNBH =WNB Hardcastle, YND =YN Dazana

BRYOPHYTES

BARTRAMIACEAE

Philonotis

dregeana (C.Mull.) A.Jaeger, JvR 1961 Mt Sullivan

BRYACEAE

Bryum

andicola Hook., JvR 1965 Mt Sullivan

argenteum Hedw., BdW 9674 Mt Thesiger

Rhodobryum

commersonii (Schwaegr.) Par., FML 3370

CALYMPERACEAE

Hypodontium

dregei (Hornsch.) C. Mull., JvR 1957 Mt Sullivan

DICRANACEAE

Dicranella

subsubulatus (C.Mull.) A.Jaeger, JvR 1967 Mt Sullivan

FISSIDENTACEAE

Appendix 1 Port St Johns

Fissidens

palmifolius (*P.Beauv.*) *Broth.*, *Leighton 3367* Isinuka; *JvR 1926* Silaka

HOOKERIAACEAE

Hookeriopsis

pappeana (*Hampe*) *A.Jaeger*, *SR 2650* Eagle's Nest

Hypopterygium

laricinum (*Hook.*) *Brid.*, *JvR 1939* Silaka

Lopidium

pennaeforme (*Brid.*) *M.Fleisch.*, *SR 2681* Mt Sullivan

METEOREACEAE

Aerobryopsis

capensis (*C.Mull.*) *M.Fleisch.*, *SR 2692b* Mt Sullivan

Papillaria

africana (*C.Mull.*) *A.Jaeger*, *SR 2686* Mt Sullivan

Squamidium

brasiliense (*Hornsch.*) *Broth.*, *FML 3371a* Isinuka

MNIACEAE

Plagiomnium

rhyrachophorum (*Hook.*) *Kop. var. reidii* (*Dixon*) *Kop.*, *JvR 1941* Silaka

ORTHOTRICHACEAE

Macrocoma

tenue (*Hook. & Grev.*) *Vitt.*, *EACLES 7510* Isinuka

Macromitrium

serpens (*Hook. & Grev.*) *Brid.*, *SR 2689* Mt Sullivan

Schlotheimia

ferruginea (*Hook. & Grev.*) *Brid.*, *EACLES 7511* Isinuka

RACOPILACEAE

Racopilum

capense *C.Mull.*, *SR 2676* Mt Sullivan

SPHAGNACEAE

Sphagnum

truncatum *Hornsch.*, *AEvW 10073* Mt Sullivan

FERNS and FERN-ALLIES

ADIANTACEAE

Adiantum

capillus-veneris *L.*, *EC 2170* Mt Sullivan, *EC 3698* Silaka

raddianum *Presl.*, * *EC 1780* Second Beach; *AH & EEP 2056* Mt Sullivan

Appendix 1 Port St Johns

Cheilanthes

bergiana Schlecht., EC 783 Mt Sullivan; AODM 13122 Bololwa Forest

parviloba (Swartz) Swartz, EC 1909 Mt Sullivan

viridis (Forssk.) Swartz var. *glauca* (Sim) Schelpe & N.C. Anthony, EC 6190 Isinuka

viridis (Forssk.) Swartz var. *macrophylla* (Kunze) Schelpe & N.C. Anthony, EC 781 Mt Sullivan

viridis (Forssk.) Swartz var. *viridis*, EC 6226 Mt Thesiger, EC 4671 Silaka

Doryopteris

concolor (Langsd. & Fisch.) Kuhn, AGM sn. East Gate

Pellaea

calomelanos (Swartz) Link, EC & AJNB 3317 Mt Thesiger

Pityrogramma

calomelanos (Swartz) Link var. *aureoflava* (Hook.) Weath. ex Bailey, * AH 2199 Mt Sullivan,
EC 4837 Mt Thesiger

Pteris

buchanii Bak. ex Sim, EC 6134 Silaka

catoptera Kunze, EC 1776 Isinuka

ASPIDIACEAE

Cyrtomium

caryotideum (Wall. ex Hook. & Grev.) Presl var. *micropterum* (Kunze) C. Chr., AH & CTJ
2233 Mt Sullivan

Dryopteris

inaequalis (Schlecht.) Kuntze, AH 571 Mt Thesiger, EC 6177 Isinuka

Polystichum

transkeiense Jacobsen, CTJ 78 The Gap, EC 3710 Silaka

Rumorha

adiantiformis (G.Forst.) Ching., EC 6177 Isinuka

ASPLENIACEAE

Asplenium

dregeanum Kunze, AB et al 2161 Mt Thesiger; AH 1174 Mt Sullivan

erectum Bory ex Willd., Jacobsen 4284 Port St Johns

lunulatum Swartz, EC 1781 Isinuka; AH & CTJ 2240 Mt Sullivan

monanthes L., AH 571 Mt Sullivan

prionitis Kunze, AB et al 2159 Mt Thesiger; AH 1174 Mt Sullivan

rutifolium (Berg.) Kunze, EC 851 Mt Sullivan

splendens Kunze, EC 853 Isinuka; AH 2195 Mt Sullivan; AH 2048 Mt Thesiger

ATHYRIACEAE

Cystopteris

fragilis (L.) Bernh., AGM sn, East Gate

DAVALLIACEAE

Davallia

Appendix 1 Port St Johns

chaerophylloides (Poir.) Steud., EC 3330 Mt Thesiger

Nephrolepis

exaltata (L.) Schott *, AH & CTJ 2229 Mt Sullivan

DENNSTAEDTIACEAE

Hypolepis

sparsisora (Schrad.) Kuhn, AH & CTJ 2238 Mt Sullivan

Pteridium

aquilinum (L.) Kuhn, AGM sn Eagle's Nest, EC 6276 Mt Thesiger

EQUISETACEAE

Equisetum

ramosissimum Desf., CTJ sn. Pondoland Bridge

GLEICHENIACEAE

Gleichenia

polypodioides (L.) J.E. Sm., WBNH 219 Top of hill above forest.

umbraculifera (Kunze) T.Moore, EC 6235 Mt Thesiger

HYMENOPHYLLACEAE

Trichomanes

inopinatum (Pichi-Serm.) J.E. Burrows, WBNH 316 Port St Johns

melanotrichum Schlecht., AB et al. 2162 Mt Thesiger; AH 1177 Mt Sullivan, EC 5463 Bulolo

LOMARIOPSIDACEAE

Elaphoglossum

acrostichoides (Hook. & Grev.) Schelpe, HAW sn. Port St Johns, EC sight record Mt Sullivan

LYCOPODIACEAE

Lycopodium

carolinianum L. var. carolinianum, EEG 3455 Westgate summit, EC 4834 Mt Thesiger

carolinianum L. var. grandifolium Spring, EC 4834 Mt Thesiger

cernuum L., EC 3732 Mt Thesiger

dacrydioides Bak., AGM sn. Westgate

gnidioides L. f., AB et al. 2292 Mt Sullivan

verticillatum L. f., AB et al. 2288 Mt Sullivan, EC 6236 Mt Thesiger

MARATTIACEAE

Marattia

fraxinea J.E. Sm. ex J.F. Gmel. var. salicifolia (Schrad.) C. Chr., AB et al. 2158 Mt Thesiger

MARSILEACEAE

Marsilea

capensis A. Braun, WBNH 317 Umzimvubu river

Appendix 1 Port St Johns

OPHIOGLOSSACEAE

Ophioglossum

reticulatum *L.*, *AEvW 10177* Port St Johns, *EC sn.* Mt Sullivan

OSMUNDACEAE

Osmunda

regalis *L.*, *EC 6398* Mt Sullivan

Todea

barbara (*L.*) *T.Moore*, *AGM 782* East Gate

POLYPODIACEAE

Microgramma

lycopodioides (*L.*) *Copel.*, *EC 4336* Mt Sullivan

Microsorium

punctatum (*L.*) *Copel.*, *EC 2081* Mt Sullivan

scolopendrium (*Burm. F.*) *Copel.*, *EC 5556* Second Beach

Platyserium

sp. cf. *bifurcatum* *, *EC sight record* Port St Johns

Pleopeltis

macrocarpa (*Bory ex Willd.*) *Kaulf.*, *AH & CTJ 2242* Mt Sullivan

Pyrrosia

africana (*Kunze*) *Ballard*, *EC 4672* Silaka

PSILOTACEAE

Psilotum

nudum (*L.*) *Beauv.*, *AB et al. 2300* Mt Sullivan

SCHIZAEACEAE

Lygodium

japonicum *Swartz*, * *JEB 3656* Port St Johns, *EC 2417* Cremorne

kerstenii *Kuhn*, *KB et al. 1906* Agate Terrace

Mohria

caffrorum (*L.*) *Desv. var. caffrorum*, *AH & CTJ 2243* Mt Sullivan

Schizaea

pectinata (*L.*) *Swartz*, *HGF 2529a* Top of mountain

SELAGINELLACEAE

Selaginella

kraussiana (*Kunze*) *A. Br. ex Kuhn*, *AH & CTJ 2239* Mt Thesiger.

mittenii *Bak.*, *EC 6215* Mt Thesiger

sp. *EC 6302*, Silaka

THELYPTERIDACEAE

Thelypteris

Appendix 1 Port St Johns

dentata (Forssk.) E. St. John, EC 850 Mt Sullivan
interrupta (Willd.) K. Iwats., AEV W 10158 Mt Sullivan, EC 3335 Mt Thesiger, EC 6183 Bulolo
pozoi (Lag.) Morton, MJW 3451 Umzimvubu River

VITTARIACEAE

Vittaria

isoetifolia Bory, AB et al. 2170 Mt Thesiger, AH 1175 Mt Sullivan

GYMNOSPERMS

Pinus

radiata D. Don. *, EC sight record Mzimvubu River

PODOCARPACEAE

Podocarpus

henkeli Stapf ex Dallim. & Jacks., EC 6045 Mt Thesiger
latifolius (Thunb.) R. Br. ex Mirb., AEV W 10053 Mt Sullivan

STANGERIACEAE

Stangeria

eripus (Kunze) Baill., EC 2381 Silaka, EC 3294 Mt Thesiger

ZAMIACEAE

Encephalartos

villosus Lem., EC 839 Mt Sullivan

ANGIOSPERMS

DICOTYLEDONS

ACANTHACEAE

Asystasia

gangetica (L.) T. Anders., EC 224 Silaka
varia N.E. Br., AH & EEP 1564 Mt Sullivan

Barleria

gueinzii Sond. LED 3878 Port St Johns

Dicliptera

clinopodia Nees, KB et al. 1766 Mt Thesiger; KB et al. 1826 Silaka
heterostegia Presl ex Nees, KB et al. 1905 Agate Terrace
zeylanica Nees, KB et al. 1900 Agate Terrace

Duvernoia

adhatodoides E. Mey. ex Nees, MEB sub CEM 16442 Port St Johns, EC 4350 Mt Sullivan

Hypoestes

Appendix 1 Port St Johns

aristata (Vahl) Soland. ex Roem & Schult., AODM sn, Noxolweni Forest EC 5890 Bulolo
forskaolii (Vahl) R. Br., AB et al. 2254 Mt Sullivan, EC 3446 Mt Sullivan, EC 5889 Bulolo

Isoglossa

cooperi C.B. Cl., EC 837 Mt Sullivan
eckloniana (Nees) Lindau, IBPE 4752 Second Beach
grantii C.B. Cl., AEvW 10137 Mt Sullivan
hypoestiflora Lindau, EEG 2836 Riverbank
ovata (Nees) Lindau, HB 8742 Isinuka
prolixa (Nees) Lindau, AODM sn Noxolweni Forest

Justicia

campylostemon (Nees) T. Anders, AB et al. 2189 Mt Thesiger, EC 1912 Mt Sullivan

Mackaya

bella Harv., AEvW 10169 Mt Sullivan

Peristrophe

cernua Nees, EC sn Second Beach.

Phaulopsis

imbricata (Forssk.) Sweet, EC 4342 Mt Sullivan

Ruellia

cordata Thunb., KB et al. 1950; AH 658 Cliff face

Sclerochiton

harveyanus Nees, EC sn. Silaka, EC 5496 Mt Thesiger

Siphonoglossa

leptantha (Nees) Immelman subsp. leptantha, AB et al. 2205 Mt Sullivan, EC 5878 Bulolo

Thunbergia

dregeana Nees, EC 856 Isinuka
natalensis Hook., EEG 3399 East Gate, EC 2977 Mt Sullivan
purpurata Harv. ex C.B. Cl., AB et al. 2134 Isinuka, EC 6047 Mt Thesiger

ACHARIACEAE

Ceratosicyos

laevis (Thunb.) A. Meeuse, EC 2385 Silaka

AIZOACEAE

Aizoon

canariense L., EC 779 Port St Johns

AMARANTHACEAE

Achyranthes

aspera L. var. aspera*, EC 6075 Mt Thesiger

aspera L. var. sicula L. *, EC 4663 Silaka

Achyropsis

avicularis (E. Mey. ex Moq.) Hook. f., EC 5504 Mt Thesiger

Amaranthus

hybridus L. *, EC 5494 Bulolo River estuary

Appendix 1 Port St Johns

spinosus *L.* *, *EC* 5494 Mt Thesiger

Celosia

trigyna *L.*, *EFG* 2855 Tiger Flats

Cyathula

cylindrica *Moq.*, *EC & AJNB* 2987 Mt Sullivan

Pupalia

lappacea(*L.*) *A. Juss. var. lappacea*, *AH* 1538 Agate Terrace

ANACARDIACEAE

Harpephyllum

caffrum *Bernh. ex Krauss.*, *EC* 1790 Second Beach

Protorhus

longifolia (*Bernh.*) *Engl.*, *EC* 459 Second Beach; *AH & CTJ* 1144 Mt Thesiger, *EC* 3292 Mt Sullivan, *EC* 6013 Bulolo

Rhus

carnulosa *Schndl.*, *EC et al* 3331 Mt Thesiger, *EC* 3210 Second Beach

chirindensis *Bak. f.*, *EC et al* 3259 Mt Sullivan, *EC* 6095 Silaka, *EC* 3673 Second Beach

dentata *Thunb.*, *EC* 22 Mt Sullivan; *EC* 4835 Mt Thesiger

fastigiata *Eckl. & Zeyh.*, *EC et al.* 3313 Mt Thesiger

gueinzii *Sond.*, *JNP* 148 Second Beach

lucida *L. forma lucida*, *EC & AJNB* 3256 Mt Sullivan, *EC* 6028 Bulolo

natalensis *Bernh. ex Krauss.*, *EC & AJNB* 3069 Silaka

nebulosa *Schndl.*, *AH & EEP* 1572 Mt Thesiger, *EC* 6174 Isinuka

ANNONACEAE

Monanthotaxis

caffra (*Sond.*) *Verdc.*, *AB et al.* 2193 Mt Thesiger; *EC* 844 Mt Sullivan

Uvaria

caffra *E.Mey. ex Sond.*, *EC* 3652 Mt Sullivan, *EC* 6069 Mt Thesiger

APIACEAE

Alepidea

gracilis *Dummer.*, *EC* 6068 Mt Thesiger

longifolia *E. Mey. ex Dummer.*, *EC et al.* 3333 Mt Thesiger

natalensis *Wood & Evans.*, *EC* 4844 Mt Thesiger

Berula

erecta (*Hudson*) *Cov. subsp. thunbergii* (*DC.*) *B.L.Burtl.*, *EC* 6341 Mt Sullivan

Peucedanum

capense (*Thunb.*) *Sond. var. capense*, *AB et al.* 2164 Mt Thesiger, *EC* 3209 Second Beach

Sanicula

elata *Hamilt. ex D. Don.*, *AB et al.* 2261 Mt Sullivan

Torilis

arvensis (*Huds.*) *Link **, *KB* 1796 Silaka

APOCYNACEAE (Including Asclepiadaceae and Periplocaceae)

Appendix 1 Port St Johns

dregeanum Benth., AODM 13072 Noxolweni Forest

incanum DC., KB et al. 1817 Mt Thesiger

repandum (Vahl) DC., KB et al. 1887 S bank of Mzimvubu, EC 6131 Silaka-

setigerum (E. Mey.) Benth ex Harv., EC 3265 Mt Sullivan, EC 4828 Mt Thesiger

Dichrostachys

cinerea (L.) Wight & Arn. subsp. *africana*, EC 5488 Mt Thesiger

Dolichos

sericeus E. Mey. subsp. *sericeus*, EC & AJNB 3448 Mt Sullivan

trilobus (L.) subsp. *transvalensis* Verdc., EC 3448 Mt Sullivan

Eriosema

acuminatum (Eckl. & Zeyh.) C.H. Stirton, AA 4202 Mt Sullivan, EC 6342 Mt Thesiger

cordatum E. Mey., S & B 30 Port St Johns

parviflorum E. Mey., AB et al. 228 Mt Sullivan

Erythrina

caffra Thunb., EC 5545 Port St Johns

humeana Spreng., EC et al 3315 Mt Thesiger

lysystemon Hutch., EC 453 Second Beach, EC 1997 Silaka

Indigofera

cylindrica DC., EC 777 Port St Johns

herrstreyi B.D. Schrire, EC 3311 Mt Thesiger

hilaris Eckl. & Zeyh., EC et al. 3341 Mt Thesiger

micrantha E. Mey., EC 854 Isinuka

natalensis Bolus., AB et al. 2190 Mt Thesiger

spicata Forssk., GG 693 Cape Hermes Hotel, EC 3658 Second Beach

stricta L.f., GG 694 Cape Hermes Hotel

woodii Bolus. var. *laxa* Bolus., AB et al. 2239 Mt Sullivan, AH & CTJ 1161 Mt Thesiger

Lablab

purpureus (L.) Sweet subsp. *uncinatus* Verdc., AH 2196 Mt Sullivan, EC 3691 Silaka; KB et al. 1947 The Gap

Lotus

discolor E. Mey. subsp. *discolor*, EC 41 Mt Sullivan, EC 6229 Mt Thesiger

Millettia

grandis (E. Mey.) Skeels, EC 2135 Silaka, EC 6020 Bulolo

Neonotonia

wightii (Arn.) Lackey, KB et al. 1814 Silaka

Philoptera

sutherlandii Harv., EC 26 Mt Sullivan, EC 6056 Mt Thesiger

Podalyria

velutina Burch. ex Benth., AB et al. 2176 Mt Thesiger

Pseudarthria

hookeri Wight & Arn. var. *hookeri*, DMC 1948 West Gate

Psoralea

pinnata L., AB et al. 2174 Mt Thesiger

Rhynchosia

Appendix 1 Port St Johns

caribaea (Jacq.) DC., EC 3291 Mt Sullivan
totta (Thumb.) DC. var. *totta*, KB et al. 1956 The Gap

Senna

septemtrionalis (Viv.) Irwin & Barneby *, DMC 1959 Mountain road, EC 6009 Bulolo

Sesbania

bispinosa (Jacq.) W.F. Wight var. *bispinosa**, EC 4260 Port St Johns, EC 5495 Mt Thesiger
punicea (Cav.) Benth. *, EC 2132 Silaka

Tephrosia

bachmannii Harms, AB MV & EC 2139 Mt Thesiger
glomerulifolia Meisn. subsp. *glomerulifolia*, EC 778 Port St Johns
grandiflora (Ait.) Pers., AB et al. 2166 Mt Thesiger
kraussiana Meisn., EC et al. 3308 Mt Thesiger
macropoda (E.Mey.) Harv. var. *diffusa* B.D.Schrire, EC 4182 Mt Sullivan
polystachya E. Mey. var. *polystachya*, EEG 2878 Tiger Flats

Vigna

luteola (Jacq.) Benth., EC & A.JNB 3037 Mt Sullivan
unguiculata (L.) Walp. subsp. *protracta* (E.Mey.) B.J.Pienaar, GG 695 Cape Hermes Hotel
vexillata (L.) A. Rich. var. *ovata* (E. Mey.) Pienaar, EC et al. 3348 Mt Thesiger

Zornia

capensis Pers., EEG 3431 W Bank, EC 4829 Mt Thesiger

FLACOURTIACEAE

Casearia

sp. nov., AB et al. 2266 Mt Sullivan

Dovyalis

rhamnoides (Burch. ex DC.) Harv., KB et al. 1898 Mt Sullivan, EC 6006 Bulolo

Gerrardina

foliosa Oliv., EC et al. 3276, Mt Sullivan, EC 4843 Mt Thesiger

Homalium

dentatum (Harv.) Warb., AEVW 10084 Mt Sullivan, EC 6052a Mt Thesiger
rufescens Benth., EC 6363

Rawsonia

lucida Harv. & Sond., AODM 13071 Noxolweni Forest, EC 5870 Bulolo, EC 6054 Mt Thesiger

Scolopia

mundii (Eckl. & Zeyh.) Warb., AEVW 10054 Mt Sullivan, EC 6041 Silaka
zeyheri (Nees) Harv., EC 6126 Silaka

Trimeria

grandifolia (Hochst.) Warb., EC 2108 Silaka

GENTIANACEAE

Chironia

laxa Gilg, EC 219 Silaka; AB et al. 2252 Mt Sullivan

Sebaea

grandis (E. Mey.) Steud., EC 4830 Mt Thesiger

Appendix 1 Port St Johns

GERANIACEAE

Geranium

flanaganii *R.Kmuth, KB et al. 1812* Silaka

ornithopodon *Eckl. & Zeyh., AH 1196* Silaka

Pelargonium

alchemilloides (*L.*) *L'Herit., KB et al. 1798*, Silaka, *EC 4183* Mt Sullivan

capitatum (*L.*) *L'Herit., EC et al. 3314* Mt Thesiger

grossularioides (*L.*) *L'Herit., EC & AJNB 3022* Mt Sullivan

GESNERIACEAE

Streptocarpus

baudertii *Britten, EC 6390* Mt Sullivan

haygarthii *N.E. Br. ex C.B. Cl., LLB 6602* Eagles Nest, *EC sn* Bulolo

johannis *Britten, EC 2155* Mt Sullivan

primulifolius *Gand., AH & EEP 1536* Mt Sullivan

formosus (*Hilliard & Burt*) *T.J. Edwards, EC 18* Mt Sullivan

GOODENIACEAE

Scaevola

plumieri (*L.*) *Vahl., EC & AJNB 3030* River mouth

HAMAMELIDACEAE

Trichocladus

crinatus (*Thunb.*) *Pers., AB et al. 2191* Mt Thesiger; *AEvW 10135* Mt Sullivan

ellipticus *Eckl. & Zeyh. subsp. ellipticus, EC 6384* Mt Sullivan

ICACINACEAE

Apodytes

dimidiata *E.Mey. ex Arn. subsp. dimidiata, AODM 13102* Bololwa Forest, *EC 2978* Mt Sullivan

abbottii *van Wyk, Van Wyk 8380* Mt Theisger

Cassinopsis

tinifolia *Harv., AEvW 10048* Mt Sullivan, *EC 5475* Mt Thesiger

LAMIACEAE

Aeollanthus

parvifolius *Benth., EC 3289* Mt Sullivan

Ajuga

ophrydis *Burch. ex Burch., EC 4347* Mt Sullivan

Clerodendrum

glabrum *E. Mey. var. glabrum, AEvW 10058* Mt Sullivan

myricoides (*Hochst.*) *Vatke, EC 6360* Mt Sullivan

Justicia

petiolaris (*Nees*) *T.Anders., Sim 4172* Forest edge Port St. Johns

Appendix 1 Port St Johns

Leonotis

leonurus (L.) R. Br, EC et al. 3296 Mt Thesiger
ocymifolia (Burm.f.) Iwarsson var. raineriana (Visiani) Iwarsson, EC3296 Mt Thesiger

Plectranthus

ambiguus (Bohus) Codd, AH 2191 Mt Sullivan; EEG 2843 Tiger Flats
ciliatus E. Mey. ex Benth., AB et al. 2183 Mt Thesiger, AEvW 10078 Mt Sullivan
ecklonii Benth., AEvW 10043 Mt Sullivan
fruticosus L'Herit, E.JvJ 10144 Bulolo River
hilliardiae Codd, EC 5483 Nenga River
laxiflorus Benth., EEG 2844 Tiger Flats; E.JvJ 3815 Moffats' Glen
madagascariensis (Pers.) Benth. var. madagascariensis, E.JvJ 3828 Second Beach
malvinus E.J.van Jaarsveld & T.J.Edwards, EvJ & THE 10522 Mt Sullivan
petiolaris E. Mey. ex Benth., EC 836 Mt Sullivan; AEvW 10082 Mt Sullivan
praetermissus Codd, EC 785 Mt Sullivan; MES 58082 Mt Thesiger, EC 5509 Isinuka
reflexus E.J. van Jaarsveld & T.J. Edwards, E.JvJ sn. Agate Terrace, EC 6057 Mt Thesiger
saccatus Benth. var. saccatus, HGF 2501 Isinuka; EC 3456 Mt Sullivan
strigosus Benth, MES sn. West Gate; E.JvJ 3827 Second Beach
verticillatus (L.f.) Druce, E.JvJ 3827 Second Beach
zuluensis T.Cooke, E.JvJ 10151 Bulolwe River

Pycnostachys

reticulata (E. Mey.) Benth, AEvW 10037

Stachys

aethiopica L., HGF 2595 Port St Johns, EC 3662 Second Beach
caffra E. Mey. ex Benth., EEG 2858 Isinuka
grandifolia E.Mey. ex Benth, KB et al. 1760 Mt Thesiger
natalensis Hochst. var. natalensis, EC 4181 Mt Sullivan, EC 3206 Second Beach

Syncolostemon

densiflorus Benth., E.JvJ 3837 Mt Thesiger

Teucrium

kraussii Codd, AEvW 10041 Mt Sullivan

LAURACEAE

Cryptocarya

latifolia Sond., EC 6245 Mt Thesiger
myrtifolia Stapf, AEvW 10095 Mt Sullivan; AEvW 8425 Mt Thesiger
sp. cf. woodii Engl., EC 6143 Mt Thesiger, EC 6167 Silaka
wyliei Stapf, AEvW 10055 Mt Sullivan; AB et al. 2226 Mt Sullivan

LENTIBULARIACEAE

Gentlisea

hispidula Stapf, EEG 3427 West Gate, EC 6288 Mt Thesiger

Utricularia

inflexa Forssk., CTJ 216 Mt Thesiger; CTJ 620 Mt Thesiger
livida E. Mey., EEG 2426 West Gate, EC 6289 Mt Thesiger

Appendix 1 Port St Johns

sandersonii Oliv., *EC sight record*, Tiger Flats
stellaris L. f., *EC 3351* Mt Thesiger

LOBELIACEAE

Cyphia

elata Harv., *AH & EEP 1548* Mt Thesiger

Grammatotheca

bergiana (Cham.) Presl., *EC 6213* Mt Thesiger

Lobelia

anceps L.F., *EEG 3493* West Bank

chamaedryfolia (Presl.) A.DC., *EC 4831* Mt Thesiger

flaccida (Presl.) A.DC., *subsp. flaccida*, *EC 6232* Mt Thesiger

pteropoda (Presl.) A. DC., *EC 4832* Mt Thesiger, *EC 3275* Mt Sullivan

vanreenensis (Kuntze) K. Schum., *AH & CTJ 1153* Mt Thesiger

Monopsis

unidentata (Dryander) F. Wimmer *subsp. laevicaulis* (Presl.) P.B. Phillipson, *EC 3733* Mt Thesiger

Wimmerella

bifida (Thunb.) Serra M.B. Crespo & Lammers., *EC 6212* Mt Thesiger

LORANTHACEAE

Erianthemum

dregei (Eckl. & Zeyh.) V. Tieghem, *EC 2174* Mt Sullivan

Tapinanthus

gracilis Toelken & Wiens, *EC 2103* Silaka

kraussianus (Meisn.) V. Tieghem *subsp. kraussianus*, *EC & AJNB 3065* Silaka

natalitius (Meisn.) Danser *subsp. natalitius*, *EC 3821* Mt Sullivan

MALPIGHIACEAE

Acridocarpus

natalitius Juss. *var. natalitius*, *EC 13* Mt Sullivan; *AH & CTJ 1139* Mt Thesiger

MALVACEAE

Abutilon

sonneratianum (Cav.) Sweet, *EC 6067* Mt Thesiger

Hibiscus

diversifolius Jacq. *subsp. diversifolius*, *TM 224* Silaka; *AH 567* Mt Thesiger

fuscus Garcke, *AODM sn.* Port St Johns

ludwigii Eckl. & Zeyh., *EC 4635* Silaka

pedunculatus L. f., *AEvW 10139* Mt Sullivan; *EC 2009*

platycalyx Mast., *EC 792* Port St Johns

rosa-sinensis L. *, *EC sight record* Bulolo

schizopetalus Hook. f., *EC & AJNB 3199* Mt Sullivan, *EC 3654* Second Beach

surattensis L., *AEvW 10115* Mt Sullivan

tiliaceus L., *EC 460* Second Beach; *TM 207* Mt Sullivan

Appendix 1 Port St Johns

trionum *L.*, *AH 1219, EAB 452* Second Beach, *EC 3702* Silaka

vitifolius *L. subsp. vitifolius*, *EC 2173* Mt Sullivan

Malvastrum

coromandelianum (*L.*) *Garcke **, *FEF 2867* Tiger Flats

Pavonia

columella *Cav.*, *AH 1220* The Gap, *EC 3447* Mt Sullivan

Sida

dregei *Burt Davy*, *EC sn.* Mt Sullivan, *EC 6228* Mt Thesiger

ternata *L.f.*, *KB et al. 1802* Silaka

MELASTOMATACEAE

Dissotis

canescens (*E. Mey. ex R.A. Grah.*) *Hook. f.*, *AEvW 10155* Mt Sullivan

princeps (*Kunth*) *Triana var. candolleana* (*Cogn.*) *A. & R. Fernandes*, *AH & EEP 1539* Mt Sullivan

Memecylon

bachmannii *Engl.*, *AEvW 10051* Mt Sullivan

Tibouchina

granulosa (*Ders.*) *Cogn. **, *EC 4175* Mt Sullivan

MELIACEAE

Ekebergia

capensis *Sparrm.*, *EC 4656*, Silaka

Trichilia

dregeana *Sond.*, *EC 3674* Second Beach

Turraea

floribunda *Hochst.*, *AEvW 10108* Mt Sullivan, *EC 2075* Silaka

MELIANTHACEAE

Bersama

swinyi *Phill.*, *AEvW 10107* Mt Sullivan

MENISPERMACEAE

Cissampelos

torulosa *E. Mey. ex Harv.*, *JNP 15*, Second Beach

Stephania

abyssinica (*Dill. & Rich.*) *Walp. var. tomentella* (*Oliv.*) *Diels*, *EC 2177* Mt Sullivan

MENYANTHACEAE

Nymphoides

thunbergiana (*Griseb.*) *Kuntze*, *EC et al. 3352* Mt Thesiger

MESEMBRYANTHEMACEAE

Appendix 1 Port St Johns

Aptenia

cordifolia (*L.f.*) *Schwant.* var. *cordifolia*, *EC 4676* Silaka, *EC 6343* Agate Terrace

Carpobrotus

dimidiatus (*Haw.*) *L. Bol.*, *EC & AJNB 3040* Mt Sullivan, *EC 3712* Silaka

Delosperma

ecklonis (*Salm-Dyck*) *Schwantes* var. *latifolia* *L. Bolus*, *EC 3026* Mt Sullivan

rogersii, Port St Johns¹

sp. *EC 6300* Silaka,

sp. *EC 4821* Mt Sullivan

Drosanthemum

sp., *KB 1946*, The Gap

MONIMIACEAE

Xymalos

monospora (*Harv.*) *Baill.*, *AEvW 10147* Mt Sullivan

MORACEAE

Ficus

bizanae *Hutch. & Burt Davy*, *EJ sn 1,7* Miles N of jetty, *EC 6404* Mt Sullivan

burt-davyi *Hutch.*, *KB et al. 1822*, *EC 5487* Mt Thesiger

craterostoma *Warb. ex Mildbr. & Burret*, *EC 5958* Bulolo

ingens (*Miq.*) *Miq.* var. *ingens*, *EC 5476* Mt Thesiger

natalensis *Hochst. subsp. natalensis*, *EC 3655* Second Beach

sp. *, *EC sn.* Second Beach

thonningii *Blume*, *EC 5452* Mt Thesiger

sur *Forssk.*, *EC & AJNB 2994* Mt Sullivan, *EC 3669* Second Beach

Morus

alba *L.* *, *EC 5467* Isinuka

MYRICACEAE

Morella

pilulifera *Rendle*, *E.vJ 3823* Mt Thesiger

serrata *Lam.*, *AB et al. 2173* Mt Thesiger

MYRSINACEAE

Ardisia

crispa *, Van Wyk s.n. Msimvubu River

Embelia

ruminata (*E. Mey. ex A. DC.*) *Mez*, *AEvW 10044* Mt Sullivan

Maesa

lanceolata *Forssk.*, *EC 44* Mt Sullivan, *EC 6238* Mt Thesiger

Rapanea

¹ *Delosperma edwardsiae* has been sunk under this name in the latest revision (P. Burgoyne, pers. com.)

Appendix 1 Port St Johns

melanophloeos (*L.*) Mez, SGC 372 Mt Sullivan

MYRTACEAE

Eugenia

capensis (*Eckl. & Zeyh.*) Harv. ex Sond., EC 221 Silaka, EC 5511 Mzimvubu river

erythrophylla *Strey*, AEvW 10057 Mt Sullivan

natalitia *Sond.*, AEvW 10089 Mt Sullivan, EC 5880 Bulolo

uniflora *L.* *, AEvW 10008 Bulolwe River, EC 4669 Silaka

zeyheri *Harv.*, TRS 19876 Port St Johns

Eucalyptus

sp. cf. saligna *, EC sight record Umzimvubu River

Psidium

cattleianum *Sabiue* *, RDAB 1498 Second Beach

guajava *L.* *, EC & AJNB 2999 Mt Sullivan, EC 6011 Bulolo

Syzygium

cordatum *Hochst.*, SS4165 Edge of forest, EC 6222 Mt Thesiger

NYCTAGINACEAE

Mirabilis

jalapa *L.* *, EC & AJNB 3451 Mt Sullivan

NYMPHAEACEAE

Nymphaea

nouchali *Burm. f. var. caerulea (Sav.) Verdc.*, AH & EEP 1554 Mt Thesiger

OCHNACEAE

Ochna

natalitia (*Meisn.*) *Walp.*, RGS 4341 Golf Course

serrulata (*Hochst.*) *Walp.*, AEvW 10069 Mt Sullivan; AH 582 Mt Thesiger

OLEACEAE

Chionanthus

peglerae (*C.H.Wr.*) *Stearn*, EC 6370 Silaka, EC 5456 Bulolo

Jasminum

multipartitum *Hochst.*, AH 583 Mt Thesiger, EC 2074 Silaka

Olea

woodiana *Knobl.*, EEG 11646 Port St Johns forest

ONAGRACEAE

Ludwigia

octovalvis (*Jacq.*) *Raven subsp. sessiliflora (Mich.) Raven*, EC 2171 Mt Sullivan

stolonifera (*Guill. & Perr.*) *Raven*, AODM 13076 Noxolweni Forest

Oenothera

jamesii *Torr. & Gray* *, EC 1774 Isinuka

Appendix 1 Port St Johns

laciniata *Hill.* *, *EC* 3736 Mt Thesiger

OXALIDACEAE

Oxalis

corniculata *L.* *, *MJW* 3352 1 Mile from town

purpurata *Jacq.*, *DM sn.* Mt Sullivan

semiloba *Sond.*, *GCT* 1599 Port St Johns forest

PASSIFLORACEAE

Adenia

gummifera (*Harv.*) *Harms* var. *gummifera*, *EC* 2179 Mt Sullivan, *EC* 3699 Silaka

Passiflora

edulis *Sims* *, *EC* & *AJNB* 3193 Mt Sullivan, *EC* 6007 Bulolo

subpeltata *Ortega* *, *EC* 465 Mt Thesiger

PEDALIACEAE

Ceratotheca

triloba (*Bernh.*) *Hook. f.*, *EC* 1783 Tiger Flats

PERIPLOCACEAE (see Apocynaceae)

PHYTOLACCACEAE

Phytolacca

dioica *L.* *, *EC* 5893 Bulolo

dodecandra *L'Herit.*, *R Story* 1343, Second Beach, *EC* 457 Second Beach, *EC* 3719 Silaka

octandra *L.*, *EC* & *AJNB* 3016 Mt Sullivan

Rivina

humilis *L.* *, *EC* 2080 Mt Sullivan

PIPERACEAE

Peperomia

blanda (*Jacq.*) *H.B.K.* var. *leptostachya* (*Hook. & Arn.*) *Duell*, *EC* 5508 Isinuka

retusa (*L. f.*) *A. Dietr.* var. *retusa*, *EC* 852 Mt Sullivan

rotundifolia (*L.*) *H.B.K.*, *AB et al.* 2293 Mt Sullivan

Piper

capense *L. f.*, *AEvW* 10085 Mt Sullivan

PITTOSPORACEAE

Pittosporum

viridiflorum *Sims*, *EC* 3685 Silaka

PLANTAGINACEAE

Plantago

major *L.* * *EC* 801 Port St Johns, *EC* 2992 Mt Sullivan

Appendix 1 Port St Johns

PLUMBAGINACEAE

Plumbago

auriculata *Lam.*, EC 1731 Isinuka

POLYGALACEAE

Muraltia

lancifolia *Harv.*, AB et al. 2136 Mt Thesiger

Polygala

hottentotta *Presl.*, AB et al. 2208 Mt Sullivan

myrtifolia *L.*, EC 6310 Silaka

virgata *Thunb.* var. *decora* (*Sond.*) *Harv.*, EC 466 Mt Thesiger

POLYGONACEAE

Persicaria

attenuata (*R.Br.*) *Sojak* subsp. *africana* *K.L. Wilson*, EC 6124 Silaka

serrulata (*Lag.*) *Webb & Moq.*, EC & AJNB 3003 Mt Thesiger

Rumex

crispus *L.* *, EC & AJNB 2991 Mt Sullivan, EC 3671 Second Beach

sagittatus *Thunb.*, AH & EEP 1540 Agate Terrace, EC 4637 Silaka

PROTEACEAE

Faurea

macnaughtonii *E. Phillips*, AP sn. Nenga Forest

Grevillea

robusta *, EC sn. Mt Sullivan

Protea

caffra *Meisn.* subsp. *caffra*, EC 3301 Mt Thesiger

roupelliae *Meisn.* subsp. *roupelliae*, YND 13 Mt Thesiger

simplex *E. Phillips*, AB et al. 2143 Mt Thesiger

PTAEROXYLACEAE

Ptaeroxylon

obliquum (*Thunb.*) *Radlk.*, EC & AJNB 3002 Mt Sullivan

RANUNCULACEAE

Clematis

brachiata *Thunb.*, EC sn. Bulolo River

Knowltonia

brevistylis *Szyszl.*, EC 786 Mt Sullivan; EC 2116 Silaka

Ranunculus

multifidus *Forssk.*, CEM 2343 Port St Johns, EC 3663 Second Beach

RHAMNACEAE

Colubrina

Appendix 1 Port St Johns

nicholsonii vanWyk & Schrire, *AEvW* 10103 Mt Sullivan, *EC* 6160 Silaka

Helinus

integrifolius (Lam.) Kuntze, *AB et al.* 2155 Mt Thesiger, *EC* 3043 Mt Sullivan

Noltea

africana (L.) Reichb. f., *AH & EEP* 1575 Mt Thesiger

Phylica

paniculata Willd., *AB et al.* 2273 Mt Sullivan

Scutia

myrtina (Burm.f.) Kurz, *EC* 5559 Second Beach

Ziziphus

mucronata Willd. *subsp. mucronata*, *CTJ* 288 Mt Thesiger

RHIZOPHORACEAE

Cassipourea

gerrardii (Schinz) Alston, *KB et al.* 1829 Mt Sullivan, *EC* 6147 Mt Thesiger

gummiflua Tul. var. *verticillata* (N.E. Br.) J. Lewis, *EC* 5470 Mt Thesiger, *EC* 6012 Bulolo, *EC* 6122 Silaka

RHYNCHOCALYCAEAE

Rhynchoalyx

lawsonioides Oliv., *AH* 1207 Second Beach

ROSACEAE

Cliffortia

paucistaminea Weim., *AB et al.* 2274 Mt Sullivan

Rubus

pinnatus Willd., *EC & AJNB* 2988 Mt Sullivan

rigidus J.E. Sm., *AODM* 13085 Noxolweni Forest

rosifolius J.E. Sm. *, *EC* 5484 Mt Thesiger, *EC* 6008 Bulolo

RUBIACEAE

Anthospermum

galpinii Schltr., *AB et al.* 2244 Mt Sullivan

herbaceum L. f., *KB et al.* 1807 Silaka

hispidulum E. Mey. ex Sond., *AB et al.* 2276 Mt Sullivan

littoreum L. Bol., *EEG* 2850 Sea shore

streyi Puff., *AEvW* 10124 Mt Sullivan

Burchellia

bubalina (L.f.) Sims, *EC* 6221 Mt Thesiger

Canthium

gueinzii Sond., *BVC* 2258 Mt Sullivan

inermis (L.f.) Kunze, *EC et al.* 3323 Mt Thesiger, *EC* 5965 Bulolo

setiflorum Hiern. *subsp. setiflorum*, *EC et al.* 3318 Mt Thesiger

Appendix 1 Port St Johns

spinosum (*Klotzsch*) *Kuntze*, *KB et al.* 1805 Silaka, *EC 2105* Mt Sullivan, *EC 3318* Mt Thesiger
vanwykii *Tilney & Kok*, *EC 5472* Mt Thesiger

Conostomium

natalense (*Hochst.*) *Brem.* var. natalense, *MJW 3448* Riverbank

Gardenia

thunbergia *L. f.*, *KB 1749* Mt Thesiger, *EC 3176* Mt Sullivan

Hyperacanthus

amoenus (*Sims*) *Bridson*, *LE Davidson 3384* Second Beach

Keetia

guenzii (*Sond.*) *Bridson*, *EC 1913* Mt Sullivan, *EC 6026* Bulolo

Mitriostigma

axillare *Hochst.*, *KB 1795* Silaka; *AH 576* Mt Thesiger, *EC 2974* Mt Sullivan

Oldenlandia

herbacia (*L.*) *Roxb.* var. herbacea, *HGF 2572* Mountain top

Oxyanthus

speciosus *DC.* subsp. gerrardii (*Sond.*) *Bridson*, *AB et al.* 2262 Mt Sullivan, *EC 5465* Bulolo

Pachystigma

macrocalyx (*Sond.*) *Robyns*, *AB et al.* 2260 Mt Sullivan, *EC 6116* Silaka

Pavetta

bowkerii *Harv.*, *KB 1776* Mt Thesiger

galpinii *Brem.*, *EC 12* Mt Sullivan

inandensis *Brem.*, *EC & AJNB 3045* Mt Sullivan

lanceolata *Eckl.*, *EC 3045* Mt Sullivan, *EC 4683* Silaka

natalensis *Sond.*, *AEvW 10060* Mt Sullivan

revoluta *Hochst.*, *EC 4657* Silaka

Pentanisia

prunelloides (*Klotzsch ex Eckl. & Zeyh.*) *Walp.* subsp. prunelloides, *EC 5442* Mt Thesiger

Plectroniella

armata (*K.Schum.*) *Robyns*, *EC 5125* Noqwekwana Forest

Psychotria

capensis (*Eckl.*) *Vatke* var. capensis, *EC 842* Mt Sullivan, *EC 5485* Mt Thesiger, *EC 4666* Silaka

Richardia

braziliensis *Gomes **, *EC 6225* Mt Thesiger

Rothmannia

globosa (*Hochst.*) *Keay*, *AH & CTJ 1138* Mt Thesiger

Rubia

cordifolia *L.*, *KB et al.* 1816 Silaka

Tarenna

pavettoides (*Harv.*) *Sim* subsp. pavettoides, *EC 2162* Mt Sullivan, *EC 5473a* Mt Thesiger

Tricalysia

africana (*Sim*) *Robbrecht* *AEvW 10102* Mt Sullivan

capensis (*Meisn. ex Hochst.*) *Sim* var. capensis, *EC 789* Mt Sullivan, *EC 6367* Mt Thesiger

lanceolata (*Sond.*) *Burt Davy*, *KB et al.* 1827 Silaka; *AEvW 10052* Mt Sullivan

Appendix 1 Port St Johns

Vangueria

infausta *Burch. subsp. infausta*, EC sn. Mt Sullivan
randii *S.Moore subsp. chartacea (Robyns) Verdc.*, EC 6024 Bulolo

RUTACEAE

Calodendrum

capense (*L. f. Thunb.*), EC 2164 Mt Sullivan

Citrus

sp. *, EC 3672 Second Beach, EC 5982 Bulolo

Clausena

anisata (*Willd.*) *Hook. f. ex Benth.*, EC & AJNB 3066 Silaka, EC 3660 Second Beach

Oricia

bachmannii (*Engl.*) *Verdoorn, AB et al.* 2218 Mt Sullivan, EC 5447 Mt Thesiger

Teclea

gerrardii *Verdoorn, AB et al.* 2264, Mt Sullivan, EC 6046 Mt Thesiger
natalensis (*Sond.*) *Engl.*, EC & AJNB 3183 Mt Sullivan

Vepris

lanceolata, (*Lam.*) *G.Don*, EC 5491 Mt Thesiger

Zanthoxylum

capense (*Thunb.*) *Harv.*, AH 584 Mt Thesiger, EC 3657 Second Beach
davyii (*Verdoorn*) *Waterm.*, EC 6362 Mt Sullivan

