Key to the species accounts

Species and infraspecific taxa are arranged alphabetically by family, genus, and species to facilitate easy lookup. Where available, synonyms are also included. Note that families are listed alphabetically, regardless of whether they are dicotyledons or monocotyledons.

Endemic and protected species are identified by the following icons:

- **C1** CITES Appendix I
- **C2** CITES Appendix II
- **E** Endemic taxon
- **P** Protected under Nature Conservation Ordinance 4 of 1975

Status

The conservation status is indicated by the following abbreviations:

CR Critically Endangered
EN Endangered
LC Least Concern
NT Near Threatened
R Rare
VU Vulnerable

Description

Description of the growth form and major distinguishing characters of each taxon.

Rationale

Brief explanation of the reasons for listing and the factors that contributed to a particular assessment.

Habitat

Short description of habitat and altitude (in metres) where taxon may be expected to occur.

Threats

List of the main factors that threaten the taxon with extinction in Namibia.

Additional notes

Other important information. Where available, common names are included in this section.

Red Data Book of Namibian Plants

Sonja Loots

2005

Southern African Botanical Diversity Network Report No. 38

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Front cover: Top, l–r: *Namibia cinerea* (Photo: C. Mannheimer), *Aloe pachygaster* (Photo: G. Owen-Smith), *Aloe pearsonii* (Photo: W. Giess). Middle, l–r: *Hoodia ruschii* (Photo: P.V. Bruyns), *Aloe pillansii* (Photo: H. Dauth), *Australluma peschii* (Photo: P.V. Bruyns), *Babiana namaquensis* (Photo: C. Mannheimer). Bottom, l–r: *Ansellia africana* (Photo: H. zur Strassen), *Crassula mesembrianthemopsis* (Photo: H. Kolberg).
Back cover: Top: *Crinum paludosum* (Photo: W. Giess). Bottom, l–r: View from the Aurus Mountain in the Sperrgebiet (Photo: W. Giess), *Sesamothamnus* sp. (Photo: B. Curtis).

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IUCN
The World Conservation Union

UNDP

USAID

GEF

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Introduction

By assessing the conservation status of taxa, Red Lists focus attention on the loss of biodiversity around the globe and on those taxa that need to be conserved urgently, as they are facing a high risk of extinction. Red Lists are therefore important in raising awareness among policy- and decision-makers, as well as conservationists. It also assists in setting conservation priorities and serves as a starting point for conservation action by highlighting those taxa that are threatened or near threatened with extinction. Once it is known which species are threatened or near threatened, a conservation and monitoring strategy can and should be implemented to conserve these taxa in their natural habitat, thereby ensuring their survival. It should be emphasised that a Red List is only one criterion that can be used to identify species for conservation. Other important criteria include economic value and usefulness of a species, genetic and ecogeographic distinction, and endemism.

Addressing the needs of rare, endemic, and threatened species by compiling Red Lists is an objective of both the National Biodiversity Strategy and Action Plan (NBSAP) and the Global Strategy for Plant Conservation (GSPC). Both these strategies hope to achieve their goals by 2010. The Namibian Biosystematic user community identified the production of Red Lists as a high priority (Irish, 2003).

An important conservation measure that could realistically be achieved within the next five years, and from which most taxa would benefit, is the development of policy and legislation. The review and streamlining of national policy and legal frameworks to bring them in line with the Convention on Biological Diversity and other relevant treaties is a strategic aim of the NBSAP.

Another crucial element in the conservation of threatened species is the role of public awareness and education. This too can benefit most species in the near future. The Red List aims to promote awareness and education, not only of conservationists and the general public, but also of policy- and decision-makers. Hopefully, this publication will increase awareness amongst all Namibians, encouraging them to conserve our country's indigenous plants, and in particular rare and threatened species. The promotion of public awareness and education for the conservation of plant biodiversity are objectives of both the NBSAP and the GSPC.

For some taxa, research on population numbers and range, habitat status, and threats will also be feasible in the near future. In addition, the National Plant Genetic Resources Centre of the NBRI is collaborating with the Millennium Seed Bank Project in Wakehurst Place, UK, to collect and store germplasm of endemic, rare, and threatened species. This conservation measure is, however, only meant to be complementary to conserving biodiversity in its natural habitat. *Ex situ* and *in situ* conservation are also objectives of both the GSPC and the NBSAP.

A small number of taxa listed here occur naturally in the existing protected area network and are therefore passively conserved, assuming that management practices in parks are not to the detriment of these taxa. The vast majority of plant taxa that should be targeted for conservation action are, however, not in formally protected areas, as these reserves were never selected for the protection of plant biodiversity. The NBSAP aims to identify and fill specific gaps in the protected area network.

The pressure on the Sperrgebiet (Diamond Area 1) in the southwestern corner of Namibia with its unique flora of generally high conservation value, is increasing continually as the area is opened up to tourism and additional mining developments (Craven & Loots, 2002). Hopefully, however, the new Sperrgebiet land use plan (MET, 2001), which has identified areas with exceptionally high biodiversity within Diamond Area 1, will protect the species of concern. The Sperrgebiet was proclaimed as part of the State Protected Area Network in 2004 (MET, 2005, pers. comm.)

Namibia's conservation legislation is presently under review. It is envisaged that, once the legislation has been approved, it will enable conservationists to list taxa that have been assessed and found to be threatened as "Specially Protected Plants". This category will highlight plants for conservation action, thereby ensuring their protection. Permits will be required for the collection, selling, possession, and export of these taxa.

History of the plant Red List in Namibia

A number of assessors have previously listed the Red List status of some Namibian plants. Table 3 lists five such publications. Subsequent to these, Craven and Loots (2002) compiled a preliminary Red List over three years, which integrated existing and new data to form a basis on which to build the Threatened Plants Programme of the National Botanical Research Institute (NBRI). The aims of the Namibian Threatened Plants Programme are to

- Prioritise plant taxa that require conservation.
- Centralise any information emanating from research or monitoring.
- Co-ordinate mechanisms to make this information available.
- Assist in developing appropriate conservation strategies.

The SABONET project, which started in 1997, and is to end in 2005, has aimed to build botanical capacity in ten participatory countries in the southern African region. One of its most important outputs was the production of the Southern African Plant Red Data Lists (Golding, 2002). Taxa from these countries were listed and assessed against the 1994 IUCN Red List criteria. The status of approximately 4,100 taxa was determined and ranged from "Extinct in the Wild" to "Least Concern". Of these, some 1,152 were from Namibia.

Future Red List endeavours

Approximately two thirds of the spermatophyte taxa in Namibia have not been evaluated against the 2001 IUCN Red

List criteria yet. The NBRI is continuing the Red Listing process, however, and the list will gradually become more comprehensive as data are collected and incorporated.

A number of Namibian taxa that are known to be of high conservation value could not be evaluated due to time constraints. It is imperative that their conservation status be determined as soon as possible to ensure that they are given priority for conservation action. Many of the taxa that were listed as Data Deficient (DD) are of conservation importance, for example, the four *Dinteranthus* (Mesembryanthemaceae) taxa. These occur in Namibia and are suspected to be vulnerable to succulent collecting. As sufficient data to assess them properly were not available, however, they had to be given a DD status.

Incorporating new data often calls for a review of a particular taxon's conservation status to ensure that it remains accurate, as the inclusion of new data may result in a revised assessment.

In future, the conservation status of a particular taxon will be updated on the relevant NBRI Database, where it will be available to conservation scientists and other stakeholders. Changes in the names of taxa may occur as groups of plants are revised. If these taxa are on the RDL, any nomenclatural changes may mean that the conservation status has to be updated accordingly.

Methods

This new work follows Golding (2002). It is a more detailed account of the Namibian taxa that fall into the categories that give them a threatened status (Critically Endangered (CR), Endangered (EN), and Vulnerable (VU)), as well as taxa that are close to qualifying for a threatened status (Near Threatened (NT)), the rare (R) taxa that are not considered to be threatened, and the less common taxa in the Least Concern (LC) category. More information is also given on the rationale that was followed for the listing of a taxon, the threats that a particular taxon is facing, its habitat, and any other relevant notes.

In order to reach a wide readership, including policy- and-decision makers, conservationists, and members of the public who are concerned about the status of Namibia's plant biodiversity, a diagnostic description is included for each taxon to aid in field identification. Furthermore, a distribution map and a photograph accompany each taxon where possible.

Taxa, considered to be a priority, as well as endemic and previously listed taxa, were assessed first.

Important literature, herbarium collections, data sources, and software used

An inventory of the liverworts, mosses, ferns, and spermatophytes in Namibia was compiled in 1999 (Craven (ed.)), citing the most relevant taxonomic literature for a particular taxon. It provided most of the taxa included here. Descriptions for a substantial number of endemic taxa were translated from FSWA (Merxmüller (ed.), 1966–1972).

The National Herbarium of Namibia (WIND) manages several databases containing data on the Namibian flora. Scientific names, synonyms, common names, and the legal status of each taxon were obtained from the Flora database. The Specimen Database (SPMNDB), which contains specimen data from both WIND and the National Herbarium, Southern African National Biodiversity Institute, Pretoria, South Africa (PRE), was largely used to obtain distribution and habitat data. Additional data on distribution and habitat, as well as some of the common names were obtained from literature sources.

When the Red List programme was initiated by SABONET in the late 1990's, the 1994 IUCN Red List criteria were used to assess taxa for the Southern African Plant Red Data Lists (Golding, 2002). Subsequently, all the previously assessed taxa included here were converted to the new IUCN Red List criteria, version 3.1 (IUCN, 2001), using the RAMAS Red List software version 2.0 (Akçakaya and Ferson, 2001). A number of taxa, which had not been evaluated yet, were also assessed against the new categories and criteria.

Arcview software was used to produce maps showing the distribution of taxa in their respective categories, as well as a map showing the combined distribution of all the taxa highlighted in this book. The distribution map of each individual taxon was produced using MAPPIT software.

Data on the Area of Occupancy (AOO), number of plants per sub-population, and threats were collected for several taxa in their natural habitat over the past four years. The information was incorporated and assessments were adjusted accordingly. Photographs were mainly obtained from the NBRI slide collection, while additional material came from many sources outside the NBRI.

Changes in assessments of taxa on the Red List

After the publication of the southern African Plant Red Data Lists (Golding, 2002), it was deemed necessary to re-evaluate the Namibian taxa that had been assigned a threatened status, as most of the assessments were based on suspected threats, rather than known threats. Taxa that occur only in Diamond Area 1, for example, were all regarded as potentially threatened due to mining activities, when, in fact, only some species were actually directly or indirectly affected by mines. It was felt that evidence of threats had to be more substantial and justifiable before a taxon could be listed as threatened with extinction. Subsequently, the number of taxa in the threatened categories decreased considerably.

The accuracy of each assessment is dependent on the amount of information available for that taxon. In many cases, very little initial information is available and it is therefore important to gather as much field data as possible in order to make

more accurate assessments, which would be representative of the true situation. Changes in assessments often occur as a result of additional information becoming available, and not necessarily because the situation of a particular taxon has improved or deteriorated.

Organisation of information

Sequence of the taxa

Species and infraspecific taxa are organised alphabetically by family, genus, and species to facilitate easy lookup, displaying the family name above the first taxon account. There is also an index to genus and species names.

The following headings are included in each taxon account:

Status

The relevant IUCN categories, together with all the relevant criteria are listed here. The IUCN categories are listed after this section (Figure 8), while Appendix 1 elaborates on the IUCN 2001 Red List criteria. Taxa that have a restricted distribution and/or a small population size, but are not currently known to be facing any actual or potential threats, are classified as rare (R). This status implies that there is no known continuing decline in the population size. If a taxon qualified as R, as well as CR, EN, VU, or NT, only the threatened or NT category was listed, as it takes precedence over R.

Many taxa are known from a limited number of locations. In cases where a taxon is known from five or fewer locations and it could be clearly linked to a threat, the VU D2 category was assigned. This was the threat category used most often. Criterion B was used five times where data on the number of locations and suspected continuing decline were available and could be linked to a threat. Criterion A could not be used, as the data on population reduction were insufficient. (See Appendix 1 for detailed definitions of these criteria.)

Endemic taxa, indicated as **E**, were assessed on a global scale, since the entire population occurs within the borders of Namibia. If a taxon occurs in Namibia, as well as in other countries, only the Namibian population was assessed as if it were an endemic. The taxon was then downlisted, usually by one category, as prescribed by the IUCN guidelines for regional assessments.

Description

This is included to familiarise the reader with the growth form and major distinguishing characters of each taxon, especially where photographs are not available. The Checklist of Namibian plant species (Craven, 1999) contains reference to further taxonomic works and can be consulted for additional references.

Rationale

This is a brief explanation of the reasons for listing and the factors that contributed to a particular assessment. Definitions of terms used in this section are given in Appendix 1.

Habitat

A vegetation map of Namibia is included (Figure 1) and can be used to determine the vegetation type in which a particular taxon grows by comparing it to the distribution map. Additional habitat data were obtained from SPMNDB

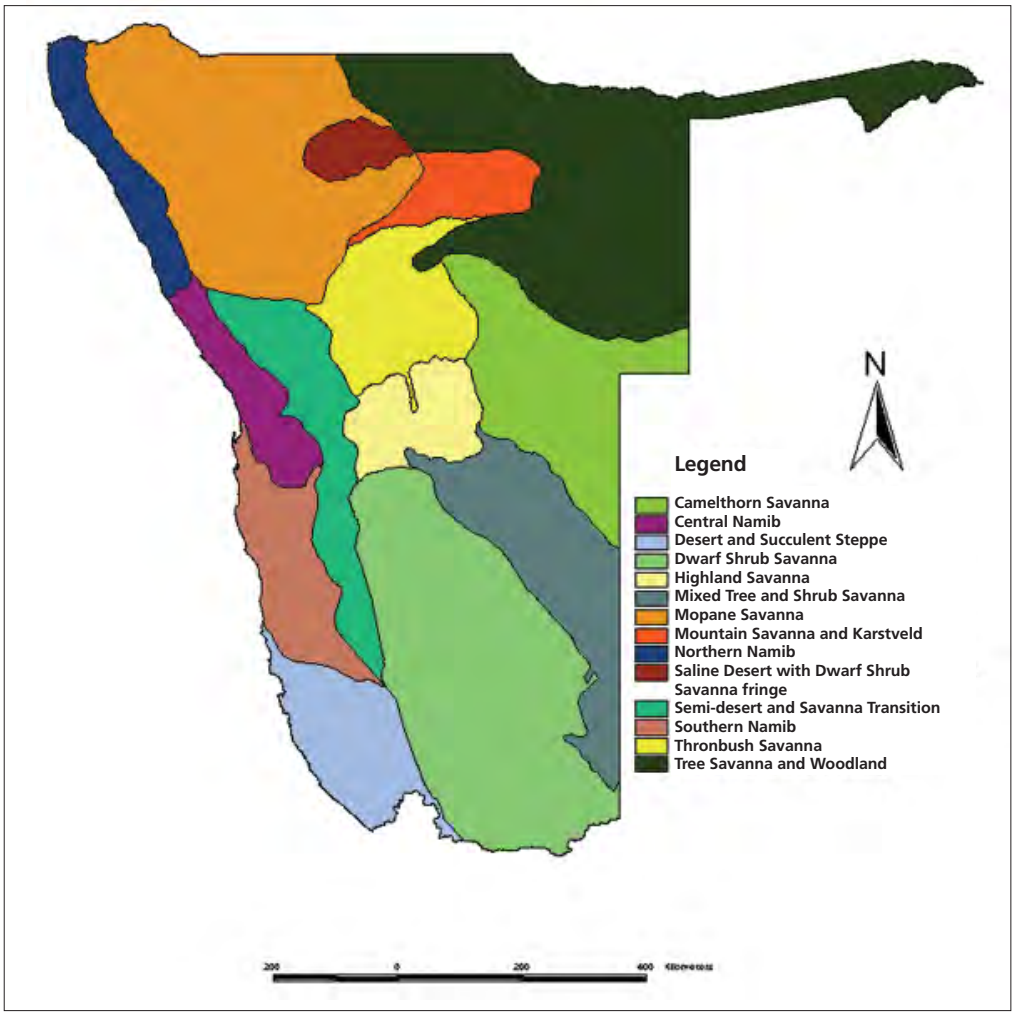


Figure 1. Vegetation map of Namibia.

and from literature. It should be noted that the information given here does not necessarily represent the entire habitat range of any given taxon. Habitat data recorded on specimens are often very scant or entirely absent. The information offered is meant merely to serve as an indication of the habitat in which a taxon may be expected to occur. Altitude is given in metres and was obtained from various sources, including Germishuizen and Meyer (2003).

Threats

Mining related activities, agriculture, illegal collecting, and various forms of human disturbance causing habitat destruction are the main factors that threaten species with extinction in Namibia. Illegal collecting of succulents is currently of particular concern. The majority of informal reports of succulents being collected illegally were of *Lithops* (*beeskloutjies* / stone plants). It is easy to pass these fairly small plants through border posts unnoticed. International succulent enthusiasts are largely to blame.

Global climate change is predicted to become a major threat to biodiversity by the year 2050. Attention is turned to mitigating the effects thereof, rather than trying to prevent it. The possible effects of climate change on plants include the shifting of suitable climate zones in latitude and altitude, loss of pollinators and dispersers, increased threats from alien plants and predators or insect herbivores, encounters with new competitors or herbivores when ranges shift, and increases in extreme climatic events such as droughts and floods (Foden, 2002; Foden, pers. comm.). Global climate change as a threat was not considered in the Red List assessments, as we do not know to what extent each taxon will be affected. Collection of seed and habitat data of species that will be affected are imperative, as we do not know yet how best to address this problem.

Additional notes

This section contains important information that was not appropriate to mention under any of the other headings. Where available, common names are included in this section.

Distribution maps

Distribution maps are included to familiarise the reader with the general distribution of the individual taxa. Detailed distribution data are omitted as it could aggravate the problem of illegal collecting.

Photographic plates

Photographic plates are included for approximately half of the taxa. By their very nature, many of the species listed are extremely rare and it was not possible to obtain photographs of every taxon. The plate corresponding to a particular taxon is indicated by "pl." and a number beneath the taxon name.

Results

Table 1 presents a breakdown of the Spermatophyte taxa in Namibia that have been evaluated to date against the IUCN criteria. Table 2 is an analysis of the threatened taxa into their respective categories. Some 23 taxa were found to be Critically Endangered, Endangered, or Vulnerable, representing less than 1% of the total number of spermatophyte taxa in Namibia. They are facing a high to extremely high risk of extinction in the near future, implying that they require urgent conservation. A total of 38 taxa were found to be Near Threatened (NT), representing approximately 1% of the spermatophyte taxa. If unchecked, they may rapidly become threatened in the near future and therefore also need an effective management programme for their protection. Figures 2–

Table 1. Spermatophytes on the Red Data List.

Category	Number of taxa
Spermatophyte taxa in Namibia	3,961
Evaluated	1,272
Threatened	23
Near Threatened	38
Rare	96
Data Deficient	301
Least Concern	754

Table 2. Breakdown of the threatened taxa into categories.

Category	Number of threatened taxa:	% of total number of threatened plants
Critically Endangered	2	8.7
Endangered	2	8.7
Vulnerable	19	82.6
Endemic	19	82.6
Near Endemic	4	17.4

Table 3. RDL status of Namibian plants in previous publications (Craven and Loots, 2002).

Publication	Number of Namibian taxa evaluated	Comments
Hall *et al.* 1980	56	
Hilton-Taylor 1996a	385	Information provided by WIND
Hilton-Taylor 1997	14	Information provided by WIND
Walter & Gillet 1998	77	Assessments not based on Hilton-Taylor 1996a, 1997 are questionable
Oldfield *et al.* 1998	11	Only four assessments completed with Namibian input

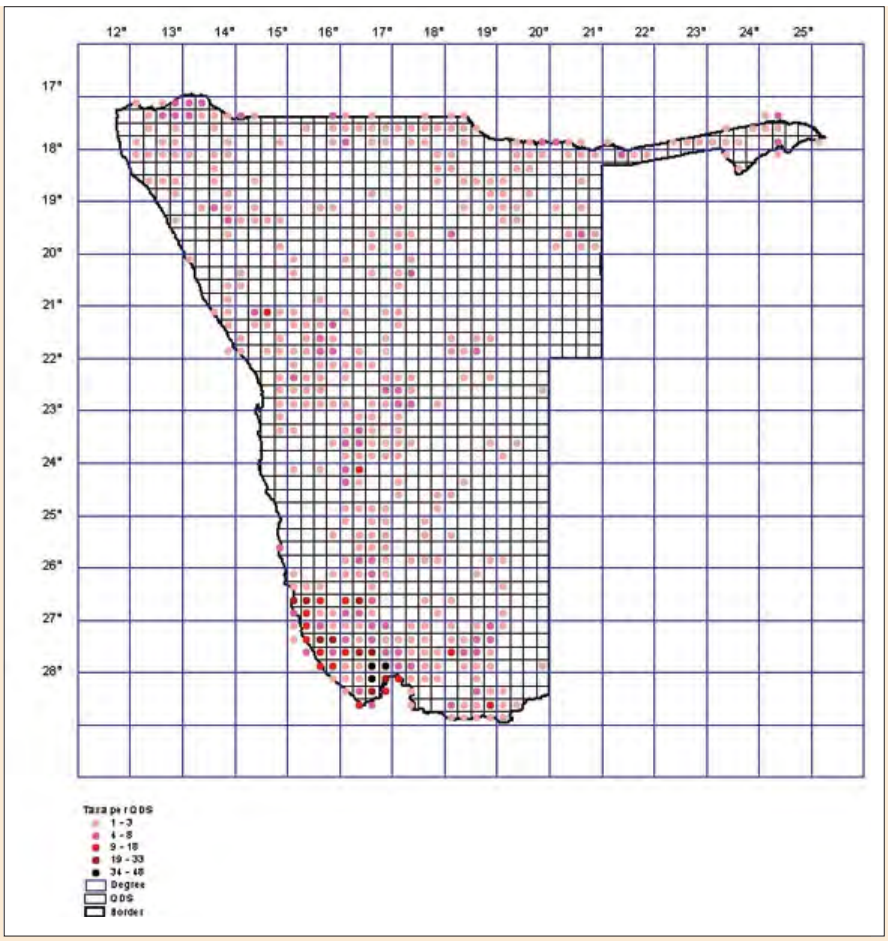


Figure 2. Distribution of Red List taxa in Namibia.

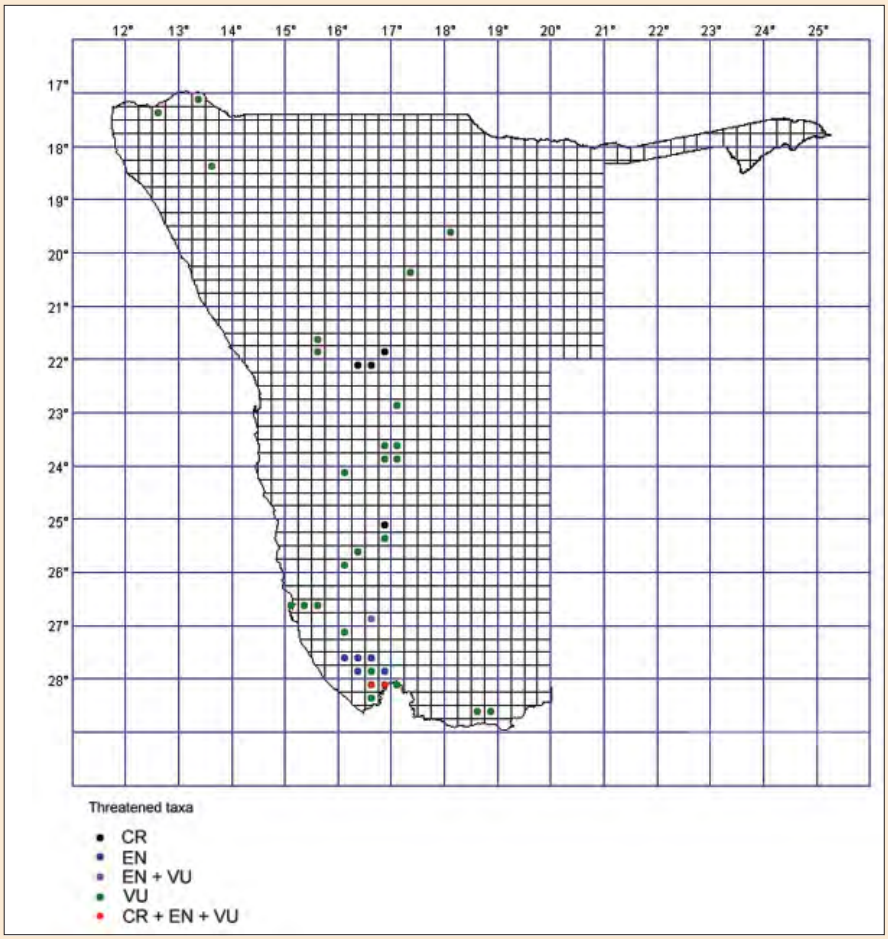


Figure 3. Distribution of threatened taxa (CR, EN and VU).

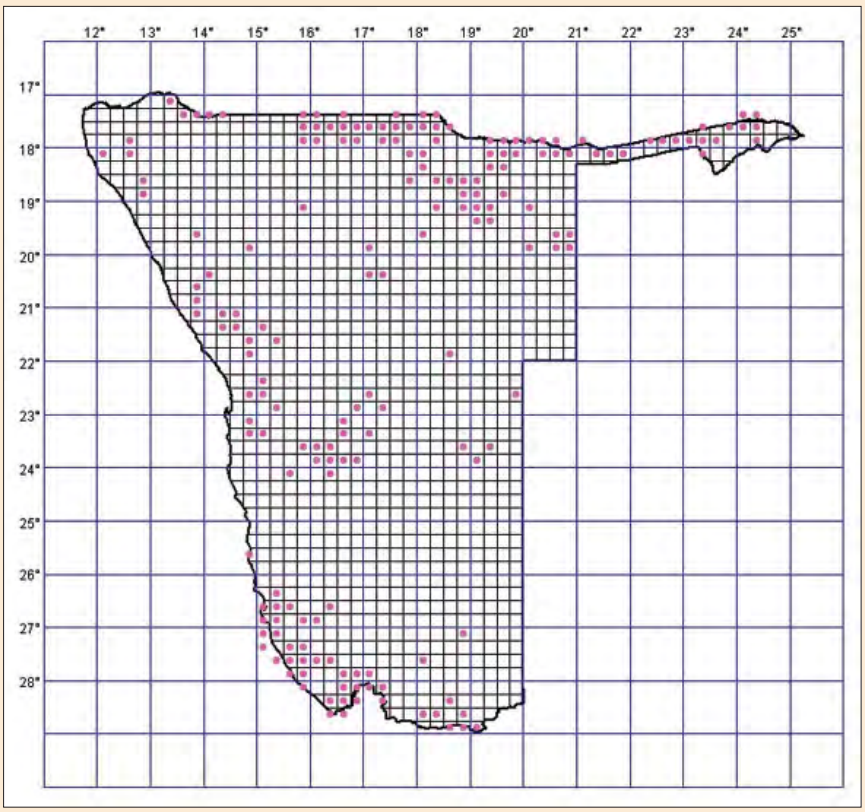


Figure 4. Distribution of Near Threatened taxa (NT)

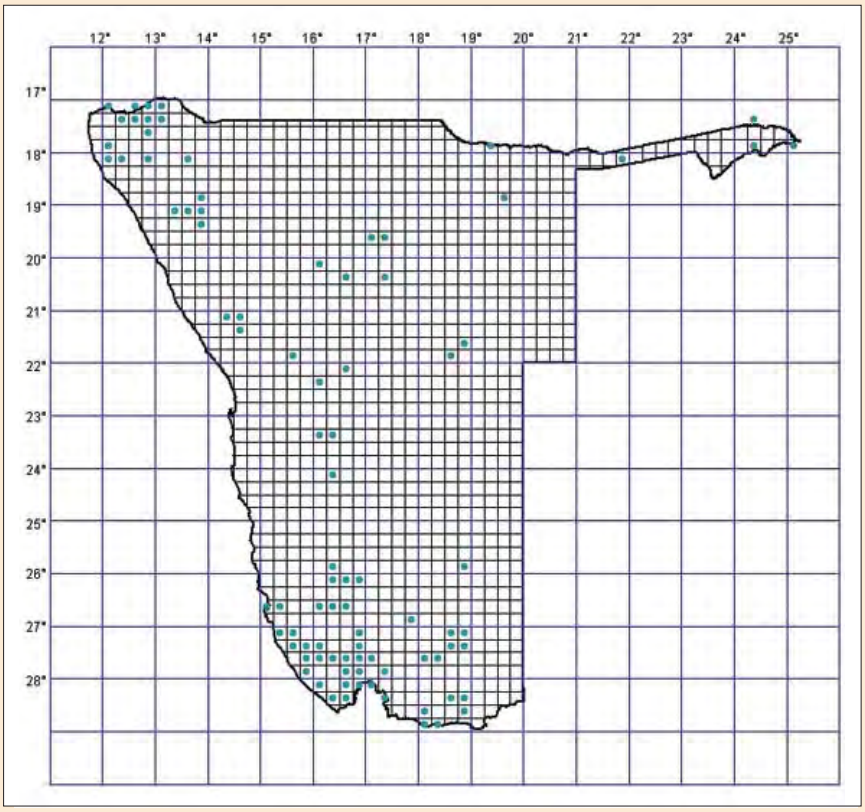


Figure 5. Distribution of Rare taxa (R)

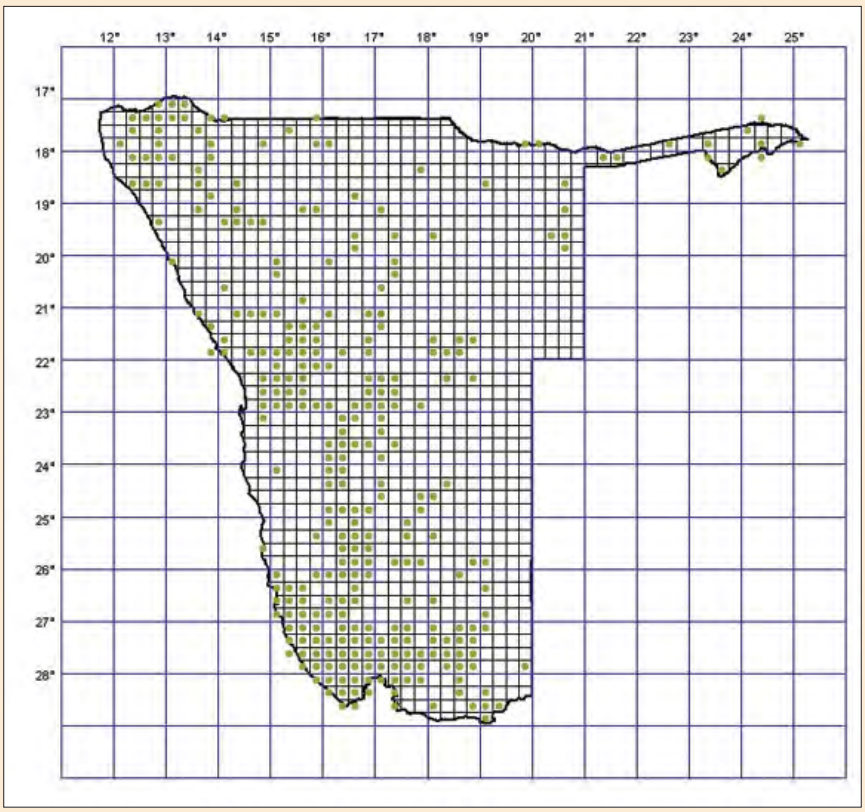


Figure 6. Distribution of Least Concern taxa (LC)

6 show the distribution of Red Listed taxa in their respective categories.

Of a total of 754 taxa assessed as LC, 119 are listed here. This category indicates that a taxon is not facing a high risk of extinction in the foreseeable future. Approximately half of the taxa in the LC category listed here, are endemic and therefore have conservation value for that reason alone. In spite of the fact that the extent of collecting could not be determined, succulent collectors are nevertheless suspected of threatening some of the succulent taxa in this category.

Appendix 2 lists all the taxa that were assessed as Data Deficient (DD), indicating a need for research and fieldwork in particular. Although it indicates that no assessment has yet been made, taxa categorised as DD should be given the same degree of protection as threatened taxa, until more information becomes available to make an accurate assessment. As mentioned, DD was often allocated to indicate inadequate information on factors of threat, but it was also used in the case of taxonomically poorly known Namibian taxa.

Discussion

On the whole, accurate information pertaining to the factors threatening plant populations is very scant and this made it difficult to ascertain to what extent a taxon is affected by an actual or potential threat. Even when there is no doubt that a taxon is threatened, the extent is difficult to determine. Given the above, it was extremely difficult to estimate a reduction in population size or the continuing decline in the number of plants. As a result, many taxa were given a LC status, despite the suspicion that they were threatened, because the true status of the population could not be ascertained. Suspected population reduction or continuing decline was applied to taxa that occur in particularly sensitive areas, such as currently active mining areas within the Sperrgebiet.

This lack of accurate information on threatening factors highlights the importance of doing field assessments, as it is the only reliable way to confirm if a taxon is threatened and, if so, to what extent. Fieldwork undertaken to establish the conservation status of *Aloe pillansii*, for example, revealed that although the total number of plants were found to be higher than previously thought, the population has definitely been declining. Mining activity is the major threat and the low levels of recruitment observed could not be fully explained. This has highlighted the need for further investigation and for urgent communication and action to monitor and conserve the populations (Craven and Loots, 2002; Loots and Mannheimer, 2003). This was the only taxon for which Criterion C could be used with confidence, as it was possible to estimate the number of mature individuals. (See Appendix 1 for detailed definitions of the different criteria.)

It proved to be very difficult to assign a threatened status to taxa with a very wide geographical distribution. For example, both *Baikiaea plurijuga* and *Pterocarpus angolensis* are extensively harvested and past reduction and continuing decline in their population sizes are strongly suspected. The wide distribution range and large population size, however, limited the possibilities that would accommodate these species to category A. To fit into this category, it has to be shown without reasonable doubt that the population has been reduced by a minumum of 30% in the last 100 years or three generations — this could not be confirmed, as data on population reduction are not available.

On numerous occasions, fieldwork has revealed that some taxa are not as rare as previously thought and that there are no real current threats. Recent fieldwork on the Brandberg has shown, for example, that the endemics *Plumbago wissii* and *Lithops gracilidelineata* subsp. *brandbergensis* are not currently threatened (Van Jaarsveld, pers. comm.). Given the restricted distribution of these taxa and easier access to the summit of the Brandberg, however, this situation may change rapidly.

Foreign collectors, who fail to obtain permits and submit duplicates to the National Herbarium, continue to impede the work of local botanists and contribute to the deficiency of data for many taxa. *Psammophora saxicola* H.E.K.Hartmann, for example, was recently described, but to date no material has been submitted to the local herbarium. In WIND, some taxa do not have a single specimen to represent them.

Conclusion and recommendations

A proportion of threatened, NT, and R taxa in the Karas Region, and to a lesser extent in other regions, grow on commercial farmland, while a number grow exclusively on freehold land. A strategy and management plan that encourages collaboration between commercial farmers and conservation authorities to conserve biodiversity on freehold land is highly desirable. The custodians of freehold land are in a better position than most to protect rare and threatened species growing there.

The role of legislation to protect threatened species is limited, as it cannot be effective in aiding biodiversity conservation on its own. Rather, if every Namibian citizen took responsibility to protect our plant biodiversity for our current and future use, it will be more effective in ensuring biodiversity conservation. By refraining from removing plants from their natural habitats, and by reporting people who do so illegally to the MET or the NBRI, Namibians can make an important contribution to protecting plants in their natural habitat.

Much of the data that were used to compile this book are preliminary. Appendix 2 lists the taxa that could not be given a status, as the available data were insufficient. Members of the public who would like to contribute to our understanding of threatened plants can do so by collecting data on threatened plants in their natural habitat.

It is, however, often very difficult to identify threatened taxa in the field, especially the ones that are more rare. It must therefore be strongly emphasised that a voucher specimen, field notes, a collecting number, and a photograph (if possible) accompany the data. Care must be taken not to collect too many specimens, though. In the case where only a few individuals are found, it is important to refrain from collecting altogether. Some populations are very small and over-collecting can be detrimental to the taxon. In order to collect any biological material, a permit must be obtained from the MET. The NBRI has designed a collecting form that specifically relates to threatened plants. These forms are available from the author upon request.

IUCN Red List Categories version 3.1. (2001)

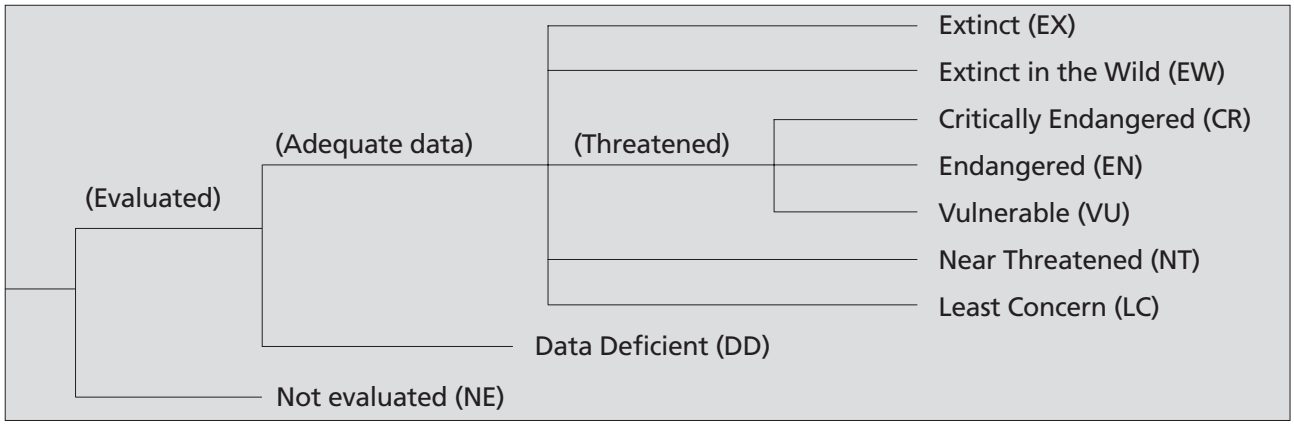


Figure 7. Structure of the categories.

(Reproduced with the permission of IUCN.)

A representation of the relationships between the categories is shown in Figure 7.

EXTINCT (EX)

A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be conducted within a time frame accommodating the taxon's life cycle and life form.

EXTINCT IN THE WILD (EW)

A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity, or as a naturalised population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be conducted within a time frame accommodating the taxon's life cycle and life form.

CRITICALLY ENDANGERED (CR)

A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Appendix 1), and it is therefore considered to be facing an extremely high risk of extinction in the wild.

ENDANGERED (EN)

A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Appendix 1), and it is therefore considered to be facing a very high risk of extinction in the wild.

VULNERABLE (VU)

A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Appendix 1), and it is therefore considered to be facing a high risk of extinction in the wild.

NEAR THREATENED (NT)

A taxon is Near Threatened when it has been evaluated against the criteria, but does not currently qualify for any of the following categories, including Critically Endangered, Endangered, or Vulnerable. It is, however, close to qualifying for a threatened category in the near future.

LEAST CONCERN (LC)

A taxon falls in the category of Least Concern when it has been evaluated against the criteria and does not qualify to fall under any of the following categories, including Critically Endangered, Endangered, Vulnerable, or Near Threatened. Widespread and abundant taxa are included in this category.

DATA DEFICIENT (DD)

A taxon is Data Deficient when there is inadequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. The category DD indicates that more information is needed, but at the same time acknowledges that future research might proof the allocation of a category of threat to be appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and a threatened status. If the suspicion exists that the range of a taxon is relatively circumscribed, and a considerable period of time has elapsed since the last record of the taxon, it may well be justified to assign a status of threat.

NOT EVALUATED (NE)

A taxon, which has not yet been evaluated against the criteria, falls in the Not Evaluated catogory.

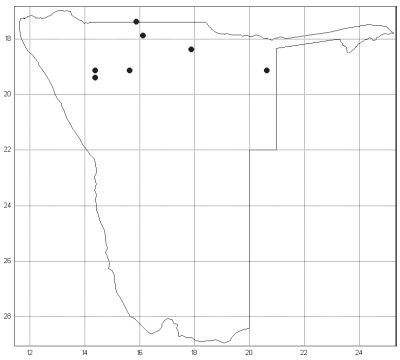
Icons and Abbreviations

AOO	Area of Occupancy
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CR	Critically Endangered
EN	Endangered
EOO	Extent of Occurrence
FSWA	Prodromus Einer Flora von Südwestafrika
IUCN	World Conservation Union (formerly the International Union for the Conservation of Nature and Natural Resources)
LC	Least Concern
MET	Ministry of Environment and Tourism
NT	Near Threatened
pl.	plate
pers. comm.	personal communication
pers. obs.	personal observation
PRE	National Herbarium, South African National Biodiversity Institute, Pretoria, South Africa
QDS	Quarter Degree Square
R	Rare
RL	Red List
SPMNDB	Specimen Database
VU	Vulnerable
WIND	National Herbarium of Namibia
C1	CITES Appendix I
C2	CITES Appendix II
E	Endemic
P	Protected under Nature Conservation Ordinance 4 of 1975

Individual Taxon Accounts

ACANTHACEAE

Hygrophila gracillima (Schinz) Burkill
Nomaphila gracillima Schinz



E

Status: LC

Description: Shrubby water plant, up to 1.5 m high, annual or sometimes perennial. Stems densely, dichotomously branched. Leaves simple, opposite, at right angles to pair above and below, ovate to elliptic, up to 100 mm long, margins entire to serrate. Flowers on long pedicels; corolla ca. 20 mm long, blue-purple, two-lipped with upper lip two-lobed, lower lip three-lobed; calyx lobes 4 or 5, deeply divided to base (Meyer, 1968; Clarke and Klaassen, 2001).

Rationale: Known from at least 6 subpopulations; number of locations unknown; no significant continuing decline in number of mature plants known.

Habitat: Margins of calcrete pans, in *omurambas*, ephemeral river beds, turf pans and on red sand plains (WIND, 2002); up to 1005 m.

Threats: Pans drying up and over-use of water resources may be a threat; increased livestock farming possibly causes decline in quality of habitat; threats unconfirmed (WIND, 2002).

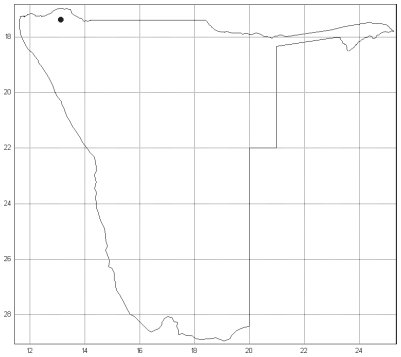
Additional notes: Common names: *efinde, omafinde* (Oshikwanyama)
Occurs in Etosha National Park and Khaudom Game Reserve (WIND, 2002).

Monechma serotinum P.G.Mey.

E

Status: R

Description: Shrub, up to 1.3 m high. Young stems green, covered with very short hairs and numerous pin-shaped, sticky glands; older stems become smooth and straw-coloured with sparse leaf cover. Leaves petiolate, covered with small mush-



room-shaped glands when young, becoming minutely and sparsely hairy at maturity; lamina elliptic, margins entire, nerves prominent, especially midrib. Flowers confined to young stems, sessile or sub-sessile, lower lip purple (Munday, 1980).

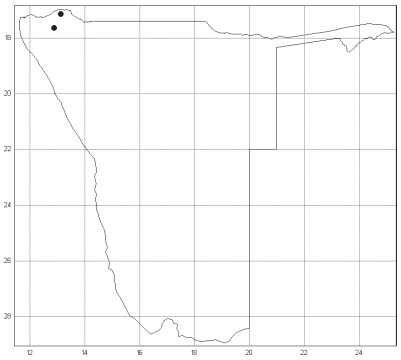
Rationale: Known from a single sub-population and location.

Habitat: Rocky areas (WIND, 2002).

Threats: Habitat degradation due to livestock farming may be a threat, but this has to be confirmed.

Additional notes: Known from type specimen only (WIND, 2002); presence of pin-shaped glands on all young parts and sparsely hairy leaf with prominent arching nerves distinctive (Munday, 1980).

Phaulopsis semiconica P.G.Mey.



Status: R

Description: Perennial, upright herb, up to 0.7 m high, with numerous ascending branches, forming tangled plant. Stems with numerous pale yellow, very sticky glandular hairs. Leaves ovate, upper surfaces moderately hairy, margins irregularly sub-serrate to sub-entire, with conspicuous ciliated hairs. Inflorescences numerous, sometimes very lax and interrupted. Flowers white with purple markings. (Manktelow, 1996).

Rationale: Known distribution restricted to between 2 and 4 subpopulations and locations.

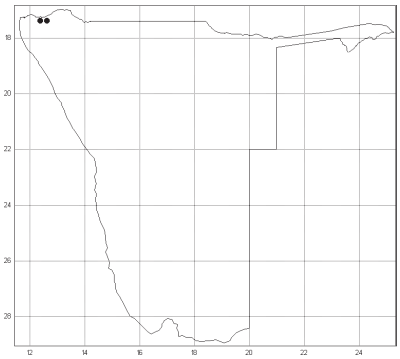
Habitat: Shaded crevices in dry rocky areas; on dry stony

slopes in steep rocky mountain passes; rock crevices facing south, close to the more or less vertical surface to keep in shade. (Manktelow, 1996; WIND, 2002); 725–1500.