SAPINDACEAE

Allophylus

africanus *Beauv.*, EC 2133 Silaka, EC 20 Mt Sullivan
dregeanus (*Sond.*) *De Winter*, AH & CTJ 1148 Mt Thesiger
natalensis (*Sond.*) *De Winter*, KB 1821 Silaka, EC 5516 Mzimvubu River

Atalaya

natalensis *R.A. Dyer*, AEW 10047 Mt Sullivan

Cardiospermum

halicacabum *L. **, RGS 8518 Port St Johns, EC sight record Mt Thesiger

Deinbollia

oblongifolia (*E. Mey. ex Arn.*) *Radlk.*, RDAB 7030 Edge of mangrove

Pancovia

columella *Cav.*, EC 3447 Mt Sullivan

SAPOTACEAE

Englerophytum

natalense (*Sond.*) *T.D. Penn.*, EC 843 Mt Sullivan, EC 6021 Bulolo

Mimusops

caffra *E. Mey. ex A. DC.*, EC 478 Silaka, EC 5510 Mzimvubu river
obovata *Sond.*, EC 4341 Mt Sullivan

Sideroxylon

inerme *L. subsp. inerme*, EC 5896 Bulolo

Appendix 1 Port St Johns

Vitellariopsis

marginata (N.E. Br.) Aubrev., *AEvW* 10167 Mt Sullivan, *EC* 3051 Mt Sullivan

SCROPHULARIACEAE

Alectra

capensis Thunb., *EC* 3680 Silaka

sessiliflora (Vahl) Kuntze var. *sessiliflora forma barbata*, *EC* 3279 Mt Sullivan

Anastrabe

interrigima E.Mey. ex Benth., *EC* Mt Thesiger

Buchnera

dura Benth., *EC* 3280 Mt Sullivan

Cynium

tubulosum (L. f.) Engl. subsp. *tubulosum*, *EC* 37 Mt Sullivan

Diclis

reptans Benth., *EC* 6380 Mt Sullivan

Halleria

lucida L., *EC* 464 Second Beach; *N Siwundla* 3 Mt Thesiger

Harveya

speciosa Bernh. ex Krauss, *CTJ* 283 Mt Thesiger, *EC* 3064 Silaka

Sopubia

simplex (Hochst.) Hochst., *EEG* 3424 West Gate

Striga

bilabiata (Thunb.) Kuntze, *EC* 43 Mt Sullivan

Sutera

floribunda (Benth.) Kuntze, *EC* 6230 Mt Thesiger

Teedia

lucida Rudolphi, *EC* 6296 Mt Thesiger

SELAGINACEAE

Hebenstretia

comosa Hochst., *AH* 569 Mt Thesiger

dura Choisy, *AB et al* 2221 Mt Sullivan, *EC* 3734 Mt Thesiger

Selago

hyssopifolia E. Mey., *EC* 4353 Mt Sullivan

lepidioides Rolfe, *AB et al.* 2171 Mt Thesiger

SOLANACEAE

Cestrum

laevigatum Schltr. *, *EC* 796 Mt Sullivan

Datura

metel L. *, *EC* 5547 Near Rose Cottage, N bank of Mzimvubu river

Physalis

peruviana L. *, *EC & AJNB* 3021 Mt Sullivan

Solanum

Appendix 1 Port St Johns

aceleatissimum *Jacq.*, *EC* 5555 Between Second Beach and Silaka
aculeastrum *Dun.*, *GCT* 1591 North bank
americanum *Mill.*, *AB et al.* 2253 Mt Sullivan
didymanthum *Dun.*, *EC* 1777 Isinuka
duplo-sinuatatum *Klotzsch*, *EC* 2115 Silaka
geniculatum *E. Mey.*, *AEvW* 10036 Mt Sullivan
giganteum *Jacq.*, *EEG* 2854 Tiger Flats
hispidum *Pers.* *, *EC* 6027 Bulolo
incanum *L.*, *EEG* 2869 Isinuka
linnaeanum *Hepper & Jaeger*, *EC & AJNB* 3042 Mt Sullivan
mauritianum *Scop.* *, *EC* 2121 Silaka
nigrum *L.* *, *EC* 6284 Mt Thesiger
nodiflorum *Jacq.*, *EC & AJNB* 2985 Mt Sullivan
sp. 1. *EC* 2979 Bulolo
terminale *Forssk. subsp. terminale*, *EC* 752 Mt Sullivan

STERCULIACEAE

Cola

natalensis *Oliv.*, *AODM* 13015 Mlolweni Forest, *EC* 6044 Mt Thesiger

Dombeya

burgessiae *Gerr. ex Harv.*, *YND* 12 Mt Sullivan
tiliacea (*Endl.*) *Planch.*, *AEvW* 10100 Mt Sullivan

STRYCHNACEAE

Strychnos

henningsii *Gilg*, *EC* 6104 Silaka
mitis *S. Moore*, *AEvW* 10081 Mt Sullivan

THYMELAEACEAE

Dais

cotinifolia *L.*, *EC* 6247 Mt Thesiger

Englerodaphne

ovalifolia (*Meisn.*) *Phill.*, *AB et al* 2206 Mt Sullivan, *EC* 5493 Mt Thesiger, *EC* 6010 Bulolo

Gnidia

anthylloides (*L. f.*) *Gilg*, *SE sn.* Port St Johns
calocephala (*C.A. Mey.*) *Gilg*, *AB et al.* 2172 Mt Thesiger, *EC* 1906 Mt Sullivan
kraussiana *Meisn.*, *HGF* 2622 In woods

Passerina

rigida *Wikstr.*, *EC & AJNB* 3062 Mt Sullivan
rubra *C.H.Wr.*, *JHPA* 10967 Sea front

Peddiea

africana *Harv.*, *EC* 4347 Mt Sullivan, *EC* 6055 Mt Thesiger

TILACEAE

Appendix 1 Port St Johns

Grewia

lasiocarpa *E. Mey. ex Harv.*, EC 2165 Mt Sullivan
occidentalis *L.*, EC 1779 Isinuka, EC 3661 Second Beach
pondoensis *Burret, CJH* 18 West Gate

Triumfetta

pilosa *Roth var. effusa (E. Mey. ex Harv.) Wild, AH & EEP* 2059 Mt Thesiger
pilosa *Roth var. tomentosa Szyszyl. ex Sprague & Hutch., AODM* 13003 Mountain drive, EC
5181 Port St Johns

ULMACEAE

Celtis

africana *Burm. f.*, EC & AJNB 3201 Mt Sullivan
durandii *Engl., CJW* 55786 Port St Johns

Chaetacme

aristata *Planch., EC & AJNB* 2998 Mt Sullivan, EC 5972 Bulolo

Trema

orientalis (*L.*) *Blume, EC* 2168 Mt Sullivan, EC5560 Second Beach

URTICACEAE

Didymodoxa

caffra (*Thunb.*) *Friis. & Wilmot-Dear, MJW* 3366 1 Mile from town

Droguetia

ambigua *Wedd., MJW* 3426 First Beach

Laportea

grossa (*Wedd.*) *Chew, EC* 6094 Silaka
peduncularis (*Wedd.*) *Chew, EEG* 3460 Westgate, EC *sn.* Mt Sullivan

Obetia

tenax (*N.E. Br.*) *Friis, EC* 2082 Mt Sullivan

Pouzolzia

parasitica (*Forsk.*) *Schweinf., EC* 4642 Silaka

Urera

trinervis (*Hochst. Apud Krauss*) *Friis & Immelman, EC* 2156 Mt Sullivan

VERBENACEAE

Lantana

camara *L. **, *M Qokweni* 2 Port St Johns

Lippia

javanica (*Burm. f.*) *Spreng., EC* 305 Port St Johns

Verbena

bonariensis *L. **, EC 1709 Port St Johns, EC 2997 Mt Sullivan
officinalis *L. **, EC 4255 Mzimvubu River

VIOLACEAE

Appendix 1 Port St Johns

Hybanthus

capensis (Thunb.) Engl., EC 6308 Silaka

Rinorea

angustifolia (Thouars) Baill., AB et al. 2263 Mt Sullivan

domatiosa van Wyk, AEvW 10170 Mt Sullivan; EC 2109 Silaka, EC 6019 Bulolo

VITACEAE

Cissus

fragilis E. Mey. ex Kunth, AH & EEP 1573 Mt Thesiger, EC 3182 Mt Sullivan, EC 4682 Silaka

Cyphostemma

hypoleucum (Harv.) Descoings ex Wild & Drum., EC 2136 Silaka

natalitium (Szyszl.) J. v.d.Merwe, AH 590 Mt Thesiger, EC 4633 Silaka

sp. EC 4659 Silaka

woodii (Gilg & Brandt) Descoings, EC & AJNB 3054 Mt Sullivan

Rhoicissus

digitata (L. f.) Gilg & Brandt, EEG 2851 Sea shore

rhomboidea (E.Mey. ex Harv.) Planch., EC 5512 Mzimvubu River, EC 6119 Silaka

tomentosa (Lam.) Wild & Drum., EC 2176 Mt Sullivan, EC 3711 Silaka

tridentata (L.f.) Wild & Drum., EC sn. Mt Sullivan

tridentata (L.f.) Wild & Drum. subsp. *cuneifolia* (Eckl. & Zeyh.) N.R. Urton, EC 3322 Mt Thesiger,
EC 3204 Second Beach

MONOCOTYLEDONS

AGAPANTHACEAE

Agapanthus

campanulatus Leighton subsp. *campanulatus*, EC 3332 Mt Thesiger

praecox Willd. subsp. *orientalis* Leighton, EC 25 Mt Sullivan

ALLIACEAE

Tulbaghia

cernua Ave-Lall., YND 21 Second Beach

AMARYLLIDACEAE

Clivia

miniata (Lindl.) Regel var. *miniata*, EC 2012, Mt Sullivan

cf. *nobilis* Lindl., EC 2002 Silaka

Crinum

moorei Hook. f., EC 2111 Silaka

Cyrtanthus

mackenii Hook. f. var. *cooperi* (Bak.) R.A. Dyer, EC 4348 Mt Sullivan

Haemanthus

albiflos Jacq., AB et al 2289 Mt Sullivan, EC 6100 Silaka

Appendix 1 Port St Johns

Scadoxus

membranaceus (*Bak.*) *Friis & Nordal, AB et al. 2187 Mt Thesiger*

multiflorus (*Martyn*) *Raf. subsp. katherinae (Baker) Friis & Nordal, EC & AJNB 3185 Mt Sullivan*

puniceus (*L.*) *Friis & Nordal, EC 849 Mt Sullivan*

ANTHERICAEAE

Anthericum

cooperi *Bak., EC sn. Port St Johns*

ARACEAE

Zanthedeschia

aethiopica (*L.*) *Spreng, EC 6346 Agate Terrace*

ARECACEAE

Phoenix

reclinata *Jacq., EC 3676 Second Beach*

ASPARAGACEAE

Myrsiphyllum

asparagoides (*L.*) *Willd., AH 1168 Silaka*

Asparagus

cooperii (*Bak.*) *Oberm., CTJ 2154 The Gap*

densiflorus (*Kunth.*) *Oberm., EC & AJNB 3048 Mt Sullivan, EC 3299 Mt Thesiger*

falcatus *L. var. falcatus, EEG 3491 West Bank, EC 3048 Mt Sullivan*

laricinus (*Burch.*) *Oberm., EC et al. Mt Sullivan*

macowanii *Baker, EC 3281 Mt Sullivan, EC 6064 Mt Thesiger*

plumosus (*Bak.*) *Oberm., EC 2158 Mt Sullivan*

racemosus *Willd., JPJ 663 5 miles from town*

setaceus (*Kunth*) *Jessop, AODM 13108 Bololwa Forest, EC 6017 Bulolo*

ASPHODELACEAE

Aloe

arborescens *Miller, EC 5553 Between Second Beach and Silaka, EC 4332 Mt Sullivan*

ferox *Mill., EC 5553 Second Beach*

maculata, *EC 5191, The Gap*

Bulbine

asphodeloides (*L.*) *Willd., RGS 4329 Port St Johns*

frutescens (*L.*) *Willd., EC 30 Mt Sullivan, EC 4840 Mt Thesiger*

latifolia (*L.f.*) *Roem. & Schult., KB 1901 Agate Terrace*

Chlorophytum

bowkeri *Bak., EC 3255, Mt Sullivan*

comosum (*Thunb.*) *Jacq., AODM 13090 Noxolweni Forest, EC 5873 Bulolo*

crookianum *Zahlbr., EEG 3495 Isinuka*

Appendix 1 Port St Johns

aceleatissimum *Jacq.*, EC 5555 Between Second Beach and Silaka
aculeastrum *Dun.*, GCT 1591 North bank
americanum *Mill.*, AB et al. 2253 Mt Sullivan
didymanthum *Dun.*, EC 1777 Isinuka
duplo-sinuatum *Klotzsch*, EC 2115 Silaka
geniculatum *E. Mey.*, AEvW 10036 Mt Sullivan
giganteum *Jacq.*, EEG 2854 Tiger Flats
hispidum *Pers.* *, EC 6027 Bulolo
incanum *L.*, EEG 2869 Isinuka
linnaeanum *Hepper & Jaeger*, EC & AJNB 3042 Mt Sullivan
mauritanum *Scop.* *, EC 2121 Silaka
nigrum *L.* *, EC 6284 Mt Thesiger
nodiflorum *Jacq.*, EC & AJNB 2985 Mt Sullivan
sp. 1. EC 2979 Bulolo
terminale *Forssk. subsp. terminale*, EC 752 Mt Sullivan

STERCULIACEAE

Cola

natalensis *Oliv.*, AODM 13015 Mlolweni Forest, EC 6044 Mt Thesiger

Dombeya

burgessiae *Gerr. ex Harv.*, YND 12 Mt Sullivan
tiliacea (*Endl.*) *Planch.*, AEvW 10100 Mt Sullivan

STRYCHNACEAE

Strychnos

henningsii *Gilg*, EC 6104 Silaka
mitis *S. Moore*, AEvW 10081 Mt Sullivan

THYMELAEACEAE

Dais

cotinifolia *L.*, EC 6247 Mt Thesiger

Englerodaphne

ovalifolia (*Meisn.*) *Phill.*, AB et al 2206 Mt Sullivan, EC 5493 Mt Thesiger, EC 6010 Bulolo

Gnidia

anthylloides (*L. f.*) *Gilg*, SE sn. Port St Johns
calocephala (*C.A. Mey.*) *Gilg*, AB et al. 2172 Mt Thesiger, EC 1906 Mt Sullivan
kraussiana *Meisn.*, HGF 2622 In woods

Passerina

rigida *Wikstr.*, EC & AJNB 3062 Mt Sullivan
rubra *C.H.Wr.*, JHPA 10967 Sea front

Peddiea

africana *Harv.*, EC 4347 Mt Sullivan, EC 6055 Mt Thesiger

TILACEAE

Appendix 1 Port St Johns

Grewia

lasiocarpa *E. Mey. ex Harv.*, EC 2165 Mt Sullivan
occidentalis *L.*, EC 1779 Isinuka, EC 3661 Second Beach
pondoensis *Burret, C.JH* 18 West Gate

Triumfetta

pilosa *Roth var. effusa (E. Mey. ex Harv.) Wild, AH & EEP* 2059 Mt Thesiger
pilosa *Roth var. tomentosa Szyszyl. ex Sprague & Hutch., AODM* 13003 Mountain drive, EC
5181 Port St Johns

ULMACEAE

Celtis

africana *Burm. f.*, EC & AJNB 3201 Mt Sullivan
durandii *Engle., CJW* 55786 Port St Johns

Chaetacme

aristata *Planch., EC & AJNB* 2998 Mt Sullivan, EC 5972 Bulolo

Trema

orientalis (*L.*) *Blume*, EC 2168 Mt Sullivan, EC5560 Second Beach

URTICACEAE

Didymodoxa

caffra (*Thunb.*) *Friis. & Wilmot-Dear, MJW* 3366 1 Mile from town

Droguetia

ambigua *Wedd., MJW* 3426 First Beach

Laportea

grossa (*Wedd.*) *Chew, EC* 6094 Silaka
peduncularis (*Wedd.*) *Chew, EEG* 3460 Westgate, EC sn. Mt Sullivan

Obetia

tenax (*N.E. Br.*) *Friis, EC* 2082 Mt Sullivan

Pouzolzia

parasitica (*Forssk.*) *Schweinf., EC* 4642 Silaka

Urera

trinervis (*Hochst. Apud Krauss*) *Friis & Immelman, EC* 2156 Mt Sullivan

VERBENACEAE

Lantana

camara *L. **, *M Qokweni* 2 Port St Johns

Lippia

javanica (*Burm. f.*) *Spreng., EC* 305 Port St Johns

Verbena

bonariensis *L. **, EC 1709 Port St Johns, EC 2997 Mt Sullivan
officinalis *L. **, EC 4255 Mzimvubu River

VIOLACEAE

Appendix 1 Port St Johns

Hybanthus

capensis (Thunb.) Engl., EC 6308 Silaka

Rinorea

angustifolia (Thouars) Baill., AB et al. 2263 Mt Sullivan

domatiosa van Wyk, AEW 10170 Mt Sullivan, EC 2109 Silaka, EC 6019 Bulolo

VITACEAE

Cissus

fragilis E. Mey. ex Kunth, AH & EEP 1573 Mt Thesiger, EC 3182 Mt Sullivan, EC 4682 Silaka

Cyphostemma

hypoleucum (Harv.) Descoings ex Wild & Drum., EC 2136 Silaka

natalitium (Szyszyl.) J. v.d.Merwe, AH 590 Mt Thesiger, EC 4633 Silaka

sp. EC 4659 Silaka

woodii (Gilg & Brandt) Descoings, EC & AJNB 3054 Mt Sullivan

Rhoicissus

digitata (L. f.) Gilg & Brandt, EEG 2851 Sea shore

rhomboidea (E.Mey. ex Harv.) Planch., EC 5512 Mzimvubu River, EC 6119 Silaka

tomentosa (Lam.) Wild & Drum., EC 2176 Mt Sullivan, EC 3711 Silaka

tridentata (L.f.) Wild & Drum., EC sn. Mt Sullivan

tridentata (L.f.) Wild & Drum. subsp. *cuneifolia* (Eckl. & Zeyh.) N.R. Urton, EC 3322 Mt Thesiger,
EC 3204 Second Beach

MONOCOTYLEDONS

AGAPANTHACEAE

Agapanthus

campanulatus Leighton subsp. *campanulatus*, EC 3332 Mt Thesiger

praecox Willd. subsp. *orientalis* Leighton, EC 25 Mt Sullivan

ALLIACEAE

Tulbaghia

cernua Ave-Lall., YND 21 Second Beach

AMARYLLIDACEAE

Clivia

miniata (Lindl.) Regel var. *miniata*, EC 2012, Mt Sullivan

cf. *nobilis* Lindl., EC 2002 Silaka

Crinum

moorei Hook. f., EC 2111 Silaka

Cyrtanthus

mackenii Hook. f. var. *cooperi* (Bak.) R.A. Dyer, EC 4348 Mt Sullivan

Haemanthus

albiflos Jacq., AB et al 2289 Mt Sullivan, EC 6100 Silaka

Appendix 1 Port St Johns

Scadoxus

- membranaceus (Bak.) Friis & Nordal, AB et al. 2187 Mt Thesiger
multiflorus (Martyn) Raf. subsp. katherinae (Baker) Friis & Nordal, EC & AJNB 3185 Mt
Sullivan
puniceus (L.) Friis & Nordal, EC 849 Mt Sullivan

ANTHERICAEAE

Anthericum

- cooperi Bak., EC sn. Port St Johns

ARACEAE

Zanthedeschia

- aethiopica (L.) Spreng, EC 6346 Agate Terrace

ARECACEAE

Phoenix

- reclinata Jacq., EC 3676 Second Beach

ASPARAGACEAE

Myrsiphyllum

- asparagoides (L.) Willd., AH 1168 Silaka

Asparagus

- cooperi (Bak.) Oberm., CTJ 2154 The Gap
densiflorus (Kunth.) Oberm., EC & AJNB 3048 Mt Sullivan, EC 3299 Mt Thesiger
falcatus L. var. falcatus, EEG 3491 West Bank, EC 3048 Mt Sullivan
laricinus (Burch.) Oberm., EC et al. Mt Sullivan
macowanii Baker, EC 3281 Mt Sullivan, EC 6064 Mt Thesiger
plumosus (Bak.) Oberm., EC 2158 Mt Sullivan
racemosus Willd., JPJ 663 5 miles from town
setaceus (Kunth) Jessop, AODM 13108 Bololwa Forest, EC 6017 Bulolo

ASPHODELACEAE

Aloe

- arborescens Miller, EC 5553 Between Second Beach and Silaka, EC 4332 Mt Sullivan
ferox Mill., EC 5553 Second Beach
maculata, EC 5191, The Gap

Bulbine

- asphodeloides (L.) Willd., RGS 4329 Port St Johns
frutescens (L.) Willd., EC 30 Mt Sullivan, EC 4840 Mt Thesiger
latifolia (L.f.) Roem. & Schult., KB 1901 Agate Terrace

Chlorophytum

- bowkeri Bak., EC 3255, Mt Sullivan
comosum (Thunb.) Jacq., AODM 13090 Noxolweni Forest, EC 5873 Bulolo
krookianum Zahlbr., EEG 3495 Isinuka

Appendix 1 Port St Johns

modestum *Bak.*, *SS* 3982 East Gate

Kniphofia

laxiflora *Kunth*, *EC & AJNB* 3217 Mt Sullivan, *EC* 3295 Mt Thesiger,

linearifolia *Bak.*, *LEWC* 9304 5 miles from town

sp. cf. *coddiana* *Cufod.*, *EC* 3217, 6328 The Gap

sp. cf. *drepanophylla* *Bak.*, *EC* 6328 The Gap

CANNACEAE

Canna

indica *L.* *, *EC* 1727 Port St Johns

COLCHICACEAE

Gloriosa

superba *L.*, *EC* 218 Silaka

Sandersonia

aurantiaca *Hook.*, *EEG* 3435 West banks on slopes

COMMELINACEAE

Ancilema

aequinoctiale (*Beauv.*) *Loudon*, *AEvW* 10144 Mt Sullivan, *EC* 6168 Isinuka

dregeanum *Kunth*, *EEG* 3194 Roadside

Coleotrype

natalensis *C.B. Cl.*, *AH & EEP* 2062 Mt Thesiger

Commelina

africana *L. var. africana*, *MJW* 3356 Umzimvubu

benghalensis *L.* *, *MJW* 3364 1 Mile from town, *EC sm* Noqwekwana forest, *EC* 6170 Isinuka

diffusa *Burm.f.*, *EC* 6169 Isinuka

modesta *Oberm.*, *EC* 6171 Isinuka

Cyanotis

speciosa (*L.f.*) *Hassk.*, *EC et al.* 3316 Mt Thesiger

Tradescantia

fluminensis *Vell.* *, *EC* 5448 Bulolo

CYPERACEAE

Bulbostylis

oritrepes (*Redley*) *C.B. Cl. subsp. australis* *B.L. Burt*, *KB et al.* 1743 Mt Thesiger

Carex

clavata *Thunb.*, *CE Moss* 5525 Port St Johns

Cyperus

albostrigatus *Schrad.*, *SS* 3978 East Gate; *CJH* 37 Eagle's Nest

brevis *Boeck.*, *CJH* 50 First Beach

congestus (*Vahl*) *C.B. Cl.*, *THA* 800 Second Beach

difformis *L.*, *EC* 14 Mt Sullivan

distans *L. f.*, *EC* 2131 Silaka, *EC* 14 Mt Sullivan

Appendix 1 Port St Johns

dives Delile, *THA 774* Second Beach, *EC 6136* Silaka
dubius (Rottb.) Kuekenth ex G.E.C. Fischer, *EC & AJNB 3031* Silaka
grantii C.B. Cl., *EC 1775* Isinuka, *EC 33* Mt Sullivan
leptocladus Kunth, *EC 32* Mt Sullivan
macrocarpus Kunth, *PJV 2237* Second Beach
natalensis Hochst., *EC & AJNB 3034* Mt Sullivan
obtusiflorus Vahl, *EC & AJNB 3216* Second Beach
owanii (Boek.) C.B. Clarke amend Vorster, *EC 6366* Eagles Nest
pulcher Thunb., *SS 4336* Around Port St Johns
sphaerocephalus (Vahl) Kuekenth., *EC 42* Mt Sullivan
*sumatrensis (Retz.) J. Raynal **, *EC 787* Mt Sullivan, *EC 4839* Mt Thesiger
textilis Thunb., *EC 6090* Silaka

Eleocharis

dregeana Steud, *EC 6241* Mt Thesiger
limosa (Schrud.) Schult., KB et al. 1779 Mt Thesiger

Ficinia

dasystachys C.B. Cl., KB 1783 Mt Thesiger

Fimbristylis

complanata (Retz.) Link, *EC et al.* Mt Sullivan, *EC 4845* Mt Thesiger
dichotoma (L.) Vahl, *EC et al.* 3264 Mt Sullivan

Isolepis

costata (Boeck.) A.Rich. var. costata, *SS 4322* Near Sanatorium
fluitans (L.) R.Br., KB et al. 1785 Mt Thesiger
prolifera (Rottb.) R. Br., *EC 5478* Mt Thesiger

Kyllinga

elatior Kunth, *EC 2134* Silaka
odorata Vahl, *EEG 6* Tiger Flats

Pycneus

intactus (Vahl) J. Raynal, *EC et al.* Mt Sullivan
polystachyos (Rottb.) P.Beauv. var. polystachyos, *MJW 3403* Along Mzimvubu

Rhynchospora

barrosiana Guaglianone, *EC 34* Mt Sullivan
corymbosa (L.) Britten, *EC 6277* Mt Thesiger
holoschoenoides (Rich.) Herter, *EC 4842* Mt Thesiger

Schoenoplectus

scirpoideus (Schrud.) J. Browning, *CE Moss 5473* Port St Johns

Scleria

melanomphala Kunth, *AB et al. 2137* Mt Thesiger

Tetraria

cuspidata (Rottb.) C.B. Cl., *EC et al. 3324* Mt Thesiger

DIOSCOREACEAE

Dioscorea

crinita Hook. f., *MJW 3438* First Beach, *EC 5514* Mzimvubu River, *EC 3046* Mt Sullivan

Appendix 1 Port St Johns

diversifolia Griseb., EC 4326 Mt Sullivan, EC 4654 Silaka
retusa Mast., EC & AJNB 3046 Mt Sullivan, EC 4658 Silaka
sylvatica (Kunth) Eckl. var. *multiflora* (Marloth) Burkill, AB et al. 2295 Mt Sullivan

DRACAENACEAE

Dracaena

aletriformis, AH & CTJ 2253; EC 38 Mt Sullivan

FLAGELLARIACEAE

Flagellaria

guineensis Schumach., EC 750 Mt Thesiger; AB et al. 2230 Mt Sullivan

HYACINTHACEAE

Albuca

fastigiata (L.f.) Dryand, EC 3218 Second Beach
nelsonii N.E. Br., KB 1808 Silaka, EC 5552 Port St Johns

Dipcadi

viride (L.) Moench, G. Edwards sub CE Moss 7898 Port St Johns

Drimiopsis

maculata Lindl., EC 857 Isinuka, EC 3668 Second Beach

Eucomis

autumnalis (Mill.) Chit., EC 6333 Agate Terrace

Ledebouria

cooperi (Hook. f.) Jessop, G. Edwards sub CE Moss 8018 Port St Johns, EC 3706 Silaka

Ornithogalum

graminifolium Thunb., AH & CTJ 1158 Mt Thesiger
juncifolium Jacq., KB 1789 Mt Thesiger
longibracteatum Jacq., EC 858 Isinuka; EC & AJNB 3452 Mt Sullivan

Scilla

natalensis Planch., AH & CTJ 1163 Mt Thesiger, EC 6218 Mt Thesiger

Urginea

capitata (Hook.) Baker, EEG 3492 West Gate, EC 6219 Mt Thesiger

HYPOXIDACEAE

Hypoxis

acuminata Bak., EC et al. 3327 Mt Thesiger
angustifolia Lam. var. *angustifolia*, LED 3458 Silaka
filiformis Bak., JS 494 Mt Thesiger
hemerocallidea Fischer & C.A. Mey., EC & AJNB 3219 Second Beach, EC 3739 Mt Thesiger
membranacea Bak., EC 6031 Bulolo
rigidula Bak., JS 495 Mt Thesiger, EC 3740 Mt Thesiger
villosa L.f. var. *obliqua* (Jacq.) Baker, EEG 3191 West Gate
villosa L.f. var. *villosa*, SS 4201 East Gate

Appendix 1 Port St Johns

IRIDACEAE

Aristea

- angolensis *Baker subsp. angolensis*, EC 3705 Silaka
cognata *N.E. Brown ex Weimarck*, SS 40076 Eagles Nest
ecklonii *Baker*, EC 6030 Bulolo
gerrardii *Weim.*, MW 48, Eagles Nest
woodii *N.E. Br., AB et al.* 2220 Mt Sullivan

Crocoshmia

- aurea (*Pappe ex Hook.*) *Planch. var. aurea*, EC 835, Mt Sullivan

Dierama

- dissimile *Hilliard*, PFB sub CEM 14308 Port St Johns
igneum *Klatt*, WM 1223 Eagle's Nest, EC 6242 Mt Thesiger
robustum *N.E. Br.*, EC 2005 Mt Sullivan

Dietes

- butcheriana *Gerstm.*, EC 5868 Bulolo
iridiodes (*L.*) *Sweet ex Klatt*, EC et al. 3678 Silaka, EC 3678 Second Beach

Freesia

- laxa (*Thunb.*) *Goldblatt & J.C. Manning subsp. laxa*, GG 1208 Near the sea

Gladiolus

- carneus *Delaroche*, LED sn. Port St Johns
longicollis *Bak. var. platypetalus (Bak.) Oberm.*, EC 2004 Mt Sullivan
oppositiflorus *Herb. subsp. salmoneus (Bak.) Oberm.*, EC 4176 Mt Sullivan, EC 3215 Second Beach

Moraea

- stricta *Bak.*, AH & CTJ 1162 Mt Thesiger

Tritonia

- disticha (*Klatt*) *Baker subsp. disticha*, EEG 3443 West bank, EC 4180 Mt Sullivan
disticha (*Klatt*) *Bak. subsp. rubro-lucens (R.C. Fost.) de Vos*, SS 4217 East Gate

Watsonia

- meriana (*L.*) *Mill.*, CTJ 285 Mt Thesiger
pillansii *L. Bol., AB et al* 2140 Mt Thesiger, GH 53 Mt Sullivan

JUNCACEAE

Juncus

- exertus *Buchen.*, EC 799 Port St Johns
kraussii *Hochst.*, EC 6032 Bulolo
lomatophyllus *Spreng.*, AB et al. 2138 Mt Thesiger
oxycarpus *E.Mey ex Kunth.*, EC 3731 Mt Thesiger

JUNCAGINACEAE

Triglochin

- striata *Ruiz & Pav.* SS 4026 Near Beach

LUZURIAGACEAE

Appendix I Port St Johns

Behnia

reticulata (*Thunb.*) *Didr.*, *KB 1774* Mt Thesiger, *EC 6088* Silaka

ORCHIDACEAE

Aerangis

mystacidii (*Reichb. f.*) *Schltr.*, *EC & EEP 6151* Silaka

Angraecum

pusillum *Lindl.*, *EC 6040* Silaka

Bonatea

speciosa (*L. f.*) *Willd. var speciosa*, *IBPE sn.* Second Beach, *EC 5546* Silaka

Brachycorythis

inhambanensis (*Schltr.*) *Schltr.*, *AH & EEP 1547* Mt Thesiger

ovata *Lindl.*, *AH & EEP 1570* Mt Thesiger

Brownleea

coerulea *Harv. ex Lindl.*, *AB et al. 2177* Mt Thesiger

parviflora *Harv. ex Lindl.*, *AH & EEP 2063* Mt Thesiger

Bulbophyllum

sandersonii *Reichb. f.*, *EC 4340* Mt Sullivan

Calanthe

sylvaticus (*Thouar*) *Lindl.*, *EC 2393* Silaka

Corycium

dracomontanum *Parkman & Schelpe*, *AGM sn.* West Gate

nigrescens *Sond.*, *RW 265* Mt Thesiger

Cyrtorchis

sp. *EC 4338* Mt Sullivan

Diaphananthe

xanthopollinia (*Reichb. f.*) *Summerh.*, *EC 1919* Mt Sullivan

Disa

caffra *Bolus*, *CTJ 165* Mt Thesiger

chrysostachya *Swartz*, *EEG 3418* West Gate

nervosa *Lindl.*, *AH & EEP 2052* Mt Thesiger

polygonoides *Lindl.*, *AB et al. 2256* Mt Sullivan; *AH & EEP 1544* Mt Thesiger

similis *Summerh.*, *RW & CB 260* Mt Thesiger

stachyoides *Reichb. f.*, *AGM sn.* West Gate

versicolor *Reichb. f.*, *RW 266*, Mt Thesiger

woodii *Schltr.*, *AGM sn.* West Gate

Eulophia

angolensis (*Reichb. f.*) *Summerh.*, *EEG 3414* West Gate

clavicornis *Lindl. var. clavicornis*, *AH 681* Mt Thesiger

clavicornis *Lindl. var. nutans* (*Sond.*) *A.V. Hall*, *EEG 3413* West Gate, *EC 6252* Mt Thesiger

clitellifera (*Reichb. f.*) *Bolus*, *AH & CTJ 1120* Mt Thesiger

ensata *Lindl.*, *AH & EEP 2050* Mt Thesiger

odontoglossa *Reichb. f.*, *AH & EEP 2070* Mt Thesiger

parviflora (*Lindl.*) *A.V. Hall*, *AH 570* Mt Thesiger

Appendix 1 Port St Johns

speciosa (R. Br. ex Lindl.) Bolus, EC & AJNB 3015 Mt Sullivan

Habenaria

ciliosa Lindl., EEP sn. Mt Thesiger

dives Reichb. f., EC 1704 Mpondombini

dregeana Lindl., AH & EEP 2069 Mt Thesiger

pseudociliosa Schelpe ex J.C. Manning, AH & EEP 2051 Mt Thesiger

tysonii Bolus, EEP sn.; RW & CB 262 Mt Thesiger

Herschelianthe

baurii (Bolus) Rauschert, RW & CB 261 Mt Thesiger

Monadenia

brevicornis Lindl., AGM sn. West Gate; RW 300 Mt Thesiger

Mystacidium

capense (L.f.) Schltr., EC 6151 Silaka

Polystachya

pubescens Reichb. f., EC 6407 Mt Sullivan

tessallata Lindl., HGF 2551 In woods

Satyrium

longicauda Lindl. var. *longicauda*, CTJ 280 Mt Thesiger

sphaerocarpum Lindl., AH & EEP 1569 Mt Thesiger

trinerve Lindl., CTJ 282; AH & EEP 1549 Mt Thesiger

Schizochilus

zeyheri Sond., EEG 3406 West Gate

Stenoglottis

fimbriata Lindl., EC 4339 Mt Sullivan

Tridactyle

bicaudata (Lindl.) Schltr. subsp. *rupestris* H.P. Linder, EEG 3490 West Gate

POACEAE

Agrostis

lachnantha Nees var. *lachnantha*, EC & AJNB 3005 Mt Sullivan

Alloteropsis

semialata (R. B.) Hitchc. subsp. *eckloniana* (Nees) Gibbs Russell, EC 3321 Mt Thesiger

Andropogon

appendiculatus Nees, EC et al. 3270 Mt Sullivan

Aristida

junciformis Trin & Rupr. subsp. *galpinii* (Stapf) DE Winter, EC 3300 Mt Thesiger

junciformis Trin. & Rupr. subsp. *junciformis*, AB et al. 2151 Mt Thesiger

Brachiaria

serrata (Thunb.) Stapf, EC 3748 Mt Thesiger

Briza

maxima L. *, EC 2076 Mt Sullivan

Chloris

gayana Kunth., EC 3214 Second Beach, EC 4638 Silaka

Coix

Appendix 1 Port St Johns

lacryma-jobi L. *, EC 751 Silaka; EC 1782 Isinuka

Ctenium

concinnum Nees, IBPE sn. River, EC 5781 Bulolo

Cymbopogon

excavatus (Hochst.) Stapf ex Burt Davy, EC 3213 Second Beach

validus (Stapf) Stapf ex Burt Davy, EC 462 Second Beach, EC 3306 Mt Thesiger, EC 4263 River

Dactyloctenium

australe Steud., CJH 51 Second Beach

Diandrochloa

namaquensis (Nees.) DeWinter, JLS 567 Near Pondoland Bridge

Digitaria

eriantha Steud., EC 3212 Second Beach

natalensis Stent, EC et al. 3273 Mt Sullivan, EC 4264 Mzimvubu River

Diheteropogon

amplectens (Nees) Clayton, AB et al. 2150 Mt Thesiger

Echinochloa

colona (L.) Link., EC & AJNB 3458 Mt Sullivan

crus-galli (L.) Beauv. *, EC & AJNB 3008 Mt Sullivan

crus-pavonis (Kunth.) Schult., EC 6135 Silaka

Eleusine

coracana (L.) Gaertn. subsp. africana (Kenn.-O'Byrne) Hilu & De Wet, MJW 3358 1 Mile from town

indica (L.) Gaertn. subsp. indica, EC 5501 Mt Thesiger

Elionurus

muticus (Spreng.) Kunth., EC 3746 Mt Thesiger

Eragrostis

capensis (Thunb.) Trin., EC et al. 3269 Mt Sullivan, EC 6211 Mt Thesiger

ciliaris (L.) R.Br., CJH 48 Second Beach

nindensis Ficalho & Hiern, HGF 2507 River Mouth

plana Nees, AODM 13136, Fairview, EC 5503 Mt Thesiger

racemosa (Thunb.) Steud., EC et al. 3305 Mt Thesiger

Eulalia

villosa (Thunb.) Nees, FB sn. Forest, EC 3743 Mt Thesiger

Helictotrichon

sp. cf. hirtulum (Steud.) Schweick., EC 3266 Mt Sullivan

Hyparrhenia

filipendula (Hochst.) Stapf. var. pilosa (Hochst.) Stapf, EC 3268 Mt Sullivan

Ischaemum

fasciculatum Brongn., AB et al. 2148 Mt Thesiger

Melinis

nerviglumis (Franch.) Zizka, EC 6227 Mt Thesiger

Miscanthus

capensis (Nees) Anderss., AB et al. 2212 Mt Sullivan, EC 3309 Mt Thesiger

Monocymbium

Appendix 1 Port St Johns

ceresiiforme (Nees) Stapf, EC 3272 Mt Sullivan

Olyra

latifolia L. *, EC 39 Mt Sullivan; KB et al. 1831 Agate Terrace

Oplismenus

hirtellus (L.) P. Beauv., MJW 3392 1 Mile from town, EC 5874 Bulolo

Panicum

aequinerve Nees, EC 3254 Mt Sullivan

deustum Thunb., AH 590 Wooded hillside, EC 4178 Mt Sullivan, EC 3682 Silaka

dregeanum Nees, EC et al. 3307 Mt Thesiger

lacticomum Nees, EC et al. 3254 Mt Sullivan

Paspalum

dilatatum Poir. *, MJW 3424 First Beach

Pennisetum

purpureum Schumach*, EC 5200 Port St Johns

Phragmites

australis (Cav.) Steud., EEG 2862 Isinuka

mauritanicus Kunth, EC 5199 Port St Johns

Polypogon

monspeiliensis Desf. *, EC & AJNB 3010 Mt Sullivan

Prosphytochloa

prehensilis (Nees) Schweick., AB et al. 2157 Mt Thesiger

Setaria

sphacelata (Schumach.) Moss var. sphacelata, AB et al. 2149 Mt Thesiger, EC 3211 Second Beach

Sorghum

bicolor (L.) Moench. subsp. arundinaceum (Desv.) de Wet & Harlan, EC 4262 Mzimvubu River

halepense (L.) Pers. *, EEG 2866 Isinuka, EC 5201 Port St Johns

Sporobolus

fimbriatus (Trin.) Nees, MJW 3370 1 Mile from town

pyramidalis Beauv., EC 5502 Mt Thesiger

Themeda

triandra Forssk., EC 3742 Mt Thesiger

Tristachya

leucothrix Nees, KB 1959 Silaka, EC 3751 Mt Thesiger

SMILACEAE

Smilax

anceps Willd., EC et al. 3320 Mt Thesiger

STRELITZIACEAE

Strelitzia

nicolai Regel & Koern., EC 479 Silaka

TYPHACEAE

Appendix 1 Port St Johns

Typha

capensis (*Rohrb.*) *N.E. Br.*, *EC 5474* Mt Thesiger

XYRIDACEAE

Xyris

capensis *Thunb.*, *EC 3729* Mt Thesiger

Appendix 2 Aliens found at Port St Johns

APPENDIX 2

Aliens found at Port St Johns

FAMILY	GENUS	SPECIES	ORIGIN	LIFE FORM	HABITAT INVADED	WEED * STATUS
ADIANTACEAE	<i>Adiantum</i>	<i>raddianum</i> Presl	S America	Fern	Forest edge	-
	<i>Pityrogramma</i>	<i>calomelanos</i> (Swartz) Link var. <i>autreosflava</i>	S America	Fern	Disturbed area	-
DAVALLIACEAE	<i>Nephrolepis</i>	<i>exultata</i> (L.) Schott	Pan-tropical	Fern	Forest edge	3
SCHIZEAECEAE	<i>Lygodium</i>	<i>japonicum</i> Swartz	Warm Tropical	Climbing Fern	Forest edge	-
	<i>Platyserium</i>	<i>cf. bifurcatum</i>	Australia	Fern	Forest	-
PINACEAE	<i>Pinus</i>	<i>radiata</i>	N America	Tree	Grassland	2
ARECACEAE	<i>unidentified palm</i> <i>at Silaka</i>	<i>sp.</i>		Tree	Forest edge	-
CANNACEAE	<i>Canna</i>	<i>indica</i> L.	C & S America	Herb	Grassland Forest Moist areas	1
COMMELINACEAE	<i>Commelina</i>	<i>benghalensis</i>	Cosmopolita n weed	Herb	Forest edge	
	<i>Tradescantia</i>	<i>fluminensis</i> Vell.	S America	Creeping herb	Forest edge	-
POACEAE	<i>Coix</i>	<i>lacryma-jobi</i> L.	Europe & Asia	Grass	Forest	-
	<i>Sorghum</i>	<i>halepense</i> (L.) Pers.	Europe & Asia	Grass	Grassland	2
	<i>Olyra</i>	<i>latifolia</i> L.		Grass	Forest	-
	<i>Polypogon</i>	<i>monspeiliensis</i> Desf.	Europe & Asia	Grass	Grassland	-

Appendix 2 Aliens found at Port St Johns

	<i>Briza</i>	<i>maxima</i> L.	Europe & Asia	Grass	Grassland	-
	<i>Echinochloa</i>	<i>crus-galli</i>	Uncertain	Grass	Grassland	-
	<i>Paspalum</i>	<i>dilatatum</i>	S America	Grass	Grassland	-
	<i>Pennisetum</i>	<i>purpureum</i>	Warm Tropical	Grass	Grassland	-
CYPERACEAE	<i>Mariscus</i>	<i>sumatrensis</i> (Retz.) J Raynal	Pan-tropical	Sedge	Grassland Forest Moist areas	-
AMARANTH-ACEAE	<i>Amaranthus</i>	<i>hybridus</i>	N & Central America	Herb	Grassland	-
	<i>Amaranthus</i>	<i>spinosus</i>	C America	Herb	Grassland	-
	<i>Achyranthes</i>	<i>aspera</i> L. var. <i>aspera</i>	Pan-tropical	Herb	Grassland	1
		<i>aspera</i> L. var. <i>sicula</i>	Pan-tropical	Herb	Grassland	
APIACEAE	<i>Torilis</i>	<i>arvensis</i> (Huds.) Link	Europe & Asia	Herb	Grassland	-
APOCYN-ACEAE	<i>Thevetia</i>	<i>peruviana</i>	Tropical America	Tree	Riverbank forest edge	1
ARISTOLO-CHIACEAE	<i>cf. Asarum</i>	<i>cf. shuttleworthii</i>	North temperate	Herb	Forest	-
ASTERACEAE	<i>Acanthospermum</i>	<i>hispidum</i> DC.	S America	Herb	Grassland	-
	<i>Ageratum</i>	<i>houstonianum</i> Mill.	C America	Herb	Forest edge	1
	<i>Ambrosia</i>	<i>artemisifolia</i> L.	N America	Herb		-
	<i>Bidens</i>	<i>pilosa</i> L.	S America	Herb	Grassland Forest edge Widespread	-
	<i>Bidens</i>	<i>bitemata</i> (Lour.) Merrill & Scherf.	S America	Herb	Forest edge	
	<i>Campuloclinum</i>	<i>macrocephalum</i> Less.	S America	Herb	Grassland	1
	<i>Chromolaena</i>	<i>odorata</i> (L.) R.M. King & H. Robinson	S America West Indies	Shrub	Forest edge, Coastal scrub shrubby areas	1