Threats: Restricted range, but no actual or potential threats known.

Additional notes: Sticky glandular hairs seem to protect plants well against grazing; rare ; also occurs in southern Angola (Manktelow, 1996; WIND, 2002).

Ruellia currorii T.Anderson



Status: R

Description: Erect, perennial shrub, ca. 1 m high with densely hairy, grooved stems branching from ground. Leaf lamina rounded off at base, becoming gradually pointed towards tip, glandular. Flowers 1–3 in axillary inflorescences; bracts linear, shorter than calyx; calyx segments 5, pointed, hairy, divided nearly to base, broadest at base; corolla white, cream or yellow, 45–65 mm long, regularly 5-lobed, tube becoming broader towards throat; stamens 4. Capsule linear to club shaped; seeds with slimy hairs (Meyer, 1968, WIND, 2002).

Rationale: Known from 3 to 4 sub-populations and locations.

Habitat: Sandy and desert conditions; mountain gorge; gravelly riverbed in sand and stones (Cadman, 1987; WIND, 2002); 610–670 m.

Threats: Restricted range but no actual or potential threats known.

Additional notes: Locally frequent; also occurs in Angola (Meyer, 1968; WIND, 2002).

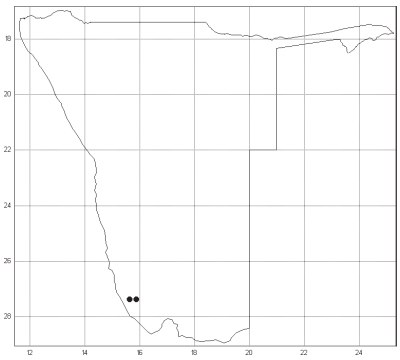
AMARYLLIDACEAE

Brunsvigia herrei Leight. ex W.F.Barker

pl. 1

Status: R

Description: Geophyte with neck and upper part of bulb exposed. Leaves 6, appearing after flowers, up to 200 x 90 mm, oblong-obtuse, glaucous green with narrow red margins, erect when young, spreading later. Peduncle green, slightly com-



pressed, up to 230 mm high. Inflorescence resembles tassel or powder brush. Flowers up to 40; pedicels up to 180 mm long; perianth pale, delicate pink with deeper pink veins and pale greenish keels, segments up to 55 x 12 mm, tube deep pink at base, 3 mm long; stamens bent downward or forward, arranged in two very distinct rows; style slightly longer than stamens (Barker, 1963).

Rationale: Known distribution restricted to a single subpopulation.

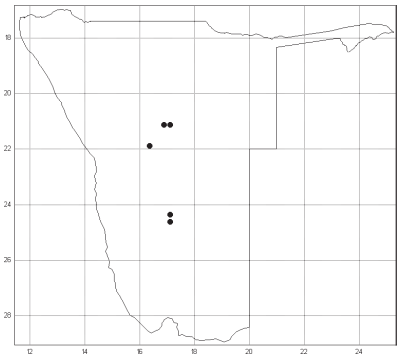
Habitat: 650–1000 m.

Threats: Restricted range but no actual or potential threats known.

Additional notes: Very attractive with potential for cultivation; known from single collection in Namibia but more widespread in South Africa (Barker, 1963); no specimens in WIND.

Crinum paludosum I.Verd.

Crinum forbesii (Lindl.) Schult. & Schult.f.



pl. 1

Status: LC

Description: Geophyte. Leaves with slight metallic sheen, moderately arched, ca. 50 mm broad, inner new leaves few in number and 2–5 mm broad, margin with very narrow cartilaginous border and short, sparse, conspicuous hairs. Inflorescence 5–11 flowered. Flowers sub-erect; perianth tube pale green; perianth lobes slightly spreading in sunshine, white with pink keel or suffused with delicate pink, faded flowers purplish-pink; stamens with white filaments which turn pink in upper half; anthers grey-brown to blackish; style crimson in upper half; stigma 3-lobed. Capsule ca. 35 mm in diameter, not beaked, but sometimes with short crown or collar at apex (Verdoorn, 1968).

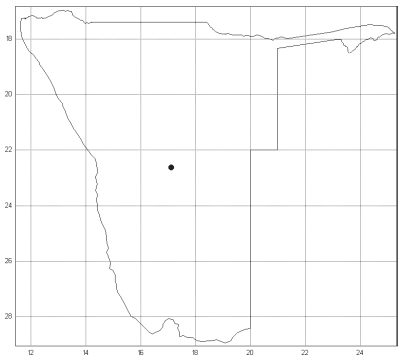
Rationale: Known from at least 6 subpopulations; no significant continuing decline in number of mature plants known.

Habitat: Pans and periodically flooded places with hard clay or clay-loam soil (Verdoorn, 1968, 1973; Giess, 1979); 150–1650 m.

Threats: One sub-population possibly threatened as plants used for cattle feed once they have flowered (Verdoorn, 1973, Republikein, 1985); possible that regeneration via seed does not occur, resulting in genetic erosion; in same subpopulation, habitat used as landing strip when dry could be possible threat; no threats recorded for other subpopulations.

Additional notes: Locally abundant in one sub-population (WIND, 2002); also occurs in South Africa (Verdoorn, 1968).

Haemanthus avasmontanus Dinter



E

Status: NT

Description: Geophyte. Leaves 2, lorate, upright, 350–400 x 40–45 mm, glabrous, soft in texture, margins smooth. Peduncle 250–350 mm long. Inflorescence resembles tassel or powder brush, ca. 45 mm in diameter; spathe valves ca. as long as flowers, with acute tips. Flowers 15–20, pure white; pedicels 7–10 mm long (Snijman, 1984).

Rationale: Known distribution restricted to a single location; there may be a continuing decline in quality of habitat.

Habitat: Steep, south-facing, mica schist ledges (Snijman, 1984).

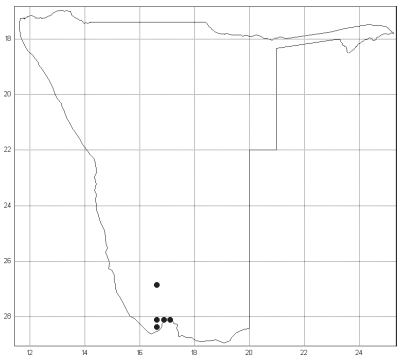
Threats: Restricted range; occasional fires a potential threat.

Additional notes: No specimen in WIND; known from type specimen only; represents northern limit of genus (Friis and Nordal, 1976).

Namaquanula bruce-bayeri D.Müll.-Doblies & U.Müll.-Doblies

pl. 1

Hessea bruce-bayeri (D.Müll.-Doblies & U.Müll.-Doblies) Snijman
Namaquanula etesionamibensis D.Müll.-Doblies & U.Müll.-Doblies



Status: VU B1ab(ii,iii)

Description: Geophyte. Leaves 2 or 3, sub-erect to spreading, lorate, up to 150 x 2.5–5 mm, firm, typically fleshy, glabrous, occasionally somewhat sticky, shiny green, curved or twisted distally. Inflorescence hemispherical, 25–60 mm in diameter. Flowers 6–17, spreading, funnel-shaped, pale pink and somewhat transparent, turning light brown with age; pedicels straight, 19–22 mm long, ultimately wine red; stamens well exerted, filaments basally forming tube, otherwise free, anthers dark maroon; style up to 15 mm long, with nectar collecting in pool around base (Snijman, 1994).

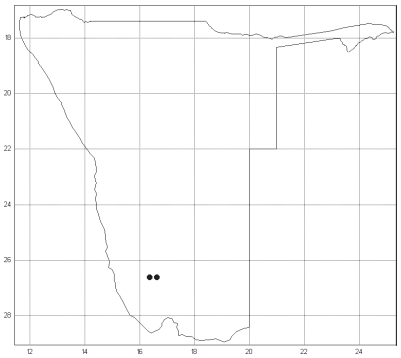
Rationale: EOO and AOO estimated to be smaller than 20000 km^2 and 2000 km^2, respectively; continuing decline in AOO and quality of habitat.

Habitat: Flats or low hills in alluvial gravel in low succulent shrubland; with species of *Cheiridopsis* and *Dracophilus dealbatus* (Snijman, 1994); calcrete sand; gravel terraces along Orange River (WIND, 2002); ± 100 m.

Threats: Mining a real threat to gravel terraces along Orange River; new vineyards and horticultural developments to cause destruction of additional habitat at subpopulation on gravel terraces.

Additional notes: Locally common (WIND, 2002); also occurs in South Africa (Snyman, 1994).

Strumaria barbarae Oberm.



Status: R

Description: Geophyte. Leaves 2–4, arranged in fan, upright to recurved, lorate, up to 200 x 5–8 mm, glabrous, shiny green. Inflorescence up to 80 mm in diameter. Flowers 3–12, pendulous, trumpet-shaped to widely funnel-shaped, white, becoming

flushed with pink towards base with age, strongly scented; stamens slightly shorter than tepals, filaments up to 30 mm long, fused at base into tube ca. 4 mm long, anthers pale yellow; style up to 35 mm long, slender, three angled in lower third (Snijman, 1994).

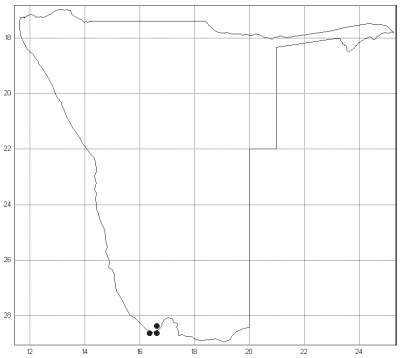
Rationale: Known from between 2 and 4 sub-populations and locations.

Habitat: Exposed limestone screes typically blackish, interlaced with some green shale (Snijman, 1994); ± 380 m.

Threats: Restricted range but no actual or potential threats known.

Additional notes: Locally abundant; very attractive flowers; largest flowers in the genus together with *S. phonolitica*; also occurs in South Africa (Snijman, 1994).

Strumaria bidentata Schinz



pl. 1

Status: R

Description: Geophyte. Leaves usually 3 or 4, arranged in fan, upright, typically broader towards tips, usually flushed with red towards bases, somewhat sticky when young. Inflorescence clustered, 10–30 mm in diameter. Flowers 5 to 8, glistening white, sometimes faintly flushed with pink, scented; pedicels straight; tepals free to base, spreading slightly; stamens longer than tepals (Snijman, 1994).

Rationale: Known from between 3 and 6 locations.

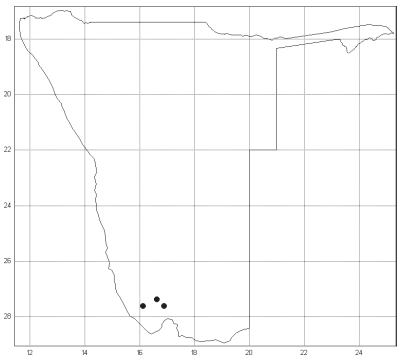
Habitat: Sand on exposed flats and amongst rocks; with sparse succulent vegetation (Snijman, 1994); scattered in rock cracks in grey schist and dolomite (WIND, 2002).

Threats: Restricted range but threats could not be ascertained.

Additional notes: Also occurs in South Africa; vegetatively, may be confused with broad, blunt leaves of *S. hardyana*, but these have transparent margins and slightly emarginate apices (Snijman, 1994).

Strumaria hardyana D.Müll.-Doblies & U.Müll.-Doblies

E pl. 1



Status: LC

Description: Geophyte. Leaves 3 or 4, arranged in fan, occasionally slightly undulate, sometimes flushed with red towards bases, apices shallowly emarginate but becoming less evident with age, margins transparent; leaf lamina never twisted. Inflorescence 15–40 mm across. Flowers 4–16, ca. pendulous, narrowly funnel-shaped, cream to pure white, occasionally flushed with pink, becoming buff-coloured with age, sometimes with coconut-like scent; stamens slightly longer than tepals, anthers wine red (Snijman, 1994).

Rationale: Known from between 6 and 12 subpopulations and locations; no significant continuing decline in number of mature plants known.

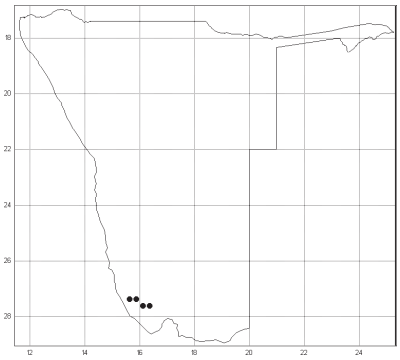
Habitat: Sand along seasonal water courses or crevices amongst schists and black limestone (Snijman, 1994).

Threats: Unknown.

Additional notes: Described as having modest charm with potential for horticulture; scattered but fairly abundant (Snijman, 1994); no specimens in WIND.

Strumaria phonolithica Dinter

Strumaria gigantea D.Müll.-Doblies & U.Müll.-Doblies



E pl. 1

Status: R

Description: Geophyte. Leaves 3 or 4, arranged in fan. Inflorescence somewhat spreading, up to 80 mm in diameter. Flowers 3–7, narrowly funnel-form, white to pink, scented; stamens somewhat shorter than tepals, anthers dirty red before opening (Snijman, 1994).

Rationale: Known from between 3 and 6 subpopulations and locations.

Habitat: Wide ledges of steep south-facing slopes, with low, winter-growing succulent shrubland; appear to benefit from fog (Snijman, 1994); one sub-population growing in dense clusters on south-facing rocky sandstone outcrop (Bartsch, pers. comm., 2002).

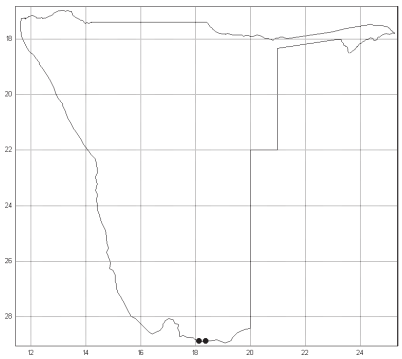
Threats: None currently.

Additional notes: Easily distinguished by the stout bulb neck (up to 160 mm long), which extends well above ground level and slender funnel-shaped flowers, in which the narrow tepals spread weakly upwards for approximately three quarters of the flower tube length and then become distinctly recurved; has largest flowers in genus together with *S. barbarae* (longer than 30 mm); form large clumps (Snijman, 1994). One sub-population estimated to have ca. 30 plants (Bartsch, pers. comm., 2002).

ANACARDIACEAE

Ozoroa namaquensis (Sprague) Von Teichman & A.E.van Wyk

Protorhus namaquensis Sprague



Status: R

Description: Dioecious, multistemmed shrub or small tree, up to 1.5 m high and 1.5 m in diameter. Stems with bark grey when old, red-brown on young twigs. Leaves simple, alternate, leathery, linear-lanceolate, shiny, below clearly lighter than above and with distinct parallel venation, margins slightly toothed, undulate. Inflorescence usually terminal raceme. Flowers small, pale cream with green tinge, fragrant; flowering time June to July. Fruit slightly wrinkled roundish to somewhat kidney-shaped drupe, flattened from sides, ca. 6mm wide, black when ripe (Von Teichman and Van Wyk, 1994; Mannheimer, pers. comm, 2002).

Rationale: Known from between 3 and 5 sub-populations and locations.

Habitat: Steep slopes, mid-slopes and among boulders in full sun (WIND, 2002); ± 680 m.

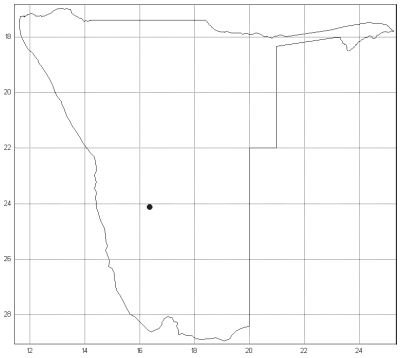
Threats: Restricted range but no threats known.

Additional notes: Occasional (WIND, 2002); also occurs in South Africa (Von Teichman and Van Wyk, 1994).

APIACEAE

Anginon streyi (Merxm.) Allison & B.-E.van Wyk

Sonderina streyi Merxm.



E

Status: R

Description: Shrub, up to 1.2 m high. Stems woody and sparsely branched from base, mature parts green, sparsely leafy. Leaves much divided, never needle-like, 80–130 mm long; petiole and rachis grooved on upper side. Inflorescence loose compound umbel, at tips of long shoots. Flowers yellow, minute (Allison and Van Wyk, 1997).

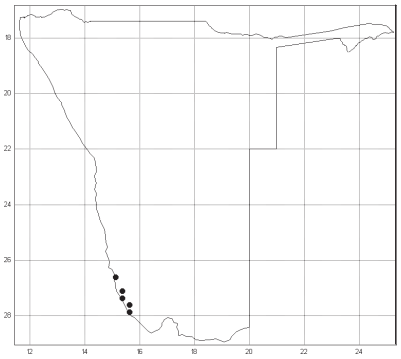
Rationale: Known distribution restricted to 3 subpopulations and locations.

Habitat: Once recorded in ravine below Naukluft plateau (WIND, 2002); ± 1250 m.

Threats: Restricted range but no threats currently known.

Additional notes: Closely related to *A. verticillatum* (Sond.) B.L. Burtt, but distinguished by compound umbels and smaller fruit; habit and leaves very similar (Allison & Van Wyk, 1997).

Marlothiella gummifera H.Wolff



E pl. 1

Status: LC

Description: Cushion-shaped, resinous, perennial shrub, up to 400 mm high. Leaves slightly fleshy, divided, mostly clustered on dwarf shoots, light green with numerous sunken glands; segments 3-lobed, apices acute. Inflorescence compound umbel, 20–45 mm in diameter. Flowers green, petal tips brownish (Schreiber, 1968; WIND, 2002).

Rationale: Known from between 5 and 10 subpopulations and locations; no significant continuing decline in number of mature plants known.

Habitat: Quartzite gravel on lower, west-facing mountain slopes and rocky outcrops; sand blown plains (WIND, 2002); up to 100 m.

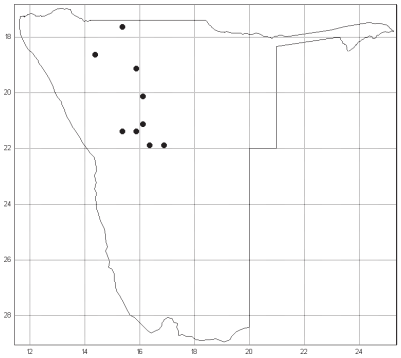
Threats: None currently known.

Additional notes: Common name: *Gewürzdolde* (German). A Namibian endemic, monospecific genus.

APOCYNACEAE

Australluma peschii (Nel) Plowes

Caralluma peschii Nel



E pl.1

Status: LC

Description: Perennial succulent, up to 300 mm in diameter with up to 6, widely separated clusters of aerial stems. Stems ca. 5 mm in diameter, grow horizontally and often form roots at nodes; subterranean stems may be only perennial parts. Leaves rudimentary, on most of length of stems. Flowers in clusters of 6–8 at upper part of stems; corolla 9 mm in diameter, yellowish-green, pubescent (White and Sloane, 1937; Bruyns, 1982).

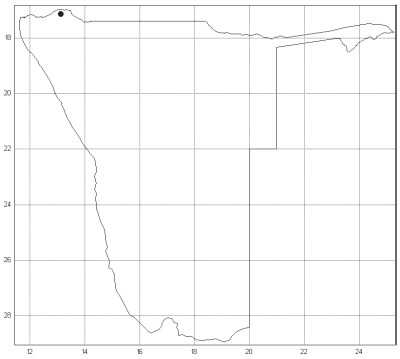
Rationale: Known from at least 12 subpopulations and locations; EOO at least 20000 km^2; no significant continuing decline in number of mature plants known.

Habitat: In small bushes; flat calcareous areas with reddish soil; places with greyish soil and limestone rocks; feldspar with slight gradients (Bryuns, 1982).

Threats: No real threats could be confirmed.

Additional notes: Widely distributed but populations far apart and usually small; in *Monechma cleomoides* bushes, which provide good camouflage (Bruyns, 1982; WIND, 2002).

Baynesia lophophora Bruyns



E pl. 1

Status: R

Description: Clump-forming dwarf succulent, normally 30–80 mm in diameter. Stems four-angled with tubercles on surface. Inflorescence usually 3–10 per stem near apex. Flowers 1–3; corolla bell-shaped, outside pale green suffused with red, inside deep maroon becoming cream in lower half of tube; corolla lobe margins folded back with ridge of papillae (Bruyns, 2000).

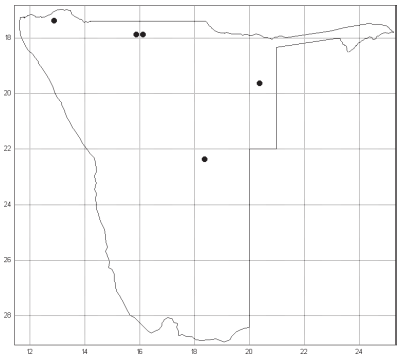
Rationale: Known from a single subpopulation and location; EOO estimated to be less than 10 km^2.

Habitat: Restricted to north-facing aspects in some parts of Baynes mountains; 1500–1600 m; with succulent vegetation in shallow stony soil; hidden inside tufts of grass (Bruyns, 2000).

Threats: Restricted range but no real threats could be confirmed.

Additional notes: Plentiful but very local (Bruyns, 2000); monospecific genus; no specimens in WIND.

Brachystelma schinzii (K.Schum.) N.E.Br.



E pl. 1

Status: LC

Description: Perennial herb with underground tuber. Stems

1 to few, produced annually, with few or no branches, usually 80–100 mm high. Leaves narrow and up to 50 mm long, sometimes with margins recurved. Flowers 1 or 2 at nodes, on thin stalks, purple-brown; corolla spreading up to 10 mm in diameter; characteristic long hairs pendulous from corolla and disc-like corona (Dyer, 1983).

Rationale: Known from between 5 and 10 subpopulations and locations; no significant continuing decline in number of mature plants known.

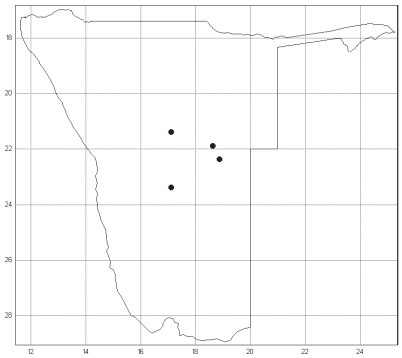
Habitat: Deep sand; in thick bush areas dominated by *Combretum* and *Commiphora* species; between grasses and stones on top of mountains (WIND, 2002); 1100–1800 m.

Threats: Harvesting for food may be a threat but this could not be ascertained.

Additional notes: Common name: *ombuthu* (Oshiwambo). Unique in small-flowered *Brachystelma* species (Dyer, 1983); tuber edible and therefore utilised; rare to occasional to common (WIND, 2002).

Brachystelma schultzei (Schltr.) Bruyns

Tenaris schultzei (Schltr.) E.Phillips



Status: LC

Description: Perennial herb, finely hairy with smooth tuber. Stems many, erect, 0.3–1 m high. Leaves vague, greyish green, very narrow, 25 x 3 mm. Flowers 50 mm in diameter, pale greenish-brown; corolla lobes very long, linear; tube absent (Schlechter, 1913–1914; Bruyns, 1984, 1995, 2003, pers. comm.).

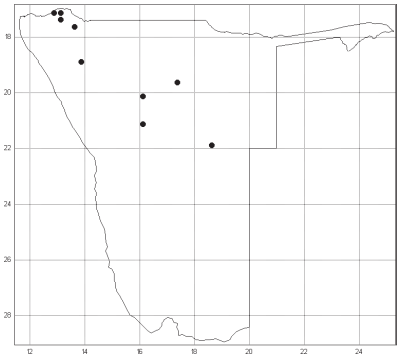
Rationale: Known from between 4 and 10 subpopulations and locations; no significant continuing decline in number of mature plants known; 1200–1600 m.

Habitat: Relatively open places among scattered grass clumps in soil that is fairly loose; deep brown sand at ca. 1300 m (Schlechter, 1913–1914; Bruyns, 1984).

Threats: No real threats could be confirmed.

Additional notes: Tuber edible and eaten roasted (Dinter, 1914); may be under-collected due to inconspicuous nature; rare; flower unusual (WIND, 2002); see Dinter (1914) for photograph.

Ceropegia dinteri Schltr.



E P pl. 2

Status: LC

Description: Erect, perennial herb with tuber. Stem single, annual, up to 300 mm high. Leaves pale green, 120–200 mm x 5 mm, non-succulent, midrib distinct on lower surface, margins folded back. Flowers near apex of stem, solitary, sessile, less than 5 mm broad, 30–80 mm long; corolla greenish-white on outside, greenish-yellow inside (Dyer, 1983, Bruyns, 1984).

Rationale: Known from between 10 and 20 subpopulations and locations; no significant continuing decline in number of mature plants known.

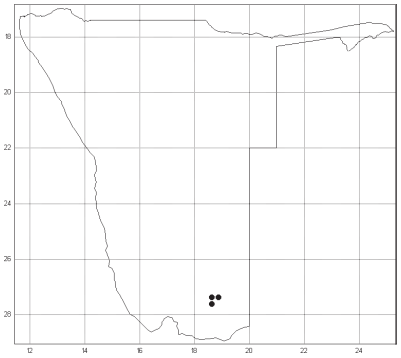
Habitat: Soils with limestone or dolomite bedrock; exposed on rock slabs under bushes; in deep soils in flats under trees; among ferns and very scattered grasses under trees on dolomite hills; on top of huge cliffs among rocks and grasses (WIND, 2002); 1000–1500 m.

Threats: None known.

Additional notes: Very obscure, even flowers inconspicuous; flowers longer in relation to width than those of any other Namibian species (Bruyns, 1984); may be under-collected; possibly occurs in Angola (Bruyns, 1995).

Ceropegia filiformis (Burch.) Schltr.

Ceropegia infundibuliformis E.Mey.



P pl. 2

Status: LC

Description: Perennial herb with rootstock producing cluster of fleshy roots. Stem annual, cylindrical, glabrous, up to ca. 800 mm long, twining, sparingly branched. Leaves slender, up to 70 x 10 mm. Flowers quite striking, 50–60 mm long, secretes droplets of clear liquid; corolla greyish mottled with purple outside, dull purple inside, margin purple-black (Dyer, 1983; Bruyns, 1995).

Rationale: Known from between 5 and 10 subpopulations and locations; no significant continuing decline in number of mature plants known.

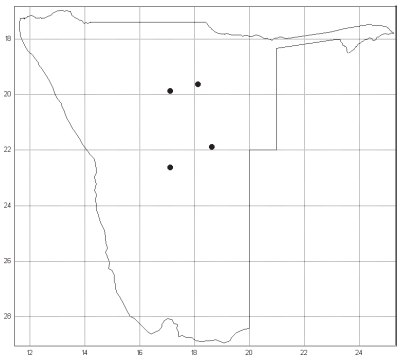
Habitat: Scrambling in the open among stones; climbing on *Rhigozum trichotomum* bushes; normally found on flat areas on the summits of mountains; 1600–1700 m (Bruyns, 1995).

Threats: None known.

Additional notes: Flowers quite striking, rest of the plant very inconspicuous; shrubs with which they are usually associated, afford them protection and support; also occurs in South Africa (Dyer, 1983); may be under-collected.

Ceropegia mafekingensis (N.E.Br.) R.A.Dyer

Brachystelma mafekingense N.E.Br.
Ceropegia patriciae Rauh & Buchloh



P

Status: NT

Description: Perennial dwarf herb with tuber. Stems annual, 1 or 2, branching from near base, 15–50 mm high. Leaves 7–30 x 7 mm, hairy on lower surface, margins somewhat folded upwards, undulate. Flowers 10–20, compact, several opening together; corolla 10–12 mm long, mottled dark purple, yellow and purple-punctate within (Dyer, 1983).

Rationale: Known from between 4 and 10 subpopulations and locations; inferred continuing decline in the number of mature plants; population size inferred to be small.

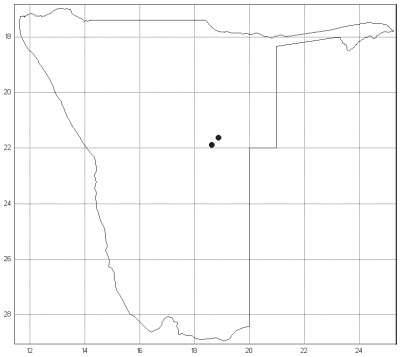
Habitat: Karstveld; grassland; open patches between trees; 1000–1600 m.

Threats: Tubers harvested for food.

Additional notes: Tubers particularly sought after by Bushmen; also occurs in South Africa (Dyer; 1983); populations very localised; widespread but scarce (Bruyns, 1984); common in some overgrazed areas (Peckover, 1998); flowers foul-smelling (WIND, 2002).

Ceropegia pachystelma Schltr. subsp. *pachystelma*

Ceropegia boerhaaviifolia Schinz
Ceropegia obscura N.E.Br.
Ceropegia undulata N.E.Br.



P pl. 2

Status: R

Description: Perennial herb producing tuber. Stem annual, twining, up to few metres long, hairy. Leaves somewhat fleshy, up to 50 x 30 mm, sometimes undulate, hairy. Flowers 4–12 on conspicuous peduncle, greenish-white with slight purple infusion in mouth of tube, covered with short soft hairs; corolla straight or somewhat curved, 20–30 mm long (Dyer, 1983; Bruyns, 1984).

Rationale: Known from 2 subpopulations and locations.

Habitat: Deep soils with no visible rocks in wooded areas like *Grewia* and *Terminalia* stands; underneath *Acacia mellifera* subsp. *detinens* (WIND, 2002); 100–1600 m.

Threats: Restricted range but no real threats could be confirmed.

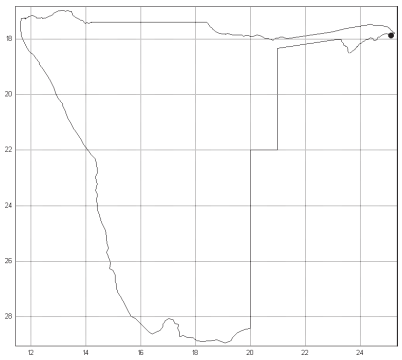
Additional notes: Relatively common in some other southern African countries; uncommon in Namibia; fairly conspicuous; flowers not very attractive but plants flower profusely; easy to cultivate; can be confused with *C. multiflora* Baker subsp. *tentaculata* (N.E.Br.) H.E. Huber, which has free, spreading corolla lobes that resemble the tentacles of an octopus (Bruyns, 1984).

Ceropegia paricyma N.E.Br.

P

Status: R

Description: Perennial herb with tuber. Stem up to 2 m long. Leaves spreading, stalked, often heart-shaped or lobed, ca. 40 x 30 mm. Flowers in groups of up to 6, cream to purple; corolla 16–22 mm long; tube straight, ca. 15 mm long; lobes united at tips, strongly recurved margins with long hairs (Dyer, 1983; Bruyns, 1984).



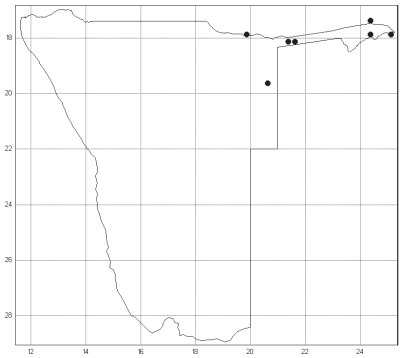
Rationale: Known distribution restricted to a single subpopulation and location.

Habitat: In bush on rocky ridges (Dyer, 1983); climbing in lower branches of small trees (Bruyns, 1984); ± 1000 m.

Threats: Restricted range but possible threats could not be ascertained.

Additional notes: Seems to be a widely distributed tropical species; leaves similar to those of some Cucurbitaceae and do not resemble that of other *Ceropegia* species; lack of coarse hairs on stems, leaves and pedicels distinguishes it from *C. meyeri* Decne; little known, may be under-collected; fairly frequent; last collected in 1959 (Dyer, 1983; Bruyns, 1984; WIND, 2002); no specimens in WIND.

Ceropegia stenantha K.Schum.



P pl. 2

Status: LC

Description: Perennial herb, producing cluster of long, fleshy roots. Stems up to 3 m long, 2–4 mm in diameter, slightly 4-angled in cross section, green, dying back in winter. Leaves lanceolate, 30–80 mm long, tapering abruptly at apices, midribs prominent. Flowers in small groups near apex of stem; corolla pale yellow to creamy, without markings (Bruyns, 1984).

Rationale: Known from between 11 and 20 subpopulations and locations.

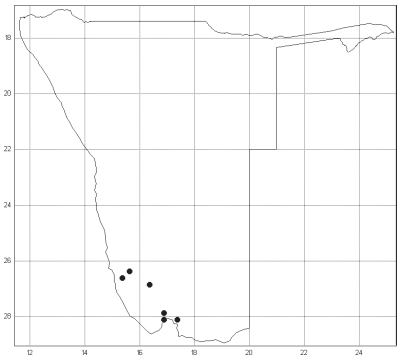
Habitat: In tropical wetlands: in grass around bases of mopane trees, in *Dichrostachys-Acacia* stands, entangled among grasses or exposed on the ground (Bruyns, 1984); 50–1200 m.

Threats: Decline and over-use of wetland areas and removal of grass in which they grow; increased human population pressure may be potential threats but this could not be ascertained.

Additional notes: Wide distribution in tropical Africa but rare in the northern tropical parts of southern Africa; common but localised; sub-populations small with 20–30 plants; distinguished from *C. floribunda* N.E.Br. by the entire margins, relatively thin texture and shape of leaves; small, creamy yellow flowers with narrow corolla lobes unmistakable; lack of peduncle also a distinguishing feature; habit of *C. stenantha* of frequently forming sprawling masses on ground rather different from *C. nilotica* Kotschy and *C. crassifolia* Schltr., which always climb upwards into trees or bushes (Dyer, 1983; Bruyns, 1984; WIND, 2002).

Hoodia alstonii (N.E.Br.) Plowes

Trichocaulon alstonii N.E.Br.



P pl. 2

Status: LC

Description: Spiny succulent often forming dense clumps of up to 1 m high, 0.5 m in diameter, branching from base. Stems whitish grey-green, 40–80 mm thick with 20–22 rows of spine-tipped tubercles. Flowers in groups of 1–8, mostly in upper parts of stems, very foul smelling, 10–18 mm in diameter, lobes ovate and usually very acute, bright yellow, becoming slightly paler towards centre (Bruyns, 1993).

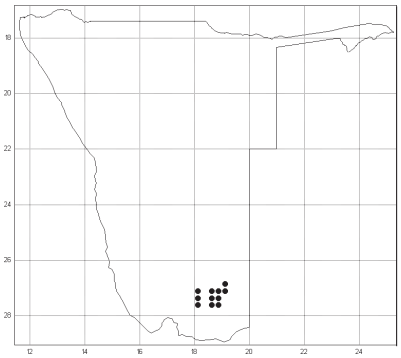
Rationale: Known from between 7 and 14 subpopulations and locations; no significant continuing decline in number of mature plants known.

Habitat: In the open on rocky slopes or stony flat areas; narrow crevices in rock outcrops; low ridges and in riverbeds between rocks; quartz, schist, limestone gravel or -sand and granite (Bruyns, 1993; WIND, 2002); 500–1100 m.

Threats: Illegal harvesting may become a potential future threat.

Additional notes: Produces smallest fruit in genus; only very common in one sub-population, much rarer on similar outcrops nearby; often very scattered but occasionally occur in small localised colonies; may be more widely distributed than the records show; also occurs in South Africa (Bruyns, 1993; WIND, 2002).

Hoodia juttae Dinter



E P pl. 2

Status: LC

Description: Spiny succulent, forming shrublet to 300 mm high, 0.5 mm in diameter, branching mainly from base. Stems many, erect, pale grey green, 30–50 mm thick with prominent obtuse, spine-tipped tubercles vertically arranged into 15 to 17 rows. Flowers in groups of 1–4, on upper parts of stems, opening successively; corolla 20–25 mm in diameter, pale yellow-brown outside, pale yellow brown to dark flesh pink with darker veins inside, flat to very shallowly saucer-shaped, slightly and broadly 5-lobed, glabrous and smooth outside (Bruyns, 1993).

Rationale: Known from between 9 and 18 subpopulations and locations; no significant continuing decline in number of mature plants known.

Habitat: Mountain bases and summits; among stones and inside bushes; in crevices on east-facing slopes in deep ravine; in coarse gravel on quartzite outcrops; lower slopes of ridges (Bruyns, 1993; WIND, 2002); 1000–1600 m.

Threats: Illegal harvesting may become a potential future threat.

Additional notes: Only known from the Little and Great Karas Mountains; resembles *H. gordonii* (Masson) Sweet ex Decne. in vegetative state and occurs together with it (Bruyns, 1993).

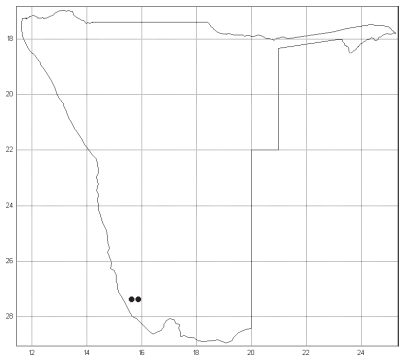
Hoodia officinalis (N.E.Br.) Plowes subsp. *delaetiana* (Dinter) Bruyns

Hoodia delaetiana (Dinter) Plowes
Trichocaulon delaetianum Dinter

E P pl. 2

Status: R

Description: Spiny succulent, up to 400 mm high. Stems several, erect to sprawling, 40–70 mm thick, with 19–23 rows of vertically arranged, spine-tipped tubercles. Flowers in groups of 1–3, mostly on upper halves of stems; corolla 14–20 mm in diameter, broadly bell-shaped, reddish-brown outside, brownish-yellow to yellow inside, with few scattered papillae each tipped with short bristle or smooth (Bruyns, 1993).



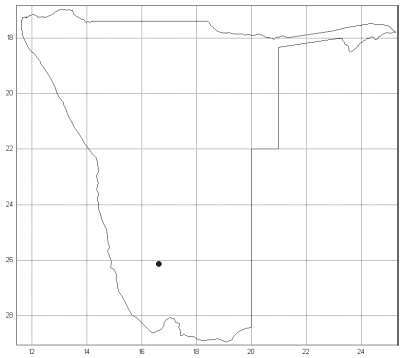
Rationale: Known from between 2 and 4 locations.

Habitat: Lower mountain slopes and rocky outcrops (WIND, 2002); 300–500 m.

Threats: Restricted range but no real threats could be confirmed; illegal harvesting may become a potential future threat.

Additional notes: Only known from Klinghardt Mountains; apparently quite common there; flowers larger and plants more stoutly spined and more robust than in subsp. *officinalis*; corolla has broader and much flatter tube; plants vary in colour from yellow to dark brownish-yellow but are never the brownish-pink often seen in subsp. *officinalis* (Bruyns, 1993).

Hoodia ruschii Dinter



E P pl. 3

Status: R

Description: Spiny succulent, up to 450 mm high, up to 0.5 m. Stems, many, erect, brownish to grey-green, 40–60 mm thick, branching mainly from base with prominent, spine-tipped tubercles that are vertically arranged into 22–28 rows. Flowers in groups of 4–10, mainly on upper half of stem, extremely foul-smelling; corolla 20–40 mm in diameter, broadly bell-shaped, glabrous, pale green to reddish at base outside, deep red-brown inside, with conical papillae, each tipped with slender, spreading bristle (Bruyns, 1993).

Rationale: Known from between 2 and 4 locations.

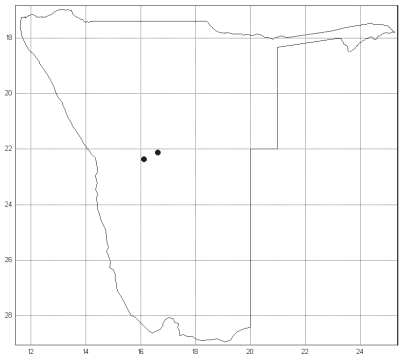
Habitat: On steep granite slopes among rocks and small bushes; east-facing slopes in steep dry rocky areas; on flats below mountains; 1600–1700 m (WIND, 2002).

Threats: Restricted range but no real threats could be confirmed; illegal harvesting may become a potential future threat.

Additional notes: Not uncommon but rather scattered; flowers putrid smelling (Bruyns, 1993).

Hoodia triebneri (Nel) Bruyns

Hoodia foetida Plowes
Trichocaulon triebneri Nel



E P pl. 3

Status: R

Description: Spiny succulent shrub, up to 300 mm high, 450 mm in diameter, branching mainly near base. Stems 10–30, erect, 25–40 mm thick with 12–14 rows of vertically arranged prominent conical, spine-tipped tubercles. Flowers in groups of 6–12, mainly on upper part of stem; corolla 11–15 mm in diameter, bell-shaped, glabrous, reddish-green outside, blackish red-purple inside, densely covered with papillae, each tipped with slender spreading bristle (Bruyns, 1993).

Rationale: Known from between 2 and 6 subpopulations and locations.

Habitat: On rocky ridges (WIND, 2002); 800–1200 m.

Threats: Restricted range but no real threats could be confirmed; illegal harvesting may become a potential future threat.

Additional notes: Rare; only very occasionally locally common; resembles *H. gordonii* (Masson) Sweet ex Decne, but flowers smaller and produced in larger numbers, somewhat funnel-shaped and exceedingly foul smelling; a most unusual species (Bruyns, 1993); flowers more star-shaped compared with flowers of *H. gordonii.*

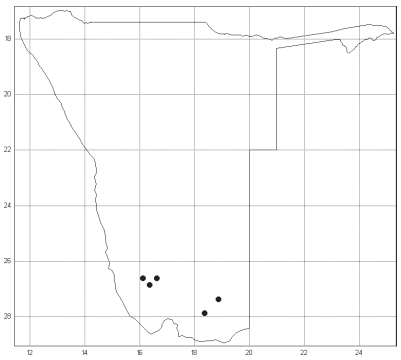
Huernia hallii E. & B.M.Lamb

Huernia namaquensis Pillans subsp. *hallii* (E.Lamb & B.M.Lamb) Bruyns

E P pl. 3

Status: LC

Description: Succulent. Stems 4- or 5-angled, 15–30 x 6–15 mm, pale fresh green, acutely toothed along angles. Inflorescence randomly produced along sides of stems, mostly towards base



or midway; corolla very variable in size, up to 30 mm in diameter; lobes with long slender sharp points, cream-coloured inside, often tinged pink, with maroon to brown-red small spots throughout, developing into concentric lines in and around throat (Leach, 1988).

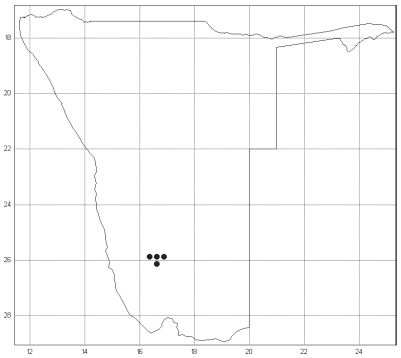
Rationale: Known from between 4 and 8 subpopulations and locations.

Habitat: Inside *Pentzia* bushes on flat-topped mountains in stony areas (WIND, 2002); 1300–1700.

Threats: None currently known.

Additional notes: Instantly recognisable by its dwarf stems (Leach, 1988); may be under-collected (WIND, 2002).

Huernia plowesii L.C.Leach



E P pl. 3

Status: LC

Description: Succulent, forming small clumps. Stems short, 4-angled, acutely toothed along angles, often somewhat pyramid-shaped. Flowers developing successively from near base of young stems; corolla 25–35 mm in diameter, glabrous outside, tube distinctly pentagonal, dark purple-brown, constricted at mouth by thickened tube wall and prominent ring-like structure, which is often irregularly marked with cream or pale yellow towards outer rim, smooth inside, with scattered hairs; lobes widely spreading, with long, slender, sharp points, slightly wider than long, cream coloured, with irregularly sized and spaced maroon spots, minutely hairy (Leach, 1988).

Rationale: Known from between 4 and 10 subpopulations and locations; no significant continuing decline in number of ma-

ture plants known.

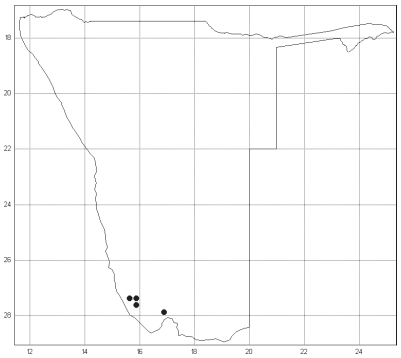
Habitat: In crevices between rocks; on granite hills; occasionally amongst stones; 1400–1950 m; often under *Ruschia divaricata* bushes (WIND, 2002).

Threats: Succulent collecting a potential threat, but could not be ascertained.

Additional notes: Scattered; occasional; can form dense mats (WIND, 2002).

Larryleachia perlata (Dinter) Plowes

Lavrania perlata (Dinter) Bruyns



P pl. 3

Status: R

Description: Spineless stem succulent, up to 300 mm high, branching from base. Stems cylindric to club-shaped, grey-green, glabrous, 25–60 mm thick with 12–14 rows of flattened, rounded, polygonal tubercles. Flowers in groups of 3–12 on upper parts of stem, with strong excrement odour; corolla 5–10 mm in diameter, glabrous, yellow-green outside, greenish-white to spotted with red to entirely deep red inside; lobes always convex, strongly reflexed and pressed against stems (Bruyns, 1993).