Appendix 2 Aliens found at Port St Johns

	<i>Cirsium</i>	<i>vulgare</i>	Europe, Asia, N Africa	Herb	Grassland Disturbed areas	1
	<i>Conyza</i>	<i>albida</i> Spreng	Warm temperate	Herb	Riverbank	-
	<i>Conyza</i>	<i>bonariensis</i> (L.) Cronq.	S America	Herb	Disturbed areas	-
	<i>Conyza</i>	<i>chilensis</i> Spreng.	S America	Herb	Grassland	-
	<i>Galinsoga</i>	<i>parviflora</i> Cav.	Probably N & S America			
	<i>Lactuca</i>	<i>indica</i>	Asia	Herb	Grassland	
	<i>Montanoa</i>	<i>hibiscifolia</i> Benth.	C America	Shrub	Forest edge	1
	<i>Sigesbeckia</i>	<i>orientalis</i> L.	Uncertain	Herb	Forest edge	-
	<i>Tagetes</i>	<i>minuta</i> L.	S America	Herb	Grassland Disturbed areas	-
	<i>Tithonia</i>	<i>diversifolia</i> (Hemsl.) A. Gray	C America	Herb	Grassland Forest Disturbed areas	1
	<i>Titonia</i>	<i>rotundifolia</i> (Mill.) Blake	C America	Herb	Grassland	1
	<i>Urospermum</i>	<i>picroides</i>	Europe	Herb	Grassland Forest Damp areas	
	<i>Xanthium</i>	<i>spinosum</i> L.	uncertain – S America	Herb	Disturbed areas	1
BASELLACEAE	<i>Anredera</i>	<i>cordifolia</i> (Ten.) Steenis	S America	Climber	Forest edge	1
BEGONIACEAE	<i>Begonia</i>	<i>cucullata</i>	S America	Herb	Forest edge	-
BIGNONIACEAE	<i>Spathodea</i>	<i>campanulata</i>	Tropical Africa	Tree	Disturbed areas	-
	<i>Tecoma</i>	<i>stans</i>	Mexico & S USA	Tree	Grassland	1
BRASSICACEAE	<i>Coronopus</i>	<i>didymus</i> (L.) Sm.	S America	Herb	Grassland	-
CACTACEAE	<i>Opuntia</i>	<i>monacantha</i> Haw.	S America	Shrub	Coastal bush	1

Appendix 2 Aliens found at Port St Johns

	<i>Pereskia</i>	<i>aculeata</i> Mill.	S & C America	Climber	Forest and disturbed areas	1
CONVOLVU-LACEAE	<i>Cuscuta</i>	<i>campestris</i> Yunck.	N & S America	Herb	Grassland	1
	<i>Ipomoea</i>	<i>alba</i> L.	Trop. America	Climber	Forest edge	1
	<i>Ipomoea</i>	<i>indica</i> (Burm.f.) Merr.	Trop. America	Climber	Forest edge	
EUPHORB-IACEAE	<i>Manihot</i>	<i>dulcis</i> Pax	S America	Shrub	Forest edge	-
	<i>Ricinus</i>	<i>communis</i> L.	Africa	Herb	Grassland	2
FABACEAE	<i>Caesalpinia</i>	<i>decapetala</i> (Roth.) Alston	Asia	Climber	Grassland	1
	<i>Senna</i>	<i>septemtrionalis</i> (Viv.) Irwin & Barneby	C America	Shrub	Grassland	-
	<i>Sesbania</i>	<i>bispinosa</i> (Jacq.) W. F. Wight var. <i>bispinosa</i>	Europe & Asia	Shrub	Grassland	-
		<i>punicea</i> (Cav.) Benth.	S America	Shrub	Grassland	1
MALVACEAE	<i>Malvastrum</i>	<i>coromandelianum</i> (L.) Garcke	N America	Herb	Unknown	-
	<i>Hibiscus</i>	<i>rosa-sinensis</i>	China	Shrub	Forest edge	-
MELASTOMATACEAE	<i>Tibouchina</i>	<i>granulosa</i> Cogn.	Trop. America	Tree	Forest	-
MORACEAE	<i>Ficus</i>	<i>sp.</i>		Tree	Forest	-
	<i>Morus</i>	<i>alba</i> L.	Europe & Asia	Tree	Riverbank	3
MYRTACEAE	<i>Eucalyptus</i>	<i>sp.</i>	Australia	Tree	Riverbank	2
	<i>Eugenia</i>	<i>uniflora</i> L.	Trop. America	Shrub	Forest edge	1
	<i>Psidium</i>	<i>guajava</i> L.	West Indies	Tree	Forest edge	2
	<i>Psidium</i>	<i>cattleianum</i> Sabine	S America	Shrub	Forest edge	3
MYRSINACEAE	<i>Ardisia</i>	<i>crispa</i>			Riverbank	
NYCTAGIN-ACEAE	<i>Mirabilis</i>	<i>jalapa</i> L.	S America	Shrub	Forest edge	3

Appendix 2 Aliens found at Port St Johns

ONAGRACEAE	<i>Oenothera</i>	<i>jamesii</i> Torr & Gray	N America	Herb	Grassland	-
	<i>Oenothera</i>	<i>laciniata</i> Hill.	Temp. America	Herb	Grassland	-
OXALIDACEAE	<i>Oxalis</i>	<i>corniculata</i> L.	Europe & Asia	Herb	Grassland	
PASSIFLOR-ACEAE	<i>Passiflora</i>	<i>edulis</i> Sims	S America	Climber	Forest	-
	<i>Passiflora</i>	<i>subpeltata</i> Ortega	S America	Climber	Forest edge	1
PHYTOLACC-ACEAE	<i>Phytolacca</i>	<i>dioica</i> L.	S America	Tree	Riverbank	3
	<i>Rivinia</i>	<i>humilis</i> L.	N America	Shrub	Forest edge	1
PLANTAGIN-ACEAE	<i>Plantago</i>	<i>major</i> L.	Europe & Asia	Herb	Moist areas	-
	<i>Rumex</i>	<i>crispus</i> L.	Europe & Asia	Herb	Grassland	3
PROTEACEAE	<i>Grevillea</i>	<i>robusta</i> A.Cunn. ex R.Br.	Australia	Tree	Forest edge	3
ROSACEAE	<i>Rubus</i>	<i>rosifolius</i> J.E. Sm.	N America	Shrub	Forest edge	-
RUBIACEAE	<i>Richardia</i>	<i>brasiliensis</i> Gomes	S America	Herb	Grassland	-
RUTACEAE	<i>Citrus</i>	<i>sp. (EC3672)</i>	S & SE Asia	Tree	Forest edge	
SAPINDACEAE	<i>Cardiospermum</i>	<i>halicacabum</i>	Trop. America	Climber	Forest edge	-
SOLANACEAE	<i>Cestrum</i>	<i>laevigatum</i> Schltr	S America	Tree	Forest edge	1
	<i>Datura</i>	<i>metel</i> L.	Europe & Asia	Herb	Grassland	1
	<i>Physalis</i>	<i>peruviana</i> L.	S America	Herb	Grassland	-
	<i>Solanum</i>	<i>mauritanum</i> Scop.	S America	Tree	Forest edge, grassland	1
	<i>Solanum</i>	<i>hispidum</i> Pers.	N America	Herb	Disturbed areas	-
	<i>Solanum</i>	<i>nigrum</i> L.	Uncertain	Herb	Grassland	-
	<i>gen.</i>	<i>sp. (EC2979)</i>	Uncertain	Shrub	Forest	-
VERBENACEAE	<i>Lantana</i>	<i>camara</i> L.	S & C America	Shrub	Grassland	1
	<i>Verbena</i>	<i>bonariensis</i> L.	S America	Herb	Grassland	-
	<i>Verbena</i>	<i>officinalis</i> L.	Europe & Asia	Herb	Grassland	-

*Weed status: Government regulations as contained in Act 43 of 1983 and amended in March 2001 with regard to the legal status of each species are indicated as follows (Henderson 2001):

Appendix 2 Aliens found at Port St Johns

1. Declared Weed (Category 1)
 - Prohibited on any land surface in South Africa
 - Must be controlled, or eradicated where possible
2. Declared Invader (Category 2)
 - Allowed only in demarcated areas under controlled conditions
 - Must be controlled outside these areas
 - Prohibited within 30 m of the 1:50 year floodline
3. Declared Invader (Category 3)
 - a. No further plantings allowed
 - b. Prohibited within 30 m of the 1:50 year floodline

APPENDIX 3

Checklist of Port St. Johns (PSJ), Mkambati (MK), Umtamvuna (UMT) and Oribi Gorge (OG)

FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
BARTRAMIACEAE	<i>Philonotis dregeana</i> (C. Moll.) Jaeg.	1	0	0	0
BRYACEAE	<i>Bryum andicola</i> Hook.	1	0	0	0
BRYACEAE	<i>Bryum argenteum</i> Hedw.	1	0	0	0
BRYACEAE	<i>Bryum pycnophyllum</i> (Dixon) Mohamed	0	0	1	0
BRYACEAE	<i>Rhodobryum roseum</i> (Hedw.) Limpr.	0	0	1	0
CALYMPERACEAE	<i>Hypodontium dregei</i> (Hornsch.) C. Moll.	1	0	1	0
CALYMPERACEAE	<i>Octoblepharum albidum</i> Hedw.	0	1	0	0
DICRANACEAE	<i>Dicranella subsubulatus</i> (C. Mull.) A. Jaeger	1	0	0	0
DICRANIACEAE	<i>Campylopus robillardei</i> Besch.	0	0	1	0
DICRANIACEAE	<i>Campylopus pyriformis</i> (Schultz) Brid.	0	0	1	0
DICRANIACEAE	<i>Holomitrium cylindraceum</i> P. Beauv. var. <i>cucullatum</i>	0	0	1	0
FISSIDENTACEAE	<i>Fissidens borgenii</i> Hampe	0	0	1	0
FISSIDENTACEAE	<i>Fissidens palmifolius</i> (P. Beauv.) Broth.	1	0	0	0
FUNARIACEAE	<i>Leucobryum acutifolium</i> (Mitt.) Card.	0	1	1	0
FUNARIACEAE	<i>Leucoloma syrhopodontioides</i> Broth.	0	1	0	0
HOOKERIAEAE	<i>Hookeriopsis pappeana</i> (Hampe) Jaeg.	1	0	0	0
HOOKERIAEAE	<i>Hypopterygium laricinum</i> (Hook.) Brid.	1	1	0	0
HOOKERIAEAE	<i>Lopidium pennaeforme</i> (Brid.) Fleisch.	1	0	0	0
METEORACEAE	<i>Aerobryopsis capensis</i> (C. Moll.) Fleisch.	1	0	1	0
METEORACEAE	<i>Papillaria africana</i> (C. Moll.) Jaeg.	1	0	1	0
METEORACEAE	<i>Squamidium brasiliense</i> (Hornsch.) Broth.	1	0	0	0
MNIACEAE	<i>Plagiomnium rhynchophorum</i> (Hook.) Kop. var. <i>reidii</i>	1	0	0	0
ORTHOTRICHACEAE	<i>Macrocoma tenue</i> (Hook. & Grev.) Vitt	1	0	0	0
ORTHOTRICHACEAE	<i>Macromitrium serpens</i> (Hook. & Grev.) Brid.	1	0	0	0
ORTHOTRICHACEAE	<i>Schlotheimia ferruginea</i> (Hook. & Grev.) Brid.	1	0	0	0
RACOPILACEAE	<i>Racopilum capense</i> C. Moll.	1	1	0	0
SPHAGNACEAE	<i>Sphagnum africanum</i> Welw. & Dub.	0	1	0	0
SPHAGNACEAE	<i>Sphagnum capense</i> Hornsch.	0	0	1	0
SPHAGNACEAE	<i>Sphagnum truncatum</i> Hornsch.	1	0	0	0
THAMNOBRYACEAE	<i>Pophamium stipitatum</i> (Mitt.) Touw ex De Stover	0	0	1	0
ADIANTACEAE	<i>Adiantum capillus-veneris</i> L.	1	0	0	0
ADIANTACEAE	<i>Adiantum raddianum</i> Presl *	1	0	1	0
ADIANTACEAE	<i>Cheilanthes bergiana</i> Schlecht.	1	0	1	1
ADIANTACEAE	<i>Cheilanthes capensis</i> (Thunb.) Swartz	0	0	1	0
ADIANTACEAE	<i>Cheilanthes concolor</i> (Langsd. & Fisch.) R. & A.F. Tr	0	1	0	0
ADIANTACEAE	<i>Cheilanthes deltoidea</i> Kunze	0	0	0	1
ADIANTACEAE	<i>Cheilanthes hirta</i> Swartz	0	0	0	1
ADIANTACEAE	<i>Cheilanthes inaequalis</i> (Kunze) Mett. var. <i>buchananii</i>	0	0	1	1
ADIANTACEAE	<i>Cheilanthes multifida</i> (Swartz) Swartz subsp. <i>lacerata</i>	0	0	0	1
ADIANTACEAE	<i>Cheilanthes parviloba</i> (Swartz) Swartz	1	0	0	0
ADIANTACEAE	<i>Cheilanthes viridis</i> (Forssk.) Swartz var. <i>glauca</i> (Sim)	1	1	0	1
ADIANTACEAE	<i>Cheilanthes viridis</i> (Forssk.) Swartz var. <i>macrophylla</i>	1	0	1	1
ADIANTACEAE	<i>Cheilanthes viridis</i> (Forssk.) Swartz var. <i>viridis</i>	1	1	1	1
ADIANTACEAE	<i>Doryopteris concolor</i> (Langsd. & Fisch.) Kuhn	1	0	0	1
ADIANTACEAE	<i>Pellaea calomelanos</i> (Swartz) Link var. <i>calomelanos</i>	1	1	1	1
ADIANTACEAE	<i>Pellaea dura</i> (Willd.) Hook.	0	0	0	1
ADIANTACEAE	<i>Pityrogramma calomelanos</i> (Swartz) Link var. <i>aurea</i>	1	0	1	1
ADIANTACEAE	<i>Pteris buchananii</i> Bak. Ex Sim	1	0	0	1
ADIANTACEAE	<i>Pteris catoptera</i> Kunze	1	0	0	1
ADIANTACEAE	<i>Pteris dentata</i> Forssk.	0	0	1	1
ASPIDIACEAE	<i>Arachniodes foliosa</i> (C. Chr.) Schelpe	0	0	1	0
ASPIDIACEAE	<i>Cyrtomium caryotideum</i> (Wall. ex Hook. & Grev.) Pr	1	0	0	0

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Checklist of Port St. Johns (PSJ), Mkambati (MK), Umtamvuna (UMT) and Oribi Gorge (OG)

FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
ASPIDIACEAE	<i>Dryopteris inaequalis</i> (Schlecht.) Kuntze	1	0	0	0
ASPIDIACEAE	<i>Polystichum transkeiense</i> Jacobsen	1	0	1	0
ASPIDIACEAE	<i>Rumohra adiantiformis</i> (G. Forst.) Ching	1	0	0	1
ASPLENIACEAE	<i>Asplenium aethiopicum</i> (Burm. f.) Becherer	0	0	0	1
ASPLENIACEAE	<i>Asplenium dregeanum</i> Kunze	1	0	0	0
ASPLENIACEAE	<i>Asplenium erectum</i> Bory ex Willd.	1	0	0	1
ASPLENIACEAE	<i>Asplenium gemmiferum</i> Schrad.	0	0	0	1
ASPLENIACEAE	<i>Asplenium inaequilaterale</i> Willd.	0	0	0	1
ASPLENIACEAE	<i>Asplenium lunulatum</i> Swartz	1	0	1	1
ASPLENIACEAE	<i>Asplenium monanthes</i> L.	1	0	0	0
ASPLENIACEAE	<i>Asplenium prionitis</i> Kunze	1	0	1	0
ASPLENIACEAE	<i>Asplenium rutifolium</i> (Berg.) Kunze	1	1	1	1
ASPLENIACEAE	<i>Asplenium sandersonii</i> Hook.	0	0	0	1
ASPLENIACEAE	<i>Asplenium simii</i> Braithw. & Schelpe	0	1	0	0
ASPLENIACEAE	<i>Asplenium splendens</i> Kunze	1	1	1	1
ASPLENIACEAE	<i>Ceterach cordatum</i> (Thunb.) Desv.	0	0	0	1
ATHYRIACEAE	<i>Cystopteris fragilis</i> (L.) Bernh.	1	0	0	0
BLECHNACEAE	<i>Blechnum attenuatum</i> (Swartz) Mett. var. <i>giganteum</i>	0	0	1	1
BLECHNACEAE	<i>Blechnum capense</i> Burm. f.	0	1	1	0
BLECHNACEAE	<i>Blechnum punctulatum</i> Swartz	0	1	1	0
BLECHNACEAE	<i>Blechnum tabulare</i> (Thunb.) Kuhn	0	0	1	0
BLECHNACEAE	<i>Stenochlaena tenuifolia</i> (Desv.) T. Moore	0	0	1	1
CYATHEACEAE	<i>Cyathea dregei</i> Kunze	0	1	1	1
DAVALLIACEAE	<i>Davalia denticulata</i> (Burm.f.) Mett. Ex Kuhn var. <i>den</i>	0	0	1	0
DAVALLIACEAE	<i>Davalia chaerophylloides</i> (Poir.) Steud.	1	1	0	1
DAVALLIACEAE	<i>Nephrolepis exaltata</i> (L.) Schott *	1	0	1	0
DAVALLIACEAE	<i>Oleandra distenta</i> Kunze	0	0	1	1
DENNSTAEDTIACEAE	<i>Histiopteris incisa</i> (Thunb.) J. Sm.	0	0	0	1
DENNSTAEDTIACEAE	<i>Hypolepis sparsisora</i> (Schrad.) Kuhn	1	0	0	1
DENNSTAEDTIACEAE	<i>Pteridium aquilinum</i> (L.) Kuhn	1	0	0	1
DICRANACEAE	<i>Campylopus pilifer</i> Brid.	0	1	0	0
EQUISETACEAE	<i>Equisetum ramosissimum</i> Desf.	1	1	1	1
GLEICHENIACEAE	<i>Gleichenia polypodioides</i> (L.) J.E. Sm.	1	1	1	1
GLEICHENIACEAE	<i>Gleichenia umbraculifera</i> (Kunze) T. Moore	1	0	0	1
HYMENOPHYLLACEAE	<i>Trichomanes borbonicum</i> v.d. Bosch	0	0	0	1
HYMENOPHYLLACEAE	<i>Trichomanes inopinatum</i> (Pichi-Serm.) JEB	1	0	0	0
HYMENOPHYLLACEAE	<i>Trichomanes melanotrichum</i> Schlecht.	1	0	1	1
HYMENOPHYLLACEAE	<i>Trichomanes reptans</i> Swartz	0	0	0	1
HYMENOPHYLLACEAE	<i>Trichomanes rigidum</i> Swartz	0	0	1	0
LINDSAEACEAE	<i>Lindsaea ensifolia</i> Swartz	0	1	0	0
LOMARIOPSIDACEAE	<i>Elaphoglossum acrostichoides</i> (Hook. & Grev.) Sche	0	0	1	0
LOMARIOPSIDACEAE	<i>Elaphoglossum angustatum</i> (Schrad.) Hieron.	0	0	1	0
LOMARIOPSIDACEAE	<i>Elaphoglossum macropodium</i> (Fee) T. Moore	0	0	0	1
LYCOPODIACEAE	<i>Lycopodium carolinianum</i> L. var. <i>carolinianum</i>	1	1	1	0
LYCOPODIACEAE	<i>Lycopodium carolinianum</i> L. var. <i>grandifolium</i> Spring	1	0	0	0
LYCOPODIACEAE	<i>Lycopodium cernuum</i> L.	1	1	1	1
LYCOPODIACEAE	<i>Lycopodium dacydioides</i> Bak.	1	0	0	0
LYCOPODIACEAE	<i>Lycopodium gnidioides</i> L. f.	1	1	1	1
LYCOPODIACEAE	<i>Lycopodium verticillatum</i> L.f.	1	0	1	0
MARATTIACEAE	<i>Marattia fraxinea</i> J.E. Sm. ex J.F. Gmel. var. <i>salicifo</i>	1	0	1	0
MARSILEACEAE	<i>Marsilea capensis</i> A. Br.	1	0	0	0
OPHIOGLOSSACEAE	<i>Ophioglossum reticulatum</i> L.	1	0	0	0

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
OSMUNDACEAE	<i>Osmunda regalis</i> L.	1	0	1	1
OSMUNDACEAE	<i>Todea barbara</i> (L.) T. Moore	1	1	1	1
POLYPODIACEAE	<i>Microgramma lycopodioides</i> (L.) Copel.	1	0	1	1
POLYPODIACEAE	<i>Microsorium punctatum</i> (L.) Copel.	1	1	1	1
POLYPODIACEAE	<i>Microsorium scolopendrium</i> (Burm. f.) Copel.	1	1	1	0
POLYPODIACEAE	<i>Platynerium</i> sp. cf. <i>bifurcatum</i> *	1	0	0	0
POLYPODIACEAE	<i>Pleopeltis macrocarpa</i> (Bory ex Willd.) Kaulf.	1	0	1	1
POLYPODIACEAE	<i>Pleopeltis schraderi</i> (Mett.) Tardieu	0	0	1	0
POLYPODIACEAE	<i>Polypodium polypodioides</i> (L.) Hitchc. subsp. <i>eckloni</i>	0	0	1	0
POLYPODIACEAE	<i>Pyrrosia africana</i> (Kunze) Ballard	1	1	1	1
PSILOACEAE	<i>Psilotum nudum</i> (L.) Beauv.	1	1	1	1
SCHIZAEACEAE	<i>Anemia dregeana</i> Kunze	0	0	1	1
SCHIZAEACEAE	<i>Lygodium japonicum</i> Swartz *	1	0	0	0
SCHIZAEACEAE	<i>Lygodium kerstenii</i> Kuhn	1	0	0	0
SCHIZAEACEAE	<i>Mohria caffrorum</i> (L.) Desv. var. <i>caffrorum</i>	1	0	1	1
SCHIZAEACEAE	<i>Mohria caffrorum</i> (L.) Desv. var. <i>ferruginea</i> J.E. & S	0	0	0	1
SCHIZAEACEAE	<i>Schizaea pectinata</i> (L.) Swartz	1	1	0	1
SELAGINACEAE	<i>Selaginella</i> sp.	1	0	0	0
SELAGINELLACEAE	<i>Selaginella caffrorum</i> (Milde) Hieron.	0	0	1	0
SELAGINELLACEAE	<i>Selaginella dregei</i> (Presl) Hieron.	0	1	1	1
SELAGINELLACEAE	<i>Selaginella kraussiana</i> (Kunze) A. Braun	1	0	0	0
SELAGINELLACEAE	<i>Selaginella mittenii</i> Bak.	1	0	1	1
THELYPTERIDACEAE	<i>Macrothelypteris torresiana</i> (Gaud.) Ching *	0	0	1	1
THELYPTERIDACEAE	<i>Thelypteris confluens</i> (Thunb.) Morton	0	0	1	0
THELYPTERIDACEAE	<i>Thelypteris dentata</i> (Forssk.) E. St. John	1	0	1	1
THELYPTERIDACEAE	<i>Thelypteris gueinziana</i> (Mett.) Schelpe	0	0	1	1
THELYPTERIDACEAE	<i>Thelypteris interrupta</i> (Willd.) K. Iwats.	1	0	1	0
THELYPTERIDACEAE	<i>Thelypteris pozoi</i> (Lag.) Morton	1	0	0	0
VITTARIACEAE	<i>Vittaria isoetifolia</i> Bory	1	1	1	1
PINACEAE	<i>Pinus radiata</i> D. Don. *	1	0	0	0
PODOCARPACEAE	<i>Podocarpus falcatus</i> (Thunb.) R. Br. ex Mirb.	0	1	1	1
PODOCARPACEAE	<i>Podocarpus henkelii</i> Stapf ex Dallim. & Jacks.	1	0	0	0
PODOCARPACEAE	<i>Podocarpus latifolius</i> (Thunb.) R. Br. ex Mirb.	1	1	1	1
STANGERIACEAE	<i>Stangeria eriopus</i> (Kunze) Baill.	1	1	1	1
ZAMIACEAE	<i>Encephalartos altensteinii</i> Lehm.	0	1	0	0
ZAMIACEAE	<i>Encephalartos caffer</i> (Thunb.) Lehm.	0	0	0	1
ZAMIACEAE	<i>Encephalartos ghellinckii</i> Lem.	0	0	0	1
ZAMIACEAE	<i>Encephalartos laevifolius</i> Stapf & Burtt Davy	0	0	1	0
ZAMIACEAE	<i>Encephalartos natalensis</i> R.A. Dyer & Verdoorn	0	1	1	1
ZAMIACEAE	<i>Encephalartos villosus</i> Lehm.	1	1	1	1
ACANTHACEAE	<i>Asystasia gangetica</i> (L.) T. Anders.	1	1	1	1
ACANTHACEAE	<i>Asystasia varia</i> N.E. Br.	1	1	1	0
ACANTHACEAE	<i>Barleria gueinzii</i> Sond.	1	0	1	0
ACANTHACEAE	<i>Barleria meyerana</i> Nees	0	0	1	1
ACANTHACEAE	<i>Barleria obtusa</i> Nees	0	0	1	1
ACANTHACEAE	<i>Barleria ovata</i> E. Mey. ex Nees	0	0	0	1
ACANTHACEAE	<i>Blepharis integrifolia</i> (L. f.) E. Mey. ex Schinz var. <i>int</i>	0	0	0	1
ACANTHACEAE	<i>Blepharis obtusisepala</i> Oberm.	0	0	0	1
ACANTHACEAE	<i>Chaetacanthus burchellii</i> Nees	0	0	1	1
ACANTHACEAE	<i>Chaetacanthus setiger</i> (Pers.) Lindl.	0	1	0	1
ACANTHACEAE	<i>Crabbea hirsuta</i> Harv.	0	0	1	0
ACANTHACEAE	<i>Crabbea nana</i> Nees	0	1	0	0

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
ACANTHACEAE	<i>Crabbea ovalifolia</i> Fical. & Hiern	0	0	1	0
ACANTHACEAE	<i>Dicliptera clinopodia</i> Nees	1	0	0	1
ACANTHACEAE	<i>Dicliptera heterostegia</i> Presl ex Nees	1	0	0	1
ACANTHACEAE	<i>Dicliptera zeylanica</i> Nees	1	0	0	1
ACANTHACEAE	<i>Duvernoia adhatodoides</i> E.Mey. ex Nees.	1	1	1	1
ACANTHACEAE	<i>Hypoestes aristata</i> (Vahl) Soland. ex Roem. & Schull	1	1	1	1
ACANTHACEAE	<i>Hypoestes forskoolii</i> (Vahl) R. Br.	1	1	1	0
ACANTHACEAE	<i>Isoglossa ciliata</i> (Nees) Lindau	0	0	1	1
ACANTHACEAE	<i>Isoglossa cooperi</i> C.B. Cl.	1	1	1	1
ACANTHACEAE	<i>Isoglossa delicatula</i> C.B. Cl.	0	0	1	0
ACANTHACEAE	<i>Isoglossa eckloniana</i> (Nees) Lindau	1	0	0	0
ACANTHACEAE	<i>Isoglossa grantii</i> C.B. Cl.	1	0	0	0
ACANTHACEAE	<i>Isoglossa hypoestiflora</i> Lindau	1	1	1	1
ACANTHACEAE	<i>Isoglossa ovata</i> (Nees) Lindau	1	1	1	1
ACANTHACEAE	<i>Isoglossa proluxa</i> (Nees) Lindau	1	0	0	0
ACANTHACEAE	<i>Isoglossa stipitata</i> C.B. Cl.	0	0	1	0
ACANTHACEAE	<i>Isoglossa woodii</i> C.B. Cl.	0	0	1	0
ACANTHACEAE	<i>Justicia betonica</i> L.	0	0	0	1
ACANTHACEAE	<i>Justicia campylostemon</i> (Nees) T. Anders.	1	1	1	1
ACANTHACEAE	<i>Justicia flava</i> (Vahl.) Vahl.	0	0	0	1
ACANTHACEAE	<i>Justicia petiolaris</i> (Nees) T. Anders. subsp. bowiei (C	0	0	0	1
ACANTHACEAE	<i>Justicia petiolaris</i> (Nees) T. Anderson subsp. incerta (0	1	0	0
ACANTHACEAE	<i>Justicia protracta</i> (Nees) T. Anders. subsp. protracta	0	0	0	1
ACANTHACEAE	<i>Justicia protracta</i> (Nees) T. Anders. subsp. rhodesiar	0	0	0	1
ACANTHACEAE	<i>Mackaya bella</i> Harv.	1	1	1	0
ACANTHACEAE	<i>Peristrophe cernua</i> Nees	1	0	1	1
ACANTHACEAE	<i>Peristrophe natalensis</i> T. Anders	0	0	0	1
ACANTHACEAE	<i>Phaulopsis imbricata</i> (Forssk.) Sweet	1	1	0	0
ACANTHACEAE	<i>Rhinacanthus gracilis</i> Klotzsch	0	0	1	1
ACANTHACEAE	<i>Ruellia cordata</i> Thunb.	1	1	0	1
ACANTHACEAE	<i>Ruellia malacophylla</i> C.B. Cl.	0	0	1	0
ACANTHACEAE	<i>Ruttya ovata</i> Harv.	0	0	1	1
ACANTHACEAE	<i>Sclerochiton harveyanus</i> Nees	1	1	1	1
ACANTHACEAE	<i>Siphonoglossa leptantha</i> (Nees) Immelman subsp. /e	1	0	1	1
ACANTHACEAE	<i>Siphonoglossa nkandlaensis</i> Immelman	0	0	1	0
ACANTHACEAE	<i>Thunbergia alata</i> Sims	0	0	0	1
ACANTHACEAE	<i>Thunbergia atriplicifolia</i> E. Mey. ex Nees x T. capens	0	1	0	0
ACANTHACEAE	<i>Thunbergia atriplicifolia</i> E.Mey.ex Nees	0	0	1	1
ACANTHACEAE	<i>Thunbergia dregeana</i> Nees	1	0	1	1
ACANTHACEAE	<i>Thunbergia natalensis</i> Hook.	1	0	1	0
ACANTHACEAE	<i>Thunbergia neglecta</i> Sond.	0	0	0	1
ACANTHACEAE	<i>Thunbergia purpurata</i> Harv. ex C.B. Cl.	0	1	1	1
ACHARIACEAE	<i>Ceratosicyos laevis</i> (Thunb.) A. Meeuse	1	0	1	1
AIZOACEAE	<i>Aizoon canariense</i> L.	1	0	0	0
AIZOACEAE	<i>Pharnaceum thunbergii</i> Adamson	0	1	0	0
AIZOACEAE	<i>Psammotropha mucronata</i> (Thunb.) Fenzl var. mucr	0	1	1	0
AIZOACEAE	<i>Psammotropha myriantha</i> Sond.	0	0	1	0
AMARANTHACEAE	<i>Achyranthes aspera</i> L. var. aspera *	1	0	1	1
AMARANTHACEAE	<i>Achyranthes aspera</i> L. var. sicula L.*	1	0	0	1
AMARANTHACEAE	<i>Achyropsis avicularis</i> (E.Mey.ex Moq.) Hook.f.	1	0	0	0
AMARANTHACEAE	<i>Achyropsis leptostachya</i> (E. Mey. ex Meisn.) Bak. &	0	0	1	0
AMARANTHACEAE	<i>Alternanthera pungens</i> H.B.K. *	0	0	0	1

FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
AMARANTHACEAE	<i>Amaranthus hybridus</i> L. var. <i>hybridus</i> *	1	0	0	0
AMARANTHACEAE	<i>Amaranthus spinosus</i> L.*	1	0	0	0
AMARANTHACEAE	<i>Celosia trigyna</i> L.	1	0	1	1
AMARANTHACEAE	<i>Cyathula cylindrica</i> Moq.	1	0	1	1
AMARANTHACEAE	<i>Gomphrena celosioides</i> Mart. *	0	0	1	0
AMARANTHACEAE	<i>Pupalia lappacea</i> (L.) A. Juss. var. <i>lappacea</i>	1	1	1	1
ANACARDIACEAE	<i>Harpephyllum caffrum</i> Bernh. ex Krauss	1	1	1	1
ANACARDIACEAE	<i>Loxostylis alata</i> Spreng. f. ex Reichb.	0	1	1	1
ANACARDIACEAE	<i>Protorhus longifolia</i> (Bernh.) Engl.	1	1	1	1
ANACARDIACEAE	<i>Rhus acocksii</i> Moffett	0	1	1	1
ANACARDIACEAE	<i>Rhus carnosula</i> Schonl.	1	1	1	1
ANACARDIACEAE	<i>Rhus chirindensis</i> Bak. f.	1	1	1	1
ANACARDIACEAE	<i>Rhus crenata</i> Thunb.	0	0	0	1
ANACARDIACEAE	<i>Rhus dentata</i> Thunb.	1	1	1	1
ANACARDIACEAE	<i>Rhus discolor</i> E. Mey. ex Sond.	0	0	1	1
ANACARDIACEAE	<i>Rhus fastigiata</i> Eckl. & Zeyh.	1	1	1	0
ANACARDIACEAE	<i>Rhus gueinzii</i> Sond.	1	0	1	1
ANACARDIACEAE	<i>Rhus lucida</i> L.	1	1	1	1
ANACARDIACEAE	<i>Rhus natalensis</i> Bernh. ex Krauss	1	1	1	1
ANACARDIACEAE	<i>Rhus nebulosa</i> Schonl.	1	1	1	1
ANACARDIACEAE	<i>Rhus pallens</i> Eckl. & Zeyh.	0	0	0	1
ANACARDIACEAE	<i>Rhus pentheri</i> Zahlbr.	0	1	1	1
ANACARDIACEAE	<i>Rhus pondoensis</i> Schonl.	0	0	1	0
ANACARDIACEAE	<i>Rhus pyroides</i> Burch. var. <i>pyroides</i>	0	0	0	1
ANACARDIACEAE	<i>Rhus rehmanniana</i> Engl. in A. & C. DC. subsp. <i>rehma</i>	0	0	1	1
ANACARDIACEAE	<i>Rhus</i> sp. nov. cf <i>R. rigida</i>	0	0	0	1
ANACARDIACEAE	<i>Sclerocarya birrea</i> (A. Rich) Hochst. subsp. <i>caffra</i> (S	0	0	0	1
ANNONACEAE	<i>Monanthes caffra</i> (Sond.) Verdc.	1	1	1	1
ANNONACEAE	<i>Uvaria caffra</i> E. Mey. ex Sond.	1	1	1	1
ANNONACEAE	<i>Uvaria lucida</i> Benth.	0	1	0	1
APIACEAE	<i>Alepidea gracilis</i> Dummer	1	0	0	0
APIACEAE	<i>Alepidea longifolia</i> E. Mey. subsp. <i>angusta</i> (Duemme	1	1	0	0
APIACEAE	<i>Alepidea longifolia</i> E. Mey. var. <i>longifolia</i>	1	1	1	1
APIACEAE	<i>Alepidea natalensis</i> Wood & Evans	1	0	0	0
APIACEAE	<i>Annesorhiza flagellifolia</i> Burt Davy	0	1	0	0
APIACEAE	<i>Apium graveolens</i> L.	0	1	0	0
APIACEAE	<i>Apium prostratum</i> Vent.	0	1	0	0
APIACEAE	<i>Berula erecta</i> (Hudson) Cov. Subsp. <i>thunbergii</i>	1	0	0	0
APIACEAE	<i>Ciclospermum leptophyllum</i> (Pers.) Eichler	0	1	1	0
APIACEAE	<i>Ciclospermum leptophyllum</i> (Pers.) Sprague	1	0	0	0
APIACEAE	<i>Foeniculum vulgare</i> Mill.*	0	0	1	1
APIACEAE	<i>Heteromorpha arborescens</i> (Thunb.) Cham. & Schleg	0	1	1	1
APIACEAE	<i>Heteromorpha trifoliata</i> (Wendl.) Eckl. & Zeyh.	0	0	0	1
APIACEAE	<i>Lichtensteinia interrupta</i> (Thunb.) E. Mey. ex Sond.	0	0	1	0
APIACEAE	<i>Lichtensteinia kolbeana</i> H. Bol.	0	1	1	0
APIACEAE	<i>Peucedanum caffrum</i> (Meisn.) Phill.	0	0	0	1
APIACEAE	<i>Peucedanum capense</i> (Thunb.) Sond. var. <i>capense</i>	1	1	0	0
APIACEAE	<i>Peucedanum natalense</i> (Sond.) Engl.	0	1	1	0
APIACEAE	<i>Peucedanum platycarpum</i> E. Mey.	0	0	1	0
APIACEAE	<i>Pimpinella caffra</i> (Eckl. & Zeyh.) D. Dietr. subsp. <i>caf</i>	0	1	1	1
APIACEAE	<i>Sanicula elata</i> Buch.-Ham. ex D. Don	1	0	0	0
APIACEAE	<i>Stenosemis angustifolia</i> E. Mey. ex Sond.	0	0	1	0

APPENDIX 3

Checklist of Port St. Johns (PSJ), Mkambati (MK), Umtamvuna (UMT) and Oribi Gorge (OG)

FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
APIACEAE	<i>Torilis arvensis</i> (Huds.) Link *	1	0	0	0
APOCYNACEAE	<i>Thevetia peruviana</i> (Pers.) K.Schum.*	1	0	0	0
APOCYNACEAE	<i>Acokanthera oblongifolia</i> (Hochst.)Codd	1	1	1	0
APOCYNACEAE	<i>Acokanthera oppositifolia</i> (Lam.) Codd	1	1	1	1
APOCYNACEAE	<i>Carissa bispinosa</i> (L.) Desf. ex Brenan subsp. zambe	0	0	1	0
APOCYNACEAE	<i>Carissa bispinosa</i> (L.) Desf. ex Brenan var. acuminat	0	1	0	0
APOCYNACEAE	<i>Carissa bispinosa</i> (L.) Desf. ex Brenan var. bispinosa	1	0	1	1
APOCYNACEAE	<i>Carissa macrocarpa</i> (Eckl.) A. DC.	1	1	0	0
APOCYNACEAE	<i>Carissa</i> sp. nov.	0	0	1	0
APOCYNACEAE	<i>Carissa wyliei</i> N.E. Br.	1	1	1	0
APOCYNACEAE	<i>Cryptolepis capensis</i> Schltr.	0	0	1	1
APOCYNACEAE	<i>Cryptolepis oblongifolia</i> (Meisn.) Schltr.	0	0	0	1
APOCYNACEAE	<i>Gonioma kamassi</i> E. Mey.	0	0	1	0
APOCYNACEAE	<i>Oncinotis inandensis</i> Wood & Evans	0	1	0	0
APOCYNACEAE	<i>Oncinotis tenuiloba</i> Stapf	1	1	1	0
APOCYNACEAE	<i>Petopentia natalensis</i> (Schltr.) Bullock	0	0	1	1
APOCYNACEAE	<i>Raphionacme galpinii</i> Schltr.	1	1	1	1
APOCYNACEAE	<i>Raphionacme hirsuta</i> (E. Mey.) R.A. Dyer ex Phill.	0	1	0	0
APOCYNACEAE	<i>Raphionacme palustris</i> Venter & Verhoefen	0	1	1	0
APOCYNACEAE	<i>Rauvolfia caffra</i> Sond.	1	1	1	0
APOCYNACEAE	<i>Strophanthus speciosus</i> (Ward & Harv.) Reber	1	1	1	1
APOCYNACEAE	<i>Tabernaemontana ventricosa</i> Hochst. ex A. DC.	0	1	0	0
APOCYNACEAE	<i>Voacanga thouarsii</i> Roem. & Schult.	0	1	1	0
AQUIFOLIACEAE	<i>Ilex mitis</i> (L.) Radlk. var. mitis	0	1	1	0
ARALIACEAE	<i>Centella asiatica</i> (L.) Urb.	1	1	0	0
ARALIACEAE	<i>Centella coriacea</i> Nannfd.	0	0	0	1
ARALIACEAE	<i>Centella glabrata</i> L. var. glabrata	1	0	1	0
ARALIACEAE	<i>Centella glabrata</i> L. var. natalensis Adamson	0	1	1	1
ARALIACEAE	<i>Centella graminifolia</i> Adamson	0	1	0	0
ARALIACEAE	<i>Cussonia nicholsonii</i> Strey	0	1	1	1
ARALIACEAE	<i>Cussonia sphaerocephala</i> Strey	0	1	1	1
ARALIACEAE	<i>Cussonia spicata</i> Thunb.	1	1	1	1
ARALIACEAE	<i>Cussonia thyrsoflora</i> Thunb.	1	0	0	0
ARALIACEAE	<i>Cussonia zuluensis</i> Strey	1	0	0	0
ARALIACEAE	<i>Hydrocotyle bonariensis</i> Lam.	0	1	0	0
ARALIACEAE	<i>Schefflera umbellifera</i> (Sond.) Baill.	1	1	1	1
ARALIACEAE	<i>Seemannaralia gerrardii</i> (Seemann) Harms	1	0	0	1
ARISTOLOCHIACEAE	cf. <i>Asarum</i> sp.*	1	0	0	0
ASCLEPIADACEAE	<i>Aspidoglossum carinatum</i> (Schltr.) Kupicha	0	1	0	0
ASCLEPIADACEAE	<i>Aspidoglossum woodii</i> (Schltr.) Kupicha	0	0	1	0
ASCLEPIADACEAE	<i>Aspidonepsis diploglossa</i> Nicholas & Goyder	0	0	1	0
ASCLEPIADACEAE	<i>Brachystelma australe</i> R.A. Dyer	0	1	1	1
ASCLEPIADACEAE	<i>Brachystelma</i> sp.nov. (=Nicholas 2356)	0	1	0	0
ASCLEPIADACEAE	<i>Brachystelma vahrmeijeri</i> R.A. Dyer	0	0	0	1
ASCLEPIADACEAE	<i>Ceropegia carnososa</i> E. Mey.	0	0	1	0
ASCLEPIADACEAE	<i>Ceropegia distincta</i> N.E. Br. subsp. haygarthii (Schltr)	0	0	0	1
ASCLEPIADACEAE	<i>Ceropegia racemosa</i> N.E.Br. subsp. setifera (Schltr.)	0	0	1	0
ASCLEPIADACEAE	<i>Cynanchum ellipticum</i> (Harv.) R.A. Dyer	1	0	0	1
ASCLEPIADACEAE	<i>Cynanchum gerrardii</i> (Harv.) Liede	0	0	0	1
ASCLEPIADACEAE	<i>Cynanchum natalitium</i> Schltr.	1	1	0	1
ASCLEPIADACEAE	<i>Cynanchum obtusifolium</i> L. f. var. obtusifolium	1	0	0	0
ASCLEPIADACEAE	<i>Dregea floribunda</i> E. Mey.	0	0	0	1

FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
ASCLEPIADACEAE	<i>Fockea tugelensis</i> N.E. Br.	0	0	0	1
ASCLEPIADACEAE	<i>Gomphocarpus fruticosus</i> (L.) W.T.Aiton	1	0	0	0
ASCLEPIADACEAE	<i>Gomphocarpus physocarpus</i> E.Mey.	1	0	1	1
ASCLEPIADACEAE	<i>Huernia hystrix</i> (Hook.f.) N.E.Br.	0	0	1	1
ASCLEPIADACEAE	<i>Pachycaris albens</i> (E.Mey.) Nicholas & Goyder	1	1	1	1
ASCLEPIADACEAE	<i>Pachycarpus asperifolius</i> Meisn.	1	1	1	1
ASCLEPIADACEAE	<i>Pachycarpus concolor</i> E. Mey.	0	0	1	0
ASCLEPIADACEAE	<i>Pachycarpus confusus</i> (Scott Elliot) Nicholas	0	0	0	1
ASCLEPIADACEAE	<i>Pachycarpus coronarius</i> E. Mey.	0	0	1	0
ASCLEPIADACEAE	<i>Pachycarpus grandiflorus</i> (L. f.) E. Mey. var. <i>grandifl.</i>	0	1	1	0
ASCLEPIADACEAE	<i>Pachycarpus natalensis</i> N.E.Br. -	1	0	0	0
ASCLEPIADACEAE	<i>Pachycarpus orbicularis</i> E. Mey.	0	0	1	0
ASCLEPIADACEAE	<i>Paulforstera patens</i> (N.E.Br.) Nicholas	1	0	0	0
ASCLEPIADACEAE	<i>Paulforstera truncata</i> (E.Mey.) Nicholas	0	1	1	1
ASCLEPIADACEAE	<i>Riocreuxia torulosa</i> Decne.	1	0	1	0
ASCLEPIADACEAE	<i>Sarcostemma viminale</i> (L.) R. Br.	1	0	1	1
ASCLEPIADACEAE	<i>Schizoglossum atropurpureum</i> E. Mey. subsp. <i>virens</i>	1	1	0	0
ASCLEPIADACEAE	<i>Schizoglossum bidens</i> E. Mey. subsp. <i>bidens</i>	0	1	0	0
ASCLEPIADACEAE	<i>Schizoglossum bidens</i> E. Mey. subsp. <i>pachyglossum</i>	0	0	1	0
ASCLEPIADACEAE	<i>Schizoglossum cordifolium</i> E.Mey.	1	0	0	0
ASCLEPIADACEAE	<i>Secamone alpinii</i> Schultes	1	1	1	1
ASCLEPIADACEAE	<i>Secamone filiformis</i> (L. f.) J.H. Ross	1	1	1	1
ASCLEPIADACEAE	<i>Secamone gerrardii</i> Harv. ex Benth.	1	0	0	1
ASCLEPIADACEAE	<i>Sigridia viridiflorum</i> (E.Mey.) Nicholas	0	0	1	0
ASCLEPIADACEAE	<i>Sisyranthus barbatus</i> (Turcz.) N.E. Br.	0	1	1	0
ASCLEPIADACEAE	<i>Sisyranthus fanniniae</i> N.E. Br.	0	0	1	0
ASCLEPIADACEAE	<i>Sisyranthus imberbis</i> Harv.	0	1	1	0
ASCLEPIADACEAE	<i>Sisyranthus saundersiae</i> N.E.Br.	0	0	1	0
ASCLEPIADACEAE	<i>Sisyranthus virgatus</i> E. Mey.	0	1	1	0
ASCLEPIADACEAE	<i>Stenostelma involucratum</i> (Decne.) Nicholas	1	1	1	0
ASCLEPIADACEAE	<i>Telosma africana</i> (N.E. Br.) N.E. Br.	1	0	1	1
ASCLEPIADACEAE	<i>Tenaris rubella</i> E. Mey.	0	0	1	1
ASCLEPIADACEAE	<i>Tylophora anomala</i> N.E. Br.	1	0	0	0
ASCLEPIADACEAE	<i>Tylophora cordata</i> (Thunb.) Druce	1	0	0	1
ASCLEPIADACEAE	<i>Tylophora flanaganii</i> Schltr.	1	0	0	1
ASCLEPIADACEAE	<i>Tylophora lycioides</i> (E. Mey.) Decne.	1	0	0	0
ASCLEPIADACEAE	<i>Tylophora umbellata</i> Schltr.	0	0	1	0
ASCLEPIADACEAE	<i>Xysmalobium undulatum</i> (L.) Ait. f.	0	0	1	0
ASTERACEAE	<i>Acanthospermum australe</i> (Loefl.) Kuntze *	0	0	0	1
ASTERACEAE	<i>Acanthospermum glabratum</i> (DC.) Wild*	0	1	1	0
ASTERACEAE	<i>Acanthospermum hispidum</i> DC.*	1	0	1	0
ASTERACEAE	<i>Adenostemma viscosum</i>	1	0	0	0
ASTERACEAE	<i>Ageratum conyzoides</i> L.*	0	0	0	1
ASTERACEAE	<i>Ageratum houstonianum</i> Mill.*	1	0	1	0
ASTERACEAE	<i>Ambrosia artemisiifolia</i> L.*	1	0	1	0
ASTERACEAE	<i>Anisochaeta mikanoides</i> DC.	0	0	1	0
ASTERACEAE	<i>Arctotheca populifolia</i> (Berg.) T. Norl.	1	0	0	0
ASTERACEAE	<i>Artemisia afra</i> Jacq. ex Willd.	1	0	1	1
ASTERACEAE	<i>Aster bakeranus</i> Burt Davy ex C.A. Sm.	1	0	1	0
ASTERACEAE	<i>Aster harveyanus</i> Kuntze	0	0	1	1
ASTERACEAE	<i>Aster squamatus</i> (Spreng.) Hieron.	0	1	1	0
ASTERACEAE	<i>Athrix phylicoides</i> DC.	1	1	1	1

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Checklist of Port St. Johns (PSJ), Mkambati (MK), Umtamvuna (UMT) and Oribi Gorge (OG)

FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
ASTERACEAE	<i>Berkheya bergiana</i> Soederb.	1	0	1	0
ASTERACEAE	<i>Berkheya bipinnatifida</i> (Harv.) Roessl. subsp. bipinnata	1	0	1	1
ASTERACEAE	<i>Berkheya erysithales</i> (DC.) Roessl.	1	1	1	1
ASTERACEAE	<i>Berkheya insignis</i> (Harv.) Thell.	0	1	1	0
ASTERACEAE	<i>Berkheya maritima</i> Wood & Evans	0	0	0	1
ASTERACEAE	<i>Berkheya rhapontica</i> (DC.) Hutch. & Burt Davy subsp.	1	1	1	0
ASTERACEAE	<i>Berkheya robusta</i> Bohnen ex Roessl.	1	0	0	0
ASTERACEAE	<i>Berkheya setifera</i> DC.	0	0	1	0
ASTERACEAE	<i>Berkheya speciosa</i> (DC.) O. Hoffm. subsp. speciosa	1	1	1	1
ASTERACEAE	<i>Berkheya sphaerocephala</i> (DC.) Roessl.	0	0	0	1
ASTERACEAE	<i>Berkheya umbellata</i> DC.	0	0	1	0
ASTERACEAE	<i>Bidens bipinnata</i> L. *	0	0	0	1
ASTERACEAE	<i>Bidens biternata</i> (Lour.) Merrill & Scherff *	1	0	0	0
ASTERACEAE	<i>Bidens pilosa</i> L. *	1	0	0	1
ASTERACEAE	<i>Blumea cafra</i> (DC.) O. Hoffm.	0	0	1	0
ASTERACEAE	<i>Blumea mollis</i> (D. Don) Merr.	0	1	1	0
ASTERACEAE	<i>Brachylaena discolor</i> DC. var. discolor	1	1	0	1
ASTERACEAE	<i>Brachylaena elliptica</i> (Thunb.) DC.	1	0	0	1
ASTERACEAE	<i>Brachylaena glabra</i> (L.f.) Druce.	1	1	1	1
ASTERACEAE	<i>Brachylaena uniflora</i> Harv.	1	1	1	1
ASTERACEAE	<i>Callilepis laureola</i> DC.	0	1	1	1
ASTERACEAE	<i>Callilepis leptophylla</i> Harv.	0	0	0	1
ASTERACEAE	<i>Campuloclinum macrocephalum</i> (Less.)DC. *	1	0	0	0
ASTERACEAE	<i>Chromolaena odorata</i> (L.) R.M. King & H. Robinson*	1	0	1	1
ASTERACEAE	<i>Chrysanthemoides monilifera</i> (L.) T. Norl. subsp. monilifera	1	1	1	0
ASTERACEAE	<i>Chrysanthemoides monilifera</i> (L.) T. Norl. subsp. rotundifolia	0	0	1	1
ASTERACEAE	<i>Chrysocoma ciliata</i> L.	0	0	0	1
ASTERACEAE	<i>Cineraria albicans</i> N.E. Br.	0	1	0	1
ASTERACEAE	<i>Cineraria decipiens</i> Harv.	0	0	0	1
ASTERACEAE	<i>Cineraria deltoidea</i> Sond.	1	0	0	0
ASTERACEAE	<i>Cineraria geraniifolia</i> DC.	0	0	1	0
ASTERACEAE	<i>Cineraria lobata</i> L'Herit.	0	0	0	1
ASTERACEAE	<i>Cineraria</i> sp.	0	1	1	1
ASTERACEAE	<i>Cirsium vulgare</i> (Savi) Ten. *	1	0	0	0
ASTERACEAE	<i>Conyza albida</i> Spreng.*	1	0	0	1
ASTERACEAE	<i>Conyza attenuata</i> DC.	0	0	1	0
ASTERACEAE	<i>Conyza bonariensis</i> (L.) Cronq.*	1	0	0	0
ASTERACEAE	<i>Conyza chilensis</i> Spreng.*	1	0	0	0
ASTERACEAE	<i>Conyza obscura</i> DC.	0	0	1	0
ASTERACEAE	<i>Conyza pinnata</i> (L. f.) Kuntze	1	0	0	0
ASTERACEAE	<i>Conyza scabrida</i> DC.	1	0	1	1
ASTERACEAE	<i>Conyza ulmifolia</i> (Burm. f.) Kuntze	0	0	1	0
ASTERACEAE	<i>Cotula hispida</i> (DC.) Harv.	0	0	0	1
ASTERACEAE	<i>Cotula nigellifolia</i> (DC.) Bremer & Humphries var. nigellifolia	1	0	0	0
ASTERACEAE	<i>Crassocephalum crepidioides</i> (Benth.) S. Moore	1	0	0	1
ASTERACEAE	<i>Crassocephalum picridifolium</i> (DC.) S. Moore	0	0	1	0
ASTERACEAE	<i>Dichrocephala integrifolia</i> (L. f.) Kuntze subsp. integrifolia	1	0	0	0
ASTERACEAE	<i>Disparago ericoides</i> (Berg.) Gaertn.	0	0	1	1
ASTERACEAE	<i>Disparago tortilis</i> (DC.) Sch. Bip.	0	0	0	1
ASTERACEAE	<i>Ethulia conyzoides</i> L.f.	1	0	0	0
ASTERACEAE	<i>Euryops brachypodus</i> (DC.) B. Nord.	1	0	0	0
ASTERACEAE	<i>Euryops brevipapposus</i> M.D. Henderson	1	0	1	1

APPENDIX 3

Checklist of Port St. Johns (PSJ), Mkambati (MK), Umtamvuna (UMT) and Oribi Gorge (OG)

FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
ASTERACEAE	<i>Euryops chrysanthemoides</i> (DC.) B. Nord.	1	0	0	1
ASTERACEAE	<i>Euryops leiocarpus</i> (DC.) B. Nord.	0	1	1	1
ASTERACEAE	<i>Euryops pedunculatus</i> N.E. Br.	0	0	0	1
ASTERACEAE	<i>Felicia erigeroides</i> DC.	1	0	1	1
ASTERACEAE	<i>Felicia filifolia</i> (Vent.) Burt Davy subsp. <i>filifolia</i>	0	0	1	0
ASTERACEAE	<i>Felicia muricata</i> (Thunb.) Nees	0	0	0	1
ASTERACEAE	<i>Galinsoga parviflora</i> Cav. *	1	0	0	0
ASTERACEAE	<i>Gazania krebsiana</i> Less. subsp. <i>krebsiana</i>	1	0	1	0
ASTERACEAE	<i>Gazania krebsiana</i> Less. subsp. <i>serrulata</i>	1	0	1	0
ASTERACEAE	<i>Gazania linearis</i> (Thunb.) Druce var. <i>linearis</i>	1	1	1	0
ASTERACEAE	<i>Gazania rigens</i> (L.) Gaertn. var. <i>uniflora</i> (L. f.)	1	0	0	0
ASTERACEAE	<i>Gerbera ambigua</i> (Cass.) Sch. Bip.	1	1	1	1
ASTERACEAE	<i>Gerbera piloselloides</i> (L.) Cass.	1	1	1	1
ASTERACEAE	<i>Gerbera viridifolia</i> (DC.) Sch. Bip.	0	0	1	1
ASTERACEAE	<i>Gnaphalium pensylvanicum</i> Willd. *	0	0	1	0
ASTERACEAE	<i>Helichrysum acutatum</i> DC.	1	1	1	1
ASTERACEAE	<i>Helichrysum adenocarpum</i> DC. subsp. <i>adenocarpum</i>	0	1	1	1
ASTERACEAE	<i>Helichrysum allioides</i> Less.	1	0	1	0
ASTERACEAE	<i>Helichrysum appendiculatum</i> (L. f.) Less.	1	1	1	1
ASTERACEAE	<i>Helichrysum argyrolepis</i> Macowan	1	0	0	0
ASTERACEAE	<i>Helichrysum asperum</i> (Thunb.) Hilliard & Burt var. <i>a</i>	0	0	1	0
ASTERACEAE	<i>Helichrysum aureum</i> (Houtt.) Merr. var. <i>aureum</i>	1	1	0	0
ASTERACEAE	<i>Helichrysum aureum</i> (Houtt.) Merr. var. <i>monocephal</i>	0	0	1	0
ASTERACEAE	<i>Helichrysum auriceps</i> Hilliard	0	0	1	1
ASTERACEAE	<i>Helichrysum cephaloideum</i> DC.	0	0	0	1
ASTERACEAE	<i>Helichrysum chionosphaerum</i> DC.	0	0	1	1
ASTERACEAE	<i>Helichrysum cymosum</i> (L.) D. Don subsp. <i>calvum</i> Hi	0	0	1	0
ASTERACEAE	<i>Helichrysum cymosum</i> (L.) D. Don subsp. <i>cymosum</i>	1	0	0	1
ASTERACEAE	<i>Helichrysum decorum</i> DC.	1	0	1	0
ASTERACEAE	<i>Helichrysum diffusum</i> DC.	0	0	1	0
ASTERACEAE	<i>Helichrysum ecklonis</i> Sond.	0	0	1	0
ASTERACEAE	<i>Helichrysum felinum</i> Less.	0	1	1	1
ASTERACEAE	<i>Helichrysum foetidum</i> (L.) Moench.	0	1	0	0
ASTERACEAE	<i>Helichrysum griseum</i> Sond.	0	1	1	1
ASTERACEAE	<i>Helichrysum herbaceum</i> (Andr.) Sweet	1	1	1	1
ASTERACEAE	<i>Helichrysum infaustum</i> Wood & Evans	0	0	1	0
ASTERACEAE	<i>Helichrysum krebsianum</i> Less.	0	1	1	1
ASTERACEAE	<i>Helichrysum lepidissimum</i> S. Moore	0	1	1	1
ASTERACEAE	<i>Helichrysum longifolium</i> DC.	1	0	1	0
ASTERACEAE	<i>Helichrysum miconiifolium</i> DC.	0	1	0	0
ASTERACEAE	<i>Helichrysum mimetes</i> S. Moore.	0	0	1	0
ASTERACEAE	<i>Helichrysum mixtum</i> (Kuntze) Moeser var. <i>mixtum</i>	1	1	0	1
ASTERACEAE	<i>Helichrysum natalitium</i> DC.	0	0	1	0
ASTERACEAE	<i>Helichrysum nudifolium</i> (L.) Less.	1	1	1	1
ASTERACEAE	<i>Helichrysum odoratissimum</i> (L.) Sweet	0	1	1	0
ASTERACEAE	<i>Helichrysum oxyphyllum</i> DC.	0	0	1	1
ASTERACEAE	<i>Helichrysum pallidum</i> DC.	0	1	1	1
ASTERACEAE	<i>Helichrysum panduratum</i> O. Hoffm. var. <i>panduratum</i>	1	1	1	1
ASTERACEAE	<i>Helichrysum pannosum</i> DC.	0	1	1	0
ASTERACEAE	<i>Helichrysum pilosellum</i> (L.f.) Less.	1	1	0	0
ASTERACEAE	<i>Helichrysum platypterum</i> DC.	0	0	1	1
ASTERACEAE	<i>Helichrysum populifolium</i> DC.	1	1	1	1

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
ASTERACEAE	<i>Helichrysum ruderales</i> Hilliard & Burt	0	0	1	0
ASTERACEAE	<i>Helichrysum scitulum</i> Hilliard & Burt	0	0	1	0
ASTERACEAE	<i>Helichrysum simillimum</i> DC.	0	0	1	1
ASTERACEAE	<i>Helichrysum spiralepis</i> Hilliard & Burt	1	1	1	1
ASTERACEAE	<i>Helichrysum subglomeratum</i> Less.	0	1	1	0
ASTERACEAE	<i>Helichrysum teretifolium</i> (L.) D. Don	0	1	0	0
ASTERACEAE	<i>Helichrysum umbraculigerum</i> Less.	0	0	0	1
ASTERACEAE	<i>Hypochoeris radicata</i> L.	0	0	1	0
ASTERACEAE	<i>Inulanthera calva</i> (Hutch.) Kallersjo	0	1	1	0
ASTERACEAE	<i>Inulanthera dregeana</i> (DC.) Kallersjo	0	0	0	1
ASTERACEAE	<i>Inulanthera leucoclada</i> (DC.) Kallersjo	0	1	1	0
ASTERACEAE	<i>Kleinia fulgens</i> Hook. f.	0	0	0	1
ASTERACEAE	<i>Lactuca capensis</i> Thunb.	0	0	1	0
ASTERACEAE	<i>Lactuca indica</i> L.*	1	0	0	0
ASTERACEAE	<i>Lopholaena dregeana</i> DC.	0	0	1	0
ASTERACEAE	<i>Matricaria nigellifolia</i> DC. var. <i>nigellifolia</i>	0	1	1	1
ASTERACEAE	<i>Matricaria nigellifolia</i> DC. var. <i>tenuior</i> DC.	0	0	1	0
ASTERACEAE	<i>Matricaria zuurbergensis</i> Oliv.	0	1	0	0
ASTERACEAE	<i>Melanthera scandens</i> (Schumach. & Thonn.) Robery	1	0	0	0
ASTERACEAE	<i>Microglossa mespilifolia</i> (Less.) B.L. Robinson	0	0	0	1
ASTERACEAE	<i>Mikania natalensis</i>	1	0	1	0
ASTERACEAE	<i>Montanoa hibiscifolia</i> Benth.*	1	0	0	0
ASTERACEAE	<i>Nidorella auriculata</i> DC.	0	0	1	0
ASTERACEAE	<i>Oedera squarrosa</i> (L.) Anders. & Bremer	0	0	0	1
ASTERACEAE	<i>Osteospermum caulescens</i> Harv.	1	0	0	0
ASTERACEAE	<i>Osteospermum fruticosum</i> (L.) T. Norl.	1	0	1	0
ASTERACEAE	<i>Osteospermum grandidentatum</i> DC.	0	0	0	1
ASTERACEAE	<i>Osteospermum imbricatum</i> L. subsp. <i>nervatum</i> (DC.)	0	0	1	0
ASTERACEAE	<i>Osteospermum imbricatum</i> L. subsp. <i>nervatum</i> (DC.)	0	1	0	1
ASTERACEAE	<i>Osteospermum</i> sp. (=Strey 8891, 5908)	0	0	1	0
ASTERACEAE	<i>Othonna natalensis</i> Sch.Bip.	0	1	1	0
ASTERACEAE	<i>Phymaspermum acerosum</i> (DC.) Kallersjo	0	0	1	1
ASTERACEAE	<i>Phymaspermum villosum</i> (Hilliard) Kallersjo	0	0	1	0
ASTERACEAE	<i>Phymaspermum woodii</i> (Thell.) Kallersjo	0	0	1	0
ASTERACEAE	<i>Plecostachys polifolia</i> (Thunb.) Hilliard & Burt	0	0	1	0
ASTERACEAE	<i>Plecostachys serpyllifolia</i> (Berg.) Hilliard & Burt	0	1	0	0
ASTERACEAE	<i>Pseudognaphalium luteo-album</i> (L.) Hilliard & Burt	0	0	1	0
ASTERACEAE	<i>Pseudognaphalium undulatum</i> (L.) Hilliard & Burt	0	0	0	1
ASTERACEAE	<i>Pulicaria scabra</i> (Thunb.) Druce	0	0	0	1
ASTERACEAE	<i>Relhania pungens</i> L'H,rit. subsp. <i>angustifolia</i> (DC.)	0	1	1	1
ASTERACEAE	<i>Relhania pungens</i> L'H,rit. subsp. <i>pungens</i>	0	0	0	1
ASTERACEAE	<i>Relhania pungens</i> L'H,rit. subsp. <i>trinervis</i> (Thunb.)	0	0	0	1
ASTERACEAE	<i>Schistostephium crataegifolium</i> (DC.) Fenzl ex Harv.	0	0	0	1
ASTERACEAE	<i>Schistostephium flabelliforme</i> Less.	1	0	0	1
ASTERACEAE	<i>Schistostephium heptalobum</i> (DC.) Oliv. & Hiern	1	1	1	1
ASTERACEAE	<i>Schistostephium rotundifolium</i> (DC.) Fenzl ex Harv.	0	0	0	1
ASTERACEAE	<i>Senecio affinis</i> DC.	1	0	0	0
ASTERACEAE	<i>Senecio albanopsis</i> Hilliard	1	0	1	1
ASTERACEAE	<i>Senecio albensis</i> DC. Var. <i>doroniciflorus</i> (DC.) Harv.	0	1	0	0
ASTERACEAE	<i>Senecio arenarius</i> Thunb.	0	0	0	1
ASTERACEAE	<i>Senecio barbatus</i> DC.	1	0	0	0
ASTERACEAE	<i>Senecio brachypodus</i> DC.	0	0	0	1

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
ASTERACEAE	<i>Senecio brevidentatus</i> M.D. Henderson	0	0	1	0
ASTERACEAE	<i>Senecio bryoniifolius</i> Harv.	0	0	1	1
ASTERACEAE	<i>Senecio bupleuroides</i> DC.	0	1	1	1
ASTERACEAE	<i>Senecio caudatus</i> DC.	0	0	1	0
ASTERACEAE	<i>Senecio chrysocoma</i> Meerb.	1	0	1	1
ASTERACEAE	<i>Senecio citriceps</i> Hilliard & Burt	0	0	1	0
ASTERACEAE	<i>Senecio coronatus</i> (Thunb.) Harv.	0	0	1	0
ASTERACEAE	<i>Senecio decurrens</i> DC.	1	0	1	0
ASTERACEAE	<i>Senecio deltoideus</i> Less.	0	1	1	1
ASTERACEAE	<i>Senecio discodregeanus</i> Hilliard & Burt	0	1	1	0
ASTERACEAE	<i>Senecio erubescens</i> Ait.	1	0	0	1
ASTERACEAE	<i>Senecio erubescens</i> Ait. var. <i>incisus</i> DC.	0	1	1	1
ASTERACEAE	<i>Senecio glaberrimus</i> DC.	0	1	1	0
ASTERACEAE	<i>Senecio glanduloso-lanosus</i> Thell.	0	0	1	0
ASTERACEAE	<i>Senecio gregatus</i> Hilliard	0	1	0	0
ASTERACEAE	<i>Senecio helminthioides</i> (Sch. Bip.) Hilliard	0	0	1	1
ASTERACEAE	<i>Senecio latifolius</i> DC.	1	0	1	1
ASTERACEAE	<i>Senecio linifolius</i> L.	0	0	0	1
ASTERACEAE	<i>Senecio lygodes</i> Hiern	0	0	0	1
ASTERACEAE	<i>Senecio macrocephalus</i> DC.	0	1	1	0
ASTERACEAE	<i>Senecio macroglossoides</i> Hilliard	1	1	0	0
ASTERACEAE	<i>Senecio macroglossus</i> DC.	0	0	0	1
ASTERACEAE	<i>Senecio madagascariensis</i> Poir.	1	0	1	0
ASTERACEAE	<i>Senecio medley-woodii</i> Hutch.	0	0	1	1
ASTERACEAE	<i>Senecio natalicola</i> Hilliard	0	0	1	0
ASTERACEAE	<i>Senecio oxyodontus</i> DC.	1	1	1	1
ASTERACEAE	<i>Senecio oxynifolius</i> DC.	1	1	0	0
ASTERACEAE	<i>Senecio panduriformis</i> Hilliard	0	0	1	0
ASTERACEAE	<i>Senecio pellucidus</i> DC.	0	0	0	1
ASTERACEAE	<i>Senecio polyanthemoides</i> Sch. Bip.	1	1	1	0
ASTERACEAE	<i>Senecio pterophorus</i> DC.	0	1	0	1
ASTERACEAE	<i>Senecio purpureus</i> L.	1	0	0	0
ASTERACEAE	<i>Senecio quinquelobus</i> (Thunb.) DC.	0	0	0	1
ASTERACEAE	<i>Senecio retrorsus</i> DC.	0	0	0	1
ASTERACEAE	<i>Senecio ryncholaenus</i> DC.	0	0	1	1
ASTERACEAE	<i>Senecio sandersonii</i> Harv.	1	0	0	0
ASTERACEAE	<i>Senecio serratuloides</i> DC. var. <i>serratuloides</i>	0	0	1	1
ASTERACEAE	<i>Senecio speciosus</i> Willd.	1	0	0	0
ASTERACEAE	<i>Senecio tamoides</i> DC.	0	0	0	1
ASTERACEAE	<i>Senecio umgeniensis</i> Thell.	1	0	0	0
ASTERACEAE	<i>Senecio variabilis</i> Sch. Bip.	0	1	1	1
ASTERACEAE	<i>Sigesbeckia orientalis</i> L.*	1	0	1	0
ASTERACEAE	<i>Sonchus integrifolius</i> Harv. var. <i>integrifolius</i>	0	1	0	0
ASTERACEAE	<i>Sonchus oleraceus</i> L.	0	0	1	0
ASTERACEAE	<i>Sonchus wilmsii</i> R.E. Fr.	0	0	0	1
ASTERACEAE	<i>Spilanthes mauritiana</i> (Pers.) Dc.	1	0	1	0
ASTERACEAE	<i>Stoebe vulgaris</i> Levyns	1	0	0	1
ASTERACEAE	<i>Tagetes minuta</i> L.*	1	0	1	1
ASTERACEAE	<i>Tarchonanthus camphoratus</i> L.	1	1	1	1
ASTERACEAE	<i>Tarchonanthus trilobus</i> DC. var. <i>trilobus</i>	0	1	1	1
ASTERACEAE	<i>Tenrynea phyllicifolia</i> (DC.) Hilliard & Burt	1	0	1	1
ASTERACEAE	<i>Tithonia diversifolia</i> (Hemsl.) A.Gray *	1	0	0	0

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
ASTERACEAE	<i>Tithonia rotundifolia</i> (Mill.) Blake *	1	0	0	0
ASTERACEAE	<i>Tolpis capensis</i> (L.) Sch. Bip.	0	0	1	0
ASTERACEAE	<i>Urospermum picroides</i> (L.) Scolopi ex F.W. Schmidt	1	0	0	0
ASTERACEAE	<i>Ursinia tenuifolia</i> (L.) Poir. subsp. <i>tenuifolia</i>	0	0	1	1
ASTERACEAE	<i>Vernonia angulifolia</i>	1	0	1	1
ASTERACEAE	<i>Vernonia anisochaetoides</i> Sond.	0	0	1	1
ASTERACEAE	<i>Vernonia capensis</i> (Houtt.) Druce	0	0	1	1
ASTERACEAE	<i>Vernonia crataegifolia</i>	0	0	1	0
ASTERACEAE	<i>Vernonia dregeana</i> Sch. Bip.	0	1	1	0
ASTERACEAE	<i>Vernonia galpinii</i> Klatt	0	0	1	1
ASTERACEAE	<i>Vernonia hirsuta</i> (DC.) Sch. Bip. *	1	1	1	0
ASTERACEAE	<i>Vernonia natalensis</i> Sch. Bip. ex. Walp.	0	0	1	1
ASTERACEAE	<i>Vernonia neocorymbosa</i> Hilliard	1	1	1	0
ASTERACEAE	<i>Vernonia oligocephala</i> (DC.) Sch. Bip. ex Walp.	0	1	1	1
ASTERACEAE	<i>Xanthium spinosum</i> L. *	1	0	0	0
ASTERACEAE	<i>Xanthium strumarium</i> L. *	0	0	1	0
ASTERACEAE	<i>Youngia japonica</i> (L.) DC. *	0	0	1	0
AVECENNIACEAE	<i>Avicennia marina</i> (Forssk.) vierh.	1	0	0	0
BALSAMINACEAE	<i>Impatiens flanaganiae</i> Hemsl.	1	0	0	0
BALSAMINACEAE	<i>Impatiens hochstetteri</i> Warb. subsp. <i>hochstetteri</i>	1	0	0	1
BASSELLACEAE	<i>Anredera cordifolia</i> (Ten.) Steenis*	1	0	0	0
BEGONIACEAE	<i>Begonia cucullata</i> Willd. *	1	0	0	0
BEGONIACEAE	<i>Begonia dregei</i> Otto & Dietr.	1	0	1	1
BEGONIACEAE	<i>Begonia homonyma</i> Steud.	1	0	1	0
BEGONIACEAE	<i>Begonia sutherlandii</i> Hook f.	0	0	1	1
BIGNONIACEAE	<i>Podranea ricasoliana</i> (Tanf.) Sprague	1	0	0	0
BIGNONIACEAE	<i>Spathodea campanulata</i> *	1	0	0	0
BIGNONIACEAE	<i>Tecoma stans</i> Juss. *	1	0	0	0
BIGNONIACEAE	<i>Tecomaria capensis</i> (Thunb.) Spach subsp. <i>capensis</i>	1	1	1	1
BORAGINACEAE	<i>Cordia caffra</i> Sond.	1	1	1	1
BORAGINACEAE	<i>Cynoglossum geometricum</i> Bak. & C.H.Wr.	1	0	0	0
BORAGINACEAE	<i>Cynoglossum lanceolatum</i> Forssk.	1	0	0	0
BORAGINACEAE	<i>Ehretia rigida</i> (Thunb.) Druce	1	1	1	0
BRASSICACEAE	<i>Cardamine africana</i> L.	0	0	1	1
BRASSICACEAE	<i>Coronopus didymus</i> (L.) Sm. *	1	0	0	0
BRASSICACEAE	<i>Heliophila brassicifolia</i> Eckl. & Zeyh.	0	1	0	0
BRASSICACEAE	<i>Heliophila elongata</i> (Thunb.) DC.	0	1	1	1
BRASSICACEAE	<i>Heliophila rigidiuscula</i> Sond.	0	1	1	1
BRASSICACEAE	<i>Heliophila scandens</i> Harv.	1	0	0	0
BRASSICACEAE	<i>Lepidium bonariense</i> L.	0	0	0	1
BRASSICACEAE	<i>Rorippa nudiuscula</i> Thell.	1	0	0	0
BRUNIACEAE	<i>Raspalia trigyna</i> (Schltr.) Duemmer	0	1	1	0
BUDDLEJACEAE	<i>Buddleja dysophylla</i> (Benth.) Radlk.	0	1	1	0
BUDDLEJACEAE	<i>Buddleja pulchella</i> N.E. Br.	0	1	0	0
BUDDLEJACEAE	<i>Buddleja saligna</i> Willd.	0	1	1	1
BUDDLEJACEAE	<i>Nuxia congesta</i> R. Br. ex Fresen.	0	1	1	1
BUDDLEJACEAE	<i>Nuxia floribunda</i> Benth.	1	1	1	1
BURSERACEAE	<i>Commiphora harveyi</i> (Engl.) Engl.	1	1	1	1
BURSERACEAE	<i>Commiphora neglecta</i> Verdoorn	0	0	0	1
BURSERACEAE	<i>Commiphora woodii</i> Engl.	1	1	1	1
BUXACEAE	<i>Buxus macowanii</i> Oliv.	1	1	1	0
BUXACEAE	<i>Buxus natalensis</i> (Oliv.) Hutchinson	1	1	1	1

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
CACTACEAE	<i>Opuntia monacantha</i> Haw.*	1	0	0	0
CACTACEAE	<i>Opuntia vulgaris</i> Mill.*	1	0	1	0
CACTACEAE	<i>Pereskia aculeata</i> Mill.*	1	0	0	0
CACTACEAE	<i>Rhipsalis baccifera</i> (J. ex Mill.) Stearn	1	0	1	1
CAMPANULACEAE	<i>Roella glomerata</i> A. DC.	0	1	1	0
CAMPANULACEAE	<i>Wahlenbergia capillacea</i> (L. f.) A. DC. subsp. <i>capilla</i>	0	0	0	1
CAMPANULACEAE	<i>Wahlenbergia denticulata</i> (Burch.) A. DC.	0	1	0	0
CAMPANULACEAE	<i>Wahlenbergia denudata</i> A. DC.	0	1	0	0
CAMPANULACEAE	<i>Wahlenbergia huttonii</i> (Sond.) Thulin	0	1	1	1
CAMPANULACEAE	<i>Wahlenbergia krebsii</i> Cham. subsp. <i>krebsii</i>	1	0	0	0
CAMPANULACEAE	<i>Wahlenbergia madagascariensis</i> A. DC.	0	1	1	1
CAMPANULACEAE	<i>Wahlenbergia pinnata</i> Compton	0	0	0	1
CAMPANULACEAE	<i>Wahlenbergia</i> sp. nov.	0	0	1	0
CAMPANULACEAE	<i>Wahlenbergia undulata</i> (L. f.) A. DC.	0	0	1	0
CAPPARACEAE	<i>Bachmannia woodii</i> (Oliv.) Gilg.	0	1	1	1
CAPPARACEAE	<i>Capparis brassii</i> DC.	0	1	1	1
CAPPARACEAE	<i>Capparis fascicularis</i> DC. var. <i>zeyheri</i> (Turcz.) Toelk	0	0	1	1
CAPPARACEAE	<i>Capparis sepiaria</i> L. var. <i>citrifolia</i> (Lam.) Toelken	0	0	0	1
CAPPARACEAE	<i>Capparis tomentosa</i> Lam.	1	1	1	1
CAPPARACEAE	<i>Maerua cafra</i> (DC.) Pax	1	1	1	0
CAPPARACEAE	<i>Maerua juncea</i> Pax subsp. <i>crustata</i> (Wild) Wild	0	0	0	1
CAPPARACEAE	<i>Maerua racemulosa</i> (A. DC.) Gilg & Ben.	1	0	0	1
CAPPARACEAE	<i>Maerua rosmarinoides</i> (Sond.) Gilg & Ben.	0	1	0	0
CARYOPHYLLACEAE	<i>Dianthus crenatus</i> Thunb.	0	0	1	0
CARYOPHYLLACEAE	<i>Dianthus mooiensis</i> F.N. Williams subsp. <i>mooiensis</i>	0	0	1	1
CARYOPHYLLACEAE	<i>Dianthus zeyheri</i> Sond. subsp. <i>natalensis</i>	0	0	1	0
CARYOPHYLLACEAE	<i>Drymaria cordata</i> (L.) Willd.	1	0	1	1
CARYOPHYLLACEAE	<i>Silene bellidioides</i> Sond.	1	0	0	0
CARYOPHYLLACEAE	<i>Silene burchellii</i> Othth	0	1	1	1
CARYOPHYLLACEAE	<i>Silene clandestina</i> Jacq.	0	1	0	0
CARYOPHYLLACEAE	<i>Silene gallica</i> L.	0	0	1	0
CARYOPHYLLACEAE	<i>Silene primuliflora</i> Eckl. & Zeyh.	1	0	0	0
CELASTRACEAE	<i>Allocassine laurifolia</i> (Harv.) N.K.B. Robson	1	1	1	0
CELASTRACEAE	<i>Cassine aethiopica</i> Thunb.	1	1	0	1
CELASTRACEAE	<i>Cassine papillosa</i> (Hochst.) Kuntze	1	1	0	1
CELASTRACEAE	<i>Cassine peragua</i> L. subsp. <i>peragua</i>	0	1	1	1
CELASTRACEAE	<i>Catha abbottii</i> A.E. Van Wyk & M. Prins	0	0	1	0
CELASTRACEAE	<i>Elaeodendron croceum</i> (Thunb.) DC.	0	0	1	1
CELASTRACEAE	<i>Gymnosporia bachmannii</i> Loes	0	1	1	1
CELASTRACEAE	<i>Gymnosporia buxifolia</i> (L.)	0	0	1	0
CELASTRACEAE	<i>Gymnosporia filiformis</i> Davidson	0	0	1	0
CELASTRACEAE	<i>Gymnosporia heterophylla</i> (Eckl. & Zeyh.) Loes	0	1	1	1
CELASTRACEAE	<i>Gymnosporia mossambicensis</i> (Klotzsch) Loes	0	1	1	1
CELASTRACEAE	<i>Gymnosporia nemorosa</i> (Eckl. & Zeyh.) Syzwyl.	1	1	1	1
CELASTRACEAE	<i>Gymnosporia rubra</i> (Harv.) Loes.	1	0	1	1
CELASTRACEAE	<i>Gymnosporia uniflora</i> Davidson	0	0	1	0
CELASTRACEAE	<i>Hippocratea schlechteri</i> Loes. var. <i>pegleriae</i> Loes.	0	0	1	0
CELASTRACEAE	<i>Lauridia tetragona</i> (L. f.) R.A. Archer	1	0	1	1
CELASTRACEAE	<i>Maytenus abbottii</i> Van Wyk	1	0	1	1
CELASTRACEAE	<i>Maytenus acuminata</i> (L. f.) Loes. var. <i>acuminata</i>	1	1	1	1
CELASTRACEAE	<i>Maytenus cordata</i> (E. Mey. ex Sond.) Loes.	1	1	1	1
CELASTRACEAE	<i>Maytenus oleosa</i> Van Wyk & Archer	0	1	1	0

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
CELASTRACEAE	<i>Maytenus peduncularis</i> (Sond.) Loes.	1	1	1	1
CELASTRACEAE	<i>Maytenus procumbens</i> (L. f.) Loes.	1	1	1	0
CELASTRACEAE	<i>Maytenus tenuispina</i> (Sond.) Marais	0	0	0	1
CELASTRACEAE	<i>Maytenus undata</i> (Thunb.) Blakelock	0	1	1	1
CELASTRACEAE	<i>Maytenus vanwykii</i> Archer	0	0	1	0
CELASTRACEAE	<i>Pleurostyliia capensis</i> (Turcz.) Loes.	0	1	1	1
CELASTRACEAE	<i>Pseudosalacia streyi</i> Codd	0	1	1	0
CELASTRACEAE	<i>Pterocelastrus echinatus</i> N.E.Br.	0	1	1	1
CELASTRACEAE	<i>Pterocelastrus rostratus</i> Walp.	0	1	1	0
CELASTRACEAE	<i>Pterocelastrus tricuspidatus</i> (Lam.) Sond.	0	1	1	0
CELASTRACEAE	<i>Putterlickia retrospinosa</i> Van Wyk & Mostert	0	1	1	1
CELASTRACEAE	<i>Putterlickia verrucosa</i> (E. Mey. ex Sond.) Szyszyl.	1	0	0	1
CELASTRACEAE	<i>Robsonodendron eucleiforme</i> (Eckl. & Zeyh.) R.A.Ar	0	1	1	1
CELASTRACEAE	<i>Salacia gerrardii</i> Harv.	1	1	1	1
CHENOPODIACEAE	<i>Chenopodium ambrosioides</i> L. *	0	0	1	0
CHENOPODIACEAE	<i>Sarcocornia natalensis</i> (Bunge ex Ung.-Stern.) A.J.S	1	0	0	0
CLUSIACEAE	<i>Garcinia gerrardii</i> Harv. ex Sim	1	1	1	1
CLUSIACEAE	<i>Hypericum aethiopicum</i> Thunb. subsp. <i>aethiopicum</i>	0	1	0	1
CLUSIACEAE	<i>Hypericum aethiopicum</i> Thunb. subsp. <i>sonderi</i>	0	0	1	0
CLUSIACEAE	<i>Hypericum lalandii</i> Choisy	0	1	1	1
CLUSIACEAE	<i>Hypericum natalense</i> Wood & Evans	0	0	0	1
CLUSIACEAE	<i>Hypericum</i> sp.nov (=Strey 7663)	0	1	0	0
COMBRETACEAE	<i>Combretum bracteosum</i> (Hochst.) Brandis ex Engl.	1	0	0	0
COMBRETACEAE	<i>Combretum edwardsii</i> Exell	0	1	1	0
COMBRETACEAE	<i>Combretum erythrophyllum</i> (Burch.) Sond.	1	1	1	1
COMBRETACEAE	<i>Combretum kraussii</i> Hochst.	1	1	1	1
COMBRETACEAE	<i>Quisqualis parviflora</i> Gerr. ex Harv.	1	1	1	0
CONNARACEAE	<i>Cnestis natalensis</i> (Hochst.) Planch. & Sond.	0	1	0	1
CONNARACEAE	<i>Cnestis polyphylla</i> Lam.	1	0	1	0
CONVOLVULACEAE	<i>Convolvulus farinosus</i> L.	0	1	0	1
CONVOLVULACEAE	<i>Convolvulus natalensis</i> Bernh. apud Krauss var. <i>nata</i>	0	0	1	0
CONVOLVULACEAE	<i>Cuscuta campestris</i> Yunck. *	1	0	0	1
CONVOLVULACEAE	<i>Cuscuta cassytoides</i> Nees ex Engelm.	1	0	1	0
CONVOLVULACEAE	<i>Evolvulus alsinoides</i> (L.) L. var. <i>linifolius</i> (L.) Bak.	0	0	0	1
CONVOLVULACEAE	<i>Falkia repens</i> L. f.	1	0	0	0
CONVOLVULACEAE	<i>Hewittia sublobata</i> (L. f.) Kuntze	1	0	1	0
CONVOLVULACEAE	<i>Ipomea indica</i> (Burm. F.) Merr.*	1	0	0	0
CONVOLVULACEAE	<i>Ipomoea alba</i> L.*	1	0	0	0
CONVOLVULACEAE	<i>Ipomoea bolusiana</i> Schinz subsp. <i>pinnatipartita</i> Verd	1	0	0	0
CONVOLVULACEAE	<i>Ipomoea cairica</i> (L.) Sweet	0	1	1	1
CONVOLVULACEAE	<i>Ipomoea congesta</i> R.Br. *	0	0	1	0
CONVOLVULACEAE	<i>Ipomoea crassipes</i> Hook.	0	1	1	0
CONVOLVULACEAE	<i>Ipomoea ficifolia</i> Lindl.	0	0	0	1
CONVOLVULACEAE	<i>Ipomoea magnusiana</i> Schinz var. <i>magnusiana</i>	0	0	0	1
CONVOLVULACEAE	<i>Ipomoea obscura</i> (L.) Ker-Gawl. var. <i>fragilis</i> (Chois	0	0	1	1
CONVOLVULACEAE	<i>Ipomoea pellita</i> Hallier f.	0	0	0	1
CONVOLVULACEAE	<i>Ipomoea pes-caprae</i> (L.) R. Br. subsp. <i>brasiliensis</i> (L	0	0	0	1
CONVOLVULACEAE	<i>Ipomoea plebeia</i> R. Br. subsp. <i>africana</i> A. Meeuse	0	0	0	1
CONVOLVULACEAE	<i>Ipomoea purpurea</i> (L.) Roth *	0	0	1	0
CONVOLVULACEAE	<i>Ipomoea simplex</i> Thunb.	0	0	1	0
CONVOLVULACEAE	<i>Ipomoea wightii</i> (Wall.) Choisy	1	0	1	1
CRASSULACEAE	<i>Cotyledon orbiculata</i> L. var. <i>oblonga</i> (Haw.) DC.	1	0	1	1

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
CRASSULACEAE	<i>Cotyledon orbiculata</i> L. var. <i>orbiculata</i>	0	0	1	0
CRASSULACEAE	<i>Crassula alba</i> Forssk.	0	0	1	0
CRASSULACEAE	<i>Crassula alba</i> Forssk. var. <i>alba</i>	1	1	0	0
CRASSULACEAE	<i>Crassula alba</i> Forssk. var. <i>parvisepala</i> (Schonl.) Toelk	0	0	0	1
CRASSULACEAE	<i>Crassula capitella</i> Thunb. subsp. <i>meyeri</i> (Harv.) Toelk	0	0	0	1
CRASSULACEAE	<i>Crassula cultrata</i> L.	0	0	1	0
CRASSULACEAE	<i>Crassula ericoides</i> Haw. subsp. <i>ericoides</i>	0	0	1	0
CRASSULACEAE	<i>Crassula flanaganii</i> Schonl. & Bak. f.	0	0	0	1
CRASSULACEAE	<i>Crassula multicava</i> Lem. subsp. <i>floribunda</i> Fridr. ex	1	0	0	0
CRASSULACEAE	<i>Crassula multicava</i> Lem. subsp. <i>multicava</i>	1	0	0	0
CRASSULACEAE	<i>Crassula nudicaulis</i> L. var. <i>nudicaulis</i>	0	0	1	0
CRASSULACEAE	<i>Crassula obovata</i> Haw. var. <i>dregeana</i> (Harv.) Toelke	0	1	0	1
CRASSULACEAE	<i>Crassula obovata</i> Haw. var. <i>obovata</i>	1	0	1	1
CRASSULACEAE	<i>Crassula orbicularis</i> L.	1	0	0	1
CRASSULACEAE	<i>Crassula orbiculata</i> L. var. <i>oblonga</i> (Haw.) DC.	1	0	0	0
CRASSULACEAE	<i>Crassula ovata</i> (Mill.) Druce	0	1	1	1
CRASSULACEAE	<i>Crassula pellucida</i> L. subsp. <i>alsinoides</i> (Hook. f.) Toelk	0	0	1	0
CRASSULACEAE	<i>Crassula pellucida</i> L. subsp. <i>brachypetala</i> (Drege ex	1	1	1	1
CRASSULACEAE	<i>Crassula pellucida</i> L. subsp. <i>marginalis</i> (Dryand. in A	0	0	0	1
CRASSULACEAE	<i>Crassula perfoliata</i> L. var. <i>heterotricha</i> (Schinz) Toelk	1	0	0	1
CRASSULACEAE	<i>Crassula perforata</i> Thunb.	0	0	1	1
CRASSULACEAE	<i>Crassula sarmentosa</i> Harv. var. <i>integrifolia</i> Toelken	0	1	1	1
CRASSULACEAE	<i>Crassula sarmentosa</i> Harv. var. <i>sarmentosa</i>	0	0	0	1
CRASSULACEAE	<i>Crassula sediflora</i> (Eckl. & Zeyh.) Endl. & Walp. var.	0	0	0	1
CRASSULACEAE	<i>Crassula setulosa</i> Harv. var. <i>setulosa</i>	1	0	0	1
CRASSULACEAE	<i>Crassula southii</i> Schonl. subsp. <i>sphaerocephala</i>	0	0	0	1
CRASSULACEAE	<i>Crassula streyi</i> Toelken	0	1	1	0
CRASSULACEAE	<i>Crassula tetragona</i> L. subsp. <i>acutifolia</i> Lam. var. x C	0	0	0	1
CRASSULACEAE	<i>Crassula vaginata</i> Eckl. & Zeyh. subsp. <i>vaginata</i>	0	1	1	1
CRASSULACEAE	<i>Kalanchoe crenata</i> (Andr.) Haw.	0	0	0	1
CRASSULACEAE	<i>Kalanchoe paniculata</i> Harv.	0	0	0	0
CRASSULACEAE	<i>Kalanchoe rotundifolia</i> (Haw.) Haw.	0	0	1	1
CUCURBITACEAE	<i>Coccinia adoensis</i> (A. Rich.) Cogn.	1	0	0	0
CUCURBITACEAE	<i>Coccinia palmata</i> (Sond.) Cogn.	1	0	1	1
CUCURBITACEAE	<i>Coccinia rehmannii</i> Cogn.	1	0	0	0
CUCURBITACEAE	<i>Cucumis hirsutus</i> Sond.	0	1	1	0
CUCURBITACEAE	<i>Gerrardanthus macrorhizus</i> Harv. ex Benth. & Hook. f.	0	0	0	1
CUCURBITACEAE	<i>Gerrardanthus tomentosus</i> Hook. f.	0	0	1	0
CUCURBITACEAE	<i>Kedrostis foetidissima</i> (Jacq.) Cogn.	0	0	0	1
CUCURBITACEAE	<i>Kedrostis hirtella</i> (Naud.) Cogn.	0	0	0	1
CUCURBITACEAE	<i>Lagenaria sphaerica</i> (Sond.) Naud.	1	0	1	0
CUCURBITACEAE	<i>Momordica balsamina</i> L.	1	0	0	0
CUCURBITACEAE	<i>Momordica foetida</i> Schumach.	0	0	1	1
CUCURBITACEAE	<i>Peponium mackenii</i> (Naud.) Engl.	1	0	0	1
CUCURBITACEAE	<i>Zehneria parvifolia</i> (Cogn.) J.H. Ross	1	0	1	1
CUCURBITACEAE	<i>Zehneria scabra</i> (L. f.) Sond. subsp. <i>scabra</i>	0	0	1	1
CUNONIACEAE	<i>Cunonia capensis</i> L.	0	1	1	0
DIPSACACEAE	<i>Cephalaria attenuata</i> (L.f.) Roem. & Schult.	1	0	0	0
DIPSACACEAE	<i>Cephalaria decurrens</i> (Thunb.) Roem. & Schult.	0	0	0	1
DIPSACACEAE	<i>Cephalaria oblongifolia</i> (Kuntze) Szabo	0	1	1	0
DIPSACACEAE	<i>Cephalaria</i> sp (=Strey 8366)	0	0	1	0
DIPSACACEAE	<i>Scabiosa columbaria</i> L.	0	1	1	1