Rationale: Known from between 3 and 6 subpopulations and locations.

Habitat: In the open, often wedged between rocks; out of small crevices in rocky outcrops (Bruyns, 1993); 250–700 m.

Threats: Succulent collecting may be a threat but this could not be ascertained.

Additional notes: Flowers arise in larger clusters than in other species; also occurs in South Africa (Bruyns, 1993).

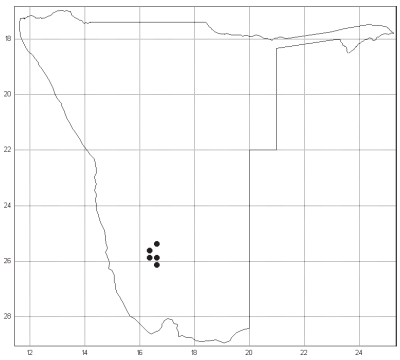
Larryleachia tirasmontana Plowes

Lavrania picta (N.E.Br.) Bruyns subsp. *parvipunctata* Bruyns

E P pl. 3

Status: LC

Description: Spineless stem succulent. Stems mostly single,



erect, 30–180 x 20–50 mm, grey-green. Corolla 8–9 mm in diameter, greenish with red spots outside, papillate and cream coloured with fine red spots inside; lobes spreading, broad at bases (Bruyns, 1993).

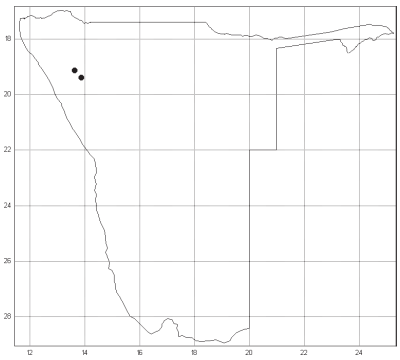
Rationale: Known from between 5 and 10 subpopulations and locations; no significant continuing decline in number of mature plants known.

Habitat: Among small grass tufts and rocks on granite slopes; 350–1800 m (WIND, 2002).

Threats: Succulent collecting may be a threat but this could not be ascertained.

Additional notes: Occasional to common and locally widespread; (Bruyns, 1993; WIND, 2002).

Lavrania haagnerae Plowes



E P pl. 4

Status: R

Description: Spineless stem succulent, usually only 150 mm high, branching from base, forming dense clusters. Stems 20–100 or more, always rigidly erect, cylindric, 20–30 mm thick; tubercles in 10–12 rows, flattened, polygonal, neatly arranged, each with small conical persistent leaf < 1 mm long, grey-green. Flowers in groups of 3–15, on lower half of stem; corolla 13–16 mm in diameter, pale whitish-green, glabrous, red-spotted on yellow background and densely covered with obtuse papillae inside (except in tube); outer lobes slightly roughened along upper margins (Bruyns, 1993).

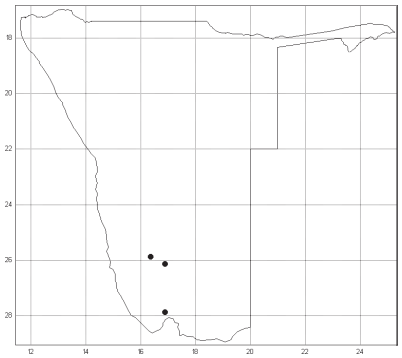
Rationale: Known from between 2 and 4 locations and subpopulations.

Habitat: Only on vertical cliffs in dolomite, with very little vegetation other than *Aloe dewinteri*; in narrow crevices and small ledges on rock faces; in small pockets of soil (Bruyns, 1993; WIND, 2002); 700–900 m.

Threats: Restricted range but no real threats.

Additional notes: Not uncommon where they grow; form large clumps; can become quite large; the only *Lavrania* found on such dangerously steep habitats; may be more sub-populations in similar habitats; different features to the rest of the genus and the unusual growth habit of the plants make them more attractive to collectors (Bruyns, 1993; WIND, 2002); no specimens in WIND.

Microloma poicilanthum H.E.Huber



pl. 4

Status: R

Description: Inconspicuous, non-succulent climber with slender habit. Leaves ca. elliptical to lorate. Flowers with pure white tube and pea green lobes; corolla lobes spread out when flower is fully expanded, ca. deltoid and folded inwards along midrib, small, narrow, much reduced; tube deeply 5-angled (Bruyns and Linder, 1991).

Rationale: Known fom two subpopulations and locations.

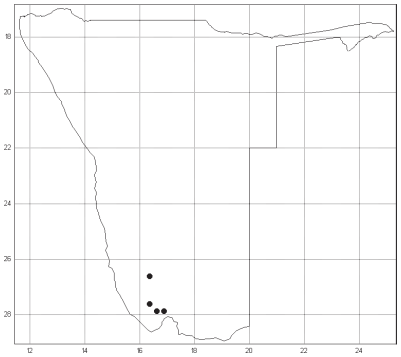
Habitat: Climbing in bushes like *Ruschia spinescens, Ruschia divaricata*, *Galenia fruticosa, Eriocephalus* or *Pteronia* species; flat, quartz-gravelly area on a plateau (Bruyns and Linder, 1991; WIND, 2002); 850–1900 m.

Threats: Restricted range but no threats known.

Additional notes: Peculiar among members of the genus in lacking entirely the bristle-like hairs that cover the flowers on outside especially on lobes; does not usually form dense concentrations of stems and remains well hidden; flowers, fruits and grows entirely inside covering shrub; the most inconspicuous in the genus with its small leaves, inconspicuous flowers and slender, climbing habit; may be more widely distributed; also occurs in South Africa (Bruyns and Linder, 1991); no specimens in WIND.

Quaqua acutiloba (N.E.Br.) Bruyns

Caralluma acutiloba N.E.Br.
Caralluma ortholoba Lavranos
Caralluma wilfriedii Dinter



P pl. 4

Status: LC

Description: Short succulent shrub, rarely higher than 120 mm, branching from base. Stems up to 20 mm thick, laxly decumbent or may develop into dense clumps 80–450 mm in diameter, most stems touching soil surface near their bases and rooting, mostly 4-angled with sharp teeth on ridges that become hard and yellow-tipped. Flowers 1–3, from small cushions in grooves between ridges; corolla entirely glabrous, pale green-purple outside, typically dark and spotted to plain yellow or uniformly purple-black inside (Bruyns 1983, 1991).

Rationale: Known from between 4 and 8 subpopulations and locations; no significant continuing decline in number of mature plants known.

Habitat: Mountain slopes, in semi-shade underneath shrubs; mostly in low lying areas with deep soils; almost never found in rocky soils (Bruyns, 1983; WIND, 2002); 350–1600 m.

Threats: None currently known.

Additional notes: Plants show very high degree of variation; widespread in South Africa and locally common there; can be flowering profusely for a month after good rains (Bruyns, 1991).

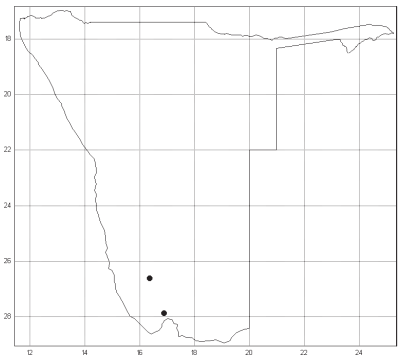
Quaqua incarnata (L.f.) Bruyns subsp. *hottentotorum* (N.E.Br.) Bruyns

Quaqua hottentotorum N.E.Brown
Caralluma ausana Dinter & A.Berger
Caralluma hottentotorum (N.E.Br.) N.E.Br.

P pl. 4

Status: R

Description: Succulent shrub, branching at or above base to form clumps up to 0.9 m in diameter. Stems glabrous, leafless, 100–300 x 15–25 mm, erect, 4-angled, greyish to purplish-green, armed with stout, conical, spreading teeth that harden at tips. Flowers 4–10, in grooves between ridges, often opening simultaneously, mostly near apex of stem; corolla pale pink to whitish outside, creamy-white to pale yellow inside, with stiff



hairs in mouth of tube and on inner face of lobes; tube deeply bowl-shaped, has definite edge around mouth; lobes with margins reflexed for at least half length (Bruyns, 1983).

Rationale: Known from between 2 and 6 subpopulations and locations.

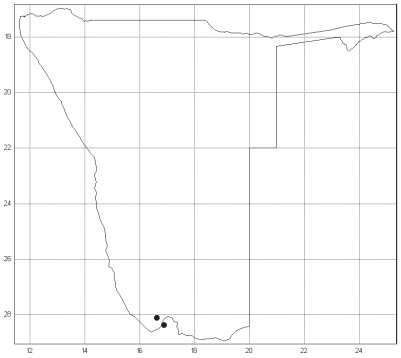
Habitat: Prefers granite and gneiss (Plowes, 1993).

Threats: None currently.

Additional notes: Also occurs in South Africa (Plowes, 1993).

Quaqua pruinosa (Masson) Bruyns

Caralluma pruinosa (Masson) N.E.Br.
Caralluma pruinosa (Masson) N.E.Br. var. *nigra* C.A.Lückh.
Stapelia pruinosa Masson
Tromotriche pruinosa (Masson) Haw.



P pl. 4

Status: NT

Description: Succulent shrub, up to 0.5 m x 15 mm, branching from single, centrally rooted system. Stems initially erect, then spreading horizontally on soil surface, greyish-green to dark purple-grey, 4-angled with ridges very much rounded, each tubercle with minute, hard-tipped tooth, less than 2 mm long. Flowers 1–3, develop successively in grooves between ridges towards stem tips; corolla 10–13 mm in diameter, glabrous, grey-green to mottled with purple-brown outside, dark brown and somewhat finely wrinkled inside, covered with fine crinkled white hairs (Bruyns, 1983).

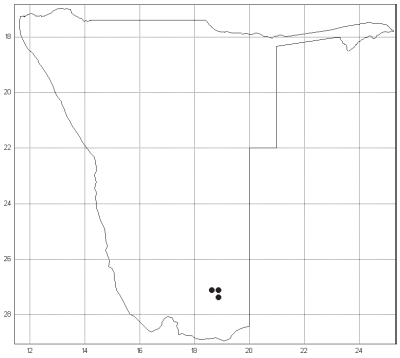
Rationale: Population size suspected to number fewer than 2500; EOO estimated to be less than 2000 km^2; known from between 2 and 4 subpopulations and locations.

Habitat: Steep quartzitic slopes; in the open or inside bushes; in *Pteronia incana* scrub; in granitic and deep red soils; do not prefer specific habitats (Bruyns, 1983); 250–1000 m.

Threats: Succulent collecting; habitat destruction due to mining and increased human population and movements along the Orange River are potential threats but the extent of these could not be ascertained.

Additional notes: Specimens mostly solitary; also occurs in South Africa (Bruyns, 1983); no specimens in WIND.

Stapelia pearsonii N.E.Br.



E P pl. 4

Status: R

Description: Erect succulent, up to 120 mm high. Stems densely covered with hairs, obtusely 4-angled, obscurely toothed, slightly tapering, up to 12 mm thick near bases. Leaves rudimentary. Flowers form near base of stem, developing successively; corolla spreading, 35–50 mm in diameter, hairy and greenish outside, glabrous but intricately rugose and dark brown inside, deeply lobed; lobes longitudinally grooved, recurved, without conspicuous hairs on margins (Leach, 1985).

Rationale: Known from between 4 and 6 subpopulations and locations.

Habitat: Among stones; granitic gravel; on shale on upper mountain slopes; 1300–2000 m (WIND, 2002).

Threats: Succulent collecting may be a potential threat but this could not be confirmed.

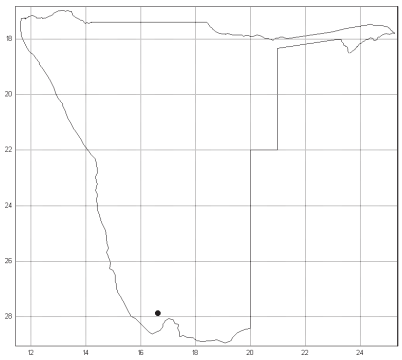
Additional notes: Rare (Leach, 1985; WIND, 2002).

Stapeliopsis neronis Pillans

pl. 4

Status: VU D2

Description: Succulent, irregularly branched into dense clumps. Stems erect or ascending, some apparently descending and rerooting, 30–35 mm thick, green, variegated with purple and brown with age, minutely papillate, 4-angled, ridges with short teeth. Flowers between ridges towards base



of young stems, several develop successively; corolla urn-shaped, 17–24 mm long, up to ca. 13 mm at its widest, contracted to 1.5–1.75 mm within mouth, deep purple and velvety outside; purple, densely and minutely papillate inside (Dyer, 1977).

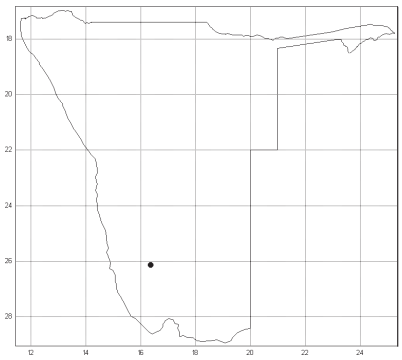
Rationale: Known distribution restricted to 1 or 2 subpopulations and locations.

Habitat: Lower mountain slopes near a riverbank in semi-shade (WIND, 2002); 200–1200 m .

Threats: Succulent collecting a potential threat; restricted range.

Additional notes: Also occurs in South Africa (Bruyns, 1981).

Stapeliopsis urniflora Lavranos



pl. 4

Status: R

Description: Strongly succulent, leafless plant. Stems downy, short, 4-angled, upright or ascending, broad, with triangular teeth on ribs. Flowers develop singularly or in very sparse clusters from base of stem, wine-red inside and out; corolla tube urn-shaped, 15–20 x 10–15 mm, becoming as narrow as 1–5 mm at mouth, glabrous outside, papillate inside, corolla tip 3–lobed, upright, 3–5 mm long, whitish or pale red (Huber, 1967).

Rationale: Known from between 2 and 4 subpopulations and locations.

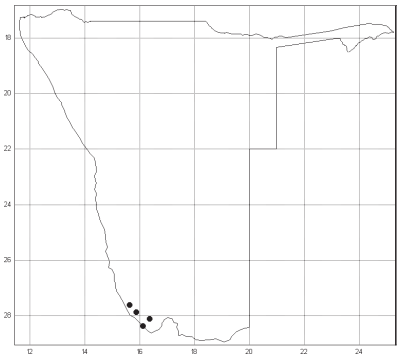
Habitat: 800–1700 m.

Threats: None currently.

Additional notes: Locally common (Bruyns, 1981); no specimens in WIND; a poorly known species.

Tridentea pachyrrhiza (Dinter) L.C.Leach

Stapelia pachyrrhiza Dinter
Stapelia umbonata Pillans



E P pl. 3

Status: LC

Description: Low, clump forming succulent in open areas. Stems short, stout, generally 50–60 x ca. 15 mm, very obtusely 4-angled, prominently toothed, deeply grooved down sides, glabrous or sparsely hairy, mainly on younger parts; Inflorescence few-flowerd, borne on short, very stout peduncle from near base of stems. Flowers developing in close succession, variable in colour; corolla glabrous outside, up to ca. 75 mm across alternate lobe apices, tube short and funnel-shaped, lobes with prominent hairs that can vibrate; plants north of Orange River most frequently have red flowers (Leach, 1980).

Rationale: Known from between 7 and 10 subpopulations and locations; no significant continuing decline in number of mature plants known.

Habitat: Drifting sand and on flats; occasionally occur among rock outcrops (Leach, 1980; WIND, 2002); 5–50 m.

Threats: None currently.

Additional notes: Often almost buried in the sand where they grow, with only the tops of the stems visible; can sometimes become completely buried (Leach, 1980).

ASPHODELACEAE

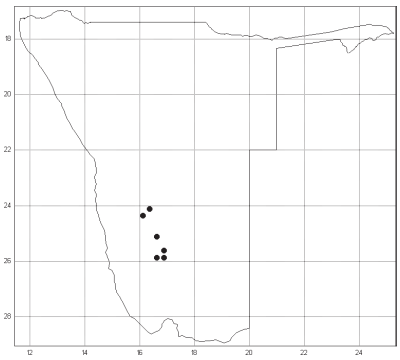
Aloe argenticauda Merxm. & Giess

Aloe pachygaster auct. non Dinter

E P C2 pl. 5

Status: LC

Description: Rosette-forming leaf succulent, tends to form dense clusters. Normally stemless or with short procumbent stem. Leaves up to 300 x 30–35 mm, dark grey-green, margin with brown thorns. Inflorescence simple, upright, 1–1.2 m long.



Flowers covered with silvery bracts when young, pinkish or dark red; flowering time September (Merxmüller and Giess, 1974; Jankowitz, 1975).

Rationale: Known from between 7 and 10 subpopulations and locations; no significant continuing decline in number of mature plants known.

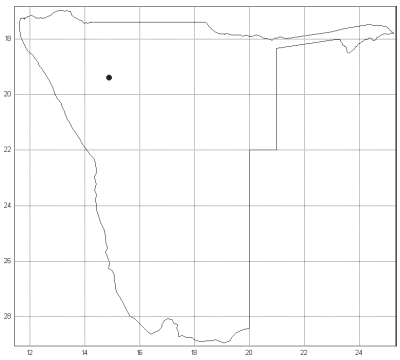
Habitat: Seems to prefer dolomite outcrops; black limestone hillock (WIND, 2002); 1000–1300 m.

Threats: None currently.

Additional notes: Common (WIND, 2002); differs from *A. pachygaster* in that it grows into a bigger plant; inflorescence longer (1 m or more) and upright (Merxmüller and Giess, 1974; Jankowitz, 1975).

Aloe buettneri A.Berger

Aloe paedogona A.Berger



P C2 pl. 5

Status: LC

Description: Plants can be solitary but often grow together in groups. Leaves die back in winter, up to 800 x 190 mm, light green, margin with small, widely spaced thorns. Inflorescence with up to 12 branches, terminal raceme highest. Flowers yellowish-green, sometimes red, with distinct globose basal swelling; flowering time February to March (Jankowitz, 1975).

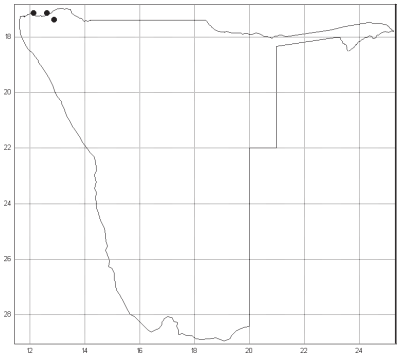
Rationale: Known from a single sub-population and location; no significant continuing decline in number of mature plants known.

Habitat: On low lying turf soils with *Colophospermum mopane* bushes; in red-brown soil in an area that is seasonally waterlogged (WIND, 2002); 850–1050.

Threats: Restricted range but no threats known.

Additional notes: Unique, for no other indigenous *Aloe* has leaves dying back in winter; most common *Aloe* in Africa (Jankowitz, 1975).

Aloe corallina I.Verd.



E P C2

Status: R

Description: Stem-forming leaf succulent. Stems ca. 1 m long, 50 mm in diameter. Leaves in dense rosette, bent slightly backwards in mature plants, texture coarse, narrowly obovate to sharp pointed, up to 500 x 100 mm, grey-green, glaucous, upper surface dull, striped with fairly prominent midrib; teeth on margins very small in young leaves, disappear in older leaves. Inflorescence branched in upper half with 2 or 3 side branches; branches lateral and then bend upwards. Flowers coral red; flowering time March to April (Jankowitz, 1975; Verdoorn, 1978).

Rationale: Known from 5 subpopulations and locations; no significant continuing decline in number of mature plants known.

Habitat: On sheer dolomite cliffs along Kunene River (WIND, 2002); 600-1200 m.

Threats: Restricted range; planned development of Epupa hydro-electric scheme along Kunene river could be a potential future threat.

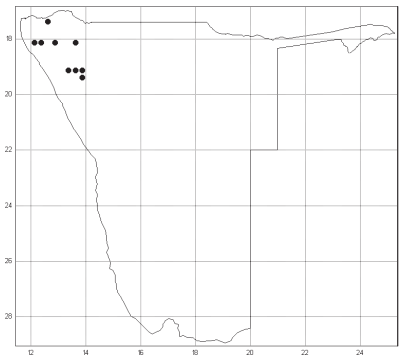
Additional notes: Can be confused with *A. dewinteri*, which has more closed rosette, relatively longer, narrower leaves, is stemless or has short stem, and flowers at different time (Jankowitz, 1975; Verdoorn, 1978).

Aloe dewinteri Giess

E P C2

Status: R

Description: Plants solitary. Stems short, ca. 100 mm long or



lacking. Leaves 500 x 90 mm, grey-green, smooth, margins with widely spaced brown thorns. Inflorescence simple, 0.7 m long, sometimes branched. Flowers coral pink, becoming nearly white when old; flowering time December to January (Jankowitz, 1975).

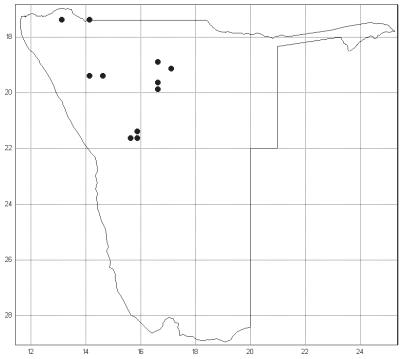
Rationale: Known from 8 subpopulations and locations.

Habitat: Rock crevices of steep dolomite precipices; on top of granite koppie on southwest-facing slope; on perpendicular cliffs (Jankowitz, 1975; WIND, 2002); 600–1200 m.

Threats: None currently.

Additional notes: Common name: *Sesfontein-aalwyn* (Afrikaans); growth form, broad leaves and distinct broad yellowish brown leaf edge normally differentiate it from other indigenous species (Jankowitz, 1975).

Aloe dinteri A.Berger



E P C2 pl. 5

Status: LC

Description: Plants stemless. Leaves arranged in three rows, forming rosette of ca. 0.3 m high, 150–300 mm x 30–80 mm, chocolate-brown or deep brown-green, with elongated white spots, margin with small teeth. Inflorescence 0.5–0.85 m high, terminal raceme longest. Flowers pale pink; flowering time January to March (Jankowitz, 1975).

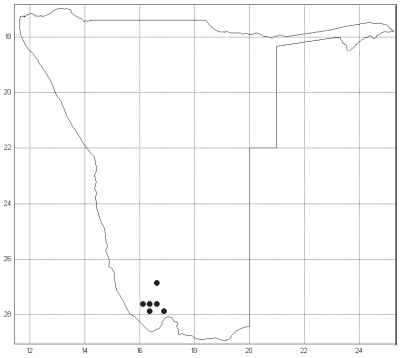
Rationale: Known from between 8 and 11 subpopulations and locations; no significant continuing decline in number of mature plants known.

Habitat: Dolomite crevices in partial shade; plains in full sun, river beds and rocky rivulets; hills with loose rocks and gravel; bare flats; black calcrete soil, quartzite and black limestone; with *Acacia reficiens*, *Colophospermum mopane*, *Commiphora* species and *Odyssea paucinervis* (Jankowitz, 1975; WIND, 2002); 600–1500 m.

Threats: None.

Additional notes: Tend to cluster; often hidden in the bushes under which they grow (WIND, 2002); differs from *A. sladeniana* and *A. variegata* L., in that it grows taller, inflorescence normally more branched (Jankowitz, 1975).

Aloe erinacea D.S.Hardy



E P C2 pl. 5

Status: EN B2ab(v)

Description: Plant with procumbent stem, tends to cluster, with up to 50 globular rosettes; vegetative reproduction takes place as new plants form at vegetative cone of old rosettes. Leaves triangular-lanceolate, 90–120 x 30–40 mm, grey-green to brown-green, margins with black thorns. Inflorescence simple, seldom branched, 1m long. Flowers red, older flowers changing to yellow; flowering time July to August (Jankowitz, 1975).

Rationale: AOO estimated to be less than 100 km^2; known from 9 fragmented subpopulations and locations; continuing decline inferred in number of mature plants.

Habitat: Steep, east-facing slopes between rocks in full sun; areas that receive fog precipitation; with *Tylecodon paniculatus*, various *Crassula* species, *Aloe ramosissima* and other succulent vegetation (Loots *et al*., pers. obs., 2001; WIND, 2002); 900–1350 m.

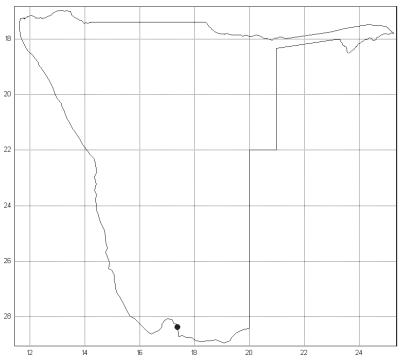
Threats: Succulent collecting; low recruitment; restricted range.

Additional notes: Common names: *Krimpvarkie* (Afrikaans), *Igel* (German) Jankowitz, (1975).
Cannot be confused with any other indigenous species (Jankowitz, 1975); occasional to common but very localised (WIND, 2002).

Aloe meyeri Van Jaarsv.

Aloe richtersveldensis Venter & Beukes

P C2 pl. 5



Status: R

Description: Stems up to 1 m high, up to 40 mm in diameter, only apically foliated. Leaves narrowly lanceolate, up to 200 x 35 mm, spreading, both surfaces with narrow lines or streaks at bases, slightly channeled at base, more distinctly so towards apices, margins with small, white teeth. Inflorescence simple or rarely branched, 150–250 mm long, curved upwards. Flowers orange-red, green tipped, horizontally spreading; flowering time December to February (Van Jaarsveld, 1981).

Rationale: Known from one subpopulation and between 1 and 3 locations.

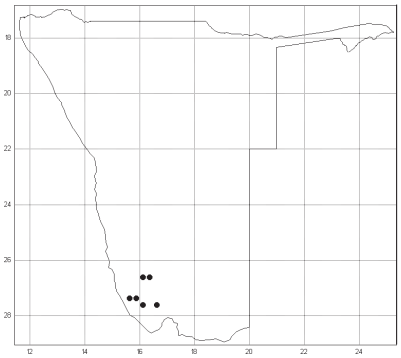
Habitat: Hanging from steep, vertical, south-facing, upper slopes in crevices of quartzite rock (Van Jaarsveld, 1981); 300–1200.

Threats: Restricted range but no real threats currently known.

Additional notes: Scattered, not very common (Van Jaarsveld, 1981); fairly inaccessible as steep cliffs afford them some protection; also in South Africa, where it was assessed as Vulnerable (Smith *et al*., 2000); no specimens in WIND.

Aloe microstigma Salm-Dyck subsp. *microstigma*

Aloe brunnthaleri A.Berger ex Cammerloher
Aloe juttae Dinter
Aloe khamiesensis Pillans



P C2 pl. 6

Status: LC

Description: Small plant, ca. 300 mm high, solitary or in dense clusters. Stems short, procumbent or absent. Leaves ca. 0.3 m x 40 mm, light green to russet red, with white spots, margins with sharp, widely spaced reddish brown thorns. Inflorescence simple, 0.6–0.8 m long. Flowers red to yellow with age; flowering time May to June (Jankowitz, 1975).

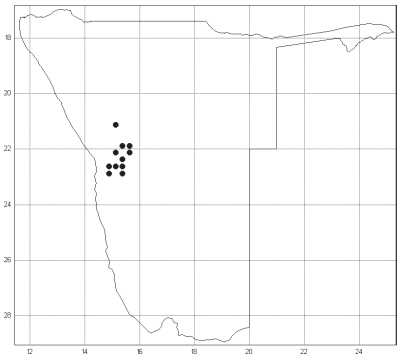
Rationale: Known from 8 subpopulations and locations; no significant continuing decline in number of mature plants known.

Habitat: Normally in rocky areas; on mesemb flats; mountain summits; granite mountain slopes (Jankowitz, 1975; WIND, 2002); 75–1450 m.

Threats: None currently.

Additional notes: Occasional to common (WIND, 2002); also occurs in South Africa (Van Wyk and Smith, 1996).

Aloe namibensis Giess



E P C2 pl. 6

Status: LC

Description: Stemless, normally solitary. Leaves 500 x 70 mm, pale grey-green to pale brown or brown-green, margins with widely spaced thorns. Inflorescence simple, ca. 0.95 m high with ca. 6 moderately curved-ascending branches. Flowers coral-red; flowering time December to March (Jankowitz, 1975).

Rationale: Known from between 17 and 20 subpopulations and locations; no significant continuing decline in number of mature plants known.

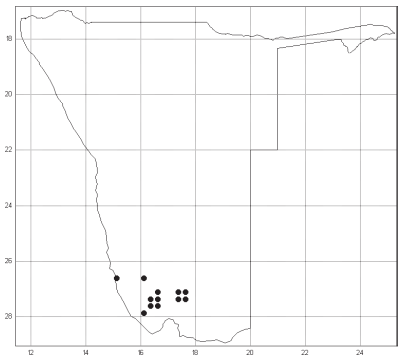
Habitat: Rocky outcrops; rocky hillock on north-facing, uppermost mountain slope; marble rift; low granite ridges (Jankowitz,1975; WIND, 2002); 450–950 m.

Threats: Habitat destruction due to tourism may be a potential threat, but this could not be confirmed.

Additional notes: Uncommon (Kolberg, pers. comm., 2002); can be confused with *A. asperifolia*, where it occurs in similar habitat but *A. namibensis* is taller and inflorescence is carried vertically, while in *A. asperifolia* the peduncle is carried nearly horizontally (Jankowitz, 1975).

Aloe pachygaster Dinter

E P C2 pl. 6



Status: LC

Description: Stemless or with procumbent stem; rosettes distinctly spirally twisted. Leaves 120–160 mm x 25 mm, brown-green to light green, margin with brown to dark brown and black thorns. Inflorescence simple, 50–55 mm long, peduncle carried horizontally in relation to ground. Flowers coral red; flowering time July to August (Jankowitz, 1975).

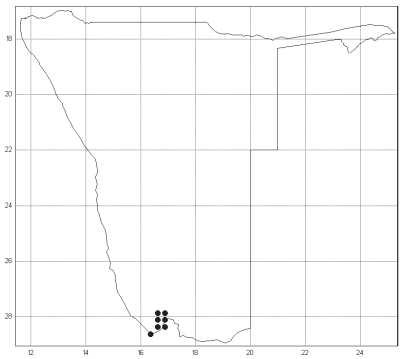
Rationale: Known from 21 subpopulations and between 6 and 12 locations; no significant continuing decline in number of mature plants known.

Habitat: Mountain summits and bases; black limestone terraces; rocky hills on weathered granite; horizontal dolomite ridges with *Zygophyllum* and *Rhigozum* species (WIND, 2002); 0–1500 m.

Threats: Succulent collecting may be a potential threat, but this could not be confirmed.

Additional notes: Often in large groups; rare to common (WIND, 2002); leaves appear to be narrower than those of *A. claviflora* Burch. and *A. asperifolia* A. Berger; similar to *A. argenticauda*, but this species grows to a bigger plant, inflorescence is longer (1 m or more) and upright; grows similarly to *A. claviflora* in semi-circles or circles (Jankowitz, 1975).

Aloe pearsonii Schönland



P C2 pl. 6

Status: NT B1ab(v)+2ab(v)

Description: Leaf succulent with candelabrum-like growth form, forms dense clusters. Stem upright, up to 1.3 m high. Leaves relatively small, pendant, arranged in star formation, 70–90 x 30–40 mm, usually red but change to green after rains, margin with small red or white thorns. Inflorescence approximately 0.4 m long with 2–3 branches. Flowers red or yellow; flowering time January to February (Jankowitz, 1975).

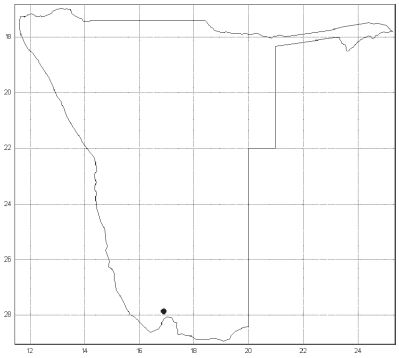
Rationale: EOO and AOO estimated to be 5000 km^2 and < 2000 km^2, respectively; known from between 8 and 12 subpopulations and locations; inferred continuing decline in number of mature plants.

Habitat: Below summit on west-facing slope among quartzite boulders; southwest-facing slopes; very rocky mountain slopes in extremely dry areas; seems to prefer habitats that receive fog precipitation (Jankowitz, 1975; WIND, 2002); 300–1150 m.

Threats: Low recruitment in three sub-populations observed and mining potential threats.

Additional notes: Locally common (Loots, pers. obs. 2001); also occurs in South Africa (Van Wyk and Smith, 1996).

Aloe pillansii L.Guthrie



P C1 pl. 7

Status: EN C1

Description: Tree, sometimes branched but may reach height of 10 m without branching, occasionally branch from below middle but often only shortly branched at top of tree. Stems usually erect, not spreading, bark smooth, grey-green to brownish-green. Leaves tend to droop downwards and form dense rosettes at branch apices, up to 640 x 170 mm. Inflorescence ca. 0.5 m long and bearing up to 50 racemes, growing out from below leaves. Flowers bright yellow; flowering time September to October (Reynolds, 1950; Jeppe, 1970; Sölch *et al.*, 1970; Jankowitz, 1975; Coates-Palgrave, 2002; Van Wyk and Smith, 1996; Loots *et al.*, pers. obs., 2000).

Rationale: Population size estimated to number fewer than 2500 mature plants; estimated continuing population decline of at least 20% within two generations.

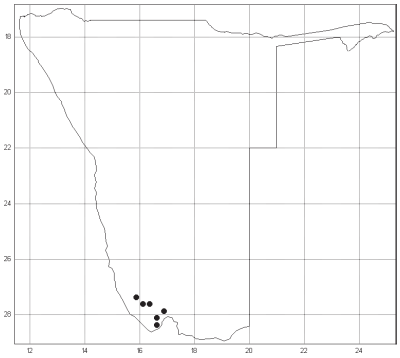
Habitat: Prefers areas that receive fog precipitation; south- and west-facing slopes mostly, but grow on all aspects; only in the winter rainfall areas in Succulent Karoo vegetation; with *Pachypodium namaquanum* and *Aloe dichotoma* and to a lesser extent with *Aloe ramosissima*; higher, steep slopes (up to 60°) and mountain summits; 550–1075 m; on very rocky slopes with

loose, coarse gravel; occasionally on sandy plains (Loots and Mannheimer, 2003).

Threats: Succulent collecting; low recruitment in all subpopulations; collecting for fuelwood; mining; restricted range (Loots and Mannheimer, 2003, Yates, pers. comm., 2003).

Additional notes: Common names: Bastard quiver tree (English) (Coates-Palgrave, 1977); *Reuse kokerboom* (Afrikaans) (Van Wyk and Smith, 1996).
Popular landscape tree; rare to common but very localised; also occurs in South Africa; *A. pillansii* is much more robust and becomes taller than *A. dichotoma* Masson and has fewer, yet larger rosettes; the fewer secondary branches of *A. pillansii* are more ascending than those of *A. dichotoma* and much thicker, measuring up to 200 mm in diameter; bark of *A. pillansii* lacks scaly appearance of *A. dichotoma*, which carries its inflorescences above leaves (Reynolds, 1950; Jeppe, 1970; Sölch *et al*., 1970; Jankowitz, 1975; Coates-Palgrave, 1977; Van Wyk and Smith, 1996; Loots and Mannheimer, 2003).

Aloe ramosissima Pillans



P C2 pl. 7

Status: LC

Description: Many-branched shrub, up to ca. 4 m high. Leaves 150–200 x 22 mm, brown-green with yellowish-brown margin; margins with small, closely-spaced thorns. Inflorescence branched, 150–200 mm high, carried above leaf rosette. Flowers bright yellow; flowering time May to June (Jankowitz, 1975).

Rationale: Known from 14 subpopulations and between 1 and 14 locations; no significant continuing decline in number of mature plants known.

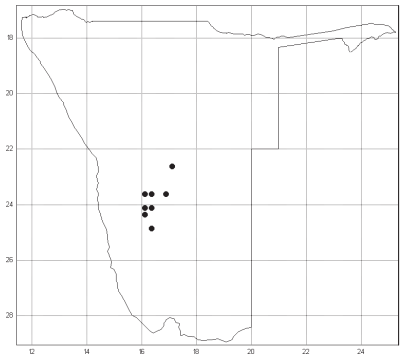
Habitat: Lower mountain slopes in Succulent Karroo vegetation that receive fog precipitation; with *A. dichotoma* and to a lesser extent *A. pillansii* and *Pachypodium namaquanum*; steep west-, southwest- and north-facing slopes; dry riverbeds flowing from mountains; open desert scrub; plains; in rocky soil (Jankowitz, 1972; Loots *et al*. pers. obs., 2000; WIND, 2002).

Threats: Leaf scale a potential threat (Williamson, 1998); but this has not been ascertained.

Additional notes: Common name: *Boskokerboom* (Afrikaans) Jankowitz (1975); also occurs in South Africa (Van Wyk and Smith, 1996); differs from *A. dichotoma* and *A. pillansii* mainly in that it forms a shrub while other two grow into trees (Jankowitz, 1975).

Aloe sladeniana Pole-Evans

Aloe carowii Reynolds



E P C2 pl. 7

Status: LC

Description: Plants stemless, reproduction can be vegetative by means of suckers forming dense groups. Leaves 40–80 x 30–40 mm, triangular, dark green, brown-green or even purplish, with irregular white spots, margins and keel with small, white teeth. Inflorescence simple, 0.5 m high. Flowers pale rose pink; flowering time January to February (Jankowitz, 1972).

Rationale: Known from beween 10 and 14 subpopulations and locations; no significant continuing decline in number of mature plants known.

Habitat: Small plateau, underneath steep ledge; on quartzite hill; rock crevices; intensely hot arid areas (Jankowitz, 1975; WIND, 2002); 900–1500 m.

Threats: Succulent collecting, tourism activities and low recruitment may be potential threats in some subpopulations, but this could not be confirmed.

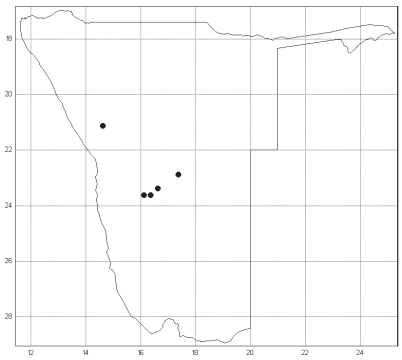
Additional notes: Related to *A. variegata* L. and *A. dinteri* but is smaller, seldom growing higher than 80–100 mm (Jankowitz, 1972).

Aloe viridiflora Reynolds

E P C2 pl. 7

Status: LC

Description: Stemless, normally solitary. Leaves 0.5–0.6 m x 80 mm, grey-green, sometimes with obscure linear markings, margins with closely packed reddish-brown thorns. Inflorescence branched panicle, 1.5 m high; racemes capitate. Flowers green with conspicuous orange coloured stamens; flowering time August to September (Verdoorn and Hardy, 1970; Jankowitz, 1975).



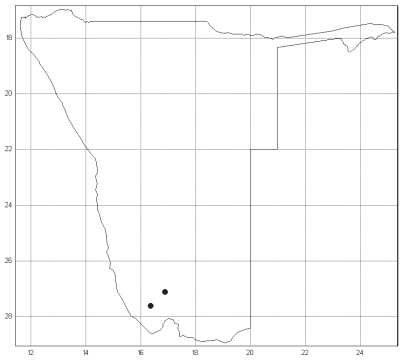
Rationale: Known from between 6 and 12 subpopulations and locations; no significant continuing decline in number of mature plants known.

Habitat: East-facing slopes; granite hills; between rocks on rocky outcrops; mostly in rocky surroundings (Jankowitz, 1975; WIND, 2002); 1650–2400 m.

Threats: Herbivory of developing inflorescences may be a potential threat in some subpopulations; succulent collecting not considered to be a real threat.

Additional notes: Rare to abundant (WIND, 2002); very typical green flowers differentiate it from *A. hereroensis* Engl. and all other *Aloe* species in Namibia (Jankowitz, 1975).

Bulbine caput-medusae G.Will.



E pl. 8

Status: R

Description: Perennial stemless geophyte. Leaves up to 15, arising from white, fibrous sheaths, spreading, strongly coiled and contorted, shallow channel above towards base, shiny dark-green, up to 240 x 2 mm. Inflorescence 1–2, suberect, pyramidal, elongating as flowers are fertilised to lie close to sand as capsules develop. Flowers ca. 20, light canary yellow with green vein; filaments bearded. Capsule broadly rounded oblong, ca. 12 mm long (Williamson, 1995).

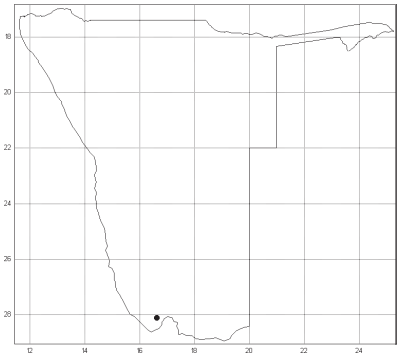
Rationale: Known from between 4 and 6 subpopulations and locations.

Habitat: Full sun on gentle slopes in red sand; areas that receive fog precipitation and winter rain (WIND, 2002); survives in very harsh wind-sand environments (Williamson, 1995); 500–1500 m.

Threats: Restricted range but no threats currently known.

Additional notes: Can be confused with *B. namaensis* but differs from it in that bunched vegetatively produced plants occur, capsules are much smaller and leaves are narrower, longer and subtended by elongated, tight, fibrous sheaths; rare (Williamson, 1995; WIND, 2002).

Bulbine francescae G.Will. & Baijnath



E

Status: R

Description: Geophyte. Leaves usually 2, very succulent, lanceolate from constricted narrow bases, translucent, pale green, with equally spaced transverse constrictions along whole leaf length giving undulate appearance. Inflorescence almost erect, solitary. Flowers 6–12, bright yellow (Williamson and Baijnath, 1995).

Rationale: Known from between 1 and 2 subpopulations and locations.

Habitat: Shaded, protected, west-facing quartzite crevices; slopes facing cold, harsh, prevailing southwest- to western winds that carry fog and sand; with mosses, ferns, *Ornithogalum*, *Albuca*, *Tylecodon*, *Pteronia*, *Anacampseros*, and *Conophytum* and other mesemb taxa (Williamson, 1995); ± 600 m.

Threats: Restricted range but no threats currently known.

Additional notes: A very unusual species.

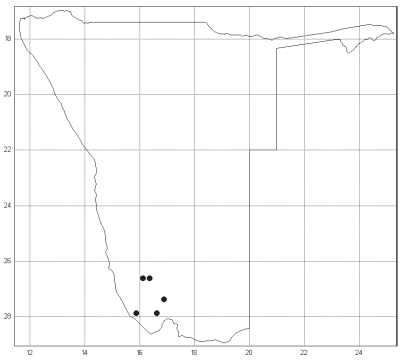
Bulbine namaensis Schinz

Bulbine vesicularis Dinter

pl. 8

Status: R

Description: Geophyte. Leaves form basal rosette, lanceolate to linear, 1–3 mm wide, often spirally curled at apices, thin and flat, bases persistent. Inflorescence a terminal dense raceme. Flowers yellow; tepals free, single nerved, spreading; filaments densely bearded, hairy. Fruit capsule, 10–13 mm in diameter, dehiscent (Sölch *et al*., 1970).



Rationale: Known from 5 subpopulations and locations.

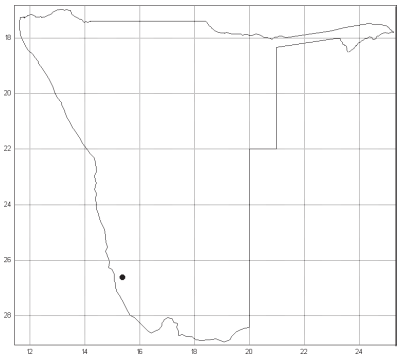
Habitat: In full sun on sandy plains and slopes (WIND, 2002); 400–1300 m.

Threats: None currently known.

Additional notes: An unusual species; occasional (WIND, 2002).

Trachyandra peculiaris (Dinter) Oberm.

Anthericum peculiare Dinter



E

Status: R

Description: Small geophyte, up to 100 mm high. Leaves few, linear, 100 x 4 mm, glabrous. Inflorescence a dense, many-flowered raceme. Flowers white, tepals 6 mm long, sparsely hirsute outside. Capsule 3-valved, glabrous, 5 mm long (Obermeyer, 1962).

Rationale: Known from 1 or 2 subpopulations and locations.

Habitat: Steep slope of mica schist (Obermeyer, 1962).

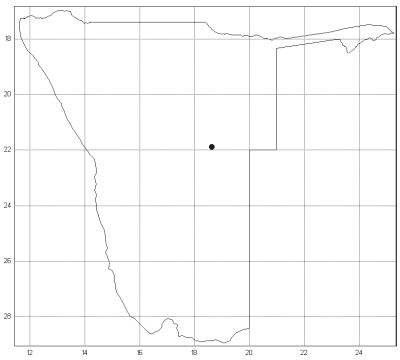
Threats: Restricted range but no real threats known.