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
DROSERACEAE	<i>Drosera burkeana</i> Planch.	0	0	0	1
DROSERACEAE	<i>Drosera collinsiae</i> N.E. Br. ex Burt Davy	0	0	0	1
DROSERACEAE	<i>Drosera cuneifolia</i> L. f.	0	0	0	1
DROSERACEAE	<i>Drosera madagascariensis</i> DC.	0	1	1	0
DROSERACEAE	<i>Drosera natalensis</i> Diels	1	1	1	0
EBENACEAE	<i>Diospyros dichrophylla</i> (Gand.) De Winter	1	1	1	1
EBENACEAE	<i>Diospyros lycioides</i> Desf. subsp. <i>lycioides</i>	0	0	0	1
EBENACEAE	<i>Diospyros lycioides</i> Desf. subsp. <i>sericea</i> (Bernh.) De	0	1	1	1
EBENACEAE	<i>Diospyros natalensis</i> (Harv.) Brenan subsp. <i>natalensis</i>	1	1	1	0
EBENACEAE	<i>Diospyros scabrida</i> (Harv. ex Hiern) De Winter var. c	0	1	0	1
EBENACEAE	<i>Diospyros scabrida</i> (Harv. ex Hiern) De Winter var. s	0	0	1	0
EBENACEAE	<i>Diospyros simii</i> (Kuntze) De Winter	1	1	1	1
EBENACEAE	<i>Diospyros villosa</i> (L.) de Winter	1	1	1	1
EBENACEAE	<i>Diospyros whyteana</i> (Hiern) F. White	0	0	0	1
EBENACEAE	<i>Euclea crispa</i> (Thunb.) Guerke subsp. <i>crispa</i>	0	1	1	1
EBENACEAE	<i>Euclea natalensis</i> A.DC. subsp. <i>natalensis</i>	1	1	1	1
EBENACEAE	<i>Euclea polyandra</i> (L. f.) E. Mey. ex Hiern	1	0	0	0
EBENACEAE	<i>Euclea schimperi</i> (A. DC.) Dandy var. <i>schimperi</i>	0	0	0	1
EBENACEAE	<i>Euclea undulata</i> Thunb. var. <i>myrtina</i> (Burch.) Hiern	0	0	1	1
EBENACEAE	<i>Euclea undulata</i> Thunb. var. <i>undulata</i>	0	1	0	1
ERICACEAE	<i>Erica abottii</i> E.G.H.Oliver	0	1	1	0
ERICACEAE	<i>Erica aspalathifolia</i> H. Bol. var. <i>aspalathifolia</i>	0	0	1	0
ERICACEAE	<i>Erica caffra</i> L. var. <i>caffra</i>	0	0	1	0
ERICACEAE	<i>Erica caffrorum</i> H. Bol. var. <i>caffrorum</i>	0	0	0	1
ERICACEAE	<i>Erica cerinthoides</i> L. var. <i>barbertona</i> (Galpin) H. Bol.	0	0	1	1
ERICACEAE	<i>Erica cubica</i> L. var. <i>cubica</i>	0	1	1	1
ERICACEAE	<i>Erica cubica</i> L. var. <i>natalensis</i> H. Bol.	0	0	0	1
ERICACEAE	<i>Erica dracomontana</i> E.G.H. Oliver	1	0	0	0
ERICACEAE	<i>Erica leucopelta</i> Tausch	0	0	0	1
ERICACEAE	<i>Erica natalensis</i> Dulfer	0	1	0	0
ERICACEAE	<i>Erica natalitia</i> H. Bol.	0	1	0	0
ERICACEAE	<i>Erica natalitia</i> H. Bol. var. <i>brevipedicellata</i> Dulfer	1	0	0	0
ERICACEAE	<i>Erica natalitia</i> H. Bol. var. <i>natalitia</i>	0	0	1	0
ERICACEAE	<i>Erica woodii</i> H. Bol.	1	0	0	0
ERYTHROXYLACEAE	<i>Erythroxylum emarginatum</i> Thonn.	1	1	1	1
ERYTHROXYLACEAE	<i>Erythroxylum pictum</i> E. Mey. ex Sond.	1	1	1	1
ERYTHROXYLACEAE	<i>Nectaropetalum capense</i> (H.Bol) Stapf & Boodle.	1	1	1	1
ERYTHROXYLACEAE	<i>Nectaropetalum zuluense</i> (Schonl.) Corbishley	0	1	1	1
EUPHORBIACEAE	<i>Acalypha ecklonii</i> Baill.	1	0	0	1
EUPHORBIACEAE	<i>Acalypha glabrata</i> Thunb. var. <i>glabrata</i>	1	1	1	1
EUPHORBIACEAE	<i>Acalypha glabrata</i> Thunb. var. <i>pilosior</i> (Kuntze) Prair	0	0	0	1
EUPHORBIACEAE	<i>Acalypha glandulifolia</i> Burchinger ex Meisn.	0	0	1	1
EUPHORBIACEAE	<i>Acalypha peduncularis</i> E. Mey. ex Meisn.	1	1	1	1
EUPHORBIACEAE	<i>Acalypha petiolaris</i> Hochst.	0	1	0	0
EUPHORBIACEAE	<i>Acalypha punctata</i> Meisn.	1	1	1	0
EUPHORBIACEAE	<i>Acalypha schinzii</i> Pax	0	0	1	1
EUPHORBIACEAE	<i>Acalypha</i> sp.	1	0	0	0
EUPHORBIACEAE	<i>Acalypha wilmsii</i> Pax ex Prain & Hutch.	0	0	0	1
EUPHORBIACEAE	<i>Adenocline acuta</i> (Thunb.) Baill.	1	0	0	0
EUPHORBIACEAE	<i>Adenocline pauciflora</i> Turcz.	0	0	1	0
EUPHORBIACEAE	<i>Antidesma venosum</i> E.Mey.ex Tul.	1	1	0	1
EUPHORBIACEAE	<i>Bridelia micrantha</i> (Hochst.) Baill.	1	1	1	0

APPENDIX 3

Checklist of Port St. Johns (PSJ), Mkambati (MK), Umtamvuna (UMT) and Oribi Gorge (OG)

FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
EUPHORBIACEAE	<i>Chamaesyce hirta</i> (L.) Millsp.	1	0	0	0
EUPHORBIACEAE	<i>Clutia abyssinica</i> Jaub. & Spach var. <i>abyssinica</i>	1	0	1	1
EUPHORBIACEAE	<i>Clutia disceptata</i> Prain	0	0	1	0
EUPHORBIACEAE	<i>Clutia hirsuta</i> E. Mey. ex Sond. var. <i>hirsuta</i>	0	1	0	1
EUPHORBIACEAE	<i>Clutia laxa</i> Eckl. ex Sond.	0	0	1	0
EUPHORBIACEAE	<i>Clutia mollis</i> Pax	0	0	1	0
EUPHORBIACEAE	<i>Clutia natalensis</i> Bernh. ex Krauss	0	0	0	1
EUPHORBIACEAE	<i>Clutia pulchella</i> L. var. <i>franksiae</i> Prain	1	0	1	0
EUPHORBIACEAE	<i>Clutia pulchella</i> L. var. <i>obtusata</i> Sond.	0	0	1	0
EUPHORBIACEAE	<i>Clutia pulchella</i> L. var. <i>pulchella</i>	1	1	0	1
EUPHORBIACEAE	<i>Clutia</i> sp.nov. (= Hitchins 775)	0	1	1	0
EUPHORBIACEAE	<i>Clutia virgata</i> Pax & K. Hoffm.	0	1	1	1
EUPHORBIACEAE	<i>Croton sylvaticus</i> Hochst.	1	1	1	1
EUPHORBIACEAE	<i>Ctenomeria capensis</i> (Thunb.) Harv. ex Sond.	1	0	1	1
EUPHORBIACEAE	<i>Dalechampia capensis</i> Spreng. f.	1	0	1	1
EUPHORBIACEAE	<i>Dalechampia volubilis</i> E. Mey. ex Baill.	0	0	0	1
EUPHORBIACEAE	<i>Drypetes arguta</i> (Muell. Arg.) Hutch.	1	1	1	1
EUPHORBIACEAE	<i>Drypetes gerrardii</i> Hutch.	1	1	1	1
EUPHORBIACEAE	<i>Erythrococca berberidea</i> Prain	1	0	0	1
EUPHORBIACEAE	<i>Erythrococca</i> sp. nov.	1	1	1	0
EUPHORBIACEAE	<i>Euphorbia bupleurifolia</i> Jacq.	0	0	1	1
EUPHORBIACEAE	<i>Euphorbia dumosa</i> E. Mey. ex Boiss.	1	1	0	0
EUPHORBIACEAE	<i>Euphorbia epicyparissias</i> E. Mey. ex Boiss. var. <i>epic</i>	0	1	1	0
EUPHORBIACEAE	<i>Euphorbia ericoides</i> Lam.	0	0	1	1
EUPHORBIACEAE	<i>Euphorbia franksiae</i> N.E. Br.	0	0	1	1
EUPHORBIACEAE	<i>Euphorbia grandidens</i> Haw.	0	1	1	1
EUPHORBIACEAE	<i>Euphorbia gueinzii</i> Boiss.	0	0	0	1
EUPHORBIACEAE	<i>Euphorbia gueinzii</i> Boiss. var. <i>albovillosa</i> (Pax) N.E.	0	0	1	0
EUPHORBIACEAE	<i>Euphorbia gueinzii</i> Boiss. var. <i>gueinzii</i>	0	0	1	0
EUPHORBIACEAE	<i>Euphorbia heterophylla</i> L.	1	0	0	0
EUPHORBIACEAE	<i>Euphorbia kraussiana</i> Bernh. var. <i>erubescens</i> N.E. Br.	1	0	1	0
EUPHORBIACEAE	<i>Euphorbia kraussiana</i> Bernh. var. <i>kraussiana</i>	1	0	1	1
EUPHORBIACEAE	<i>Euphorbia natalensis</i> Bernh.	0	1	0	1
EUPHORBIACEAE	<i>Euphorbia striata</i> Thunb. var. <i>striata</i>	1	1	1	0
EUPHORBIACEAE	<i>Euphorbia tetragona</i> Haw.	0	0	1	0
EUPHORBIACEAE	<i>Euphorbia tirucalli</i> L.	0	1	1	1
EUPHORBIACEAE	<i>Euphorbia triangularis</i> Desf.	0	1	1	1
EUPHORBIACEAE	<i>Euphorbia woodii</i> N.E.Br.	0	1	0	0
EUPHORBIACEAE	<i>Excoecaria simii</i> (Kuntze) Pax	1	1	1	1
EUPHORBIACEAE	<i>Heywoodia lucens</i> Sim	1	1	1	1
EUPHORBIACEAE	<i>Jatropha variifolia</i> Pax	0	0	0	1
EUPHORBIACEAE	<i>Macaranga capensis</i> (Baill.) Benth. ex Sim	1	1	1	1
EUPHORBIACEAE	<i>Manihot dulcis</i> Pax *	1	0	0	0
EUPHORBIACEAE	<i>Margaritaria discoidea</i> (Baill.) Webster var. <i>discoidea</i>	1	1	1	1
EUPHORBIACEAE	<i>Margaritaria discoidea</i> (Baill.) Webster var. <i>fagifolia</i>	1	0	0	0
EUPHORBIACEAE	<i>Margaritaria discoidea</i> (Baill.) Webster var. <i>nitida</i> (Pax)	0	0	1	1
EUPHORBIACEAE	<i>Micrococca capensis</i> (Baill.) Prain.	1	1	1	1
EUPHORBIACEAE	<i>Phyllanthus cedrelifolius</i> Verdoorn	1	0	0	0
EUPHORBIACEAE	<i>Phyllanthus glaucophyllus</i> Sond.	0	0	1	0
EUPHORBIACEAE	<i>Phyllanthus maderaspatensis</i> L.	1	0	0	0
EUPHORBIACEAE	<i>Phyllanthus meyerianus</i> Muell. Arg.	0	0	1	0
EUPHORBIACEAE	<i>Phyllanthus myrtaceus</i> Sond.	1	1	1	0

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
EUPHORBIACEAE	<i>Phyllanthus nummulariifolius</i> Poir.	0	0	0	1
EUPHORBIACEAE	<i>Phyllanthus reticulatus</i> Poir.	0	0	0	1
EUPHORBIACEAE	<i>Ricinus communis</i> L.*	1	0	0	0
EUPHORBIACEAE	<i>Sapium ellipticum</i> (Krauss) Pax	1	1	1	0
EUPHORBIACEAE	<i>Sapium integerrimum</i> (Hochst.) J. Leonard	1	0	0	1
EUPHORBIACEAE	<i>Suregada africana</i> (Sond.) Kuntze	0	1	1	1
EUPHORBIACEAE	<i>Suregada procera</i> (Prain) Croizat	1	1	1	0
EUPHORBIACEAE	<i>Synadenium cupulare</i> (Boiss.) L.C.Wheeler	0	0	1	0
EUPHORBIACEAE	<i>Tragia glabrata</i> (Muell. Arg.) Pax & Hoffm. var. <i>glabrata</i>	1	0	1	1
FABACEAE	<i>Abrus laevigatus</i> E. Mey.	1	1	1	1
FABACEAE	<i>Abrus precatorius</i> L. subsp. <i>africanus</i> Verdc.	1	0	0	1
FABACEAE	<i>Acacia ataxacantha</i> DC.	1	1	1	1
FABACEAE	<i>Acacia caffra</i> (Thunb.) Willd.	1	1	1	1
FABACEAE	<i>Acacia karroo</i> Hayne	1	1	1	1
FABACEAE	<i>Acacia longifolia</i> (Andr.) Willd. *	0	1	1	0
FABACEAE	<i>Acacia mearnsii</i> De Wild.	0	0	0	1
FABACEAE	<i>Acacia melanoxylon</i> R. Br. *	0	1	0	0
FABACEAE	<i>Acacia robusta</i> Burch. subsp. <i>robusta</i>	0	1	0	0
FABACEAE	<i>Adenopodia spicata</i> (E. Mey.) Presl	1	1	1	1
FABACEAE	<i>Aeschynomene micrantha</i> DC.	0	0	1	1
FABACEAE	<i>Aeschynomene uniflora</i> E. Mey. var. <i>uniflora</i>	1	0	0	0
FABACEAE	<i>Albizia adianthifolia</i> (Schumach.) W.F. Wight	1	1	1	1
FABACEAE	<i>Alysicarpus rugosus</i> (Willd.) DC. subsp. <i>perennirufus</i>	1	0	1	0
FABACEAE	<i>Argyrobium harveyanum</i> Oliv.	0	1	1	1
FABACEAE	<i>Argyrobium humile</i> Phill.	0	1	0	0
FABACEAE	<i>Argyrobium marginatum</i> H. Bol.	0	0	1	0
FABACEAE	<i>Argyrobium pilosum</i> Harv.	0	0	1	0
FABACEAE	<i>Argyrobium rotundifolium</i> T. Edwards	1	0	0	0
FABACEAE	<i>Argyrobium rupestre</i> (Eckl. & Zeyh.) Walp.	0	1	1	1
FABACEAE	<i>Argyrobium tomentosum</i> (Andr.) Druce	1	1	1	1
FABACEAE	<i>Argyrobium tuberosum</i> Eckl. & Zeyh.	0	1	0	0
FABACEAE	<i>Argyrobium woodii</i> Duemmer	0	0	1	0
FABACEAE	<i>Aspalathus chortophila</i> Eckl. & Zeyh.	0	1	1	0
FABACEAE	<i>Aspalathus gerrardii</i> H. Bol.	0	1	1	1
FABACEAE	<i>Aspalathus laricifolia</i> Berg. subsp. <i>canescens</i> (L.) Da	0	0	1	0
FABACEAE	<i>Aspalathus spinosa</i> L. subsp. <i>spinosa</i>	0	1	1	0
FABACEAE	<i>Baphia racemosa</i> (Hochst.) Bak.	1	0	0	1
FABACEAE	<i>Bauhinia natalensis</i> Oliv. ex Hook.	0	0	0	1
FABACEAE	<i>Caesalpinia bonduc</i> (L.) Roxb.	0	0	0	1
FABACEAE	<i>Caesalpinia decapetala</i> (Roth) Alston*	1	1	1	1
FABACEAE	<i>Calpurnia aurea</i> (Ait.) Benth.	0	1	0	1
FABACEAE	<i>Canavalia bonariensis</i> Lindl. *	1	0	1	0
FABACEAE	<i>Canavalia maritima</i> (Aubl.) Thouars	0	0	0	1
FABACEAE	<i>Chamaecrista capensis</i> (Thunb.) E. Mey. var. <i>flavescens</i>	0	0	1	0
FABACEAE	<i>Chamaecrista comosa</i> E. Mey. var. <i>comosa</i>	0	1	1	0
FABACEAE	<i>Chamaecrista mimosoides</i> (L.) Greene	1	1	1	1
FABACEAE	<i>Chamaecrista plumosa</i> E. Mey. var. <i>erecta</i> (Schorn &	1	1	1	0
FABACEAE	<i>Chamaecrista plumosa</i> E. Mey. var. <i>plumosa</i>	0	0	0	1
FABACEAE	<i>Chamaecrista stricta</i> E. Mey.	0	0	0	1
FABACEAE	<i>Crabia zimmermannii</i> (Harms) Dunn	1	0	0	0
FABACEAE	<i>Crotalaria capensis</i> Jacq.	1	1	1	1
FABACEAE	<i>Crotalaria globifera</i> E. Mey.	0	1	1	1

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
FABACEAE	<i>Crotalaria lanceolata</i> E.Mey. subsp. <i>lanceolata</i>	0	0	1	1
FABACEAE	<i>Crotalaria macrocarpa</i> E.Mey subsp. <i>macrocarpa</i>	1	0	0	1
FABACEAE	<i>Crotalaria natalensis</i> Bak. f.	1	0	0	1
FABACEAE	<i>Crotalaria natalitia</i> Meisn. var. <i>natalitia</i>	0	0	1	1
FABACEAE	<i>Crotalaria obscura</i> DC.	0	1	0	0
FABACEAE	<i>Crotalaria pallida</i> Ait. var. <i>pallida</i>	1	0	0	0
FABACEAE	<i>Crotalaria virgulata</i> Klotzsch subsp. <i>grantiana</i> (Harv.)	1	0	1	0
FABACEAE	<i>Dalbergia armata</i> E. Mey.	0	1	1	1
FABACEAE	<i>Dalbergia multijuga</i> E. Mey.	1	1	1	1
FABACEAE	<i>Dalbergia obovata</i> E.Mey.	1	1	1	1
FABACEAE	<i>Desmodium dregeanum</i> Benth.	1	1	1	1
FABACEAE	<i>Desmodium incanum</i> DC.	1	0	1	1
FABACEAE	<i>Desmodium repandum</i> (Vahl) DC.	1	0	0	0
FABACEAE	<i>Desmodium setigerum</i> (E. Mey.) Benth. ex Harv.	1	1	1	1
FABACEAE	<i>Dichilus reflexus</i> (N.E. Br.)A.L. Schutte	0	0	1	0
FABACEAE	<i>Dichrostachys cinerea</i> (L.) Wight & Arn. subsp. <i>nyasae</i>	1	0	1	1
FABACEAE	<i>Dolichos falciformis</i> E. Mey.	0	1	0	1
FABACEAE	<i>Dolichos sericeus</i> E. Mey. subsp. <i>sericeus</i>	1	0	0	1
FABACEAE	<i>Dolichos trilobus</i> L. subsp. <i>transvaalicus</i> Verdc.	1	0	0	0
FABACEAE	<i>Eriosema acuminatum</i> (Eckl. & Zeyh.) C.H. Stirton	1	1	1	0
FABACEAE	<i>Eriosema burkei</i> Benth.	0	0	0	1
FABACEAE	<i>Eriosema cordatum</i> E.Mey.	1	0	1	1
FABACEAE	<i>Eriosema dregei</i> E. Mey.	0	1	0	0
FABACEAE	<i>Eriosema kraussianum</i> Meisn.	0	1	1	1
FABACEAE	<i>Eriosema parviflorum</i> E. Mey.	1	0	1	0
FABACEAE	<i>Eriosema preptum</i> C.H. Stirton	0	0	1	0
FABACEAE	<i>Eriosema salignum</i> E. Mey.	0	1	1	1
FABACEAE	<i>Eriosema simulans</i> C.H. Stirton	0	0	0	1
FABACEAE	<i>Eriosema squarrosus</i> (taxon a)	0	0	1	0
FABACEAE	<i>Eriosema umtamvunense</i> C.H. Stirton	0	1	1	0
FABACEAE	<i>Erythrina caffra</i> Thunb.	1	1	0	0
FABACEAE	<i>Erythrina humeana</i> Spreng.	1	1	0	1
FABACEAE	<i>Erythrina latissima</i> E.Mey.	0	1	1	1
FABACEAE	<i>Erythrina lysistemon</i> Hutch.	1	1	1	1
FABACEAE	<i>Erythrina xdyeri</i> Hennesy	0	0	0	1
FABACEAE	<i>Indigostrum fastigiatum</i> (E.Mey.) Schrire	0	0	1	0
FABACEAE	<i>Indigofera braamtonyi</i>	0	0	1	0
FABACEAE	<i>Indigofera dregeana</i> E. Mey.	0	0	0	1
FABACEAE	<i>Indigofera eriocarpa</i> E.Mey.	0	0	1	1
FABACEAE	<i>Indigofera fastigiata</i> E. Mey.	0	1	0	0
FABACEAE	<i>Indigofera filipes</i> Benth. ex Harv.	0	1	0	1
FABACEAE	<i>Indigofera grata</i> E. Mey.	0	0	1	0
FABACEAE	<i>Indigofera hedyantha</i> Eckl. & Zeyh.	0	1	0	1
FABACEAE	<i>Indigofera herrstreyi</i> Schrire	1	0	1	0
FABACEAE	<i>Indigofera hilaris</i> Eckl. & Zeyh.	1	1	1	1
FABACEAE	<i>Indigofera jucunda</i> B. Schrire	0	0	1	0
FABACEAE	<i>Indigofera longipes</i> N.E. Br.	0	1	1	0
FABACEAE	<i>Indigofera micrantha</i> E.Mey.	1	1	1	1
FABACEAE	<i>Indigofera natalensis</i> H. Bol.	1	1	1	0
FABACEAE	<i>Indigofera pondoense</i> Schrire	0	0	1	0
FABACEAE	<i>Indigofera rostrata</i> H. Bol.	0	1	0	0
FABACEAE	<i>Indigofera rubroglandulosa</i> Germishuizen	0	1	1	1

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
FABACEAE	<i>Indigofera sordida</i> Benth. ex Harv.	0	0	0	1
FABACEAE	<i>Indigofera</i> sp. (= van Hoepen 89)	0	1	0	0
FABACEAE	<i>Indigofera spicata</i> Forssk.	1	0	1	0
FABACEAE	<i>Indigofera stricta</i> L. f.	1	1	0	0
FABACEAE	<i>Indigofera torulosa</i> E. Mey.	0	0	1	0
FABACEAE	<i>Indigofera tristis</i> E. Mey.	0	0	1	1
FABACEAE	<i>Indigofera velutina</i> E. Mey.	0	0	1	1
FABACEAE	<i>Indigofera williamsonii</i> (Harv.) N.E. Br.	0	0	0	1
FABACEAE	<i>Indigofera woodii</i> H. Bol. var. <i>laxa</i> H. Bol.	1	0	0	0
FABACEAE	<i>Indigofera woodii</i> H. Bol. var. <i>woodii</i>	0	0	0	1
FABACEAE	<i>Indigofera zeyheri</i> Spreng. ex Eckl. & Zeyh.	0	0	1	0
FABACEAE	<i>Indigofera cylindrica</i> DC.	1	0	0	0
FABACEAE	<i>Lablab purpureus</i> (L.) Sweet subsp. <i>uncinatus</i> Verdc.	1	0	1	0
FABACEAE	<i>Lotononis bachmanniana</i> Duemmer	0	1	1	0
FABACEAE	<i>Lotononis corymbosa</i> Benth.	0	1	1	0
FABACEAE	<i>Lotononis eriocarpa</i> (E. Mey.) B.-E. van Wyk	0	1	0	0
FABACEAE	<i>Lotononis pulchra</i> Duemmer	0	1	0	0
FABACEAE	<i>Lotononis umbellata</i> Benth.	0	0	1	0
FABACEAE	<i>Lotononis viminea</i> (E. Mey.) B.-E. van Wyk	0	1	1	0
FABACEAE	<i>Lotononis wilmsii</i> Dummer	0	0	1	0
FABACEAE	<i>Lotus discolor</i> E. Mey. subsp. <i>discolor</i>	1	0	0	0
FABACEAE	<i>Macrotyloma axillare</i> (E. Mey.) Verdc. var. <i>axillare</i>	0	0	0	1
FABACEAE	<i>Millettia grandis</i> (E. Mey.) Skeels	1	1	1	1
FABACEAE	<i>Neonotonia wightii</i> (Arn.) Lackey	1	0	1	0
FABACEAE	<i>Ophrestia oblongifolia</i> (E. Mey.) H.M. Forbes	0	1	1	0
FABACEAE	<i>Ophrestia oblongifolia</i> (E. Mey.) H.M. Forbes var. <i>ob</i>	0	0	0	1
FABACEAE	<i>Philoptera sutherlandii</i> Harv.	1	1	0	0
FABACEAE	<i>Podalyria velutina</i> Burch. ex Benth.	1	1	1	1
FABACEAE	<i>Pseudarthria hookeri</i> Wight & Arn. var. <i>hookeri</i>	1	0	1	1
FABACEAE	<i>Psoralea abbotii</i> C.H. Stirton	0	1	1	0
FABACEAE	<i>Psoralea glabra</i> E. Mey.	0	0	1	0
FABACEAE	<i>Psoralea latifolia</i> (Harv.) C.H. Stirton	0	0	1	0
FABACEAE	<i>Psoralea pinnata</i> L.	1	1	0	1
FABACEAE	<i>Rafnia elliptica</i> Thunb.	0	1	1	1
FABACEAE	<i>Rhynchosia caribaea</i> (Jacq.) DC.	1	1	1	1
FABACEAE	<i>Rhynchosia cooperi</i> (Harv. ex Bak. f.) Burt Davy	0	1	0	0
FABACEAE	<i>Rhynchosia harmsiana</i> Schltr. ex Zahlbr. var. <i>harmsi</i>	0	0	1	0
FABACEAE	<i>Rhynchosia hirsuta</i> Eckl. & Zeyh.	0	0	0	1
FABACEAE	<i>Rhynchosia minima</i> (L.) DC. var. <i>prostrata</i> (Harv.) M	0	0	0	1
FABACEAE	<i>Rhynchosia pentheri</i> Schltr. ex Zahlbr. var. <i>pentheri</i>	0	0	1	1
FABACEAE	<i>Rhynchosia sordida</i> (E. Mey.) Schinz	0	1	1	0
FABACEAE	<i>Rhynchosia totta</i> (Thunb.) DC. var. <i>totta</i>	1	1	1	1
FABACEAE	<i>Rhynchosia villosa</i> (Meisn.) Druce	0	0	1	0
FABACEAE	<i>Schotia brachypetala</i> Sond.	0	1	1	1
FABACEAE	<i>Schotia capitata</i> Bolle	0	0	0	1
FABACEAE	<i>Schotia latifolia</i> Jacq.	0	0	0	1
FABACEAE	<i>Senna floribunda</i> (Cav.) H.S. Irwin & R.C. Barneby	0	0	1	0
FABACEAE	<i>Senna septemtrionalis</i> (Viv.) Irwin & Barneby*	1	0	1	1
FABACEAE	<i>Sesbania bispinosa</i> (Jacq.) W.F. Wight var. <i>bispinos</i>	1	0	0	0
FABACEAE	<i>Sesbania punicea</i> (Cav.) Benth.*	1	0	0	0
FABACEAE	<i>Sphenostylis marginata</i> E. Mey. subsp. <i>marginata</i>	0	0	1	1
FABACEAE	<i>Tephrosia acaciifolia</i> Baker	0	1	0	0

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
FABACEAE	<i>Tephrosia bachmannii</i> Harms	1	1	1	1
FABACEAE	<i>Tephrosia diffusa</i> (E. Mey.) Harv.	0	1	0	0
FABACEAE	<i>Tephrosia glomeruliflora</i> Meisn. subsp. <i>glomeruliflora</i>	1	0	0	1
FABACEAE	<i>Tephrosia grandiflora</i> (Ait.) Pers.	1	1	1	1
FABACEAE	<i>Tephrosia kraussiana</i> Meisn.	1	1	1	1
FABACEAE	<i>Tephrosia macropoda</i> (E. Mey.) Harv. var. <i>macropoda</i>	0	1	1	0
FABACEAE	<i>Tephrosia macropoda</i> (E. Mey.) Harv. var. <i>diffusa</i> (E. Mey.)	1	0	1	1
FABACEAE	<i>Tephrosia multijuga</i> R.G.N. Young	0	0	0	1
FABACEAE	<i>Tephrosia polystachya</i> E. Mey. var. <i>hirta</i> Harv.	0	0	1	1
FABACEAE	<i>Tephrosia polystachya</i> E. Mey. var. <i>longidens</i> H. M. I.	0	1	0	0
FABACEAE	<i>Tephrosia polystachya</i> E. Mey. var. <i>polystachya</i>	1	0	1	0
FABACEAE	<i>Tephrosia pondoensis</i> (Codd) Schirre	0	1	1	1
FABACEAE	<i>Tephrosia purpurea</i> (L.) Pers. subsp. <i>canescens</i> (E. Mey.)	0	0	0	1
FABACEAE	<i>Tephrosia shilwanensis</i> Schinz	0	1	1	1
FABACEAE	<i>Vigna luteola</i> (Jacq.) Benth.	1	0	0	0
FABACEAE	<i>Vigna nervosa</i> Markoetter	0	0	1	0
FABACEAE	<i>Vigna unguiculata</i> (L.) Walp. Var. <i>ovata</i> (E. Mey.) Pie	1	0	0	0
FABACEAE	<i>Vigna vexillata</i> (L.) A. Rich. var. <i>angustifolia</i> (Schum.)	0	1	0	0
FABACEAE	<i>Vigna vexillata</i> (L.) A. Rich. var. <i>vexillata</i>	0	1	1	0
FABACEAE	<i>Zornia capensis</i> Pers.	1	0	0	1
FABACEAE	<i>Zornia linearis</i> E. Mey.	0	1	1	1
FABACEAE	<i>Zornia milneana</i> Mohlenbr.	0	0	0	1
FLACOURTIACEAE	<i>Casearia</i> sp. nov.	0	0	1	0
FLACOURTIACEAE	<i>Casearia</i> sp. nov.	1	1	0	0
FLACOURTIACEAE	<i>Dovyalis caffra</i> (Hook. f. & Harv.) Hook. f.	0	1	0	1
FLACOURTIACEAE	<i>Dovyalis longispina</i> (Harv.) Warb.	0	0	0	1
FLACOURTIACEAE	<i>Dovyalis lucida</i> Sim	0	1	1	0
FLACOURTIACEAE	<i>Dovyalis rhamnoides</i> (Burch. ex DC.) Harv.	1	1	1	1
FLACOURTIACEAE	<i>Dovyalis zeyheri</i> (Sond.) Warb.	0	0	0	0
FLACOURTIACEAE	<i>Gerrardina foliosa</i> Oliv.	1	1	1	1
FLACOURTIACEAE	<i>Homalium dentatum</i> (Harv.) Warb.	1	1	1	1
FLACOURTIACEAE	<i>Homalium rufescens</i> Benth.	1	1	1	1
FLACOURTIACEAE	<i>Kiggelaria africana</i> L.	0	1	1	0
FLACOURTIACEAE	<i>Pseudoscopia polyantha</i> Gilg	0	1	1	1
FLACOURTIACEAE	<i>Rawsonia lucida</i> Harv. & Sond.	1	1	1	1
FLACOURTIACEAE	<i>Scolopia flanaganii</i> (H. Bol.) Sim	0	1	0	0
FLACOURTIACEAE	<i>Scolopia mundii</i> (Eckl. & Zeyh.) Warb.	1	1	1	0
FLACOURTIACEAE	<i>Scolopia</i> sp. (= van Wyk 6069)	0	1	0	0
FLACOURTIACEAE	<i>Scolopia zeyheri</i> (Nees) Harv.	1	1	1	1
FLACOURTIACEAE	<i>Trimeria grandifolia</i> (Hochst.) Warb. subsp. <i>grandifolia</i>	1	1	1	1
FLACOURTIACEAE	<i>Xylothea krausiana</i> Hochst.	0	0	0	1
GENTIANACEAE	<i>Chironia albiflora</i> Hilliard	0	1	0	0
GENTIANACEAE	<i>Chironia krebsii</i> Griseb.	0	0	1	0
GENTIANACEAE	<i>Chironia laxa</i> Gilg	1	0	1	1
GENTIANACEAE	<i>Sebaea bojeri</i> Griseb.	0	0	1	1
GENTIANACEAE	<i>Sebaea filiformis</i> Schinz	0	1	0	0
GENTIANACEAE	<i>Sebaea grandis</i> (E. Mey.) Steud.	1	1	1	0
GENTIANACEAE	<i>Sebaea rehmannii</i> Schinz	0	0	1	0
GERANIACEAE	<i>Geranium flanaganii</i> Knuth	1	1	0	0
GERANIACEAE	<i>Geranium ornithopodon</i> Eckl. & Zeyh.	1	0	1	0
GERANIACEAE	<i>Geranium subglabrum</i> Hilliard & B.L. Burtt	0	1	0	0
GERANIACEAE	<i>Monsonia grandifolia</i> Knuth	0	0	1	0

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
GERANIACEAE	<i>Monsonia natalensis</i> Knuth	0	1	1	1
GERANIACEAE	<i>Pelargonium alchemilloides</i> (L.) L'H,rit.	1	0	1	1
GERANIACEAE	<i>Pelargonium capitatum</i> (L.) L'Herit.	1	1	1	0
GERANIACEAE	<i>Pelargonium grossularioides</i> (L.) L'H,rit.	1	0	0	0
GERANIACEAE	<i>Pelargonium luridum</i> (Andr.) Sweet	0	1	1	1
GERANIACEAE	<i>Pelargonium odoratissimum</i> (L.) L'H,rit.	0	0	0	1
GERANIACEAE	<i>Pelargonium pulverulentum</i> Colv. ex Sweet	0	1	0	1
GESNERIACEAE	<i>Streptocarpus baudertii</i> Britten	1	0	0	0
GESNERIACEAE	<i>Streptocarpus formosus</i>	1	1	1	1
GESNERIACEAE	<i>Streptocarpus haygarthii</i> N.E. Br. ex C.B. Cl.	1	1	1	1
GESNERIACEAE	<i>Streptocarpus johannis</i> Britten	1	0	0	0
GESNERIACEAE	<i>Streptocarpus polyanthus</i> Hook. subsp. <i>polyanthus</i>	0	0	1	1
GESNERIACEAE	<i>Streptocarpus polyanthus</i> Hook. subsp. <i>verecundus</i> B.	0	0	0	1
GESNERIACEAE	<i>Streptocarpus porphyrostachys</i> Hilliard	0	1	1	0
GESNERIACEAE	<i>Streptocarpus primulifolius</i> Gand. subsp. <i>primulifolius</i>	1	0	0	0
GESNERIACEAE	<i>Streptocarpus rexii</i> (Hook.) Lindl.	0	0	0	1
GESNERIACEAE	<i>Streptocarpus</i> sp. (Cloete sn)	0	1	0	0
GESNERIACEAE	<i>Streptocarpus trabeculatus</i> Hilliard	0	0	0	1
GOODENIACEAE	<i>Scaevola plumieri</i> (L.) Vahl	1	0	0	0
HALORAGACEAE	<i>Laurembergia repens</i> Berg. subsp. <i>brachypoda</i> (Hier)	0	0	1	0
HAMAMELIDACEAE	<i>Trichocladus crinitus</i> (Thunb.) Pers.	1	1	1	1
HAMAMELIDACEAE	<i>Trichocladus ellipticus</i> Eckl. & Zeyh. subsp. <i>ellipticus</i>	1	1	1	0
HAMAMELIDACEAE	<i>Trichocladus grandiflorus</i> Oliv.	0	1	1	1
ICACINACEAE	<i>Apodytes abbotii</i> Potgieter and Van Wyk	1	1	1	1
ICACINACEAE	<i>Apodytes dimidiata</i> E. Mey. ex Arn. subsp. <i>dimidiata</i>	1	1	1	1
ICACINACEAE	<i>Cassinopsis ilicifolia</i> (Hochst.) Kuntze	0	0	0	1
ICACINACEAE	<i>Cassinopsis tinifolia</i> Harv.	1	1	1	1
ILLECEBRACEAE	<i>Pollichia campestris</i> Ait.	0	0	1	1
LAMIACEAE	<i>Aeollanthus buchnerianus</i> Briq.	0	0	0	1
LAMIACEAE	<i>Aeollanthus parvifolius</i> Benth.	1	1	1	1
LAMIACEAE	<i>Ajuga ophrydis</i> Burch. ex Benth.	1	1	1	0
LAMIACEAE	<i>Becium grandiflorum</i> (Lam.) Pichi-Serm. var. <i>obovatum</i>	0	0	1	0
LAMIACEAE	<i>Becium obovatum</i> (E. Mey. ex Benth.) N.E. Br. var. <i>obovatum</i>	0	1	0	0
LAMIACEAE	<i>Endostemon obtusifolius</i> (E. Mey. ex Benth.) N.E. Br.	0	1	1	1
LAMIACEAE	<i>Justicia petiolaris</i> (Nees) T. Anders subsp. <i>petiolaris</i>	1	0	0	0
LAMIACEAE	<i>Hyptis pectinata</i> (L.) Poit.	0	0	1	0
LAMIACEAE	<i>Leonotis leonurus</i> (L.) R. Br.	1	1	0	0
LAMIACEAE	<i>Leonotis ocymifolia</i> (Burm. f.) Iwarsson var. <i>raineriana</i>	1	0	1	1
LAMIACEAE	<i>Leucas lavandulifolia</i> Sm.	0	0	0	0
LAMIACEAE	<i>Orthosiphon suffrutescens</i> (Thonn.) J.K. Morton	0	0	0	1
LAMIACEAE	<i>Plectranthus aliciae</i> (Codd) Van Jaarsv. & T.J. Edwar	0	0	1	1
LAMIACEAE	<i>Plectranthus ambiguus</i> (H. Bol.) Codd	1	0	1	1
LAMIACEAE	<i>Plectranthus ciliatus</i> E. Mey. ex Benth.	1	1	1	1
LAMIACEAE	<i>Plectranthus ecklonii</i> Benth.	1	0	1	1
LAMIACEAE	<i>Plectranthus ernstii</i> Codd	0	0	1	1
LAMIACEAE	<i>Plectranthus fruticosus</i> L'Herit.	1	0	0	1
LAMIACEAE	<i>Plectranthus grillatus</i> Briq.	0	0	0	1
LAMIACEAE	<i>Plectranthus hadiensis</i> (Forssk.) Schweinf. ex Spreng	0	1	1	0
LAMIACEAE	<i>Plectranthus hadiensis</i> (Forssk.) Schweinf. ex Spreng	0	0	0	1
LAMIACEAE	<i>Plectranthus hadiensis</i> (Forssk.) Schweinf. ex Spreng	0	0	0	1
LAMIACEAE	<i>Plectranthus hilliardiae</i> Codd subsp. <i>hilliardiae</i>	1	1	1	0
LAMIACEAE	<i>Plectranthus laxiflorus</i> Benth.	1	0	0	0
LAMIACEAE	<i>Plectranthus madagascariensis</i> (Pers.) Benth. var. <i>m</i>	1	1	0	1

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
LAMIACEAE	<i>Plectranthus malvinus</i> Van Jaarsveld & T.J. Edwards	1	0	0	0
LAMIACEAE	<i>Plectranthus oertendahlii</i> Th. Fr. Jr.	0	0	0	1
LAMIACEAE	<i>Plectranthus oribiensis</i> Codd	0	0	0	1
LAMIACEAE	<i>Plectranthus petiolaris</i> E. Mey. ex Benth.	1	0	1	1
LAMIACEAE	<i>Plectranthus praetermissus</i> Codd	1	0	0	0
LAMIACEAE	<i>Plectranthus reflexus</i> E.J.vJ & T.J.Edwards	1	0	0	0
LAMIACEAE	<i>Plectranthus saccatus</i> Benth. subsp. <i>saccatus</i>	1	1	1	1
LAMIACEAE	<i>Plectranthus saccatus</i> Benth. Subsp. <i>pondensis</i>	0	0	0	1
LAMIACEAE	<i>Plectranthus saccatus</i> Benth. var. <i>longitubus</i> Codd	0	0	1	0
LAMIACEAE	<i>Plectranthus spicatus</i> E. Mey. ex Benth.	0	0	0	1
LAMIACEAE	<i>Plectranthus strigosus</i> Benth.	1	1	1	0
LAMIACEAE	<i>Plectranthus verticillatus</i> (L. f.) Druce	1	0	0	1
LAMIACEAE	<i>Plectranthus zuluensis</i> T. Cooke	1	0	1	1
LAMIACEAE	<i>Pycnostachys reticulata</i> (E.Mey.) Benth.	1	0	1	1
LAMIACEAE	<i>Rabdosiella calycina</i> (Benth.) Codd	0	1	1	1
LAMIACEAE	<i>Stachys aethiopica</i> L.	1	0	1	1
LAMIACEAE	<i>Stachys caffra</i> E. Mey. ex Benth.	1	0	0	0
LAMIACEAE	<i>Stachys erectiuscula</i> Guerke	0	0	1	0
LAMIACEAE	<i>Stachys graciliflora</i> Presl	0	0	1	0
LAMIACEAE	<i>Stachys grandifolia</i> E. Mey. ex Benth.	1	0	0	0
LAMIACEAE	<i>Stachys natalensis</i> Hochst. var. <i>galpinii</i> (Briq.) Codd	1	0	0	0
LAMIACEAE	<i>Stachys natalensis</i> Hochst. var. <i>natalensis</i>	1	0	0	0
LAMIACEAE	<i>Stachys nigricans</i> Benth.	0	1	0	0
LAMIACEAE	<i>Syncolostemon argenteus</i> N.E. Br.	0	0	1	0
LAMIACEAE	<i>Syncolostemon densiflorus</i> Benth.	1	1	0	0
LAMIACEAE	<i>Syncolostemon macranthus</i> (Guerke) Ashby	0	0	0	1
LAMIACEAE	<i>Syncolostemon parviflorus</i> E. Mey. ex Benth. var. <i>lar</i>	0	0	1	0
LAMIACEAE	<i>Syncolostemon parviflorus</i> E. Mey. ex Benth. var. <i>pa</i>	0	1	0	0
LAMIACEAE	<i>Syncolostemon ramulosus</i> E.Mey. ex Benth.	0	1	1	0
LAMIACEAE	<i>Syncolostemon rotundifolius</i> E. Mey. ex Benth.	0	1	1	1
LAMIACEAE	<i>Tetradenia riparia</i> (Hochst.) Codd	0	0	0	1
LAMIACEAE	<i>Teucrium kraussii</i> Codd	1	1	1	1
LAMIACEAE	<i>Tinnea galpinii</i> Briq.	0	1	1	0
LAURACEAE	<i>Cassytha filiformis</i> L.	0	1	0	1
LAURACEAE	<i>Cassytha pondoensis</i> Engl.	0	1	1	0
LAURACEAE	<i>Cryptocarya latifolia</i> Sond.	1	1	1	1
LAURACEAE	<i>Cryptocarya myrtifolia</i> Stapf.	1	1	1	0
LAURACEAE	<i>Cryptocarya woodii</i> Engl.	1	1	1	1
LAURACEAE	<i>Cryptocarya wyliei</i> Stapf	1	1	1	1
LAURACEAE	<i>Dahlgrenodendron natalensis</i> (J.H. Ross) v.d. Merwe	0	1	1	1
LENTIBULARIACEAE	<i>Genlisea hispidula</i> Stapf subsp. <i>hispidula</i>	1	1	1	0
LENTIBULARIACEAE	<i>Utricularia arenaria</i> A. DC.	0	1	1	0
LENTIBULARIACEAE	<i>Utricularia firmula</i> Oliv.	0	1	1	0
LENTIBULARIACEAE	<i>Utricularia inflexa</i> Forssk.	1	0	0	0
LENTIBULARIACEAE	<i>Utricularia livida</i> E. Mey.	1	1	1	1
LENTIBULARIACEAE	<i>Utricularia prehensilis</i> E.Mey.	0	1	1	1
LENTIBULARIACEAE	<i>Utricularia sandersonii</i> Oliv.	1	1	1	1
LENTIBULARIACEAE	<i>Utricularia stellaris</i> L. f.	1	0	0	0
LENTIBULARIACEAE	<i>Utricularia subulata</i> L.	0	1	1	1
LINACEAE	<i>Linum thunbergii</i> Eckl. & Zeyh.	0	0	1	1
LOBELIACEAE	<i>Cyphia elata</i> Harv. var. <i>elata</i>	1	1	1	1
LOBELIACEAE	<i>Grammatotheca bergiana</i> (Cham.) Presl var. <i>bergian</i>	1	1	1	1