Additional notes: Known from type specimen only (Obermeyer, 1962); no specimens in WIND.

ASTERACEAE

Anisopappus pseudopinnatifidus S.Ortiz and Paiva

E



Status: R

Description: Subshrub, 1 m high. Stems with mostly felty hairs and sessile glands. Leaves alternate, narrowly linear, 0.5–4 mm wide, mostly with one pair of short, narrow lobes or teeth, glabrous above, with dense white hairs below. Inflorescence terminal, branched. Flower head 5–8(–12) mm in diameter, semi-spherical. Disc florets tubular, yellow (Merxmüller, 1967; Ortiz and Paiva, 1995).

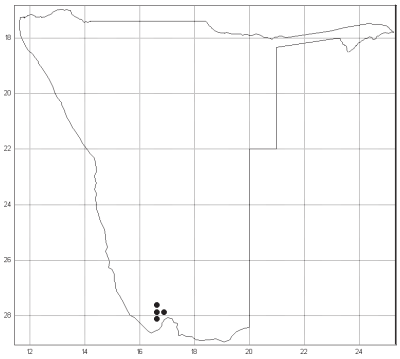
Rationale: Known from 1 or 2 subpopulations and locations; no significant continuing decline in number of mature plants known.

Habitat: Sandy soils (Ortiz and Paiva, 1995); ± 1500 m.

Threats: Restricted range but no threats currently known.

Additional notes: Rare; known from type specimen only; no specimens in WIND; similar to *A. pinnatifidus* in leaf morphology, but flower heads of *A. pseudopinnatifidus* small and obconical, those of *A. pinnatifidus* are larger (8–13 mm wide) and hemispherical; involucral bracts in *A. pinnatifidus* (Klatt) O. Hoffm. ex Hutch. are more acute and have scarious lacerate-denticulate margins which are generally wider, (normally 0.3–1 mm) than in *A. pseudopinnatifidus*, especially the innermost bracts which may be almost completely membranous (Merxmüller, 1967; Ortiz and Paiva, 1995).

Arctotis frutescens T.Norl.



E

Status: LC

Description: Subshrub. Leaves alternate, dense, white-grey, hairy, glandular, often ca. rosette-like, clustered at base, mostly

obovate to elongated, narrowing into long petiole, roughly crenately lobed, margins dentate. Flower heads on long, leafless peduncles at stem tips. Ray florets spreading, yellow to orange, up to 80 (–100) mm in diameter. Disc florets tubular, yellow to orange. Fruit one-seeded (Merxmüller, 1967).

Rationale: Known from between 4 and 8 sub-populations and locations; no significant continuing decline in number of mature plants known.

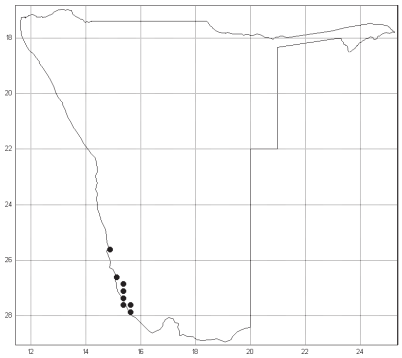
Habitat: Steep south-facing slopes; west-facing slopes; deep rock gorge; rocky outcrops; near waterfall; granite ridges; hills; crevices in vertical rocks; rock walls (WIND, 2002).

Threats: None currently known.

Additional notes: Similar to *A. fastuosa* Jacq., but achenes with long silky hairs, whereas *A. fastuosa* has glabrous achenes; pappus in *A. frutescens* with two rows of small scales, pappus in *A. fastuosa* with one row of scales, ray florets of *A. fastuosa* often with dark spot at bases (Merxmüller, 1967); common (WIND, 2002).

Eremothamnus marlothianus O.Hoffm.

Pteronia aizoides Muschl.
Pteronia marlothiana (O.Hoffm.) Dinter



E pl. 8

Status: LC

Description: Small, woolly shrub. Leaves alternate, obovate, entire or apically 3–5-dentate, spine-tipped, fleshy. Flower heads radiate, solitary, sessile, terminal. Involucre campanulate; bracts in several rows, with papery texture, glabrous, spine-tipped. Ray florets yellow. Disc florets yellow, tube widening above, deeply 5-lobed, with linear lobes (Herman *et al*., 2000).

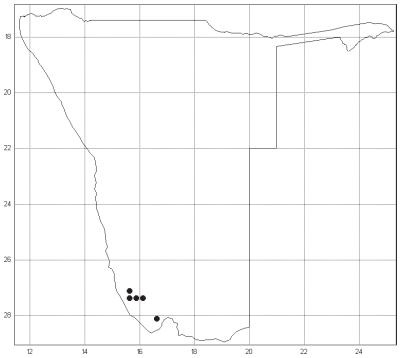
Rationale: Known from between 5 and 30 subpopulations and between 5 and 13 locations; no significant continuing decline in number of mature plants known.

Habitat: Full sun; 10–50 m altitude; sand hummocks; west- and southwest-facing slopes; rocky ridges and outcrops; accumulated dune sand on rock outcrops; dolomite cliffs close to the sea; sandy plains; sandstone gravel and quartzite (WIND, 2002).

Threats: Mining a potential threat but this could not be ascertained.

Additional notes: Occasional to common; monotypic genus (WIND, 2002); a seed accession was collected for *ex situ* conservation.

Eriocephalus klinghardtensis M.A.N.Müller



E pl. 8

Status: LC

Description: Much branched, aromatic shrub, 0.35–0.6 m high, 0.5 m in diameter. Leaves opposite to sub-opposite, linear to club-shaped, semi-succulent, 5–10 x 0.7–1.2 mm, entire, silvery grey, densely felty. Flower heads radiate, mainly in terminal racemes that resemble tassels or powder brushes, 4–6 mm long; peduncles permanently felty. Ray florets 2 or 3, white, 3 mm long. Disc florets 12–15, tubular, creamy white basally, red-purple distally, 3.6–4.0 mm long (Müller *et al.*, 2001).

Rationale: Known from between 5 and 10 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Rocky, south-facing quartzite slopes and summits with *E. giessii* (Müller *et al.*, 2001; WIND, 2002); 100–1500 m.

Threats: None currently known.

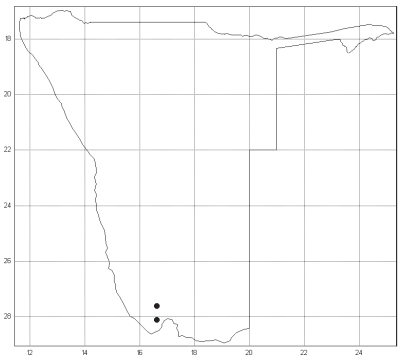
Additional notes: Common name: *Kapokbos* (Afrikaans). Locally common (WIND, 2002); closely related to *E. scariosus* DC., from which it can be distinguished by consistently opposite leaves covered with dense, felty hairs (Müller *et al.*, 2001).

Euryops mucosus B.Nord.

E

Status: NT

Description: Shrub, ca. 0.5 m high. Stems erect, glabrous, leafy in upper parts, naked towards base. Leaves closely arranged, 10–25 x 4–9 mm, triangular, wedge-shaped, flat, glabrous, bright green, with distinct midvein in basal half, 2–5-lobed or -toothed at apices, some entire. Ray florets yellow, elliptic-oblong, 3.5 x 2 mm, 4-nerved. Disc florets yellow, 3 mm long,



tubular at base, gradually widening upwards (Nordenstam, 1966; Merxmüller, 1967).

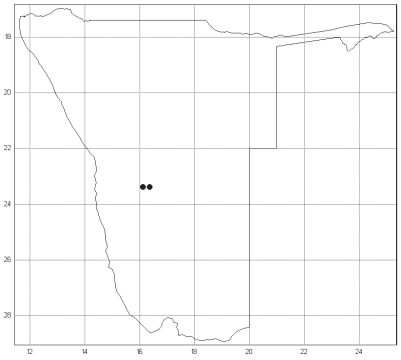
Rationale: Known from between 2 and 4 sub-populations and locations.

Habitat: Riverbed (WIND, 2002).

Threats: Power line to be built from Obib to Chameis Bay a potential future threat to some subpopulations; mining also a potential threat.

Additional notes: Leaves quite similar to *E. dregeanus* Sch. Bip. in outline, but always covered with dense, fine greyish-white hairs or dense, matted, woolly hairs, whereas those of *E. mucosus* are always entirely glabrous (Nordenstam, 1966).

Euryops walterorum Merxm.



E pl. 8

Status: R

Description: Rigid, erect shrub, up to 2 m high. Stems with brownish or grey bark, mostly glabrous; young twigs felty. Leaves felty, alternate, broadly lanceolate to ovate or obovate, 10–15 x 5–7 mm, stiff, leathery and undivided, rough due to short, tooth-like conspicuous hairs, margins entire. Flower heads on bare stalks, short shoots or in leaf axils, without ray florets, broadly bowl-shaped, 4–9 mm in diameter, base with shallow pits (Merxmüller, 1967).

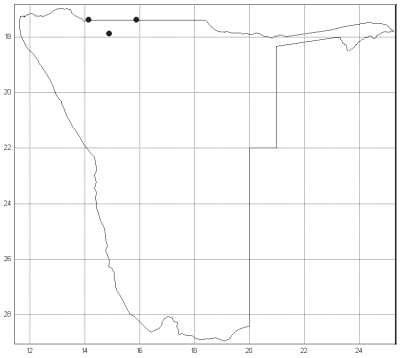
Rationale: Known from between 1 and 3 sub-populations and locations.

Habitat: Flat aspect, in clayey soil on Gamsberg summit plateau; (WIND, 2002; Irish, pers. comm., 2003; 2000–2334 m).

Threats: Restricted range coupled with fire and trampling are potential threats.

Additional notes: Locally common (WIND, 2002; Irish, pers. comm., 2003).

Felicia alba Grau



E

Status: R

Description: Annual herb. Stems much branched, mostly ca. densely bristly, often glandular, rarely glabrous. Leaves with short soft hairs, up to 30(–50) x 1 mm, linear, alternate, margins entire. Flower heads ca. solitary on branch tips; peduncles densely glandular beneath flower heads. Ray florets tongue shaped, pure white. Disc florets tubular, yellow, occasionally also shaded red (Grau, 1974).

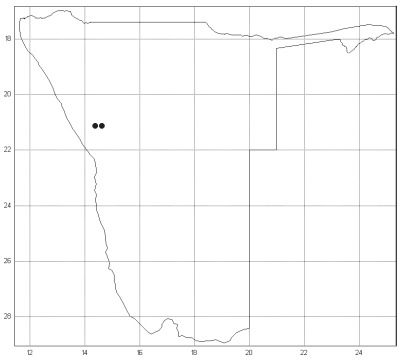
Rationale: Known from between 3 and 6 sub-populations and locations.

Habitat: Flat areas in full sun (WIND, 2002); 900–1500 m.

Threats: Human population growth, settlement and associated land use are potential threats but these could not be ascertained.

Additional notes: Rare (WIND, 2002).

Felicia gunillae B.Nord.



E

Status: R

Description: Subshrub, up to 1.5 m high. Stems with coarse bristles, glandular. Leaves alternate, sometimes clustered on axillary short shoots, spathulate to oblanceolate, sometimes ca. needle-like, coarsely dentate, up to 10–20 x 5–10 mm, with 5–7 pointed to ovate teeth, large bristles below. Flower heads ca. solitary. Ray florets ligulate, blue, violet or whitish (Merxmüller, 1967; Grau, 1974).

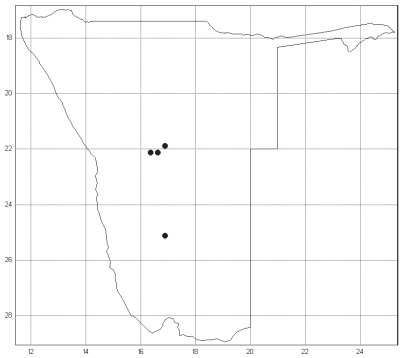
Rationale: Known from 1 to 2 sub-populations and locations.

Habitat: West-facing slope below summit of peak on Brandberg (WIND, 2002); possibly only occurs at high altitudes (Kolberg, 2002, pers. comm.); 2000–2650 m.

Threats: Restricted range but no threats currently known.

Additional notes: Known from type specimen only.

Gazania thermalis Dinter



E pl. 8

Status: CR B2ab(ii,iii)

Description: Perennial herb with woody rootstock, forming dense aggregates. Leaves mostly densely crowded at base, linear, entire or lobed, 50–70 x 1–1.5 mm, sessile, margins with minute spines. Flower heads solitary on leafless peduncle or at top of stems or branches, radiate; involucral bracts fused into cup. Ray florets mostly yellow, sometimes white or orange, often with dark spot or eye at base, but nearly always yellow and unspotted. Fruit one-seeded, covered with fine hairs (Roessler, 1973, 1975).

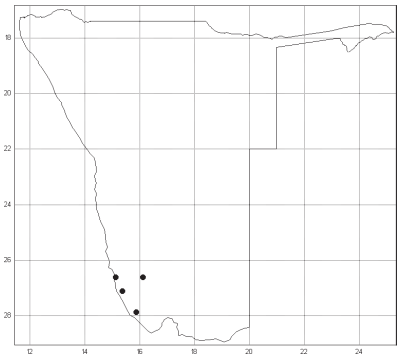
Rationale: AOO estimated to be smaller than 10 km^2 sub-populations severely fragmented; continuing decline in AOO and quality of habitat.

Habitat: Saline hot springs, in moderate to very brackish/saline soil; 1276–1400 m.

Threats: Restricted range; decreasing water tables in hot springs; habitat degradation. Fountain at one sub-population seems to have been declining over several years, resulting in some mortality. Many plants in one sub-population in a poor condition compared to another sub-population assessed; building of a new lodge a potential future threat.

Additional notes: Has not been found at type locality since description (Roessler, 1973); *G. thermalis* distinguished from other *Gazania* species in Namibia by complete lack of felt-like pubescence, and from *G. krebsiana* subsp. *serrulata* (DC.) Roessler by smaller heads and narrower, occasionally short lobes on leaves (Roessler, 1973, 1975).

Lasiopogon ponticulus Hilliard



Status: LC

Description: Annual herb, forming small woody mats. Stems 10–80 mm long, filiform, simple or branched, prostrate or decumbent, cobwebby, leafless or sparsely leafy, densely leafy below the heads. Leaves generally 3–8 x 1–1.5 mm, spathulate, loosely greyish woolly. Flower heads heterogamous, bell-shaped, ca. 3 x 2 mm, very closely surrounded by leaves and aggregated in dense terminal woolly clusters. All florets tubular, white, sometimes red-tipped (Hilliard and Burtt, 1981).

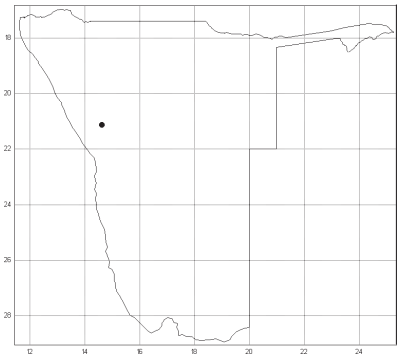
Rationale: Known from between 7 and 12 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Coarse granite sand formation; sand hills (WIND, 2002); 100–1500 m.

Threats: Mining and town expansion may potentially threaten 1 sub-population, but this has not been ascertained.

Additional notes: Last collected in 1959; also occurs in South Africa (Germishuizen and Meyer, 2003; WIND, 2002); no specimens in WIND.

Nidorella nordenstamii Wild



E

Status: R

Description: Annual herb. Leaves alternate, bipinnately lobed or lobes dentate. Flower heads numerous in dense terminal clusters, hemispheric or more rarely bell-shaped. Ray florets ligulate, yellow. Disc florets funnel-shaped, yellow (Wild, 1969).

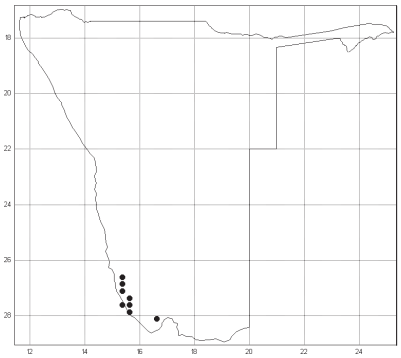
Rationale: Known from 1 or 2 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Dry watercourse (Wild, 1969); 1500–2100 m.

Threats: Restricted range but no threats currently known.

Additional notes: Could not be found since original collection in 1964 (WIND, 2002); no specimens in WIND; closely related to *N. resedifolia* DC., but foliage of *N. nordenstamii* is very characteristic (Wild, 1969).

Othonna clavifolia Marloth



E pl. 8

Status: LC

Description: Glabrous dwarf pachycaul. Stems often nearly subterranean, turnip-shaped or only few centimetres high, fleshy and very thick, partially with papery bark and copious resin. Leaves sessile or petiolate, alternate, sometimes clustered at branch tips, cylindrical, broadly club-shaped, up to 30 x 8 mm, grey-green, margins usually entire. Inflorescence with 1(or 2) flower heads on branch ends or in leaf axils. Ray florets tongue-shaped, luminous yellow. Disc florets tubular (Merxmüller, 1967).

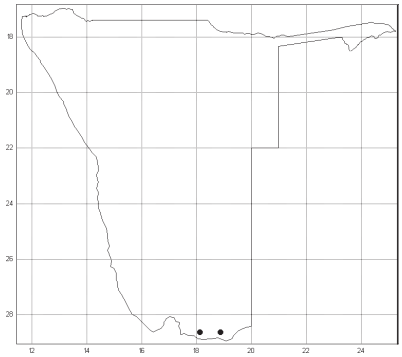
Rationale: Known from between 6 and 12 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Rock crevices; cliffs; rocky dolomite outcrops; gravelly and sandy soil; limestone plateau (Marloth, 1910-1912; WIND, 2002).

Threats: None currently known.

Additional notes: Very attractive (WIND, 2002).

Othonna cyclophylla Merxm.



Status: R

Description: Shrub or dwarf tree. Stems thickened, glabrous, fleshy, with papery bark and copious resin; twigs with whitish grey granular bark, flaky to felty at point of attachment of leaves. Leaves alternate, sometimes clustered at branch tips, ca. circular, 10–20 mm in diameter, margins usually entire or weakly dentate. Flower heads usually in loose axillary or terminal panicle. Ray florets threadlike, yellow or yellowish. Disc florets tubular, yellow (Merxmüller, 1967; WIND, 2002).

Rationale: Known from 1 or 2 sub-populations and locations; no significant continuing decline in number of mature plants known.

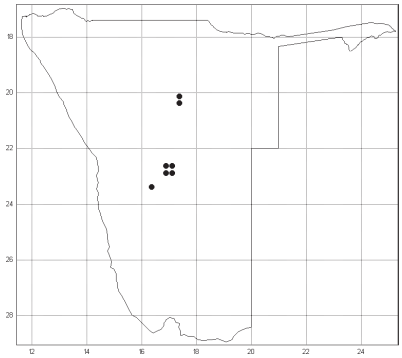
Habitat: Quartz ridge with succulent vegetation; between dolomite boulders; on dolerite; in crevices (WIND, 2002) ± 945 m.

Threats: Restricted range but no threats currently known.

Additional notes: Fairly abundant (WIND, 2002); also occurs in South Africa (Merxmüller, 1967).

Pentatrichia avasmontana Merxm.

Pentatrichia confertifolia Merxm.
Pulicaria confertifolia Klatt ex Merxm.
Tetratrichia avasmontana Dinter ex Merxm.



E

Status: LC

Description: Densely glandular-hairy shrub, up to ca. 1 m high. Leaves alternate, lanceolate, elongated or ovate, narrow-

ing into 5–10 mm long petiole, toothed to slightly divided, up to 25 x 10 mm. Flower heads in loose panicles at branch tips. Ray florets, tongue shaped when present, white or pink. Disc florets tubular, yellow (Merxmüller, 1967).

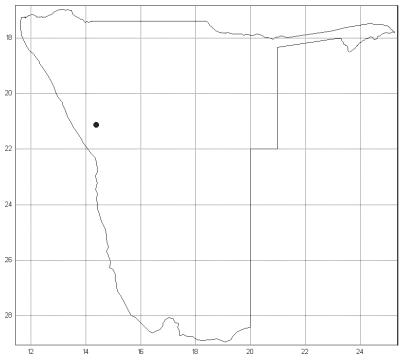
Rationale: Known from between 7 and 14 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Crevices on vertical, south-facing, rock or cliff faces; mountain slopes, plateaus and bases with mica schist; sometimes hangs from rocks (WIND, 2002).

Threats: None currently known.

Additional notes: Common in some places; sometimes form dense cushions (WIND, 2002).

Pentzia tomentosa B.Nord.



E

Status: R

Description: Subshrub or dwarf shrub. Leaves alternate, pinnately divided, 20–40 mm long, with dense, silver-grey hairs. Flower heads terminal, 10–15 mm in diameter, solitary on 100–200 mm long, bare peduncle. All florets tubular, pure yellow (Merxmüller, 1967).

Rationale: Known from 1 or 2 sub-populations and locations.

Habitat: Sheltered stony places on slopes (WIND, 2002); 1800–2500 m.

Threats: Restricted range but no threats currently known.

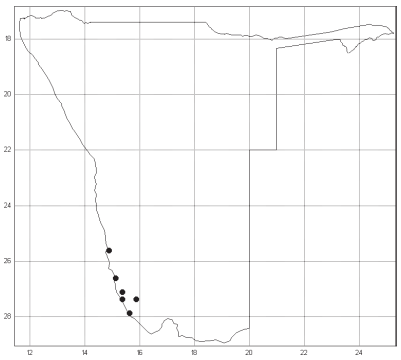
Additional notes: Known from type specimen only; no specimens in WIND.

Pteronia spinulosa E.Phillips

E

Status: LC

Description: Woody shrub. Stems much-branched, grey; leafy branchlets short, with numerous spines in lower part, glabrous. Leaves opposite, fused at base but not sheathing, boat-shaped,



ca. 10 x 4 mm, densely warty when dry. Flower heads usually solitary, sessile, narrowly ellipsoid, 15 mm long, ca. 7 mm in diameter; involucral bracts elongated to rounded, yellow, without membranous margin, midrib swollen. All florets tubular, yellow (Hutchinson and Phillips, 1917; Merxmüller, 1967).

Rationale: Known from between 10 and 20 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Granitic gravel; gravel plains; mountain slopes; dolomite outcrops intermixed with flint; in weathered sand on rocky flats; sandy soil; ± 40 m.

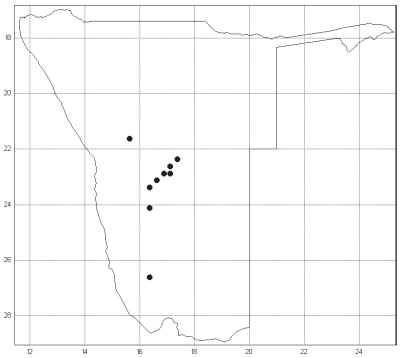
Threats: Mining a potential threat to 1 or 2 sub-populations but this has not been ascertained.