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
LOBELIACEAE	<i>Lobelia anceps</i> L. f.	1	1	0	0
LOBELIACEAE	<i>Lobelia caerulea</i> Sims var. <i>macularis</i> (Presl) E. Wimm	0	1	0	0
LOBELIACEAE	<i>Lobelia chamaedryfolia</i> (Presl) A. DC.	1	1	0	1
LOBELIACEAE	<i>Lobelia chinensis</i> Lour.	0	0	1	0
LOBELIACEAE	<i>Lobelia coronopifolia</i> L.	0	1	1	0
LOBELIACEAE	<i>Lobelia erinus</i> L.	0	0	1	1
LOBELIACEAE	<i>Lobelia flaccida</i> (Presl) A. DC. subsp. <i>flaccida</i>	1	0	1	0
LOBELIACEAE	<i>Lobelia malowensis</i> E. Wimm.	0	1	0	1
LOBELIACEAE	<i>Lobelia patula</i> L.f.	0	1	0	0
LOBELIACEAE	<i>Lobelia preslii</i> A. DC.	0	0	0	1
LOBELIACEAE	<i>Lobelia pteropoda</i> (Presl) A. DC.	1	0	1	1
LOBELIACEAE	<i>Lobelia vanreenensis</i> (Kuntze) K. Schum.	1	0	0	1
LOBELIACEAE	<i>Monopsis decipiens</i> (Sond.) Thulin	0	0	0	1
LOBELIACEAE	<i>Monopsis scabra</i> (Thunb.) Urb.	0	1	0	1
LOBELIACEAE	<i>Monopsis stellarioides</i> (Presl) Urb. subsp. <i>stellarioide</i>	0	0	1	0
LOBELIACEAE	<i>Monopsis unidentata</i> (Dryand.) E. Wimm. subsp. <i>inte</i>	0	0	1	0
LOBELIACEAE	<i>Monopsis unidentata</i> (Dryand.) E. Wimm. subsp. <i>lae</i>	1	1	0	1
LOBELIACEAE	<i>Wimmerella bifida</i>	1	0	0	0
LORANTHACEAE	<i>Erianthemum dregei</i> (Eckl. & Zeyh.) V. Tieghem	1	0	1	0
LORANTHACEAE	<i>Helixanthera subcylindrica</i> (Sprague) Danser	0	0	0	1
LORANTHACEAE	<i>Helixanthera woodii</i> (Schltr. & Krause) Danser	0	0	1	0
LORANTHACEAE	<i>Tapinanthus gracilis</i> Toelken & Wiens	1	0	0	0
LORANTHACEAE	<i>Tapinanthus kraussianus</i> (Meisn.) V. Tieghem subsp.	1	0	1	0
LORANTHACEAE	<i>Tapinanthus kraussianus</i> (Meisn.) V. Tieghem subsp.	0	0	0	1
LORANTHACEAE	<i>Tapinanthus natalitius</i> (Meisn.) Danser subsp. <i>natalit</i>	1	0	0	1
LORANTHACEAE	<i>Tapinanthus natalitius</i> (Meisn.) Danser subsp. <i>zeyhe</i>	0	0	0	1
LYTHRACEAE	<i>Heimia myrtifolia</i> Cham. & Schlechtd.	0	0	1	0
LYTHRACEAE	<i>Nesaea radicans</i> Guill. & Perr. var. <i>floribunda</i> (Sond.	0	0	0	1
LYTHRACEAE	<i>Nesaea</i> sp.	0	0	1	0
MALPIGHIACEAE	<i>Acridocarpus natalitius</i> Juss. var. <i>linearifolius</i> Launer	0	1	0	0
MALPIGHIACEAE	<i>Acridocarpus natalitius</i> Juss. var. <i>natalitius</i>	1	0	1	1
MALPIGHIACEAE	<i>Sphedamnocarpus pruriens</i> (Juss.) Szyszyl. var. <i>pru</i>	0	0	0	1
MALVACEAE	<i>Abutilon sonneratianum</i> (Cav.) Sweet	1	0	1	1
MALVACEAE	<i>Anisodontea scabrosa</i> (L.) Bates	0	0	1	0
MALVACEAE	<i>Hibiscus aethiopicus</i> L. var. <i>ovatus</i> Harv.	0	1	1	1
MALVACEAE	<i>Hibiscus calyphyllus</i> Cav.	0	0	1	1
MALVACEAE	<i>Hibiscus diversifolius</i> Jacq. subsp. <i>diversifolius</i>	1	0	0	0
MALVACEAE	<i>Hibiscus fuscus</i> Garcke	1	0	0	1
MALVACEAE	<i>Hibiscus ludwigii</i> Eckl. & Zeyh.	1	0	0	1
MALVACEAE	<i>Hibiscus meyeri</i> Harv. subsp. <i>meyeri</i>	0	0	0	1
MALVACEAE	<i>Hibiscus pedunculatus</i> L. f.	1	0	1	1
MALVACEAE	<i>Hibiscus platycalyx</i> Mast.	1	0	0	0
MALVACEAE	<i>Hibiscus rosa-sinensis</i> L. *	1	0	0	0
MALVACEAE	<i>Hibiscus schizopetalus</i> (Mast.) Hook.f.	1	0	0	0
MALVACEAE	<i>Hibiscus</i> sp. nov. (=Strey 6513)	0	1	1	0
MALVACEAE	<i>Hibiscus surattensis</i> L.	1	0	0	0
MALVACEAE	<i>Hibiscus tiliaceus</i> L.	1	1	1	0
MALVACEAE	<i>Hibiscus trionum</i> L.	1	1	1	1
MALVACEAE	<i>Hibiscus vitifolius</i> L. subsp. <i>vitifolius</i>	1	0	1	0
MALVACEAE	<i>Malvastrum coromandelianum</i> (L.) Garcke *	1	0	0	0
MALVACEAE	<i>Pavonia burchellii</i> (DC.) R.A. Dyer	0	0	0	1
MALVACEAE	<i>Pavonia columella</i> Cav.	1	0	1	1

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
MALVACEAE	<i>Sida dregei</i> Burt Davy	1	0	1	1
MALVACEAE	<i>Sida rhombifolia</i> L.	0	0	1	1
MALVACEAE	<i>Sida ternata</i> L. f.	1	0	0	0
MELASTOMATACEAE	<i>Antherotoma naudini</i> Hook. f.	0	0	0	1
MELASTOMATACEAE	<i>Dissotis canescens</i> (E. Mey. ex R.A. Grah.) Hook. f.	1	1	1	1
MELASTOMATACEAE	<i>Dissotis princeps</i> (Kunth) Triana var. <i>candolleana</i> (C.	1	0	0	0
MELASTOMATACEAE	<i>Memecylon bachmannii</i> Engl.	1	1	1	1
MELASTOMATACEAE	<i>Memecylon natalense</i> Markg.	0	1	1	1
MELASTOMATACEAE	<i>Tibouchina granulosa</i> Cogn.*	1	0	0	0
MELIACEAE	<i>Ekebergia capensis</i> Sparrm.	1	1	1	1
MELIACEAE	<i>Ekebergia pterophylla</i> (C. DC.) Hofmeyr	0	1	1	1
MELIACEAE	<i>Melia azedarach</i> L.	0	1	1	0
MELIACEAE	<i>Trichilia dregeana</i> Sond.	1	1	1	1
MELIACEAE	<i>Turraea floribunda</i> Hochst.	1	1	1	1
MELIANTHACEAE	<i>Bersama lucens</i> (Hochst.) Szyszyl.	0	1	1	1
MELIANTHACEAE	<i>Bersama stayneri</i> Phill.	0	0	0	1
MELIANTHACEAE	<i>Bersama swinnyi</i> Phill.	1	1	1	1
MELIANTHACEAE	<i>Bersama tysoniana</i> Oliv.	0	1	1	1
MENISPERMACEAE	<i>Cissampelos mucronata</i> A.Rich.	0	0	0	1
MENISPERMACEAE	<i>Cissampelos torulosa</i> E. Mey. ex Harv.	1	0	1	1
MENISPERMACEAE	<i>Stephania abyssinica</i> (Dill. & Rich.) Walp. var. <i>tomere</i>	1	0	0	0
MENYANTHACEAE	<i>Nymphoides indica</i> (L.) Kuntze subsp. <i>occidentalis</i>	0	0	1	0
MENYANTHACEAE	<i>Nymphoides thunbergiana</i> (Griseb.) Kuntze	1	1	0	0
MESEMBRYANTHEMACEAE	<i>Aptenia cordifolia</i> (L. f.) Schwant. var. <i>cordifolia</i>	1	0	0	1
MESEMBRYANTHEMACEAE	<i>Carpobrotus dimidiatus</i> (Haw.) L. Bol.	1	0	0	0
MESEMBRYANTHEMACEAE	<i>Delosperma caespitosum</i> L. Bol. forma <i>caespitosum</i>	0	0	1	0
MESEMBRYANTHEMACEAE	<i>Delosperma concavum</i> L. Bol.	0	0	1	0
MESEMBRYANTHEMACEAE	<i>Delosperma cooperi</i> (Hook. f.) L. Bol. forma <i>cooperi</i>	0	1	0	0
MESEMBRYANTHEMACEAE	<i>Delosperma galpinii</i> L. Bol.	0	0	0	1
MESEMBRYANTHEMACEAE	<i>Delosperma herbeum</i> (N.E. Br.) N.E. Br.	0	0	0	1
MESEMBRYANTHEMACEAE	<i>Delosperma lavisiae</i> L. Bol.	0	1	0	0
MESEMBRYANTHEMACEAE	<i>Delosperma lineare</i> L. var. <i>lineare</i>	0	0	1	0
MESEMBRYANTHEMACEAE	<i>Delosperma rogersii</i> (Schoenl+Berger)L. Bol. var. <i>rogersii</i>	1	1	0	0
MESEMBRYANTHEMACEAE	<i>Delosperma</i> sp. nov.	0	0	1	0
MESEMBRYANTHEMACEAE	<i>Delosperma</i> sp. nov.	1	0	0	0
MESEMBRYANTHEMACEAE	<i>Delosperma subpetiolatum</i> L. Bol.	0	1	0	0
MESEMBRYANTHEMACEAE	<i>Delosperma tradescantioides</i> (Berger) L. Bol.	0	1	1	0
MESEMBRYANTHEMACEAE	<i>Delosperma velutinum</i> L. Bol.	0	0	1	0
MESEMBRYANTHEMACEAE	<i>Disphyma</i> sp.	0	1	0	0
MESEMBRYANTHEMACEAE	<i>Lampranthus blandus</i> (Haw.) Schwant.	0	0	0	1
MESEMBRYANTHEMACEAE	<i>Lampranthus</i> sp. nov.	0	0	1	0
MESEMBRYANTHEMACEAE	<i>Lampranthus spectabilis</i> (Haw.) N.E. Br. subsp. <i>fugit</i>	0	0	0	1
MESEMBRYANTHEMACEAE	<i>Lampranthus stipulaceus</i> (L.) N.E. Br.	0	1	1	0
MONIMIACEAE	<i>Xymalos monospora</i> (Harv.) Baill. ex Warb.	1	1	1	1
MORACEAE	<i>Ficus bizanae</i> Hutch. & Burt Davy	1	1	1	1
MORACEAE	<i>Ficus burt-davyi</i> Hutch.	1	1	1	1
MORACEAE	<i>Ficus craterostoma</i> Warb. ex Mildbr. & Burret	1	1	1	1
MORACEAE	<i>Ficus glumosa</i> (Miq.) Del.	0	1	0	1
MORACEAE	<i>Ficus ingens</i> (Miq.) Miq. var. <i>ingens</i>	1	1	1	1
MORACEAE	<i>Ficus natalensis</i> Hochst. subsp. <i>natalensis</i>	1	1	0	1
MORACEAE	<i>Ficus</i> sp.*	1	0	0	0
MORACEAE	<i>Ficus sur</i> Forssk.	1	1	1	1

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
MORACEAE	<i>Ficus thonningii</i> Blume	1	0	1	1
MORACEAE	<i>Morus alba</i> L.*	1	0	0	0
MYRICACEAE	<i>Morella pilulifera</i> Rendle	1	0	0	0
MYRICACEAE	<i>Morella serrata</i> Lam.	1	1	1	1
MYRSINACEAE	<i>Embelia ruminata</i> (E. Mey. ex A. DC.) Mez	1	0	1	0
MYRSINACEAE	<i>Maesa alnifolia</i> Harv.	0	0	1	0
MYRSINACEAE	<i>Maesa lanceolata</i> Forssk.	1	1	1	1
MYRSINACEAE	<i>Myrsine africana</i> L.	0	1	1	0
MYRSINACEAE	<i>Rapanea melanophloeos</i> (L.) Mez	1	1	1	1
MYRTACEAE	<i>Eucalyptus</i> sp.	1	1	0	0
MYRTACEAE	<i>Eugenia albanensis</i> Sond.	0	1	1	0
MYRTACEAE	<i>Eugenia capensis</i> (Eckl. & Zeyh.) Harv. ex Sond. sub	1	1	0	1
MYRTACEAE	<i>Eugenia erythrophylla</i> Strey	1	1	1	1
MYRTACEAE	<i>Eugenia gueinzii</i> Sond.	0	0	1	1
MYRTACEAE	<i>Eugenia natalitia</i> Sond.	1	1	1	1
MYRTACEAE	<i>Eugenia simii</i> Dummer	0	1	1	1
MYRTACEAE	<i>Eugenia</i> sp. nov. C	0	0	1	0
MYRTACEAE	<i>Eugenia umtamvunensis</i> Van Wyk	0	1	1	0
MYRTACEAE	<i>Eugenia uniflora</i> L.*	1	0	0	0
MYRTACEAE	<i>Eugenia verdoorniae</i> Van Wyk	0	1	1	0
MYRTACEAE	<i>Eugenia woodii</i> Dummer	0	1	0	1
MYRTACEAE	<i>Eugenia zeyheri</i> Harv.	1	0	0	1
MYRTACEAE	<i>Heteropyxis natalensis</i> Harv.	0	0	0	1
MYRTACEAE	<i>Psidium cattleianum</i> Sabine *	1	0	0	1
MYRTACEAE	<i>Psidium guajava</i> L. *	1	0	0	1
MYRTACEAE	<i>Syzygium cordatum</i> Hochst.	1	1	1	1
MYRTACEAE	<i>Syzygium gerrardii</i> (Harv. ex Hook. f.) Burt Davy	0	1	1	1
MYRTACEAE	<i>Syzygium guineense</i> (Willd.) DC.	0	0	0	1
MYRTACEAE	<i>Syzygium pondoense</i> Engl.	0	1	1	0
NYCTAGINACEAE	<i>Mirabilis jalapa</i> L.*	1	0	0	0
NYMPHAEACEAE	<i>Nymphaea capensis</i> Thunb. var. <i>capensis</i>	0	1	0	0
NYMPHAEACEAE	<i>Nymphaea nouchali</i> Burm. f. var. <i>caerulea</i> (Sav.) Ve	1	0	1	1
OCHNACEAE	<i>Ochna arborea</i> Burch. ex DC. var. <i>arborea</i>	0	1	1	1
OCHNACEAE	<i>Ochna arborea</i> Burch. ex DC. var. <i>oconnorii</i> (Phill.) D	0	0	0	1
OCHNACEAE	<i>Ochna</i> cf. <i>chilversii</i> Phillips	0	0	1	0
OCHNACEAE	<i>Ochna gamostigmata</i> Du Toit	0	0	0	1
OCHNACEAE	<i>Ochna natalitia</i> (Meisn.) Walp.	1	1	1	1
OCHNACEAE	<i>Ochna serrulata</i> (Hochst.) Walp.	1	1	1	1
OCHNACEAE	<i>Ochna</i> sp. (= Abbott 965)	0	1	0	0
OLACACEAE	<i>Olax dissitiflora</i> Oliv.	0	0	0	1
OLACACEAE	<i>Ximenia caffra</i> Sond. var. <i>natalensis</i> Sond.	0	0	0	1
OLEACEAE	<i>Chionanthus foveolatus</i> (E. Mey.) Stearn subsp. <i>fove</i>	0	1	1	0
OLEACEAE	<i>Chionanthus foveolatus</i> (E. Mey.) Stearn subsp. <i>tom</i>	0	0	1	0
OLEACEAE	<i>Chionanthus peglerae</i> (C.H. Wr.) Stearn	1	1	1	1
OLEACEAE	<i>Jasminum multipartitum</i> Hochst.	1	1	1	1
OLEACEAE	<i>Jasminum streptopus</i> E. Mey.	0	0	1	0
OLEACEAE	<i>Olea capensis</i> L. subsp. <i>enervis</i> (Harv. ex C. H. Wr.	0	1	1	1
OLEACEAE	<i>Olea capensis</i> L. subsp. <i>macrocarpa</i> (C.H. Wr.) Ver	0	0	1	1
OLEACEAE	<i>Olea woodiana</i> Knobl.	1	1	1	1
OLEACEAE	<i>Schrebera alata</i> (Hochst.) Welw.	0	1	1	0
OLINIACEAE	<i>Olinia radiata</i> J. Hofmeyr & Phill.	0	1	1	0
OLINIACEAE	<i>Olinia ventosa</i> (L.) Cufod.	0	1	0	0

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
ONAGRACEAE	<i>Ludwigia octovalvis</i> (Jacq.) Raven subsp. <i>sessiliflora</i>	1	0	1	1
ONAGRACEAE	<i>Ludwigia stolonifera</i> (Guill. & Perr.) Raven	1	0	0	0
ONAGRACEAE	<i>Oenothera indecora</i> Cambess. subsp. <i>indecora</i> *	0	0	0	1
ONAGRACEAE	<i>Oenothera jamesii</i> Torr. & Gray *	1	0	0	0
ONAGRACEAE	<i>Oenothera laciniata</i> Hill. *	1	0	0	0
ONAGRACEAE	<i>Oenothera parodiana</i> Munz subsp. <i>parodiana</i> *	0	0	1	0
ONAGRACEAE	<i>Oenothera rosea</i> L'Hérit. ex Ait. *	0	0	1	1
ONAGRACEAE	<i>Oenothera villosa</i> Thunb.*	0	0	1	0
OXALIDACEAE	<i>Oxalis corniculata</i> L. *	1	0	1	0
OXALIDACEAE	<i>Oxalis purpurata</i> Jacq.	1	0	0	0
OXALIDACEAE	<i>Oxalis semiloba</i> Sond.	1	0	1	1
OXALIDACEAE	<i>Oxalis smithiana</i> Eckl. & Zeyh.	0	1	1	0
PAPAVERACEAE	<i>Argemone ochroleuca</i> Sweet subsp. <i>ochroleuca</i> *	0	0	1	0
PASSIFLORACEAE	<i>Adenia gummifera</i> (Harv.) Harms var. <i>gummifera</i>	1	0	1	1
PASSIFLORACEAE	<i>Basananthe sandersonii</i> (Harv.) De Wilde	0	1	0	0
PASSIFLORACEAE	<i>Passiflora edulis</i> Sims *	1	0	0	0
PASSIFLORACEAE	<i>Passiflora subpeltata</i> Ortega*	1	0	1	0
PEDALIACEAE	<i>Ceratotheca triloba</i> (Bernh.) Hook. f.	1	0	1	1
PHYTOLACCACEAE	<i>Phytolacca dioica</i> L. *	1	0	0	0
PHYTOLACCACEAE	<i>Phytolacca dodecandra</i> L'Herit	1	0	1	1
PHYTOLACCACEAE	<i>Phytolacca octandra</i> L.	1	0	1	1
PHYTOLACCACEAE	<i>Rivina humilis</i> L. *	1	0	0	0
PIPERACEAE	<i>Peperomia blanda</i> (Jacq.) H.B.K. var. <i>leptostachya</i> (L.)	1	0	1	0
PIPERACEAE	<i>Peperomia retusa</i> (L. f.) A. Dietr. var. <i>bachmannii</i>	0	0	1	0
PIPERACEAE	<i>Peperomia retusa</i> (L. f.) A.A. Dietr. subsp. <i>retusa</i>	1	0	1	1
PIPERACEAE	<i>Peperomia rotundifolia</i> (L.) Humb., Bonpl. & Kunth	1	1	1	1
PIPERACEAE	<i>Peperomia tetraphylla</i> (G. Forst.) Hook. & Arn.	0	0	1	1
PIPERACEAE	<i>Piper capense</i> L.f.	1	1	0	0
PITTIOSPORACEAE	<i>Pittosporum viridiflorum</i> Sims	1	1	1	1
PLANTAGINACEAE	<i>Plantago lanceolata</i> L. *	0	0	1	0
PLANTAGINACEAE	<i>Plantago longissima</i> Decne.	0	1	1	0
PLANTAGINACEAE	<i>Plantago major</i> L. *	1	0	0	1
PLUMBAGINACEAE	<i>Plumbago auriculata</i> Lam.	1	0	1	1
POLYGALACEAE	<i>Muraltia lancifolia</i> Harv.	1	1	1	0
POLYGALACEAE	<i>Muraltia saxicola</i> Chod.	0	0	1	0
POLYGALACEAE	<i>Polygala amatymbica</i> Eckl. & Zeyh.	0	0	1	0
POLYGALACEAE	<i>Polygala capillaris</i> E. Mey. ex Harv.	0	1	0	0
POLYGALACEAE	<i>Polygala confusa</i> Macowan	0	0	1	1
POLYGALACEAE	<i>Polygala esterae</i> Chod.	0	0	1	0
POLYGALACEAE	<i>Polygala fruticosa</i> Berg.	0	1	1	1
POLYGALACEAE	<i>Polygala gerrardii</i> Chod.	0	0	1	0
POLYGALACEAE	<i>Polygala hispida</i> Burch.	0	1	0	0
POLYGALACEAE	<i>Polygala hottentotta</i> Presl	1	1	1	1
POLYGALACEAE	<i>Polygala myrtifolia</i> L.	1	1	1	0
POLYGALACEAE	<i>Polygala ohlendorffiana</i> Eckl. & Zeyh.	0	0	1	1
POLYGALACEAE	<i>Polygala producta</i> N.E.Br.	0	1	0	0
POLYGALACEAE	<i>Polygala refracta</i> DC.	0	1	1	0
POLYGALACEAE	<i>Polygala rehmannii</i> Chod.	0	0	1	0
POLYGALACEAE	<i>Polygala serpentaria</i> Eckl. & Zeyh.	0	1	1	1
POLYGALACEAE	<i>Polygala transvaalensis</i> Chodat subsp. <i>transvaalensis</i>	0	1	0	0
POLYGALACEAE	<i>Polygala uncinata</i> E. Mey. ex Meisn.	0	0	1	0
POLYGALACEAE	<i>Polygala virgata</i> Thunb. var. <i>decora</i> (Sond.) Harv.	1	0	0	0

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
POLYGALACEAE	<i>Polygala virgata</i> Thunb. var. <i>virgata</i>	0	0	0	1
POLYGONACEAE	<i>Oxygonum dregeanum</i> Meisn. subsp. <i>dregeanum</i>	0	1	0	0
POLYGONACEAE	<i>Persicaria attenuata</i> (R.Br.) Sojak subsp. <i>africana</i>	1	0	0	0
POLYGONACEAE	<i>Persicaria hydropiper</i> (L.) Spach. *	0	0	1	0
POLYGONACEAE	<i>Persicaria lapathifolia</i> (L.) S.F. Gray *	0	0	1	1
POLYGONACEAE	<i>Persicaria serrulata</i> (Lag.) Webb & Moq.	1	1	0	1
POLYGONACEAE	<i>Rumex crispus</i> L. *	1	0	0	0
POLYGONACEAE	<i>Rumex dregeanus</i> Meisn. subsp. <i>dregeanus</i>	0	0	1	0
POLYGONACEAE	<i>Rumex sagittatus</i> Thunb.	1	0	1	1
PORTULACACEAE	<i>Anacampseros rufescens</i> (Harv.) Sweet	0	0	0	1
PORTULACACEAE	<i>Portulacaria afra</i> Jacq.	0	0	1	0
PRIMULACEAE	<i>Anagallis huttonii</i> Harv.	0	0	0	1
PRIMULACEAE	<i>Samolus porosus</i> (L. f.) Thunb.	0	1	0	0
PROTEACEAE	<i>Faurea macnaughtonii</i> Phill.	1	1	1	1
PROTEACEAE	<i>Grevillea robusta</i> *	1	0	0	0
PROTEACEAE	<i>Leucadendron spissifolium</i> (Salisb. ex Knight) I. Willi	0	1	1	1
PROTEACEAE	<i>Leucadendron spissifolium</i> (Salisb. ex Knight) I. Willi	0	0	1	1
PROTEACEAE	<i>Leucospermum innovans</i> Rourke	0	1	0	0
PROTEACEAE	<i>Protea caffra</i> Meisn. subsp. <i>caffra</i>	1	1	1	1
PROTEACEAE	<i>Protea roupelliae</i> Meisn. subsp. <i>roupelliae</i>	1	1	1	1
PROTEACEAE	<i>Protea simplex</i> Phill.	1	0	1	1
PTAEROXYLACEAE	<i>Ptaeroxylon obliquum</i> (Thunb.) Radlk.	1	1	1	1
RANUNCULACEAE	<i>Anemone fanninii</i> Harv. ex Mast.	0	0	1	0
RANUNCULACEAE	<i>Clematis brachiata</i> Thunb.	1	0	1	1
RANUNCULACEAE	<i>Knowltonia bracteata</i> Harv. ex Zahlbr.	0	0	1	0
RANUNCULACEAE	<i>Knowltonia brevistylis</i> Szyszyl.	1	0	0	1
RANUNCULACEAE	<i>Knowltonia capensis</i> (L.) Huth	0	1	0	0
RANUNCULACEAE	<i>Ranunculus capensis</i> Thunb.	0	0	0	0
RANUNCULACEAE	<i>Ranunculus multifidus</i> Forssk.	1	0	1	1
RHAMNACEAE	<i>Colubrina nicholsonii</i> Van Wyk & Schrire	1	1	0	0
RHAMNACEAE	<i>Helinus integrifolius</i> (Lam.) Kuntze	1	1	1	1
RHAMNACEAE	<i>Noltea africana</i> (L.) Reichb. f.	1	0	0	0
RHAMNACEAE	<i>Phylica natalensis</i> Pillans	0	0	1	0
RHAMNACEAE	<i>Phylica paniculata</i> Willd.	1	1	1	1
RHAMNACEAE	<i>Scutia myrtina</i> (Burm. f.) Kurz	1	1	1	1
RHAMNACEAE	<i>Ziziphus mucronata</i> Willd. subsp. <i>mucronata</i>	1	1	1	1
RHIZOPHORACEAE	<i>Bruguiera gymnorrhiza</i> (L.) Lam.	0	1	0	0
RHIZOPHORACEAE	<i>Cassipourea flanagani</i> (Schinz) Alston	0	0	0	0
RHIZOPHORACEAE	<i>Cassipourea gerrardii</i> (Schinz) Alston	1	1	1	1
RHIZOPHORACEAE	<i>Cassipourea gummiflua</i> Tul. var. <i>verticillata</i> (N.E. Br.)	1	1	1	1
RHYNCHOCALYCEAE	<i>Rhynchocalyx lawsonioides</i> Oliv.	1	1	1	1
ROSACEAE	<i>Cliffortia linearifolia</i> Eckl. & Zeyh.	0	0	0	1
ROSACEAE	<i>Cliffortia paucistaminea</i> Weim.	1	1	1	1
ROSACEAE	<i>Cliffortia serpyllifolia</i> Cham. & Schlechtd.	0	1	1	0
ROSACEAE	<i>Cliffortia strobilifera</i> Murray	0	0	1	1
ROSACEAE	<i>Prunus africana</i> (Hoek. f.) Kalkm.	0	0	1	0
ROSACEAE	<i>Rubus immixtus</i> C.E. Gust.	0	0	1	0
ROSACEAE	<i>Rubus pinnatus</i> Willd.	1	0	1	0
ROSACEAE	<i>Rubus rigidus</i> J.E. Sm.	1	1	1	0
ROSACEAE	<i>Rubus rosifolius</i> J.E. Sm. *	1	0	1	0
RUBIACEAE	<i>Agathisanthemum chlorophyllum</i> (Hochst.) Brem.	0	0	1	0
RUBIACEAE	<i>Alberta magna</i> E.Mey.	0	1	1	1

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
RUBIACEAE	<i>Anthospermum galpinii</i> Schltr.	1	1	1	1
RUBIACEAE	<i>Anthospermum herbaceum</i> L. f.	1	1	1	0
RUBIACEAE	<i>Anthospermum hispidulum</i> E. Mey. ex Sond.	1	0	1	1
RUBIACEAE	<i>Anthospermum littoreum</i> L. Bol.	1	1	0	0
RUBIACEAE	<i>Anthospermum streyi</i> Puff	1	1	1	1
RUBIACEAE	<i>Burchellia bubalina</i> (L. f.) Sims	1	1	1	1
RUBIACEAE	<i>Canthium ciliatum</i> (Klotzsch) Kuntze	0	1	1	1
RUBIACEAE	<i>Canthium inerme</i> (L. f.) Kuntze	1	1	1	1
RUBIACEAE	<i>Canthium mundianum</i> Cham. & Schlechtd.	0	0	1	0
RUBIACEAE	<i>Canthium setiflorum</i> Hiem subsp. setiflorum	1	0	0	0
RUBIACEAE	<i>Canthium spinosum</i> (Klotzsch) Kuntze	1	1	1	1
RUBIACEAE	<i>Canthium suberosum</i> Codd	0	1	1	1
RUBIACEAE	<i>Canthium vanwykii</i> Tilney & Kok	1	1	1	1
RUBIACEAE	<i>Catunaregam spinosa</i> (Thunb.) Tirveng. subsp. spinosa	0	1	0	1
RUBIACEAE	<i>Coddia rudis</i> (E. Mey. ex Harv.) Verdc.	0	1	1	1
RUBIACEAE	<i>Conostomium natalense</i> (Hochst.) Brem. var. glabrum	0	1	1	1
RUBIACEAE	<i>Conostomium natalense</i> (Hochst.) Brem. var. natalense	1	0	0	1
RUBIACEAE	<i>Eriosemopsis subanisophylla</i> Robyns	0	1	1	1
RUBIACEAE	<i>Galopina circaeoides</i> Thunb.	0	0	1	1
RUBIACEAE	<i>Galopina tomentosa</i> Hochst.	0	0	1	1
RUBIACEAE	<i>Gardenia thunbergia</i> Thunb.	1	1	0	1
RUBIACEAE	<i>Hyperacanthus amoenus</i> (Sims) Bridson	1	1	1	1
RUBIACEAE	<i>Keetia gueinzii</i> (Sond.) D.M.Bridson	1	1	1	1
RUBIACEAE	<i>Kohautia amatymbica</i> Eckl. & Zeyh.	0	0	1	1
RUBIACEAE	<i>Mitriostigma axillare</i> Hochst.	1	1	1	0
RUBIACEAE	<i>Oldenlandia affinis</i> (Roem. & Schult.) DC. subsp. fugosa	0	1	0	1
RUBIACEAE	<i>Oldenlandia affinis</i> (Roem. & Schult.) DC.	0	0	1	0
RUBIACEAE	<i>Oldenlandia cephalotes</i> (Hochst.) Kuntze	0	1	1	0
RUBIACEAE	<i>Oldenlandia corymbosa</i> L.	0	0	1	0
RUBIACEAE	<i>Oldenlandia herbacea</i> (L.) Roxb. var. herbacea	1	1	1	1
RUBIACEAE	<i>Oldenlandia rosulata</i> K. Schum. var. rosulata	0	1	1	0
RUBIACEAE	<i>Oldenlandia rupicola</i> (Sond.) Kuntze	0	1	0	0
RUBIACEAE	<i>Oldenlandia tenella</i> (Hochst.) Kuntze	0	1	1	0
RUBIACEAE	<i>Oxyanthus speciosus</i> DC. subsp. gerrardii (Sond.) Br	1	1	1	1
RUBIACEAE	<i>Pachystigma bowkeri</i> Robyns	0	1	1	0
RUBIACEAE	<i>Pachystigma cymosum</i> Robyns	0	1	1	0
RUBIACEAE	<i>Pachystigma macrocalyx</i> (Sond.) Robyns.	1	1	1	1
RUBIACEAE	<i>Pavetta bowkeri</i> Harv.	1	1	1	1
RUBIACEAE	<i>Pavetta capensis</i> (Houtt.) Brem. subsp. komghensis	0	1	1	1
RUBIACEAE	<i>Pavetta galpinii</i> Brem.	1	1	1	0
RUBIACEAE	<i>Pavetta gracilifolia</i> Brem.	0	0	0	1
RUBIACEAE	<i>Pavetta inandensis</i> Brem.	1	1	1	1
RUBIACEAE	<i>Pavetta lanceolata</i> Eckl.	1	1	1	1
RUBIACEAE	<i>Pavetta natalensis</i> Sond.	1	1	1	0
RUBIACEAE	<i>Pavetta revoluta</i> Hochst.	1	1	0	0
RUBIACEAE	<i>Pentania angustifolia</i> (Hochst.) Hochst.	0	1	1	1
RUBIACEAE	<i>Pentania prunelloides</i> (Klotzsch ex Eckl. & Zeyh.) V	1	1	1	1
RUBIACEAE	<i>Plectroniella armata</i> (K.Schum.)Robyns	1	0	0	0
RUBIACEAE	<i>Psychotria capensis</i> (Eckl.) Vatke subsp. capensis	1	1	1	1
RUBIACEAE	<i>Psydrax locuples</i> (K. Schum.) Bridson	0	0	0	1
RUBIACEAE	<i>Psydrax obovata</i> (Eckl. & Zeyh.) Bridson subsp. obovata	0	1	1	1
RUBIACEAE	<i>Richardia brasiliensis</i> Gomes *	1	0	1	1

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
RUBIACEAE	Rothmannia capensis Thunb.	0	0	1	0
RUBIACEAE	Rothmannia globosa (Hochst.) Keay	1	1	1	1
RUBIACEAE	Rubia cordifolia L. subsp. conotricha (Gand.) Verdc.	1	1	1	0
RUBIACEAE	Rubia petiolaris DC.	0	0	0	0
RUBIACEAE	Spermacoce natalensis Hochst.	0	1	1	1
RUBIACEAE	Tarenna pavettoides (Harv.) Sim subsp. pavettoides	1	1	1	0
RUBIACEAE	Tricalysia africana (Sim) Robbrecht	1	1	0	0
RUBIACEAE	Tricalysia capensis (Meisn. ex Hochst.) Sim var. cap	1	1	1	1
RUBIACEAE	Tricalysia lanceolata (Sond.) Burt Davy	1	1	1	1
RUBIACEAE	Tricalysia sonderiana Hiern	0	0	0	1
RUBIACEAE	Vangueria esculenta S. Moore	0	1	0	0
RUBIACEAE	Vangueria infausta Burch. subsp. infausta	1	1	1	1
RUBIACEAE	Vangueria randii S. Moore subsp. chartacea (Robyns	1	1	1	1
RUTACEAE	Agathosma bisulca (Thunb.) Bartl. & Wendl.	0	0	0	1
RUTACEAE	Agathosma ovata (Thunb.) Pillans	0	1	1	1
RUTACEAE	Calodendrum capense (L. f.) Thunb.	1	1	1	1
RUTACEAE	Citrus sp.*	1	0	0	0
RUTACEAE	Clausena anisata (Willd.) Hook. f. ex Benth.	1	1	1	1
RUTACEAE	Oricia bachmannii (Engl.) Verdoorn	1	1	1	1
RUTACEAE	Teclea gerrardii Verdoorn	1	1	1	1
RUTACEAE	Teclea natalensis (Sond.) Engl.	1	1	0	1
RUTACEAE	Vepris lanceolata (Lam.) G. Don	1	1	1	1
RUTACEAE	Zanthoxylum capense (Thunb.) Harv.	1	1	1	1
RUTACEAE	Zanthoxylum davyi (Verdoorn) Waterm.	1	1	1	1
SALICACEAE	Salix mucronata Thunb. subsp. capensis (Thunb.) Im	0	0	0	1
SALVADORACEAE	Azima tetraacantha Lam.	0	0	1	1
SANTALACEAE	Colpoon compressum Berg.	0	1	1	1
SANTALACEAE	Osyridicarpus schimperianus (Hochst. ex A. Rich.) A	0	1	1	1
SANTALACEAE	Thesium acutissimum A. DC.	0	1	1	1
SANTALACEAE	Thesium angulosum DC.	0	0	1	0
SANTALACEAE	Thesium asterias A.W. Hill	0	1	0	1
SANTALACEAE	Thesium cupressoides A.W. Hill	0	0	1	0
SANTALACEAE	Thesium funale L.	0	0	1	0
SANTALACEAE	Thesium impeditum A.W. Hill.	0	0	1	0
SANTALACEAE	Thesium natalense Sond.	0	1	0	0
SANTALACEAE	Thesium pallidum A. DC.	0	1	1	0
SANTALACEAE	Thesium squarrosum L. f.	0	0	0	1
SANTALACEAE	Thesium triflorum Thunb.	0	0	0	1
SAPINDACEAE	Allophylus africanus P.Beauv. subsp. africanus	1	0	1	0
SAPINDACEAE	Allophylus dregeanus (Sond.) De Winter	1	1	1	1
SAPINDACEAE	Allophylus melanocarpus (Sond.) Radlk.	0	0	0	1
SAPINDACEAE	Allophylus natalensis (Sond.) De Winter	1	1	0	1
SAPINDACEAE	Atalaya natalensis R.A. Dyer	1	0	1	0
SAPINDACEAE	Cardiospermum halicacabum L.*	1	0	0	0
SAPINDACEAE	Deinbollia oblongifolia (E.Mey.ex Arn.) Radlk.	1	1	1	0
SAPINDACEAE	Dodonaea angustifolia L.f.	0	1	1	1
SAPINDACEAE	Hippobromus pauciflorus (L. f.) Radlk.	0	1	1	1
SAPINDACEAE	Pancovia columella Cav.	1	0	0	0
SAPOTACEAE	Chrysophyllum viridifolium Wood & Franks	0	1	1	0
SAPOTACEAE	Englerophytum natalense (Sond.)T.D.Penn.	1	1	0	1
SAPOTACEAE	Manilkara nicholsonii Van Wyk	0	1	1	0
SAPOTACEAE	Mimusops caffra E. Mey. ex A. DC.	1	1	0	0

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
SAPOTACEAE	Mimusops obovata Sond.	1	1	1	1
SAPOTACEAE	Sideroxylon inerme L. subsp. inerme	1	1	1	1
SAPOTACEAE	Vitellariopsis marginata (N.E.Br.) Aubrv	1	1	0	1
SCROPHULARIACEAE	Alectra capensis Thunb.	1	0	0	0
SCROPHULARIACEAE	Alectra orobanchoides Benth.	0	0	1	0
SCROPHULARIACEAE	Alectra sessiliflora (Vahl) Kuntze var. sessiliflora	1	1	1	1
SCROPHULARIACEAE	Anastrabe integerrima E. Mey. ex Benth.	1	1	1	1
SCROPHULARIACEAE	Bacopa monnieri (L.) Pennell	0	1	0	0
SCROPHULARIACEAE	Buchnera dura Benth.	1	1	1	1
SCROPHULARIACEAE	Buchnera longespicata Schinz	0	1	0	0
SCROPHULARIACEAE	Craterostigma sp. nov.	0	0	1	0
SCROPHULARIACEAE	Cycnium adonense E. Mey. ex Benth. subsp. adoner	0	0	1	0
SCROPHULARIACEAE	Cycnium racemosum Benth.	0	1	1	1
SCROPHULARIACEAE	Cycnium tubulosum (L. f.) Engl. subsp. tubulosum	1	0	1	1
SCROPHULARIACEAE	Dermatobotrys saundersii H. Bol.	0	1	1	0
SCROPHULARIACEAE	Diclis reptans Benth.	1	1	0	0
SCROPHULARIACEAE	Graderia scabra (L.f.) Benth.	0	1	1	0
SCROPHULARIACEAE	Halleria lucida L.	1	1	1	1
SCROPHULARIACEAE	Harveya coccinea (Harv.) Schltr.	0	0	1	0
SCROPHULARIACEAE	Harveya silvatica Hilliard & Burt	0	0	1	0
SCROPHULARIACEAE	Harveya speciosa Bernh. ex Krauss	1	1	0	1
SCROPHULARIACEAE	Ilysanthes dubia (L.) Bernh.	0	0	0	1
SCROPHULARIACEAE	Manulea parviflora Benth. var. parviflora	0	0	0	1
SCROPHULARIACEAE	Melasma scabrum Berg.	0	0	1	0
SCROPHULARIACEAE	Nemesia caerulea Hiern	0	1	1	0
SCROPHULARIACEAE	Nemesia denticulata (Benth.) Fourc.	0	1	0	0
SCROPHULARIACEAE	Nemesia melissifolia Benth.	0	1	0	0
SCROPHULARIACEAE	Sopubia mannii Skan var. nov.	0	0	1	0
SCROPHULARIACEAE	Sopubia simplex (Hochst.) Hochst.	1	0	1	1
SCROPHULARIACEAE	Striga asiatica (L.) Kuntze	0	1	1	1
SCROPHULARIACEAE	Striga bilabiata (Thunb.) Kuntze	1	1	1	1
SCROPHULARIACEAE	Striga elegans Benth.	0	1	1	0
SCROPHULARIACEAE	Sutera floribunda (Benth.) Kuntze	1	0	0	1
SCROPHULARIACEAE	Sutera kraussiana (Bernh. ex Krauss) Hiern	0	1	0	1
SCROPHULARIACEAE	Sutera noodsbergensis Hiern	0	0	1	0
SCROPHULARIACEAE	Sutera pallescens Hiern	0	0	1	0
SCROPHULARIACEAE	Sutera platysepala Hiern	0	0	0	1
SCROPHULARIACEAE	Sutera polelensis Hiern. subsp. polelensis	0	0	1	1
SCROPHULARIACEAE	Teedia lucida Rudolphi	1	0	1	0
SCROPHULARIACEAE	Zaluzianskya angustifolia Hilliard & Burt	0	1	1	1
SCROPHULARIACEAE	Zaluzianskya capensis (L.) Walp.	0	0	1	1
SCROPHULARIACEAE	Zaluzianskya elongata Hilliard & Burt	0	0	0	1
SCROPHULARIACEAE	Zaluzianskya maritima (L. f.) Walp.	0	1	0	0
SCROPHULARIACEAE	Zaluzianskya pachyrrhiza Hilliard & Burt	0	0	1	0
SCROPHULARIACEAE	Zaluzianskya sp. nov.	0	0	1	0
SELAGINACEAE	Hebenstretia comosa Hochst.	1	0	0	0
SELAGINACEAE	Hebenstretia dura Choisy	1	1	1	0
SELAGINACEAE	Selago elongata Hilliard	0	0	1	1
SELAGINACEAE	Selago hyssopifolia E. Mey.	1	1	0	0
SELAGINACEAE	Selago lepidioides Rolfe = S. peduncularis	1	1	1	1
SELAGINACEAE	Selago trinervia E. Mey.	0	1	0	0
SELAGINACEAE	Selago woodii Rolfe	0	1	1	0

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
SELAGINACEAE	<i>Walafriida rotundifolia</i> (L. f.) Rolfe	0	1	0	0
SOLANACEAE	<i>Cestrum laevigatum</i> Schlechtd. *	1	1	1	0
SOLANACEAE	<i>Datura metel</i> L. *	1	0	0	0
SOLANACEAE	<i>Lycium acutifolium</i> E. Mey. ex Dun.	0	0	0	1
SOLANACEAE	<i>Nicandra physalodes</i> (L.) Gaertn. *	0	0	1	0
SOLANACEAE	<i>Physalis angulata</i> L. *	0	0	0	1
SOLANACEAE	<i>Physalis peruviana</i> L. *	1	0	1	0
SOLANACEAE	<i>Solanum aculeastrum</i> Dun.	1	0	0	0
SOLANACEAE	<i>Solanum aculeatissimum</i> Jacq.	1	0	0	0
SOLANACEAE	<i>Solanum americanum</i> Mill.	1	0	0	0
SOLANACEAE	<i>Solanum didymanthum</i> Dun.	1	0	1	0
SOLANACEAE	<i>Solanum duplo-sinuatum</i> Klotzsch	1	0	0	1
SOLANACEAE	<i>Solanum geniculatum</i> E. Mey.	1	0	0	0
SOLANACEAE	<i>Solanum giganteum</i> Jacq.	1	0	1	1
SOLANACEAE	<i>Solanum hispidum</i> Pers.*	1	0	0	0
SOLANACEAE	<i>Solanum incanum</i> L.	1	0	0	1
SOLANACEAE	<i>Solanum linnaeanum</i> Hepper & Jaeger	1	0	0	0
SOLANACEAE	<i>Solanum mauritianum</i> Scop.*	1	1	0	1
SOLANACEAE	<i>Solanum nigrum</i> L.*	1	0	0	0
SOLANACEAE	<i>Solanum nodiflorum</i> Jacq.	1	0	1	0
SOLANACEAE	<i>Solanum retroflexum</i> Dun.	0	1	1	1
SOLANACEAE	<i>Solanum rigescens</i> Jacq.	0	0	0	1
SOLANACEAE	<i>Solanum seforthianum</i> Andr.*	0	0	0	1
SOLANACEAE	<i>Solanum</i> sp.*	1	0	0	0
SOLANACEAE	<i>Solanum terminale</i> Forssk.	1	0	1	0
SOLANACEAE	<i>Solanum terminale</i> Forssk. subsp. <i>terminale</i>	0	1	0	0
SOLANACEAE	<i>Solanum tomentosum</i> L.	0	0	1	1
STERCULIACEAE	<i>Cola natalensis</i> Oliv.	1	1	1	0
STERCULIACEAE	<i>Dombeya burgessiae</i> Gerr. ex Harv.	1	0	0	1
STERCULIACEAE	<i>Dombeya cymosa</i> Harvey	0	0	0	1
STERCULIACEAE	<i>Dombeya tiliacea</i> (Endl.) Planch.	1	0	1	1
STERCULIACEAE	<i>Hermannia grandistipula</i> (Burchinger ex Hochst.) K.S	0	0	0	1
STERCULIACEAE	<i>Melhania didyma</i> Eckl. & Zeyh.	0	0	0	1
STRYCHNACEAE	<i>Strychnos decussata</i> (Pappe) Gilg	0	1	1	1
STRYCHNACEAE	<i>Strychnos henningsii</i> Gilg	1	1	1	1
STRYCHNACEAE	<i>Strychnos madagascariensis</i> Poir.	0	1	1	1
STRYCHNACEAE	<i>Strychnos mitis</i> S. Moore	1	1	1	0
STRYCHNACEAE	<i>Strychnos spinosa</i> Lam.	0	1	1	1
STRYCHNACEAE	<i>Strychnos usambarensis</i> Gilg	0	1	1	1
THYMELAEACEAE	<i>Dais cotinifolia</i> L.	1	1	1	0
THYMELAEACEAE	<i>Englerodaphne ovalifolia</i> (Meisn.) Phill.	1	1	1	0
THYMELAEACEAE	<i>Gnidia anthylloides</i> (L. f.) Gilg	1	0	1	1
THYMELAEACEAE	<i>Gnidia calocephala</i> (C.A. Mey.) Gilg	1	0	0	0
THYMELAEACEAE	<i>Gnidia coriacea</i> Meisn.	0	0	1	0
THYMELAEACEAE	<i>Gnidia kraussiana</i> Meisn.	1	1	1	1
THYMELAEACEAE	<i>Gnidia macropetala</i> Meisn.	0	1	0	1
THYMELAEACEAE	<i>Gnidia myrtifolia</i> C.H. Wr.	0	1	0	1
THYMELAEACEAE	<i>Gnidia nodiflora</i> Meisn.	0	1	1	1
THYMELAEACEAE	<i>Gnidia polyantha</i> Gilg.	0	1	0	0
THYMELAEACEAE	<i>Gnidia pulchella</i> Meisn.	0	0	1	0
THYMELAEACEAE	<i>Gnidia triplinervis</i> Meisn.	0	1	1	0
THYMELAEACEAE	<i>Gnidia woodii</i> C.H. Wr.	0	0	1	0

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
THYMELAEACEAE	<i>Passerina filiformis</i> L.	0	1	1	1
THYMELAEACEAE	<i>Passerina rigida</i> Wikstr.	1	0	0	0
THYMELAEACEAE	<i>Passerina rubra</i> C.H. Wr.	1	0	0	0
THYMELAEACEAE	<i>Peddiea africana</i> Harv.	1	1	1	1
THYMELAEACEAE	<i>Struthiola pondoensis</i> Gilg ex C.H. Wr.	0	1	1	0
TILIACEAE	<i>Grewia caffra</i> Meisn.	0	0	0	1
TILIACEAE	<i>Grewia hispida</i> Harv.	0	0	1	0
TILIACEAE	<i>Grewia lasiocarpa</i> E. Mey. ex Harv.	1	1	1	1
TILIACEAE	<i>Grewia occidentalis</i> L. f. var. <i>occidentalis</i>	1	1	1	1
TILIACEAE	<i>Grewia pondoensis</i> Burret	1	1	1	1
TILIACEAE	<i>Triumfetta pilosa</i> Roth var. <i>effusa</i> (E. Mey. ex Harv.)	1	0	1	0
TILIACEAE	<i>Triumfetta pilosa</i> Roth var. <i>tomentosa</i> Szyszyl. ex S	1	0	0	1
TILIACEAE	<i>Triumfetta rhomboidea</i> Jacq.	0	0	1	0
ULMACEAE	<i>Celtis africana</i> Burm. f.	1	1	1	1
ULMACEAE	<i>Celtis durandii</i> Engl.	1	1	1	0
ULMACEAE	<i>Chaetacme aristata</i> Planch.	1	1	1	1
ULMACEAE	<i>Trema orientalis</i> (L.) Blume	1	1	1	1
URTICACEAE	<i>Didymodoxa caffra</i> (Thunb.) Friis & Wilmot-Dear	1	0	1	0
URTICACEAE	<i>Droguetia ambigua</i> Wedd.	1	0	0	0
URTICACEAE	<i>Droguetia iners</i> (Forssk.) Schweinf. subsp. <i>iners</i>	0	0	1	0
URTICACEAE	<i>Droguetia woodii</i> N.E. Br.	0	0	1	0
URTICACEAE	<i>Laportea grossa</i> (Wedd.) Chew	1	0	1	1
URTICACEAE	<i>Laportea peduncularis</i> (Wedd.) Chew	1	0	1	0
URTICACEAE	<i>Obetia tenax</i> (N.E. Br.) Friis	1	1	1	1
URTICACEAE	<i>Pouzolzia parasitica</i> (Forssk.) Schweinf.	1	0	0	0
URTICACEAE	<i>Urera trinervis</i> (Hochst. apud Krauss) Friis & Immel	1	1	1	1
VERBENACEAE	<i>Clerodendrum glabrum</i> E. Mey. var. <i>glabrum</i>	1	1	1	1
VERBENACEAE	<i>Clerodendrum myricoides</i> (Hochst.) Vatke	1	1	0	0
VERBENACEAE	<i>Clerodendrum triphyllum</i> (Harv.) H. Pearson var. <i>trip</i>	0	0	1	0
VERBENACEAE	<i>Lantana camara</i> L. *	1	0	1	0
VERBENACEAE	<i>Lantana rugosa</i> Thunb.	0	1	1	1
VERBENACEAE	<i>Lippia javanica</i> (Burm. f.) Spreng.	1	0	1	0
VERBENACEAE	<i>Phyla nodiflora</i> (L.) Greene var. <i>nodiflora</i>	0	1	0	0
VERBENACEAE	<i>Premna mooiensis</i> (H. Pearson) Pieper	0	0	1	0
VERBENACEAE	<i>Priva meyeri</i> Jaub. & Spach var. <i>meyeri</i>	0	0	1	0
VERBENACEAE	<i>Verbena bonariensis</i> L. *	1	0	1	0
VERBENACEAE	<i>Verbena officinalis</i> L. *	1	0	0	0
VERBENACEAE	<i>Verbena tenuisecta</i> Briq. *	0	0	1	0
VERBENACEAE	<i>Verbena venosa</i> Gill. & Hook.*	0	0	1	0
VIOLACEAE	<i>Hybanthus capensis</i> (Thunb.) Engl.	1	0	0	0
VIOLACEAE	<i>Hybanthus enneaspermus</i> (L.) F. Muell.	0	1	1	1
VIOLACEAE	<i>Rinorea angustifolia</i> (Thouars) Baill.	1	1	1	1
VIOLACEAE	<i>Rinorea domatiosa</i> Van Wyk	1	1	1	0
VISCACEAE	<i>Viscum anceps</i> E. Mey. ex Sprague	0	0	0	1
VISCACEAE	<i>Viscum combreticola</i> Engl.	0	0	0	1
VISCACEAE	<i>Viscum obovatum</i> Harv.	0	0	0	1
VISCACEAE	<i>Viscum obscurum</i> Thunb.	0	0	1	1
VITACEAE	<i>Cissus fragilis</i> E. Mey. ex Kunth	1	0	1	1
VITACEAE	<i>Cyphostemma cirrhosum</i> (Thunb.) Descoings ex Wil	0	0	0	1
VITACEAE	<i>Cyphostemma hypoleucum</i> (Harv.) Descoings ex Wi	1	0	1	1
VITACEAE	<i>Cyphostemma natalitium</i> (Szyszyl.) J. V.D. Merwe	1	0	1	0
VITACEAE	<i>Cyphostemma woodii</i> (Gilg & Brandt) Descoings	1	1	0	1

APPENDIX 3

Checklist of Port St. Johns (PSJ), Mkambati (MK), Umtamvuna (UMT) and Oribi Gorge (OG)

FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
VITACEAE	<i>Rhoicissus digitata</i> (L. f.) Gilg & Brandt	1	0	1	1
VITACEAE	<i>Rhoicissus rhomboidea</i> (E. Mey. ex Harv.) Planch.	1	1	1	1
VITACEAE	<i>Rhoicissus tomentosa</i> (Lam.) Wild & R. B. Drumm.	1	1	1	1
VITACEAE	<i>Rhoicissus tridentata</i> (L. f.) Wild & R. B. Drumm. subsp.	1	0	0	0
VITACEAE	<i>Rhoicissus tridentata</i> (L. f.) Wild & R. B. Drumm. subsp.	1	1	1	1
AGAPATHACEAE	<i>Agapanthus campanulatus</i> Leighton subsp. <i>campanu</i>	1	0	0	1
AGAPATHACEAE	<i>Agapanthus campanulatus</i> Leighton subsp. <i>patens</i>	0	0	1	0
AGAPATHACEAE	<i>Agapanthus caulescens</i> Spreng. subsp. <i>angustifolius</i>	0	0	0	1
AGAPATHACEAE	<i>Agapanthus praecox</i> Willd. subsp. <i>orientalis</i> (Leighto	1	0	1	1
ALISMATACEAE	<i>Alisma plantago-aquatica</i> L.	0	0	1	0
ALISMATACEAE	<i>Alisma planto-aquatica</i> L.	0	0	1	0
ALLIACEAE	<i>Nothoscordum gracile</i> (Ait.) Stearn	0	0	1	0
ALLIACEAE	<i>Tulbaghia acutiloba</i> Harv.	0	0	1	0
ALLIACEAE	<i>Tulbaghia cernua</i> Ave-Lall.	1	0	0	0
AMARYLLIDACEAE	<i>Boophane disticha</i> (L. f.) Herb.	0	0	1	0
AMARYLLIDACEAE	<i>Brunsvigia grandiflora</i> Lindl.	0	0	1	0
AMARYLLIDACEAE	<i>Clivia gardenii</i> Hook.	0	0	1	1
AMARYLLIDACEAE	<i>Clivia miniata</i> (Lindl.) Regel var. <i>miniata</i>	1	0	1	1
AMARYLLIDACEAE	<i>Clivia nobilis</i> Lindl.	1	0	0	0
AMARYLLIDACEAE	<i>Clivia</i> sp. nov.	0	1	0	0
AMARYLLIDACEAE	<i>Crinum moorei</i> Hook.f.	1	0	0	1
AMARYLLIDACEAE	<i>Cyrtanthus brachyscyphus</i> Bak.	0	0	1	0
AMARYLLIDACEAE	<i>Cyrtanthus breviflorus</i> Harv.	0	1	1	0
AMARYLLIDACEAE	<i>Cyrtanthus mackenii</i> Hook. f. var. <i>cooperi</i> (Bak.) R.A	1	0	1	0
AMARYLLIDACEAE	<i>Cyrtanthus sanguineus</i> (Lindl.) Walp.	0	0	0	1
AMARYLLIDACEAE	<i>Cyrtanthus</i> sp.	0	0	1	0
AMARYLLIDACEAE	<i>Haemanthus albiflos</i> Jacq.	1	0	1	1
AMARYLLIDACEAE	<i>Haemanthus montanus</i> Bak.	0	0	0	1
AMARYLLIDACEAE	<i>Scadoxus membranaceus</i> (Bak.) Friis & Nordal	1	0	1	1
AMARYLLIDACEAE	<i>Scadoxus multiflorus</i> (Martyn) Raf. subsp. <i>katharinae</i>	1	0	1	1
AMARYLLIDACEAE	<i>Scadoxus puniceus</i> (L.) Friis & Nordal	1	0	1	1
ANTHERICACEAE	<i>Anthericum cooperi</i> Bak.	1	0	1	0
ANTHERICACEAE	<i>Anthericum galpinii</i> Bak.	0	0	1	0
ANTHERICACEAE	<i>Anthericum saundersiae</i> Bak.	0	1	0	0
ARACEAE	<i>Zantedescia aethiopica</i> (L.) Spreng.	1	0	0	0
ARECACEAE	<i>Jubaeopsis caffra</i> Becc.	0	1	0	0
ARECACEAE	<i>Phoenix reclinata</i> Jacq.	1	1	1	1
ASPARAGACEAE	<i>Asparagus africanus</i> (Lam.) Oberm.	0	0	1	0
ASPARAGACEAE	<i>Asparagus asparagoides</i> (L.) Willd.	1	0	0	0
ASPARAGACEAE	<i>Asparagus cooperi</i> (Bak.) Oberm.	1	0	0	0
ASPARAGACEAE	<i>Asparagus densiflorus</i> (Kunth) Oberm.	1	1	0	1
ASPARAGACEAE	<i>Asparagus falcatus</i> (L.) Oberm.	1	0	1	1
ASPARAGACEAE	<i>Asparagus larinicus</i> (Burch.) Oberm.	1	1	1	0
ASPARAGACEAE	<i>Asparagus macowanii</i> (Bak.) Oberm.	1	0	0	1
ASPARAGACEAE	<i>Asparagus natalensis</i> (Bak.) Oberm.	0	0	0	1
ASPARAGACEAE	<i>Asparagus plumosus</i> Baker	1	0	0	0
ASPARAGACEAE	<i>Asparagus racemosus</i> (Willd.) Oberm.	1	0	0	1
ASPARAGACEAE	<i>Asparagus setaceus</i> (Kunth) Oberm.	1	0	0	1
ASPARAGACEAE	<i>Asparagus subulatus</i> (Thunb.) Oberm.	0	0	0	1
ASPARAGACEAE	<i>Asparagus virgatus</i> (Bak.) Oberm.	0	0	1	1
ASPHODELACEAE	<i>Aloe arborescens</i> Miller	1	1	1	1
ASPHODELACEAE	<i>Aloe barberiae</i> T.-Dyer	0	0	0	1

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
ASPHODELACEAE	<i>Aloe candelabrum</i> Berger	0	0	0	1
ASPHODELACEAE	<i>Aloe ferox</i> Mill.	1	0	1	1
ASPHODELACEAE	<i>Aloe linearifolia</i> Berger	0	0	1	1
ASPHODELACEAE	<i>Aloe maculata</i> All.	1	1	1	0
ASPHODELACEAE	<i>Aloe myriacantha</i> (Haw.) Schult. & J.H. Schult.	0	0	1	0
ASPHODELACEAE	<i>Aloe pluridens</i> Haw.	0	0	0	1
ASPHODELACEAE	<i>Bulbine abyssinica</i> A. Rich.	0	0	0	1
ASPHODELACEAE	<i>Bulbine asphodeloides</i> R.S.	1	0	0	0
ASPHODELACEAE	<i>Bulbine frutescens</i> (L.) Willd.	1	1	1	1
ASPHODELACEAE	<i>Bulbine latifolia</i> (L. f.) Roem. & Schult.	1	1	1	0
ASPHODELACEAE	<i>Bulbine</i> sp.	0	0	1	0
ASPHODELACEAE	<i>Bulbine</i> sp.nov.	0	1	1	0
ASPHODELACEAE	<i>Caesia contorta</i> (L. f.) Dur. & Schinz	0	1	1	0
ASPHODELACEAE	<i>Chlorophytum angulicaule</i> (Baker)Kativu	0	1	0	0
ASPHODELACEAE	<i>Chlorophytum bowkeri</i> Bak.	1	0	0	0
ASPHODELACEAE	<i>Chlorophytum comosum</i> (Thunb.) Jacques	1	1	1	1
ASPHODELACEAE	<i>Chlorophytum krookianum</i> Zahlbr.	1	0	1	1
ASPHODELACEAE	<i>Chlorophytum modestum</i> Bak.	1	0	0	1
ASPHODELACEAE	<i>Chlorophytum saundersiae</i> (Baker) Nordal	1	0	0	0
ASPHODELACEAE	<i>Gasteria croucheri</i> (Hook. f.) Bak.	0	0	1	1
ASPHODELACEAE	<i>Kniphofia coddiana</i> Cufod.	1	1	0	1
ASPHODELACEAE	<i>Kniphofia drepanophylla</i> Bak.	1	1	0	0
ASPHODELACEAE	<i>Kniphofia fibrosa</i> Bak.	0	1	0	0
ASPHODELACEAE	<i>Kniphofia laxiflora</i> Kunth.	1	0	1	0
ASPHODELACEAE	<i>Kniphofia linearifolia</i> Bak.	1	0	0	0
ASPHODELACEAE	<i>Kniphofia littoralis</i> Codd	0	0	1	0
ASPHODELACEAE	<i>Kniphofia parviflora</i> Kunth	0	0	1	1
ASPHODELACEAE	<i>Kniphofia rooperi</i> (Moore)Lem.	0	0	1	0
ASPHODELACEAE	<i>Trachyandra affinis</i> Kunth	0	1	0	0
ASPHODELACEAE	<i>Trachyandra asperata</i> Kunth var. <i>nataglencoensis</i> (K)	0	0	1	0
ASPHODELACEAE	<i>Trachyandra asperata</i> Kunth var. <i>stenophylla</i> (Bak.)	0	0	1	0
ASPHODELACEAE	<i>Trachyandra capillata</i> (V. Poelln.) Oberm.	0	0	1	1
ASPHODELACEAE	<i>Trachyandra saltii</i> (Bak.) Oberm. var. <i>saltii</i>	0	0	1	1
CANNACEAE	<i>Canna indica</i> L.*	1	0	1	0
COLCHICACEAE	<i>Gloriosa superba</i> L.	1	0	0	0
COLCHICACEAE	<i>Littonia modesta</i> Hook.	0	1	1	0
COLCHICACEAE	<i>Sandersonia aurantiaca</i> Hook.	1	0	0	1
COLCHICACEAE	<i>Wurmbea kraussii</i> Bak.	0	0	1	0
COMMELINACEAE	<i>Aneilema aequinoctiale</i> (Beauv.) Loudon	1	0	1	1
COMMELINACEAE	<i>Aneilema dregeanum</i> Kunth	1	0	1	1
COMMELINACEAE	<i>Aneilema hockii</i> De Wild.	0	0	0	1
COMMELINACEAE	<i>Coleotrype natalensis</i> C.B. Cl.	1	0	1	0
COMMELINACEAE	<i>Commelina africana</i> L. var. <i>africana</i>	1	1	1	0
COMMELINACEAE	<i>Commelina africana</i> L. var. <i>lancispatha</i> C.B. Cl.	0	1	1	1
COMMELINACEAE	<i>Commelina benghalensis</i> L. *	1	0	1	1
COMMELINACEAE	<i>Commelina diffusa</i> Burm. f.	1	0	0	1
COMMELINACEAE	<i>Commelina eckloniana</i> Kunth	0	0	1	1
COMMELINACEAE	<i>Commelina erecta</i> (L.)	0	1	1	0
COMMELINACEAE	<i>Commelina modesta</i> Oberm.	1	1	0	0
COMMELINACEAE	<i>Cyanotis speciosa</i> (L. f.) Hassk.	1	1	1	1
COMMELINACEAE	<i>Floscopa glomerata</i> (Willd. ex Schult. & Schult. F.) F	0	1	0	0
COMMELINACEAE	<i>Tradescantia fluminensis</i> Vell.*	1	0	0	0

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
CYPERACEAE	<i>Abildgaardia hygrophila</i> (Gordon-Gray) K. Lye	0	1	1	0
CYPERACEAE	<i>Abildgaardia ovata</i> (Burm. f.) Kral	0	1	0	1
CYPERACEAE	<i>Abildgaardia variegata</i> (Gordon-Gray) K. Lye	0	1	0	1
CYPERACEAE	<i>Ascolepis capensis</i> (Kunth) Ridley	0	1	1	0
CYPERACEAE	<i>Bulbostylis boeckleriana</i> (Schweinf.) Beetle	0	0	1	1
CYPERACEAE	<i>Bulbostylis contexta</i> (Nees) Bodard	0	1	1	0
CYPERACEAE	<i>Bulbostylis densa</i> (Wall.) Hand.-Mazz.	0	1	0	0
CYPERACEAE	<i>Bulbostylis hispidula</i> (Vahl) R. Haines	0	0	1	0
CYPERACEAE	<i>Bulbostylis humilis</i> (Kunth) C.B. Cl.	0	1	0	1
CYPERACEAE	<i>Bulbostylis oritrephes</i> (Ridley) C.B. Cl.	1	1	0	0
CYPERACEAE	<i>Bulbostylis scleropus</i> C.B. Clarke	0	1	0	0
CYPERACEAE	<i>Bulbostylis</i> sp. (=Strey 10330)	0	1	0	0
CYPERACEAE	<i>Carex clavata</i> Thunb.	1	0	0	0
CYPERACEAE	<i>Carpha glomerata</i> (Thunb.) Nees	0	0	1	0
CYPERACEAE	<i>Cyperus albostriatus</i> Schrad.	1	1	1	1
CYPERACEAE	<i>Cyperus articulatus</i> L.	0	1	0	0
CYPERACEAE	<i>Cyperus austro-africanus</i> C.Archer & Goetgh. Nom. I	0	0	0	1
CYPERACEAE	<i>Cyperus brevis</i> Boeck.	1	0	0	0
CYPERACEAE	<i>Cyperus congestus</i> Vahl	1	0	0	1
CYPERACEAE	<i>Cyperus cyperoides</i> (L.) Kuntze subsp. <i>cyperoides</i>	1	1	0	1
CYPERACEAE	<i>Cyperus cyperoides</i> (L.) Kuntze subsp. <i>pseudoflavus</i>	0	0	0	1
CYPERACEAE	<i>Cyperus difformis</i> L.	1	0	0	1
CYPERACEAE	<i>Cyperus distans</i> L. f.	1	0	0	1
CYPERACEAE	<i>Cyperus dives</i> Del.	1	0	1	0
CYPERACEAE	<i>Cyperus dubius</i> Rottb.	1	1	0	1
CYPERACEAE	<i>Cyperus immensus</i> C.B. Cl.	1	1	0	1
CYPERACEAE	<i>Cyperus leptocladus</i> Kunth	1	0	0	1
CYPERACEAE	<i>Cyperus macrocarpus</i> (Kunth.) Boeck.	1	0	0	0
CYPERACEAE	<i>Cyperus natalensis</i> Hochst.	1	0	0	0
CYPERACEAE	<i>Cyperus obtusiflorus</i> Vahl	0	0	1	0
CYPERACEAE	<i>Cyperus obtusiflorus</i> Vahl var. <i>obtusiflorus</i>	1	1	0	1
CYPERACEAE	<i>Cyperus obtusiflorus</i> Vahl var. <i>sphaerocephalus</i> (Vahl)	1	0	0	0
CYPERACEAE	<i>Cyperus owanii</i> Boeck.	1	1	0	0
CYPERACEAE	<i>Cyperus prolifer</i> Lam.	0	1	0	1
CYPERACEAE	<i>Cyperus pseudovestitus</i> (C.B. Cl.) Kuk.	0	0	0	1
CYPERACEAE	<i>Cyperus pulcher</i> Thunb.	1	0	0	0
CYPERACEAE	<i>Cyperus rubicundus</i> Vahl	0	0	0	1
CYPERACEAE	<i>Cyperus rupestris</i> Kunth	0	1	1	1
CYPERACEAE	<i>Cyperus sexangularis</i> Nees.	0	0	0	1
CYPERACEAE	<i>Cyperus</i> sp. (= <i>Mariscus uitenhagensis</i> Steud. New r	0	0	0	1
CYPERACEAE	<i>Cyperus sphaerospermus</i> Schrad.	1	1	1	1
CYPERACEAE	<i>Cyperus textilis</i> Thunb.	1	0	1	1
CYPERACEAE	<i>Cyperus vorsteri</i> K.L. Wilson	1	1	1	1
CYPERACEAE	<i>Eleocharis dregeana</i> Steud.	1	0	1	0
CYPERACEAE	<i>Eleocharis limosa</i> (Schrad.) Schult.	1	0	0	0
CYPERACEAE	<i>Eleocharis variegata</i> (Poir.) Kunth	0	1	0	0
CYPERACEAE	<i>Ficinia dasystachys</i> C.B.Cl.	1	0	0	0
CYPERACEAE	<i>Ficinia stolonifera</i> Boeck.	0	1	0	0
CYPERACEAE	<i>Fimbristylis complanata</i> (Retz.) Link	1	1	1	1
CYPERACEAE	<i>Fimbristylis dichotoma</i> (L.) Vahl	1	1	0	1
CYPERACEAE	<i>Fimbristylis ferruginea</i> (L.) Vahl	0	1	0	0
CYPERACEAE	<i>Fuirena ecklonii</i> Nees	0	1	0	0

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
CYPERACEAE	<i>Fuirena hirsuta</i> (Berg.) P.L. Forbes	0	0	0	1
CYPERACEAE	<i>Fuirena pubescens</i> (Poir.) Kunth	0	1	1	0
CYPERACEAE	<i>Ischyrolepis schoenoides</i> (Kunth) H.P. Linder	0	1	0	0
CYPERACEAE	<i>Isolepis cernua</i> (Vahl) Roem. & Schult.	0	0	0	1
CYPERACEAE	<i>Isolepis costata</i> (Boeck.) A. Rich. var. <i>costata</i>	1	0	0	0
CYPERACEAE	<i>Isolepis fluitans</i> (L.) R. Br.	1	0	1	0
CYPERACEAE	<i>Isolepis prolifer</i> R. Br.	1	0	0	1
CYPERACEAE	<i>Kyllinga elatior</i> Kunth	1	0	0	1
CYPERACEAE	<i>Kyllinga odorata</i> Vahl	1	0	0	0
CYPERACEAE	<i>Macrochaetium hexandrum</i> (Nees) Pfeiffer	0	1	0	0
CYPERACEAE	<i>Pseudoschoenus inanis</i> (Thunb.) Oteng-Yeb.	0	0	1	0
CYPERACEAE	<i>Pycreus intactus</i> (Vahl) J. Raynal	1	1	0	0
CYPERACEAE	<i>Pycreus macranthus</i> (Boeck.) C.B. Cl.	0	0	1	0
CYPERACEAE	<i>Pycreus oakfortensis</i> C.B. Cl.	0	1	0	0
CYPERACEAE	<i>Pycreus polystachyos</i> (Rottb.) Beauv. var. <i>polystachyos</i>	1	1	0	1
CYPERACEAE	<i>Pycreus unioloides</i> (R. Br.) Urb.	0	1	0	0
CYPERACEAE	<i>Rhynchospora barrosiana</i> Guaglianone	1	0	0	1
CYPERACEAE	<i>Rhynchospora brownii</i> Roem. & Schult.	0	1	1	1
CYPERACEAE	<i>Rhynchospora corymbosa</i> (L.) Britton	1	0	1	0
CYPERACEAE	<i>Rhynchospora holoschoenoides</i> (Rich.) Herter	1	1	0	0
CYPERACEAE	<i>Schoenoplectus scirpoideus</i> (Schrad.) J. Browning	1	0	0	0
CYPERACEAE	<i>Schoenoxiphium lanceum</i> (Thunb.) Kuekenh.	0	0	1	0
CYPERACEAE	<i>Schoenoxiphium lehmannii</i> (Nees) Steud.	0	1	1	1
CYPERACEAE	<i>Schoenoxiphium sparteum</i> (Wahlenb.) C.B. Cl.	0	1	0	0
CYPERACEAE	<i>Scirpus ficinioides</i> Kunth	0	0	1	0
CYPERACEAE	<i>Scleria angusta</i> Nees ex Kunth	0	1	0	0
CYPERACEAE	<i>Scleria aterrima</i> (Ridley) Napper	0	0	1	0
CYPERACEAE	<i>Scleria bulbifera</i> Hochst. ex A. Rich.	0	1	1	0
CYPERACEAE	<i>Scleria dieterlenii</i> Turill	0	1	0	0
CYPERACEAE	<i>Scleria distans</i> Poir. var. <i>distans</i>	0	0	1	0
CYPERACEAE	<i>Scleria melanomphala</i> Kunth	1	1	1	1
CYPERACEAE	<i>Scleria natalensis</i> C.B. Cl.	0	1	0	0
CYPERACEAE	<i>Scleria nutans</i> Willd. ex Kunth	0	1	0	0
CYPERACEAE	<i>Scleria woodii</i> C.B. Cl.	0	1	0	1
CYPERACEAE	<i>Tetraria capillacea</i> (Thunb.) C.B. Cl.	0	0	0	1
CYPERACEAE	<i>Tetraria cuspidata</i> (Rottb.) C.B. Cl.	1	0	1	0
CYPERACEAE	<i>Tetraria macowaniana</i> B.L. Burtt	0	0	1	0
DIOSCOREACEAE	<i>Dioscorea cotinifolia</i> Kunth	0	0	1	1
DIOSCOREACEAE	<i>Dioscorea crinita</i> Hook. f.	1	0	0	0
DIOSCOREACEAE	<i>Dioscorea diversifolia</i> Griseb.	1	0	0	0
DIOSCOREACEAE	<i>Dioscorea dregeana</i> (Kunth) Dur. & Schinz	0	0	1	1
DIOSCOREACEAE	<i>Dioscorea retusa</i> Mast.	1	0	0	0
DIOSCOREACEAE	<i>Dioscorea sylvatica</i> (Kunth) Eckl.	1	0	1	1
DRACAENACEAE	<i>Dracaena aletriformis</i> (Haw.) Bos	1	1	1	1
DRACAENACEAE	<i>Sansevieria hyacinthoides</i> (L.) Druce	0	0	1	1
ERIOCAULACEAE	<i>Eriocaulon abyssinicum</i> Hochst.	0	0	0	1
ERIOCAULACEAE	<i>Eriocaulon dregei</i> Hochst. var. <i>dregei</i>	0	1	1	0
ERIOSPERMACEAE	<i>Eriospermum abyssinicum</i> Bak.	0	0	1	0
ERIOSPERMACEAE	<i>Eriospermum cooperi</i> Bak.	0	0	1	0
ERIOSPERMACEAE	<i>Eriospermum mackenii</i> (Hook. f.) Bak. subsp. <i>galpini</i>	0	1	1	1
ERIOSPERMACEAE	<i>Eriospermum mackenii</i> (Hook. f.) Baker subsp. <i>mackeenii</i>	0	1	0	0
FLAGELLARIACEAE	<i>Flagellaria guineensis</i> Schumach.	1	1	1	1

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
HYACINTHACEAE	<i>Albuca fastigiata</i> (L. f.) Dryand.	1	0	0	0
HYACINTHACEAE	<i>Albuca nelsonii</i> N.E. Br.	1	0	0	1
HYACINTHACEAE	<i>Albuca setosa</i> Jacq.	0	1	1	1
HYACINTHACEAE	<i>Dipcadi marlothii</i> Engl.	0	1	1	0
HYACINTHACEAE	<i>Dipcadi viride</i> (L.) Moench	1	0	1	1
HYACINTHACEAE	<i>Drimiopsis burkei</i> Bak.	0	0	0	1
HYACINTHACEAE	<i>Drimiopsis lachenalioides</i> (Bak.) Jessop	0	0	0	1
HYACINTHACEAE	<i>Drimiopsis maculata</i> Lindl.	1	0	1	0
HYACINTHACEAE	<i>Drimiopsis maxima</i> Bak.	0	0	1	1
HYACINTHACEAE	<i>Eucomis autumnalis</i> (Mill.) Chitt.	1	0	1	0
HYACINTHACEAE	<i>Ledebouria cooperi</i> (Hook. f.) Jessop	1	1	1	0
HYACINTHACEAE	<i>Ledebouria floribunda</i> (Bak.) Jessop	0	0	1	0
HYACINTHACEAE	<i>Ledebouria revoluta</i> (L. f.) Jessop	0	1	1	1
HYACINTHACEAE	<i>Litanthus pusillus</i> Harv.	0	0	1	0
HYACINTHACEAE	<i>Ornithogalum graminifolium</i> Thunb.	1	0	1	0
HYACINTHACEAE	<i>Ornithogalum juncifolium</i> Jacq.	1	1	1	1
HYACINTHACEAE	<i>Ornithogalum longibracteatum</i> Jacq.	1	0	1	1
HYACINTHACEAE	<i>Ornithogalum ornithogaloides</i> (Kunth) Oberm.	0	0	1	0
HYACINTHACEAE	<i>Ornithogalum paludosum</i> Bak.	0	0	1	0
HYACINTHACEAE	<i>Ornithogalum tenuifolium</i> Delaroché subsp. <i>tenuifolium</i>	0	1	0	1
HYACINTHACEAE	<i>Scilla natalensis</i> Planch.	1	1	1	0
HYACINTHACEAE	<i>Scilla nervosa</i> (Burch.) Jessop	0	1	1	1
HYACINTHACEAE	<i>Urginea capitata</i> (Hook.) Bak.	1	0	0	0
HYACINTHACEAE	<i>Urginea delagoensis</i> Bak.	0	0	1	0
HYACINTHACEAE	<i>Urginea modesta</i> Bak.	0	0	0	1
HYACINTHACEAE	<i>Urginea rubella</i> Bak.	0	1	1	0
HYPOXIDACEAE	<i>Empodium elongatum</i> (Nel) B.L. Burt	0	0	1	0
HYPOXIDACEAE	<i>Hypoxis acuminata</i> Bak.	1	0	0	0
HYPOXIDACEAE	<i>Hypoxis angustifolia</i> Lam. var. <i>angustifolia</i>	1	1	1	1
HYPOXIDACEAE	<i>Hypoxis angustifolia</i> Lam. var. <i>buchananii</i> Bak.	0	1	1	0
HYPOXIDACEAE	<i>Hypoxis argentea</i> Harv. ex Bak.	0	0	1	0
HYPOXIDACEAE	<i>Hypoxis colchicifolia</i> Bak.	0	0	1	0
HYPOXIDACEAE	<i>Hypoxis filiformis</i> Bak.	1	1	1	1
HYPOXIDACEAE	<i>Hypoxis gerrardii</i> Bak.	0	0	1	0
HYPOXIDACEAE	<i>Hypoxis hemerocallidea</i> Fisch. & C.A. Mey.	1	0	1	0
HYPOXIDACEAE	<i>Hypoxis interjecta</i> Nel	0	1	0	0
HYPOXIDACEAE	<i>Hypoxis longifolia</i> Bak.	0	1	0	1
HYPOXIDACEAE	<i>Hypoxis ludwigii</i> Bak.	0	1	0	0
HYPOXIDACEAE	<i>Hypoxis membranacea</i> Baker x <i>angustifolia</i> Lam.	0	0	1	0
HYPOXIDACEAE	<i>Hypoxis multiceps</i> Buchinger ex Bak.	0	1	0	0
HYPOXIDACEAE	<i>Hypoxis rigidula</i> Bak. var. <i>rigidula</i>	1	0	1	1
HYPOXIDACEAE	<i>Hypoxis villosa</i> L. f. var. <i>obliqua</i> (Jacq.) Bak.	1	0	0	0
HYPOXIDACEAE	<i>Hypoxis villosa</i> L. f. var. <i>villosa</i>	1	1	0	0
IRIDACEAE	<i>Aristea abyssinica</i> Pax	0	0	1	0
IRIDACEAE	<i>Aristea angolensis</i> Bak. subsp. <i>angolensis</i>	1	0	1	0
IRIDACEAE	<i>Aristea cognata</i> N.E. Br. ex Weim.	1	1	0	1
IRIDACEAE	<i>Aristea compressa</i> Buchinger ex Bak.	0	0	1	0
IRIDACEAE	<i>Aristea ecklonii</i> Bak.	1	0	1	0
IRIDACEAE	<i>Aristea gerrardii</i> Weim.	1	1	1	0
IRIDACEAE	<i>Aristea platycaulis</i> Bak.	0	0	1	0
IRIDACEAE	<i>Aristea woodii</i> N.E.Br.	1	1	1	1
IRIDACEAE	<i>Crocsmia aurea</i> (Pappe ex Hook.) Planch. var. <i>aurea</i>	1	0	1	1

APPENDIX 3

Checklist of Port St. Johns (PSJ), Mkambati (MK), Umtamvuna (UMT) and Oribi Gorge (OG)

FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
IRIDACEAE	<i>Dierama argyreum</i> L. Bol.	0	0	0	1
IRIDACEAE	<i>Dierama dissimile</i> Hilliard	1	0	0	0
IRIDACEAE	<i>Dierama igneum</i> Klatt	1	0	0	1
IRIDACEAE	<i>Dierama robustum</i> N.E. Br.	1	1	1	0
IRIDACEAE	<i>Dietes bicolor</i> (Steud.) Sweet ex Klatt	0	0	1	0
IRIDACEAE	<i>Dietes butcheriana</i> Gerstn.	1	1	1	0
IRIDACEAE	<i>Dietes grandiflora</i> N.E. Br.	0	0	1	0
IRIDACEAE	<i>Dietes iridioides</i> (L.) Sweet ex Klatt	1	0	0	1
IRIDACEAE	<i>Freesia laxa</i> (Thunb.) Goldblatt & Man subsp. <i>laxa</i>	1	1	1	1
IRIDACEAE	<i>Gladiolus carneus</i> Delaroché	1	0	0	0
IRIDACEAE	<i>Gladiolus dalenii</i> Van Geel	0	1	1	1
IRIDACEAE	<i>Gladiolus ecklonii</i> Lehm.	0	1	1	0
IRIDACEAE	<i>Gladiolus longicollis</i> Bak. var. <i>longicollis</i>	0	1	1	0
IRIDACEAE	<i>Gladiolus longicollis</i> Bak. var. <i>platypetalus</i> (Bak.) Ob	1	0	1	0
IRIDACEAE	<i>Gladiolus oppositiflorus</i> Herb. subsp. <i>salmoneus</i> (Bak)	1	0	0	0
IRIDACEAE	<i>Gladiolus permeabilis</i> Delaroché subsp. <i>wilsonii</i> (Bak)	0	0	1	1
IRIDACEAE	<i>Hesperantha baurii</i> Bak. subsp. <i>baurii</i>	0	1	1	0
IRIDACEAE	<i>Hesperantha hygrophila</i> Hilliard & Burt	0	0	1	0
IRIDACEAE	<i>Hesperantha lactea</i> Bak.	0	0	0	1
IRIDACEAE	<i>Moraea brevistyla</i> (Goldbl.) Goldbl.	0	0	1	0
IRIDACEAE	<i>Moraea elliotii</i> Bak.	0	1	1	0
IRIDACEAE	<i>Moraea inclinata</i> Goldbl.	0	0	1	0
IRIDACEAE	<i>Moraea spathulata</i> (L. f.) Klatt	0	1	1	0
IRIDACEAE	<i>Moraea stricta</i> Bak.	1	0	0	0
IRIDACEAE	<i>Tritonia disticha</i> (Klatt) Bak. subsp. <i>disticha</i>	1	1	0	0
IRIDACEAE	<i>Tritonia disticha</i> (Klatt) Bak. subsp. <i>rubrolucens</i> (R.	1	1	0	1
IRIDACEAE	<i>Tritonia lineata</i> (Salisb.) Ker-Gawl. var. <i>lineata</i>	0	0	1	1
IRIDACEAE	<i>Tritonia parvula</i> N.E. Br.	0	0	1	0
IRIDACEAE	<i>Tritonia</i> sp. nov.	0	0	1	0
IRIDACEAE	<i>Watsonia angusta</i> Ker-Gawl.	0	1	0	0
IRIDACEAE	<i>Watsonia bachmannii</i> L. Bol.	0	1	1	0
IRIDACEAE	<i>Watsonia confusa</i> Goldbl.	0	0	1	0
IRIDACEAE	<i>Watsonia densiflora</i> Bak.	0	1	1	1
IRIDACEAE	<i>Watsonia inclinata</i> Goldbl.	0	0	1	0
IRIDACEAE	<i>Watsonia meriana</i> (L.) Mill.	1	0	0	0
IRIDACEAE	<i>Watsonia mtamvunae</i> Goldbl.	0	0	1	0
IRIDACEAE	<i>Watsonia pillansii</i> L. Bol.	1	0	1	0
IRIDACEAE	<i>Watsonia pondoensis</i> Goldbl.	0	0	1	0
JUNCACEAE	<i>Juncus dregeanus</i> Kunth	0	0	0	1
JUNCACEAE	<i>Juncus effusus</i> L.	0	0	0	1
JUNCACEAE	<i>Juncus exertus</i> Buchen.	1	0	0	0
JUNCACEAE	<i>Juncus exsertus</i> Buchen. subsp. <i>exsertus</i>	1	0	0	1
JUNCACEAE	<i>Juncus kraussii</i> Hochst.	1	1	1	1
JUNCACEAE	<i>Juncus lomatophyllus</i> Spreng.	1	1	1	0
JUNCACEAE	<i>Juncus oxycarpus</i> E.Mey. Ex Kunth	1	0	0	0
JUNCACEAE	<i>Juncus rigidus</i> Desf.	0	1	0	0
JUNCACEAE	<i>Prionium serratum</i> (L. f.) Drege ex E. Mey.	0	1	1	1
JUNCAGINACEAE	<i>Triglochin bulbosa</i> L.	0	1	0	1
JUNCAGINACEAE	<i>Triglochin striata</i> Ruiz & Pav.	1	0	0	0
LUZURIAGACEAE	<i>Behnia reticulata</i> (Thunb.) Didr.	1	0	1	1
ORCHIDACEAE	<i>Aerangis mystacidii</i> (Reichb. f.) Schltr.	1	0	0	1
ORCHIDACEAE	<i>Angraecum pusillum</i> Lindl.	1	1	1	1

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
ORCHIDACEAE	<i>Bonatea speciosa</i> (L. f.) Willd. var. <i>speciosa</i>	1	1	0	1
ORCHIDACEAE	<i>Brachycorythis inhambanensis</i> (Schltr.) Schltr.	1	0	1	0
ORCHIDACEAE	<i>Brachycorythis ovata</i> Lindl.	1	1	0	0
ORCHIDACEAE	<i>Brownleea coerulea</i> Harv. ex Lindl.	1	0	1	0
ORCHIDACEAE	<i>Brownleea parviflora</i> Harv. ex Lindl.	1	0	0	0
ORCHIDACEAE	<i>Bulbophyllum sandersonii</i> (Oliv.) Reichb. f.	1	1	0	0
ORCHIDACEAE	<i>Bulbophyllum scaberulum</i> (Rolfe) H. Bol.	0	1	1	0
ORCHIDACEAE	<i>Calanthe sylvatica</i> (Thouars) Lindl.	1	0	0	0
ORCHIDACEAE	<i>Corycium dracomontanum</i> Parkman & Schelpe	1	0	0	0
ORCHIDACEAE	<i>Corycium nigrescens</i> Sond.	1	1	0	0
ORCHIDACEAE	<i>Corymborkis corymbis</i> Thouars	0	0	1	0
ORCHIDACEAE	<i>Cyrtorchis arcuata</i> (Lindl.) Schltr.	0	1	1	1
ORCHIDACEAE	<i>Diaphananthe xanthopollinia</i> (Reichb.f.) Summerh.	1	0	0	1
ORCHIDACEAE	<i>Disa baurii</i> (H. Bol.) Rauschert	1	1	1	0
ORCHIDACEAE	<i>Disa brevicornis</i> Lindl.	1	1	0	0
ORCHIDACEAE	<i>Disa caffra</i> H. Bol.	1	1	1	0
ORCHIDACEAE	<i>Disa chrysostachya</i> Swartz	1	0	0	0
ORCHIDACEAE	<i>Disa nervosa</i> Lindl.	1	1	1	0
ORCHIDACEAE	<i>Disa polygonoides</i> Lindl.	1	1	1	1
ORCHIDACEAE	<i>Disa sagittalis</i> (L. f.) Swartz	0	0	1	0
ORCHIDACEAE	<i>Disa similis</i> Summerh.	1	0	1	0
ORCHIDACEAE	<i>Disa stachyoides</i> Reichb. f.	1	0	1	0
ORCHIDACEAE	<i>Disa tripetaloides</i> (L. f.) N.E. Br. subsp. <i>tripetaloides</i>	0	1	1	0
ORCHIDACEAE	<i>Disa versicolor</i> Reichb. f.	1	1	1	0
ORCHIDACEAE	<i>Disa woodii</i> Schltr.	1	0	1	0
ORCHIDACEAE	<i>Disperis anthoceros</i> Rchb.f. var. <i>anthoceros</i>	0	0	1	0
ORCHIDACEAE	<i>Eulophia angolensis</i> (Reichb.f.) Summerh.	1	1	1	0
ORCHIDACEAE	<i>Eulophia clavicornis</i> Lindl. var. <i>clavicornis</i>	1	0	1	0
ORCHIDACEAE	<i>Eulophia clavicornis</i> Lindl. var. <i>nutans</i> (Sond.) A.V. H.	1	1	0	0
ORCHIDACEAE	<i>Eulophia clitellifera</i> (Reichb. f.) H. Bol.	1	0	0	0
ORCHIDACEAE	<i>Eulophia ensata</i> Lindl.	1	1	1	1
ORCHIDACEAE	<i>Eulophia foliosa</i> (Lindl.) H. Bol.	0	1	0	0
ORCHIDACEAE	<i>Eulophia odontoglossa</i> Reichb. f.	1	1	1	0
ORCHIDACEAE	<i>Eulophia ovalis</i> Lindl. subsp. <i>ovalis</i>	0	1	0	0
ORCHIDACEAE	<i>Eulophia parviflora</i> (Lindl.) A.V. Hall	1	1	1	0
ORCHIDACEAE	<i>Eulophia speciosa</i> (R. Br. ex Lindl.) H. Bol.	1	0	0	0
ORCHIDACEAE	<i>Eulophia tenella</i> Reichb. f.	0	0	1	0
ORCHIDACEAE	<i>Habenaria chlorotica</i> Reichb. f.	0	0	1	0
ORCHIDACEAE	<i>Habenaria ciliosa</i> Lindl.	1	1	0	0
ORCHIDACEAE	<i>Habenaria clavata</i> (Lindl.) Reichb. f.	0	1	0	0
ORCHIDACEAE	<i>Habenaria dives</i> Reichb. f.	1	1	1	1
ORCHIDACEAE	<i>Habenaria dregeana</i> Lindl.	1	0	0	0
ORCHIDACEAE	<i>Habenaria falcicornis</i> (Burch. ex Lindl.) H. Bol. subsp.	0	0	0	1
ORCHIDACEAE	<i>Habenaria falcicornis</i> (Burch. ex Lindl.) H. Bol. subsp.	0	0	1	0
ORCHIDACEAE	<i>Habenaria lithophila</i> Schltr.	0	0	1	0
ORCHIDACEAE	<i>Habenaria pseudociliosa</i> Schelpe ex J.C. Manning	1	0	0	0
ORCHIDACEAE	<i>Habenaria tysonii</i> H. Bol.	1	0	0	0
ORCHIDACEAE	<i>Habenaria woodii</i> Schltr.	0	0	1	0
ORCHIDACEAE	<i>Holothrix orthoceras</i> (Harv.) Reichb. f.	0	0	1	0
ORCHIDACEAE	<i>Liparis bowkeri</i> Harv.	0	1	1	1
ORCHIDACEAE	<i>Liparis remota</i> J. Stewart & Schelpe	0	1	1	0
ORCHIDACEAE	<i>Mystacidium aliceae</i> H. Bol.	0	0	0	1

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
ORCHIDACEAE	<i>Mystacidium capense</i> (L.f.) Schltr.	1	0	0	0
ORCHIDACEAE	<i>Mystacidium venosum</i> Harv. ex Rolfe	0	1	1	0
ORCHIDACEAE	<i>Polystachya concreta</i> (Jacq.) Garay & Sweet	0	1	1	0
ORCHIDACEAE	<i>Polystachya pubescens</i> Reichb. f.	1	1	1	0
ORCHIDACEAE	<i>Polystachya sandersonii</i> Harv.	0	1	0	0
ORCHIDACEAE	<i>Polystachya tessellata</i> Lindl.	1	0	0	0
ORCHIDACEAE	<i>Rangaeris musciola</i> (Reichb. f.) Summerh.	0	1	0	1
ORCHIDACEAE	<i>Satyrium cristatum</i> Sond. var. <i>cristatum</i>	0	1	0	0
ORCHIDACEAE	<i>Satyrium longicauda</i> Lindl. var. <i>longicauda</i>	1	1	1	1
ORCHIDACEAE	<i>Satyrium parviflorum</i> Swartz	0	1	0	0
ORCHIDACEAE	<i>Satyrium sphaerocarpum</i> Lindl.	1	1	1	0
ORCHIDACEAE	<i>Satyrium trinerve</i> Lindl.	1	1	1	0
ORCHIDACEAE	<i>Schizochilus zeyheri</i> Sond.	1	1	1	0
ORCHIDACEAE	<i>Stenoglottis fimbriata</i> Lindl.	1	1	0	1
ORCHIDACEAE	<i>Stenoglottis woodii</i> Schltr.	0	1	1	1
ORCHIDACEAE	<i>Tridactyle bicaudata</i> (Lindl.) Schltr. subsp. <i>bicaudata</i>	0	1	1	0
ORCHIDACEAE	<i>Tridactyle bicaudata</i> (Lindl.) Schltr. subsp. <i>rupestris</i> L	1	0	0	1
ORCHIDACEAE	<i>Tridactyle tridentata</i> (Harv.) Schltr.	0	1	1	1
ORCHIDACEAE	<i>Ypsilopus erectus</i> (Cribb) Cribb & J. Stewart	0	0	1	0
POACEAE	<i>Acroceras macrum</i> Stapf	0	1	0	0
POACEAE	<i>Agrostis lachnantha</i> Nees var. <i>lachnantha</i>	1	0	1	0
POACEAE	<i>Alloteropsis semialata</i> (R. Br.) Hitchc. subsp. <i>eckloni</i>	1	1	1	1
POACEAE	<i>Andropogon appendiculatus</i> Nees	1	1	1	0
POACEAE	<i>Andropogon eucomus</i> Nees	0	1	1	1
POACEAE	<i>Andropogon festuciformis</i> Rendle	0	1	1	0
POACEAE	<i>Aristida junciformis</i> Trin. & Rupr. subsp. <i>galpinii</i> (Sta	1	0	0	1
POACEAE	<i>Aristida junciformis</i> Trin. & Rupr. subsp. <i>junciformis</i>	1	1	1	0
POACEAE	<i>Arundinella nepalensis</i> Trin.	0	1	1	1
POACEAE	<i>Axonopus affinis</i> Chase	0	1	0	0
POACEAE	<i>Bothriochloa bladhii</i> (Retz.) S.T. Blake	0	0	0	1
POACEAE	<i>Brachiaria arrecta</i> (Dur. & Schinz) Stent	0	1	0	0
POACEAE	<i>Brachiaria chusqueoides</i> (Hack.) Clayton	0	1	0	0
POACEAE	<i>Brachiaria deflexa</i> (Schumach.) C.E. Hubb ex Robyns	0	1	0	0
POACEAE	<i>Brachiaria serrata</i> (Thunb.) Stapf	1	0	0	0
POACEAE	<i>Briza maxima</i> L. *	1	0	0	0
POACEAE	<i>Bromus catharticus</i> Vahl *	0	0	0	1
POACEAE	<i>Chloris gayana</i> Kunth	1	1	1	1
POACEAE	<i>Chloris pycnothrix</i> Trin.	0	1	0	1
POACEAE	<i>Chloris virgata</i> Swartz	0	1	0	1
POACEAE	<i>Coix lacryma-jobi</i> L. *	1	0	0	0
POACEAE	<i>Ctenium concinnum</i> Nees	1	1	1	1
POACEAE	<i>Cymbopogon excavatus</i> (Hochst.) Stapf ex Burt Dav	1	1	1	1
POACEAE	<i>Cymbopogon plurinodis</i> (Stapf) Stapf ex Burt Davy	0	0	0	1
POACEAE	<i>Cymbopogon validus</i> (Stapf) Stapf ex Burt Davy	1	1	0	1
POACEAE	<i>Cynodon dactylon</i> (L.) Pers.	0	0	0	1
POACEAE	<i>Dactyloctenium aegyptium</i> (L.) Beauv.	0	0	0	1
POACEAE	<i>Dactyloctenium australe</i> Steud.	1	1	1	1
POACEAE	<i>Diandrochloa namaquensis</i> (Nees) De Winter	1	0	0	0
POACEAE	<i>Digitaria diagonalis</i> (Nees) Stapf var. <i>diagonalis</i>	0	1	1	0
POACEAE	<i>Digitaria eriantha</i> Steud.	1	1	0	0
POACEAE	<i>Digitaria longiflora</i> (Retz.) Pers.	0	0	0	1
POACEAE	<i>Digitaria natalensis</i> Stent	1	1	1	1

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FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
POACEAE	<i>Digitaria setifolia</i> Stapf	0	1	0	0
POACEAE	<i>Diheteropogon amplexens</i> (Nees) Clayton	1	1	1	1
POACEAE	<i>Diheteropogon filifolius</i> (Nees) Clayton	0	1	1	0
POACEAE	<i>Echinochloa colona</i> (L.) Link	1	0	0	1
POACEAE	<i>Echinochloa crus-pavonis</i> (Kunth)Schult.	1	0	0	0
POACEAE	<i>Echinochloa crus-galli</i> (L.) Beauv.*	1	0	0	0
POACEAE	<i>Echinochloa pyramidalis</i> (Lam.) Hitchc. & Chase	0	0	1	1
POACEAE	<i>Ehrharta calycina</i> J.E. Sm. var. <i>calycina</i>	0	1	0	0
POACEAE	<i>Ehrharta erecta</i> Lam. var. <i>natalensis</i> Stapf	0	1	0	0
POACEAE	<i>Ehrharta</i> sp. (Fish 6088)	0	1	0	0
POACEAE	<i>Eleusine coracana</i> (L.) Gaertn. subsp. <i>africana</i> (K.-O	1	1	0	0
POACEAE	<i>Eleusine indica</i> (L.) Gaertn. subsp. <i>indica</i>	1	0	0	0
POACEAE	<i>Elionurus muticus</i> (Spreng.) Kunth	1	1	1	0
POACEAE	<i>Eragrostis acraea</i> De Winter	0	1	1	1
POACEAE	<i>Eragrostis capensis</i> (Thunb.) Trin.	1	1	1	1
POACEAE	<i>Eragrostis ciliaris</i> (L.) R. Br.	1	0	0	1
POACEAE	<i>Eragrostis curvula</i> (Schrad.) Nees	0	1	1	1
POACEAE	<i>Eragrostis inamoena</i> K. Schum.	0	1	1	1
POACEAE	<i>Eragrostis nindensis</i> Fical. & Hiern	1	0	0	0
POACEAE	<i>Eragrostis patens</i> Oliv.	0	1	0	0
POACEAE	<i>Eragrostis pilosa</i> (L.) Beauv.	0	0	0	1
POACEAE	<i>Eragrostis plana</i> Nees	1	1	1	1
POACEAE	<i>Eragrostis racemosa</i> (Thunb.) Steud.	1	1	1	1
POACEAE	<i>Eragrostis rigidior</i> Pilg.	0	0	0	1
POACEAE	<i>Eriochrysis pallida</i> Munro	0	1	1	0
POACEAE	<i>Eulalia villosa</i> (Thunb.) Nees	1	1	1	0
POACEAE	<i>Festuca costata</i> Nees	0	1	1	0
POACEAE	<i>Harpochloa falx</i> (L. f.) Kuntze	0	1	1	1
POACEAE	<i>Helictotrichon hirtulum</i> (Steud.) Schweick.	1	1	0	0
POACEAE	<i>Hemarthria altissima</i> (Poir.) Stapf & C.E. Hubb.	0	0	1	0
POACEAE	<i>Heteropogon contortus</i> (L.) Roem. & Schult.	0	1	0	1
POACEAE	<i>Hyparrhenia anamesa</i> Clayton	0	1	0	1
POACEAE	<i>Hyparrhenia filipendula</i> (Hochst.) Stapf var. <i>filipendu</i>	0	1	1	0
POACEAE	<i>Hyparrhenia filipendula</i> (Hochst.) Stapf var. <i>pilosa</i> (H	1	1	0	1
POACEAE	<i>Hyparrhenia hirta</i> (L.) Stapf	0	0	0	1
POACEAE	<i>Hyparrhenia schimperii</i> (A. Rich.) Stapf	0	0	1	0
POACEAE	<i>Imperata cylindrica</i> (L.) Rauschel	0	1	0	0
POACEAE	<i>Ischaemum fasciculatum</i> Brongn.	1	1	1	1
POACEAE	<i>Koeleria capensis</i> (Steud.) Nees	0	1	1	1
POACEAE	<i>Leersia hexandra</i> Swartz	0	1	0	0
POACEAE	<i>Loudetia simplex</i> (Nees) C.E. Hubb.	0	1	1	1
POACEAE	<i>Melinis nerviglumis</i> (Franch.) Zizka	1	1	1	0
POACEAE	<i>Melinis repens</i> (Willd.) Zizka subsp. <i>repens</i>	0	0	0	1
POACEAE	<i>Microchloa caffra</i> Nees	0	1	0	1
POACEAE	<i>Miscanthus capensis</i> (Nees) Anderss.	1	0	1	1
POACEAE	<i>Miscanthus junceus</i> (Stapf) Pilg.	0	1	1	0
POACEAE	<i>Monocymbium ceresiiforme</i> (Nees) Stapf	1	1	1	1
POACEAE	<i>Olyra latifolia</i> L. *	1	1	1	0
POACEAE	<i>Oplismenus hirtellus</i> (L.) Beauv.	1	1	1	1
POACEAE	<i>Oplismenus undulatifolius</i> (Ard.) Roem. & Schult.	0	1	0	0
POACEAE	<i>Oxyrhachis gracillima</i> (Bak.) C.E. Hubb.	0	1	0	0
POACEAE	<i>Panicum aequinerve</i> Nees	1	1	0	1

APPENDIX 3

Checklist of Port St. Johns (PSJ), Mkambati (MK), Umtamvuna (UMT) and Oribi Gorge (OG)

FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
POACEAE	<i>Panicum deustum</i> Thunb.	1	1	1	1
POACEAE	<i>Panicum dregeanum</i> Nees	1	0	1	1
POACEAE	<i>Panicum ecklonii</i> Nees	0	1	1	0
POACEAE	<i>Panicum fluviicola</i> Steud.	0	0	0	1
POACEAE	<i>Panicum hymeniophilum</i> Nees	0	0	1	0
POACEAE	<i>Panicum laticomum</i> Nees	1	0	0	1
POACEAE	<i>Panicum maximum</i> Jacq.	0	1	0	1
POACEAE	<i>Panicum natalense</i> Hochst.	0	1	0	1
POACEAE	<i>Panicum parvifolium</i> Lam.	0	1	0	0
POACEAE	<i>Paspalum dilatatum</i> Poir. *	1	1	1	0
POACEAE	<i>Paspalum distichum</i> L.	0	1	0	0
POACEAE	<i>Paspalum scrobiculatum</i> L.	0	1	1	1
POACEAE	<i>Paspalum urvillei</i> Steud. *	0	1	1	1
POACEAE	<i>Pennisetum purpureum</i> Schumach. *	1	0	0	0
POACEAE	<i>Phacelurus franksae</i> (J.M. Wood) Clayton	0	0	1	0
POACEAE	<i>Phalaris arundinacea</i> L. *	0	0	0	1
POACEAE	<i>Phragmites australis</i> (Cav.) Steud.	1	0	1	0
POACEAE	<i>Phragmites mauritianus</i> Kunth	1	0	1	1
POACEAE	<i>Polypogon monspeliensis</i> (L.) Desf. *	1	0	0	0
POACEAE	<i>Polypogon strictus</i> Nees	0	1	0	0
POACEAE	<i>Polypogon viridis</i> (Gouan.) Breistr.	0	1	0	0
POACEAE	<i>Prosphytochloa prehensilis</i> (Nees) Schweick.	1	1	1	1
POACEAE	<i>Pseudechinloaena polystachya</i> (Kunth) Stapf	0	1	0	0
POACEAE	<i>Rendlia altera</i> (Rendle) Chiov.	0	1	1	0
POACEAE	<i>Rhynchelytrum nerviglume</i> (Franch.) Chiov.	0	1	0	0
POACEAE	<i>Rhytachne rottboellioides</i> Desv.	0	1	0	0
POACEAE	<i>Sacciolepis indica</i> (L.) Chase	0	1	0	0
POACEAE	<i>Sacciolepis spiciformis</i> (A.Rich) Stapf	0	1	0	0
POACEAE	<i>Schizachyrium sanguineum</i> (Retz.) Alst.	0	1	1	1
POACEAE	<i>Setaria incrassata</i> (Hochst.) Hack.	0	0	0	1
POACEAE	<i>Setaria lindenberghiana</i> (Nees) Stapf	0	0	1	1
POACEAE	<i>Setaria megaphylla</i> (Steud.) Dur. & Schinz	0	1	0	1
POACEAE	<i>Setaria sphacelata</i> (Schumach.) Moss var. <i>sericea</i> (S	0	1	1	0
POACEAE	<i>Setaria sphacelata</i> (Schumach.) Moss var. <i>sphacelata</i>	1	0	1	1
POACEAE	<i>Sorghum bicolor</i> (L.) Moench	1	0	0	0
POACEAE	<i>Sorghum halepense</i> (L.) Pers. *	1	0	0	0
POACEAE	<i>Sporobolus africanus</i> (Poir.) Robyns & Tournay	0	1	0	1
POACEAE	<i>Sporobolus centrifugus</i> (Trin.) Nees	0	1	1	1
POACEAE	<i>Sporobolus fimbriatus</i> (Trin.) Nees	1	0	0	1
POACEAE	<i>Sporobolus natalensis</i> (Steud.) Dur. & Schinz	0	0	0	1
POACEAE	<i>Sporobolus pyramidalis</i> Beauv.	1	1	0	1
POACEAE	<i>Sporobolus subtilis</i> Kunth	0	1	1	0
POACEAE	<i>Sporobolus subulatus</i> Hack.	0	0	1	0
POACEAE	<i>Sporobolus virginicus</i> (L.) Kunth	0	1	0	0
POACEAE	<i>Stenotaphrum secundatum</i> (Walt.) Kuntze	0	1	0	1
POACEAE	<i>Stiburus alopecuroides</i> (Hack.) Stapf	0	0	1	0
POACEAE	<i>Themeda triandra</i> Forssk.	1	1	1	1
POACEAE	<i>Trachypogon spicatus</i> (L. f.) Kuntze	0	1	1	1
POACEAE	<i>Trichopteryx dregeana</i> Nees	0	1	1	0
POACEAE	<i>Tristachya leucothrix</i> Nees	1	1	1	1
POACEAE	<i>Tristachya rehmannii</i> Hack.	0	0	1	0
POACEAE	<i>Urelytrum agropyroides</i> (Hack.) Hack.	0	1	1	0

APPENDIX 3

Checklist of Port St. Johns (PSJ), Mkambati (MK), Umtamvuna (UMT) and Oribi Gorge (OG)

FAMILY	GENUS SPECIES	PSJ	MK	UMT	OG
POACEAE	<i>Urochloa mosambicensis</i> (Hack.) Clayton	0	1	0	0
POTAMOGETONACEAE	<i>Potamogeton crispus</i> L.	0	0	1	0
POTAMOGETONACEAE	<i>Potamogeton schweinfurthii</i> A.W. Benn.	0	0	1	1
POTAMOGETONACEAE	<i>Potamogeton thunbergii</i> Cham. & Schlechtd.	0	0	0	1
RESTIONACEAE	<i>Calopsis paniculata</i> (Rottb.) Desv.	0	1	1	0
RESTIONACEAE	<i>Ischyrolepis setiger</i> (Kunth) Linder	0	0	0	1
RESTIONACEAE	<i>Restio distichus</i> Rottb.	0	0	0	1
RESTIONACEAE	<i>Restio sejunctus</i> Mast.	0	0	1	0
RESTIONACEAE	<i>Restio triticeus</i> Rottb.	0	0	1	0
RESTIONACEAE	<i>Rhodocoma capensis</i> Nees ex Steud.	0	0	0	1
SMILACACEAE	<i>Smilax anceps</i> Willd.	1	1	1	1
STRELITZIACEAE	<i>Strelitzia nicolai</i> Regel & Koern.	1	1	1	1
TYPHACEAE	<i>Typha capensis</i> (Rohrb.) N.E. Br.	1	0	1	0
XYRIDACEAE	<i>Xyris anceps</i> Lam.	0	0	1	1
XYRIDACEAE	<i>Xyris capensis</i> Thunb.	1	0	1	0
XYRIDACEAE	<i>Xyris natalensis</i> Nilss.	0	1	1	0

APPENDIX 4

TABLE 1. Pondoland Centre of Endemism endemics

Sources of information a: Pooley 1993, b: Pooley 1998, c: van Wyk 1990, van Wyk & Smith 2001, d: Abbott 1997, e: Abbott *et al.* 2000, f: Scott Shaw 1999, g: Meter 1998, h: S Ramdani pers. com., i: Prinsloo 2000, j: P Phillipson pers. com., k: A Ngwenya pers. com., l: Priscilla Burgoyne, Pers. comm., m: Hartman (1991), n: D. Belstedt, pers. comm., o: de Vos 1999, p: Nicholas 1999.

Bold script indicates monotypic taxon.

Abbreviations: Umtv = Umtamvuna, Mkb = Mkambati, S = Southern, KZN = KwaZulu-Natal, PC = Pondoland Center

FAMILY	GENUS & SPECIES	Source	PSJ	MKB	UMTV	OG	RANGE
ACANTHACEAE	<i>Thunbergia purpurata</i> Harv. Ex C.B. Cl.	e	-	+	+	+	
ANACARDIACEAE	<i>Rhus acocksii</i> Moffett	c,e	-	+	+	+	Oribi-Msikaba
	<i>R. sp. nov. cf. rigida</i>	g	-	-	-	+	Oribi
APOCYNACEAE	<i>Carissa sp. nov.</i>		-	-	+	-	
ASCLEPIADACEAE	<i>Aspidoglossum peltigera</i> (E. Mey.) Schltr.	f, p	-	-	-	-	PC, extinct KZN
	<i>A. uncinatum</i>	c, p	-	-	-	-	
	<i>A. virgatum</i>	c, p	-	-	-	-	
	<i>Brachystelma australe</i>	c,f	-	+	+	+	
	<i>B. kerzneri</i>	c,f	-	-	-	-	Mzamba
	<i>B. tenellum</i>	c,f	-	-	-	-	Oribi to Msikaba
	<i>B. sp. nov. (=Nicholas 2354)</i>		-	+	-	-	Mkambati
	<i>Huernia hystrix</i> var. <i>parvula</i>	c,f	-	-	-	-	Oribi, Umzimkulu and Umzimkulwana Rivers
	<i>Orbea speciosa</i>	c,f	-	-	-	-	Oribi
	<i>Asclepias peltigera</i>	c					
	<i>Paulforstera truncata</i> (= <i>Asclepias</i>	b,f,p	-	-	-	-	

	<i>praemorsa</i>)						
	<i>Riocreuxia alexandrina</i>	f	-	-	-	-	Oribi
	<i>Schizoglossum atropurpureum</i> ssp. <i>virens</i>	c,f,p	+	+	-	-	
ASTERACEAE	<i>Berkheya pondoensis</i>	f	-	-	-	-	Oribi-Mkb
	<i>Cineraria</i> sp.	e	-	+	+	+	UNR
	<i>Euryops leiocarpus</i>	c,e	-	+	+	+	
	<i>Helichrysum pannosum</i>	c,e	-	+	=	-	
	<i>Kleinia fulgens</i>	g	-	-	-	+	Oribi
	<i>Lopholaena dregeana</i>	e	-	-	+	-	
	<i>Osteospermum</i> sp. (Strey 5908, 8891)		-	-	+	-	Umtamvuna
	<i>Senecio erubescens</i> var. <i>incisus</i>	c,e,f	-	+	+	+	
	<i>S. glanduloso-lanosus</i>	f	-	-	+	-	? Near endemic
	<i>S. medley-woodii</i>	c,f	-	-	+	+	?
	<i>S. poseideonis</i>	f	-	-	-	-	?
	<i>S. ryncholaenus</i>	f	-	-	+	+	?
	<i>Tarchonanthus trilobus</i> var. <i>trilobus</i>	c	-	+	+	+	
BIGNONIACEAE	<i>Podranea ricasoliana</i> (Tanf.) Sprague	c,e,f	+	-	-	-	PSJ
BRUNIACEAE	<i>Raspalia trigyna</i> (Schtr.) Duemmer	c,e,f	-	+	+	-	Umtv, Mkb
CAMPANULACEAE	<i>Wahlenbergia</i> sp. nov. (Abbott 1954)	e,	-	-	+	-	UNR
CELASTRACEAE	<i>Catha abbotii</i> van Wyk & Prins	c,e,f	-	-	+	-	
	<i>Gymnosporia bachmannii</i> (Loes.) Marais	c,e,f	-	+	+	+	
	<i>G. vanwykii</i>		-	-	+	-	
	<i>Maytenus oleosa</i> van Wyk & Archer	c,e,f	-	+	+	-	
	<i>Pseudosalacia streyi</i> Codd	c,e,f,i	-	+	+	-	
	<i>Putterlickia retrospinosa</i> van Wyk & Mostert	c,e,f	-	+	+	+	
CLUSIACEAE	<i>Hypericum</i> sp. nov. (=Strey 7443)		-	+	-	-	
CONVOLVULACEAE	<i>Ipomea</i> sp.	e	-	-	-	-	Nyameni, UNR, MNR
CRASSULACEAE	<i>Andromichus cristatus</i> var. <i>zeyheri</i>	c	-	-	-	-	Oribi Gorge

	<i>Crassula obovata</i> var. <i>dregeana</i>	c,e,f	-	+	-	+	
	<i>C. streyii</i>	c,e,f	-	+	+	-	
DIPSACAEEAE	<i>Cephalaria</i> sp. (=Strey 8366)		-	-	+	-	
ERICACEAE	<i>Erica abbotii</i>	c,e,f	-	+	+	-	
	<i>E. sp.</i>	i	-	-	-	-	Mkb
EUPHORBIACEAE	<i>Clutia</i> sp. nov. (Abbott 4084)	e	-	+	+	-	Umtv – Mkb
	<i>Erythrococca</i> sp. nov. (Hitchins 775)	e	+	+	+	-	
FABACEAE	<i>Aspalathus gerrardii</i>	e	-	+	+	+	
	<i>Eriosema dregei</i>	f	-	+	-	-	Msikaba – P.Edward
	<i>E. latifolium</i>	f	-	-	-	-	Izingolweni- Lusikisiki
	<i>E. luteopetalum</i>	g	-	-	-	-	
	<i>E. umtamvunense</i>	c,b,e,f	-	+	+	-	
	<i>Indigofera braamtonyi</i>	b	-	-	-	-	
	<i>I. gogosa</i>	e	-	-	+	-	
	<i>I. herrstreyi</i>	e	+	-	+	-	
	<i>I. jucunda</i>	e	-	-	+	-	
	<i>I. pondoensis</i>	b	-	-	+	-	
	<i>I. rubroglandulosa</i>	e	-	+	+	+	
	<i>I. sp.</i> (= van Hoepen 89)		-	+	-	-	
	<i>Indigastrum fastigiatum</i>	e	-	-	+	-	
	<i>Lotononis bachmanniana</i>	b,e,f	-	+	+	-	
	<i>Podalyria velutina</i>	g	+	+	+	+	
	<i>Psoralea abbotii</i>	c,b,e,f	-	+	+	-	
	<i>T. pondoensis</i> (Codd) Schrire	c,f	-	+	+	+	PC & S KZN
	<i>Tephrosia bachmannii</i>	b,e,f	+	+	+	+	
FLACOURTIACEAE	<i>Casearia</i> sp. nov.	e	-	-	+	-	Wide
	<i>Scolopia</i> sp. (=van Wyk 6049)		-	+	-	-	
GENTIANACEAE	<i>Chironia albiflora</i>	b, e,f	-	+	-	-	Umtv, Magwa

	<i>Sebaea</i> sp. nov. (Abbott 2982a)	e	-	-	-	-	Wide
GERANIACEAE	<i>Monsonia natalensis</i>	c,f	-	+	+	+	
GESNERIACEAE	<i>Streptocarpus formosus</i>	c,e	+	+	+	+	Mkb, OG
	<i>S. modestus</i>	g	-	-	-	-	
	<i>S. porphyrostachys</i>	c,b,e,f	-	+	+	-	
	<i>S. trabeculatus</i>	c,b,e,f	-	-	-	+	
	<i>S. sp. (=Cloete sn)</i>	n	-	+	-	-	Mkambati
	<i>S. sp. (liliputana in press)</i>	n	-	-	-	-	Lupatana
ICACINACEAE	<i>Apodytes abbotii</i>	c,e,f,i	+	+	+	+	
LAMIACEAE	<i>Plectranthus aliciae</i>	c,e	-	-	+	+	
	<i>P. ernstii</i>	c,b,,f	-	-	+	+	
	<i>P. hilliardiae</i>	c,b,e,f	+	+	+	-	
	<i>P. malvinus</i>	c,e,f	+	-	-	-	
	<i>P. oertendahlii</i>	c,b,e,f	-	-	-	+	
	<i>P. oribiensis</i>	c,b,e,f	-	-	-	+	
	<i>P. praetermissus</i>	c,f	+	-	-	-	
	<i>P. reflexus</i>	c,b,e	+	-	-	-	
	<i>P. saccatus</i> ssp. <i>pondoensis</i>	c,b,e	-	-	-	-	
	<i>P. sp. (Belstedt)</i>	n	-	-	-	-	Grovenor
	<i>P. sp. (Belstedt)</i>	n	-	-	-	-	Lupatana
	<i>Syncolostemon ramulosus</i>	c,b,e,f	-	+	+	-	
	<i>S. rotundifolius</i>	c,e,f	-	+	+	+	
LAURACEAE	<i>Cassytha pondoensis</i> Engl.	e	-	+	+	-	
LOBELIACEAE	<i>Lobelia</i> sp.	j	-	-	-	-	Nyameni
MALVACEAE	<i>Hibiscus</i> sp. nov. (=Strey 4513)		-	+	+	-	
MESEMBRYANTH ¹	<i>Delosperma pondoense</i>	m	-	-	-	-	
	<i>D. rogersii</i> ²	l	+	+	-	-	PSJ & Mkb
	<i>D. subpetiolatum</i>	m	-	-	-	-	As above
	<i>D. sp. nov. (Abbott 954 and others)</i>	e	-	-	-	-	Sikuba
	<i>D. spp. cf. nov. (Cloete 4821, 6300)</i>	l	+	-	-	-	PSJ

	<i>Lampranthus</i> sp. nov. (Abbott 3476)	e	-	-	+	-	
	<i>L. stipulaceus</i>	b, e,	-	+	+	-	Wide
MYRTACEAE	<i>Eugenia</i> sp. nov.	k	-	-	-	-	Gibraltar Rock, Mzimkulu R.
	<i>E.</i> sp. nov. A	c,f	-	-	-	-	Mapumulo – Umtv
	<i>E.</i> sp. nov. B	c,f, k	-	-	-	-	Mapumulo – Umtv
	<i>E.</i> sp. nov. C (Abbott s.n.)	e,c,f, k	-	-	-	-	S KZN & PC
	<i>E. erythrophylla</i> Strey	c,e,f	+	+	+	+	
	<i>E. umtamvunensis</i> Van Wyk	c,e,f	-	+	+	-	Umt, Mkb, PSJ
	<i>E. verdoorniae</i> Van Wyk	c, e,f	-	+	+	-	S KZN & PC
	<i>Syzygium pondoense</i> Engl.	c,e,f	-	+	+	-	S KZN & PC
	<i>S.</i> sp. nov. (Abbott 1209)	e	-	-	-	-	Umtv
OCHNACEAE	<i>Ochna</i> cf. <i>chilversii</i> (Abbott 4004)	e					Wide
POLYGALACEAE	<i>Muraltia muraltioides</i>	f	-	-	-	-	
	<i>Polygala esteræ</i> Chod.	c,f	-	-	+	-	S KZN-PC
PROTEACEAE	<i>Leucadendron pondoense</i> van Wyk	c,e,f,i	-	-	-	-	
	<i>L. spissifolium</i> ssp. <i>natalense</i>	b,f,i	-	+	+	+	
	<i>L. spissifolium</i> ssp. <i>oribinum</i>	b,f,i	-	-	+	+	
	<i>Leucospermum innovans</i>	c,b,e,f,i	-	+	-	-	
RHAMNACEAE	<i>Colubrina nicholsonii</i> van Wyk & Schrire	c,e,f,i	+	+	+	-	PSJ to Vernon Crooks Reserve
	<i>Phyllica natalensis</i>	c,b,f	-	-	+	-	
RHYNCHOCALYCA CEAE	<i>Rhynchoalyx lawsonioides</i> Oliv.	c, e,f	+	+	+	+	PSJ to Oribi
RUBIACEAE	<i>Anthospermum streyii</i> Puff	c,e,f	+	+	+	+	
	<i>Canthium vanwykii</i> Tilney & Kok	c,e,f	+	+	+	+	
	<i>Eriosemopsis subanisophylla</i> Robyns	c, e,f	-	+	+	+	
	<i>Pavetta bowkeri</i>	f	+	+	+	+	SKZN & PC

	<i>Tricalysia africana</i> (Sim) Robbrecht	c,e,f	+	+	-	-	Nsubane
RUTACEAE	<i>Agathosma</i> sp.	i	-	-	-	-	Mkb- KwaDlambu
SAPOTACEAE	<i>Manilkaria nicholsonii</i> Van Wyk	c,e,f,i	-	+	+	-	
SCROPHULARIAC. ²	<i>Craterostigma nanum</i> var. <i>nanum</i>	f	-	-	-	-	S KZN & PC
	<i>C.</i> sp. nov. (Abbott 1909)	e,	-	-	+	-	UNR, MNR, Nya meni
	<i>Zaluzianskya</i> sp. nov.		-	-	+	-	
SELAGINACEAE	<i>Selago peduncularis</i> = <i>S. lepidioides</i>	c,f	+	+	+	+	
THYMELEACEAE	<i>Gnidia triplinervis</i>	e	-	+	+	-	
	<i>Struthiola anomala</i>	b	-	-	-	-	
	<i>S. pondoensis</i>	c,f	-	+	+	-	Paddock to Mtentu
TILIACEAE	<i>Grewia pondoensis</i> Burret	c,e,f	+	+	+	+	
VIOLACEAE	<i>Rinorea domatiosa</i> Van Wyk	c,e,f	+	+	+	-	
VITACEAE	<i>Cyphostemma rubroglandulosum</i>	c,e,f	-	-	-	-	
AMARYLLIDACEAE	<i>Clivia</i> sp.	i	-	+	-	-	Mkb
	<i>Cyrtanthus</i> sp. nov. (Abbott 4412)	e	-	-	+	-	
ARECACEAE	<i>Jubaeopsis caffra</i> Becc.	c,e,f,i	-	+	-	-	Mkambati
ASPHODELACEAE	<i>Bulbine</i> sp. nov. (Abbott 2123, Cloete)	c,h, e	-	+	+	-	Umtv & Mkb, wide
	<i>Kniphofia coddiana</i>	c,f	+	+	-	+	Oribi - Mkb
IRIDACEAE	<i>Aristea platycaulis</i>	c,e,f	-	-	+	-	Umtv to Msikaba
	<i>Tritonia disticha</i> subsp. <i>disticha</i>	o	+	+	-	-	PSJ to Margate
	<i>Tritonia</i> sp. (Abbott 1549)	e	-	-	+	-	UNR
	<i>Watsonia bachmannii</i>	c	-	+	+	-	
	<i>W. mtamvunae</i>	c,b,e,f	-	-	+	-	
	<i>W. pondoensis</i>	c,b,e,f	-	-	+	-	
	<i>W. inclinata</i>	b,e,f	-	-	+	-	
ORCHIDACEAE	<i>Tridactyle bicaudata</i> (Lind.) Schltr. subsp.	g	+	-	-	+	

	<i>rupestris</i>						
RESTIONACEAE	<i>Calopsis paniculata</i> (Rottb.) Desv.		-	+	+	-	

1. Mesembryanth. = Mesembranthemaceae
2. Scrophulariac. = Scrophulariaceae
3. *Delosperma edwardiae* may be reinstated, but current literature places it under *D. rogersii*

There seems to be confusion about the true range of *Olyra latifolia* but it is probably exotic.

Table 2. Near-endemics of Pondoland

FAMILY	TAXON	PSJ	MKB	UMT	OG	SOURCE	RANGE
ANACARDIACEAE	<i>Rhus pondoensis</i>	-	-	+	+		
ASCLEPIADACEAE	<i>Paulforstera patens</i>	+	-	-	-	c, p	Kentani to PSJ
	<i>Pachycarpus coronarius</i>	-	-	+	-	c, f, p	Bashee to Paddock
ASTERACEAE	<i>Phymaspermum villosum</i> = <i>Athanasia villosa</i>	-	-	+	-	e	Paddock, Lower Ngeli
BALSAMINACEAE	<i>Impatiens flanaganiae</i> Hemsl.	+	-	-	-	c	
CELASTRACEAE	<i>Gymnosporia vanwykii</i>	-	-	+	-	f	PC & Manubi
EUPHORBIACEAE	<i>Euphorbia woodii</i>	-	+	-	-	f	Durban – Mkb
GESNERIACEAE	<i>Streptocarpus johannis</i>	+	-	-	-	f	PSJ to Ngeli
	<i>S haygarthii</i>	+	+	+	+		PSJ, Tabankulu
SAPINDACEAE	<i>Atalaya natalensis</i>	+	-	+	-	f	Dwesa to Ngome and Ngoye
AMARYLLIDACEAE	<i>Cyrtanthus brachyscyphus</i>	-	-	+	-	c, Dold	
	<i>Cyrtanthus mackenii</i> var <i>mackenii</i>	-	-	-	-	f	Scottburg to Lusikisiki
ASPHODELACEAE	<i>Gasteria croucheri</i>	-	-	+	+	f	Mapumulo to PSJ, Mzimvubu valley
	<i>Kniphofia drepanophylla</i>	+	+	-	-	bf	Ngeli and PC
CYPERACEAE	<i>Fimbristylis variegata</i>	-	-	-	-	f	coastal KZN & PC
ORCHIDACEAE	<i>Stenoglottis woodii</i>	-	+	+	+	f	Port St Johns to Ngome

TABLE 3. DISJUNCTIONS BETWEEN PONDOLAND AND OTHER SITES

FAMILY	TAXON	PSJ	MK B	UM T	OG	SOURCE	RANGE
ZAMIACEAE	<i>Encephalartos caffer</i>	-	-	-	+	f	
ANACARDIACEAE	<i>Loxostylis alata</i> Spreng f. ex Reichb.	-	+	+	+		Rare in KwaZulu-Natal, Eastern Ca
APOCYANACEAE	<i>Carissa wyliei</i> N.E. Br	+	+	+	-	f	Localised N/Z/T
	<i>Gonioma kamassi</i>	-	-	+	-	f	KZN, Swaziland, Mpumalanga
ARALIACEAE	<i>Cussonia nicholsonii</i>	-	+	+	+	f	S KZN, Midlands
ASTERACEAE	<i>Helichrysum diffusum</i>	-	-	+	-		Hottentots Holland Mts
	<i>H. populifolium</i>	+	+	+	+	c	PC Noodsberg
	<i>Senecio albanopsis</i>	+	-	+	+	f	Mkb to Mapulolo
	<i>S. dregeanus</i>	-	-	-	-	f	Ndwedwe to Mkambati, Midlands
	<i>Cineraria atriplicifolia</i>	-	-	-	-	f	Ngoye to Oribi on sandstone.
CELASTRACEAE	<i>Gymnosporia filiformis</i>	-	-	+	-		Ngoye
	<i>Maytenus abbotii</i>	+	-	+	+		Durban
FABACEAE	<i>Milletia sutherlandii</i> = <i>Philenoptera</i>	+	+	-	-	f	PC, Central Zululand, NW Swazilan
FLACOURTIACEAE	<i>Pseudoscolopia polyantha</i> Gilg	-	+	+	+	e,f	Noodsberg, Oribi Mbumbulu, PSJ & Clanwilliam
LAMIACEAE	<i>Tinnea galpinii</i> (yellow)	-	+	+	-	c,f	PC, S Swaziland and N KZN
LAURACEAE	<i>Cryptocarya wyliei</i> Stapf	+	+	+	+	f	Ngoye, Nkandla, Noodsberg, Krantzkloof
	<i>Dahlgrenodendron natalense</i> (J.H. Ross) J.J.M. v/d Merwe & van Wyk	-	+	+	+	c	PC plus 4 other localities
LENTIBULARIACEAE	<i>Utricularia sandersonii</i>	+	+	+	+	e	Noodsberg, Inanda, Pinetown, PC
MELASTOMATACEAE	<i>Memecyclon bachmannii</i> Engl.	+	+	+	+		Durban
MORACEAE	<i>Ficus bizanae</i> Hutch & Burt Davy	+	+	+	+	f	Ngoye forest and PC
MYRTACEAE	<i>Eugenia simii</i>	-	+	+	+	f	Tugela/Transvaal
ROSACEAE	<i>Clifforita odorata</i>	-	-	-	-		Cape & PC

RUBIACEAE	<i>Alberta magna</i>	-	+	+	+	f	PC, Midlands, Ngome
ASPHODELACEAE	<i>Caesia contorta</i> (L.f.) Dur. & Schinz	-	+	+	+		Cape & PC
CYPERACEAE	<i>Tetraria robusta</i>	-	-	-	-	f	Umtv. & S Cape
CYPERACEAE	<i>Macrochaetium hexandrum</i>	-	+	-	-		Cape & PC
JUNCACEAE	<i>Prionium serratum</i> (L.f.) Drege ex E.Mey	-	+	-	-	f	PC and south of Grahamstown
RESTIONACEAE	<i>Restio triticeus</i>	-	-	+	-		Cape & PC

Table 4. A survey of all *Delosperma* species mentioned in connection with Pondoland.

Abbreviations: a. Hartmann 1991, b Abbott 2000, c Meter 1998, d this document, e P.Burgoyne pers comm.

TAXON	Source	RANGE	Type locality
<i>Delosperma caespitosum</i> L.Bol.		Coastal, from Kentani northwards	
<i>D. concavum</i> L.Bol.		Widespread	Graaf Reinet
<i>D. cooperii</i> (Hook.f.) L.Bol.		Very wide, OFS, EC, Gauteng	
<i>D. crassuloides</i>	a	Widespread, from Albany northwards	
<i>D. galpinii</i> L.Bol.		Lions River	Lions River
<i>D. grantiae</i>	a	Ciskei, one locality	Ciskei
<i>D. herbeum</i>		Wide: EC, KZN, OFS, Gauteng, NP	
<i>D. lavisiae</i>		Lesotho, Drakensberg	Lesotho
<i>D. leightoniae</i>		Ciskei, one collection	Ciskei
<i>D. lineare</i> L.		Wide: OFS, Lesotho, EC, Gauteng	Lesotho
<i>D. pallidum</i>	a	Locality unknown	
<i>D. pondoense</i>	a	Narrow, in Pondoland	Port Shepstone
<i>D. rogersii</i> (Schoenl. & Berger) L.Bol.		Mixed collection	
<i>D. stenandrum</i>	a	Wide in Transkei, Umtata to CoffeeBay	Umtata
<i>D. subpetiolatum</i>	a		
<i>D. tradescantioides</i> (Berger) L.Bol.		Very wide, Port Shepstone to Chimanimani Mountains	
<i>D. velutinum</i> L.Bol.		Kranskop	Kranskop
<i>D. uniflorum</i>		Keiskamma, one collection	Keiskamma
<i>D. sp. nov.</i> (Abbott 954)		Umtamvuna	
<i>D. sp. nov.</i> (Cloete 6300)		Port St Johns	
<i>D. sp.</i> (Cloete 4821)		Port St Johns	