Additional notes: Occasional (WIND, 2002).

CAMPANULACEAE

Namacodon schinzianum (Markgr.) Thulin

Prismatocarpus schinzianus Markgr.



E

Status: LC

Description: Erect shrublet, much branched from base, 300–400 mm high. Stems erect, ribbed. Leaves alternate, sessile, flat, narrowly lanceolate, cuneate to truncate, up to 15–25 x 1.5–6 mm, rapidly diminishing in size upwards, glabrous; margins cartilaginous, slightly rolling downwards, entire or sparsely dentate with teeth often directed slightly backwards. Flowers terminal, solitary; corolla bell-shaped, blue, 13–22 mm long; lobes 5, united almost halfway (Thulin, 1974).

Rationale: Known from between 9 and 18 sub-populations and locations; no significant continuing decline in number of mature plants known.

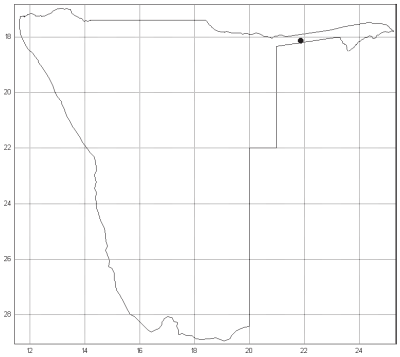
Habitat: Mountain slopes and bases; 800–2290 m; on rocky slopes; in crevices among rocks and boulders; rocky ridges; free standing on mica schist; on grassy hillsides (Thulin, 1974; WIND, 2002).

Threats: None currently known.

Additional notes: Locally common (WIND, 2002).

CAPPARACEAE

Cadaba termitaria N.E.Br.



Status: R

Description: Much branched shrub, 2–3(–5) m high. Stems stiff and rigid, grey-black. Leaves elliptic to obovate, 7–20 x 3–7 mm, grey-green, leathery, alternate or crowded on short side shoots. Flowers without petals, solitary in axils of leaves or crowded towards apices of short side shoots. Fruit cylindric, usually 50(–75) mm long, 3–5 mm in diameter, covered with wartlike outgrowths (Marsh, 1970).

Rationale: Known from 1 to 2 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Flat sandy area; in full sun; with *Acacia* species (WIND, 2002); 275–1310 m.

Threats: Restricted range but no threats currently known.

Additional notes: Known from only two collections in Namibia; uncommon (WIND, 2002); more common in the rest of southern Africa (Wild, 1960).

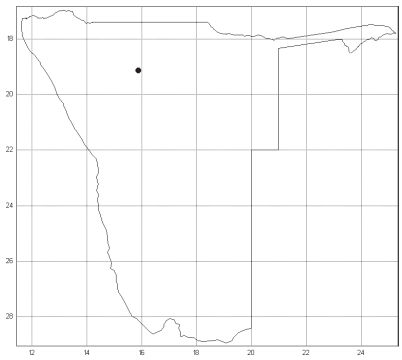
CHENOPODIACEAE

Suaeda salina B.Nord.

E

Status: NT

Description: Erect, glabrous herb, 0.2–0.6 m high, richly



branching from somewhat woody base. Leaves narrowly oblong-linear, 5–8(–10) mm x 1.2–1.8 mm, glabrous, green or often turning reddish. Flowers solitary or in few-flowered axillary clusters, 1.5–2 mm in diameter (Nordenstam, 1970).

Rationale: Known from 1 or 2 sub-populations and locations; AOO smaller than 20 km^2.

Habitat: Soft, whitish saline soil of the dry pan surface, which has almost no other vegetation (Nordenstam, 1970).

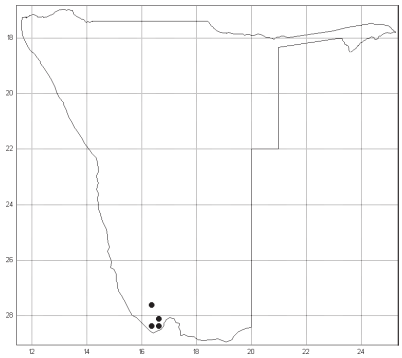
Threats: Restricted range; over-utilization of habitat by game at least a potential threat.

Additional notes: Known from type specimen only but may be under collected due to growing in a nature reserve (WIND, 2002); may be confused with *S. articulata* Aellen, which is common on the border of Etosha pan but is more woody and shrublike; leaf shape is somewhat similar to *S. articulata*, (Nordenstam, 1970); no specimens in WIND.

CRASSULACEAE

Crassula atropurpurea (Haw.) D.Dietr. var. *cultriformis* (Friedrich) Tölken

Crassula cultriformis Friedr. var. *robusta* Friedrich
Crassula cultriformis Friedrich



pl. 9

Status: R

Description: Perennial shrublet, up to 0.6 m high. Stems short, erect or decumbent, fleshy to woody. Leaves linear-oblanceolate to obovate, apices obtuse to rounded, usually glabrous, green to brown or red, 15–30 x 6–25 mm, usually

with distinct horned margins. Inflorescence elongated with flowers often divided into few clusters. Flowers tubular to almost cylindrical; petals fused basally, cream; stamens with yellow anthers (Tölken, 1985).

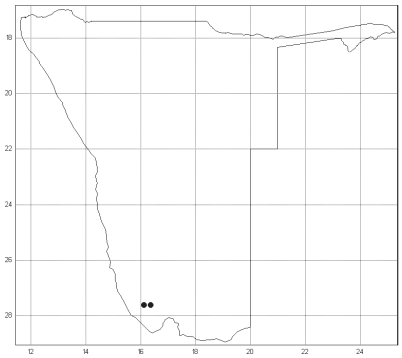
Rationale: Known from between 4 and 8 sub-populations locations.

Habitat: Rough, dark coloured, rocky slopes; valleys; lower mountain slopes; quartzite gravel plains, wind-blown red dune sand; pockets of soil among rocks; well drained stony soil with calcareous sand in half shade or full sun (WIND, 2002); 50–600 m.

Threats: Mining may be a potential threat but this has not been ascertained.

Additional notes: Also occurs in South Africa (Tölken, 1985).

Crassula aurusbergensis G.Will.



E pl. 9

Status: R

Description: Perennial, up to 20 mm high excluding inflorescence and ca. 38 mm in diameter, growing in dense clumps. Stems short, woody. Leaves in basal rosette, very fleshy, obovate to ovate, apices acute and very unequally bilobed, light green with numerous red to dark green spots above, margins transparent and minutely serrated with rounded teeth angled towards bases. Inflorescence a spike. Flowers shallowly cup-shaped, petals fused basally, white; stamens with yellow anthers (Williamson, 1992).

Rationale: Known from between 2 and 6 sub-populations and locations.

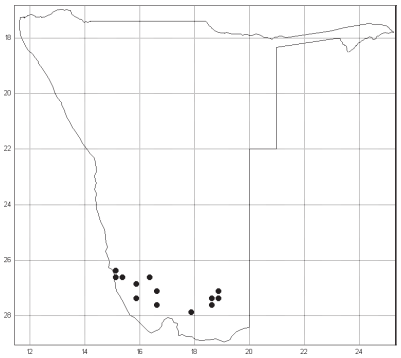
Habitat: South-facing, protected rock crevices on mountain summit and base (Williamson 1992); gentle hill slope in full sun on well drained rocky soil with sand and white quartzite on north-west facing slope; west- and southwest- facing lower, mid and upper slopes in half shade, in well-drained dark reddish-brown clay-loam; areas that receive fog precipitation (Loots *et al*., pers. obs., 2002); 900–1050 m.

Threats: Restricted range but no threats currently known.

Additional notes: Attractive mat-forming dwarf succulent with horticultural potential (Loots *et al*., pers. obs., 2002; WIND, 2002); seed collection done for *ex situ* conservation.

Crassula ausensis Hutchison subsp. *ausensis*

Crassula ausensis Hutchison
Crassula hofmeyeriana Dinter
Crassula littlewoodii Friedrich
Crassula karasana Friedrich



E pl. 9

Status: LC

Description: Perennial, forming dense cushions. Stems short, often thick. Leaves closely clustered, usually lanceolate or elliptic, 12–30 x 4–10 mm, flat above and very convex below, densely covered with fine spreading hairs, without cilia, green to grey-green to light brown but often darker brown along margins. Inflorescence elongate with several clusters of few to numerous flowers. Flowers tubular; petals fused basally, white to cream; stamens with brown anthers (Tölken, 1985).

Rationale: Known from between 14 and 28 sub-populations and between 10 and 20 locations; no significant continuing decline in number of mature plants known.

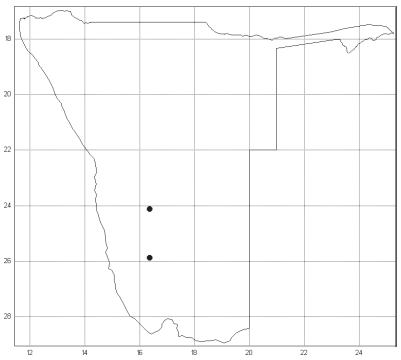
Habitat: South- and west-facing slopes; outcrops in somewhat protected crevices; granite; sandstone; outcrops of quartzite (WIND, 2002 and Tölken, 1985); 900–2000 m.

Threats: None currently known.

Additional notes: Very rare to very common (WIND, 2002 and Tölken, 1985).

Crassula ausensis Hutchison subsp. *giessii* (Friedrich) Tölken

Crassula giessii Friedrich



E

Status: R

Description: As for C. *ausensis* subsp. *ausensis*, but with differences under 'Additional notes' (Tölken, 1985).

Rationale: Known from between 2 and 6 sub-populations and locations.

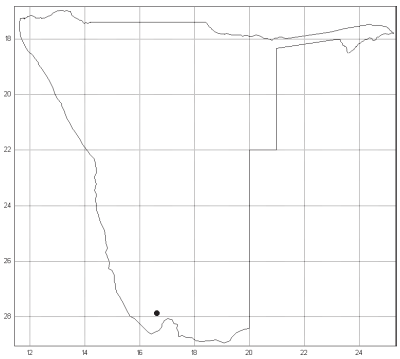
Habitat: Rock crevices in quartz; shallow sand on top of rocks (Tölken, 1985; WIND, 2002); 1400–1700 m.

Threats: Succulent collecting may be a potential threat but this has not been ascertained.

Additional notes: Leaves obovate, sometimes triangular in section, sparsely covered with fine spreading hairs and long cilia; inflorescence a terminal cluster with 3–5 sessile flowers (Tölken, 1985).

Crassula campestris (Eckl. & Zeyh.) Endl. ex Walp.

Crassula campestris (Eckl. & Zeyh.) Endl. ex Walp. forma *compacta* Schönland
Crassula campestris (Eckl. & Zeyh.) Endl. ex Walp. forma *laxa* Schönland
Sedum campestre (Eckl. & Zeyh.) Kuntze



Status: R

Description: Sparsely branched annual. Stems erect, up to 100 mm long, glabrous. Leaves sessile, lanceolate to narrowly triangular, 4–6 x 1–2 mm, ca. flat above and convex below, glabrous, fleshy, green to brown. Flowers cup-shaped; petals scarcely fused basally, pale yellow to brown; stamens with yellow anthers (Tölken, 1985).

Rationale: Known from 1 to 2 sub-populations and locations.

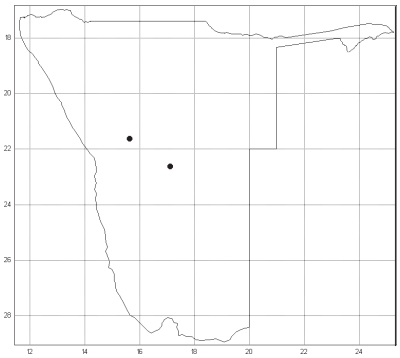
Habitat: Gorge; on plain under overhanging rocks; sandy and gravelly slopes; usually not in the shade; granite (Tölken,1985; WIND, 2002); 100–1700 m.

Threats: Restricted range but no threats currently known.

Additional notes: Occasional, but may be overlooked due to small size (WIND, 2002); also occurs in South Africa (Tölken, 1985).

Crassula capitella Thunb. subsp. *nodulosa* (Schönland) Tölken

Crassula avismontana Dinter
Crassula capitella Thunb. subsp. *enantiophylla* (Baker f.) Tölken
Crassula elata N.E.Br.
Crassula enantiophylla Baker f.
Crassula guchabensis Merxm.
Crassula nodulosa Schönland
Crassula pectinata Conrath



pl. 9

Status: LC

Description: Perennial, usually with tuberous base. Stems erect, covered with short recurved hairs. Leaves in one or rarely few rosettes, obovate to elliptic to lanceolate, 20–50 x 10–25 mm, apices acute, often covered with short hairs and cilia. Inflorescence spike-like, unbranched with sessile flower clusters. Flowers tubular; petals fused basally, white, cream or sometimes tinged pink, oblong, each with rounded or barely pointed dorsal terminal appendage; stamens with brown to black anthers (Tölken, 1985).

Rationale: Known from between 4 and 8 sub-populations and locations.

Habitat: Grassland; usually on gravelly slopes or in depressions; ridges, summits; south-facing slopes (Tölken, 1985; WIND, 2002); 800-2200.

Threats: None currently known.

Additional notes: Also occurs in South Africa (Tölken, 1985).

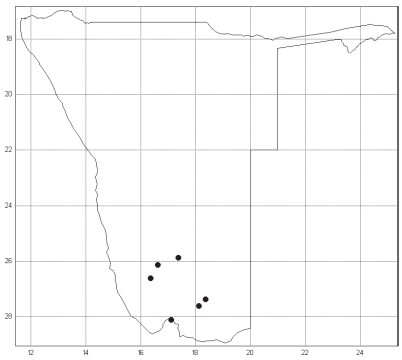
Crassula corallina Thunb. subsp. *corallina*

Crassula corallina Thunb.
Crassula dasyphylla Harv.

pl. 9

Status: LC

Description: Perennial. Stems prostrate, up to 80 mm long, often with roots produced at nodes. Leaves obovate to almost elliptical, 3–5 x 2–3 mm, sometimes glaucous, grey-green to greyish brown. Flowers urn-shaped; petals scarcely fused, cream; stamens with yellow anthers (Tölken, 1985)



Rationale: Known from between 5 and 10 sub-populations and locations; no significant continuing decline in number of mature plants known.

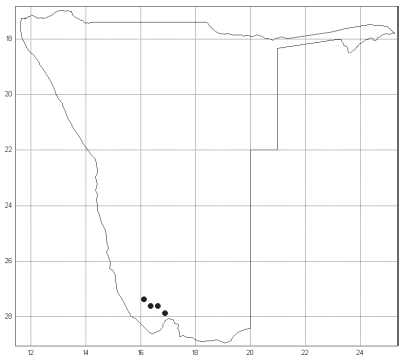
Habitat: Sandy soil, often with surface limestone or on shallow soil with granite and dolerite rocks; red brown soil and deep soil; on calcrete; coarse gravel and gravelly plains between larger rocks; small plains in small groups; between hill tops; karroid shrubland in mini depressions; moderate west-facing slopes; 1500–1800 m. (Tölken, 1985; WIND, 2002).

Threats: None currently known.

Additional notes: Occasional (WIND, 2002); Also occurs in South Africa (Tölken, 1985).

Crassula cotyledonis Thunb.

Crassula cephalophora Thunb. var. *dubia* (Schönland) Schönland
Crassula cephalophora Thunb. var. *tayloriae* (Schönland) Schönland
Crassula dubia Schönland
Crassula rehmanni Baker f.
Crassula tayloriae Schönland
Purgosea cotelydonis (Thunb.) Sweet



pl. 9

Status: LC

Description: Robust perennial, usually little branched. Stems woody, rarely up to 0.2 m long. Leaves in basal rosettes, oblong-oblanceolate to broadly obovate, 30–60 x 10–25 mm, apices obtuse or rounded, dorsiventrally flattened but both surfaces ca. convex in section, densely covered with coarse spreading to recurved hairs, cilia not arranged in single row. Inflorescence elongate with many dense spherical flower clusters. Flowers tubular to almost cylindrical; petals fused basally, cream to pale yellow; stamens with yellow anthers (Tölken, 1985).

Rationale: Known from between 5 and 10 sub-populations and locations; no significant continuing decline in number of mature plants known.

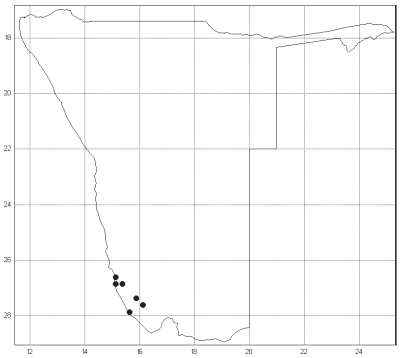
Habitat: South-facing gravelly slopes; rock outcrops; granite, sandstone and quartzite soils; rocky, west-facing slopes with a weak incline of 30°; plains; summits; ridges; well-drained gravelly soil; rock crevices; shade and full sun (Tölken, 1985; WIND, 2002); 50–1800 m.

Threats: None currently known.

Additional notes: Sometimes form thick cushions; frequent; also occurs in South Africa (Tölken, 1985; WIND, 2002; Bartsch, pers. comm., 2002).

Crassula elegans Schönland & Baker f. subsp. *namibensis* (Friedrich) Tölken

Crassula namibensis Friedrich
Crassula mesembryanthemoides Dinter & A.Berger



E

Status: NT

Description: Perennial, up to 80 mm high, with tough, slightly woody base. Stems short, much branched. Leaves ovate, 5–15 x 4–8 mm, apices obtuse, broadly triangular in section, closely packed so that internodes are usually not visible, glabrous, covered with papillae, green to brownish red to deep red. Inflorescence loose, rounded; peduncle (15–)25–60 mm long, covered with recurved hairs. Flowers tubular; petals basally fused, cream or white, fading to brown; stamens with brown anthers (Tölken, 1985).

Rationale: EOO estimated to be less than 10000 km^2; known from between 6 and 12 sub-populations and locations; possible continuing decline in quality of habitat.

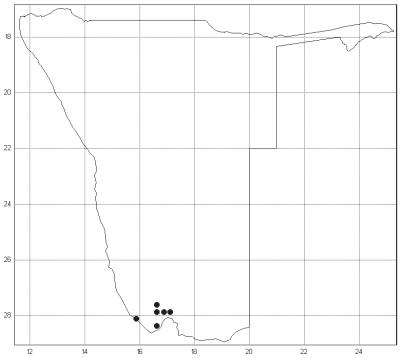
Habitat: Gentle to moderate south- and east-facing rocky slopes; often in exposed positions in full sun, in sand and rock crevices in rocky outcrops, on well-drained gravel plains, sandstone, granite or pegmatite gravel in dykes; associated with *Lithops* and *Tylecodon* species (WIND, 2002); 20–300 m.

Threats: Population and town expansion and infrastructure development potentially threaten 2 sub-populations; succulent collecting may be a potential threat.

Additional notes: Locally scattered but widespread; occasional (WIND, 2002).

Crassula expansa Dryand. subsp. *pyrifolia* (Compton) Tölken

Crassula pyrifolia Compton



pl. 9

Status: LC

Description: Perennial, with more or less rigid stilt roots. Stems decumbent to scrambling, slightly woody, up to 0.4 m long. Leaves sessile, lanceolate to oblanceolate 1.5–3 mm wide, apices obtuse or acute, cylindrical in section, glabrous, green to yellowish green to brown. Flowers borne mainly in terminal clusters, cup-shaped; petals scarcely fused basally, white, often tinged red; stamens with black anthers (Tölken, 1985).

Rationale: Known from between 7 and 14 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Sandy depressions; lower slopes; south-facing granite slopes with quartz corridors and granite and quartzitic gravel; 40° slope; associated with lichens and high succulent diversity (Tölken, 1985; WIND, 2002); 50–500 m.

Threats: One sub-population at least potentially threatened by intensive mining activities.

Additional notes: Common (WIND, 2002); also occurs in South Africa (Tölken, 1985).

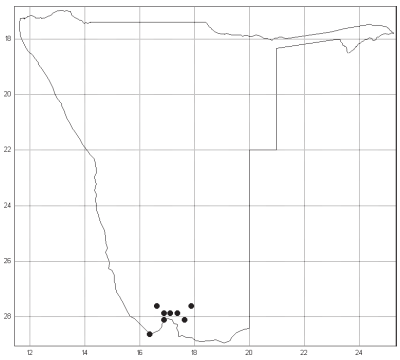
Crassula garibina Marloth & Schönland subsp. *garibina*

Crassula garibina Marloth & Schönland

pl. 10

Status: LC

Description: Perennial. Stems usually decumbent, up to 0.25 m long, brittle. Leaves brittle, linear-lanceolate, 20–40 x 3–6 mm, abruptly constricted into usually acute apices, flat or



slightly convex above but strongly convex below in section, glabrous, grey-green to brownish, densely covered with club-shaped hairs. Inflorescence densely hairy, rounded with one to several flower clusters. Flowers tubular, often half hidden by leaves below; petals fused basally for up to 1.5 mm, off-white to cream; stamens with brown anthers (Tölken, 1985).

Rationale: Known from between 4 and 8 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Rock crevices in granite or quartzite outcrops; among boulders on exposed east-facing slopes; spreading and low growing on rocky ridges in quartzitic gravel and semi-shade (Tölken, 1985; WIND, 2002); 500-800 m.

Threats: Mining; agriculture; habitat destruction coupled with increased human population along Orange River may potentially threaten some sub-populations, but this has not been ascertained.

Additional notes: Found on both sides of lower Orange River (Tölken, 1985).

Crassula luederitzii Schönland

E

Status: R

Description: Perennial, rarely up to 150 mm high when flowering. Leaves in rosettes with leaf pairs in four ranks, oblong-oblanceolate, 10–30 x 10–20 mm, apices obtuse, dorsiventrally flattened in section, glabrous except for cilia, green to reddish brown, often with reddish spots. Inflorescence a round head with stalked to subsessile flowers. FLowers tubular; petals basally fused, white; stamens with black anthers (Tölken, 1985).

Rationale: Suspected to occur in between 3 and 6 sub-populations and locations; no significant continuing decline in number of mature plants known.

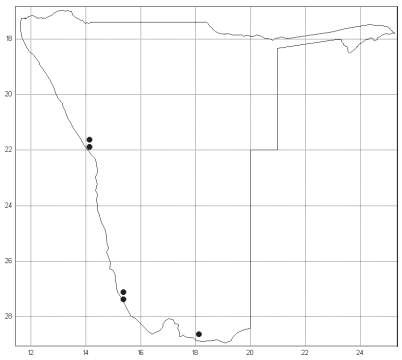
Habitat: Isolated outcrops in mountains under rock faces; sheltered slopes in shade; usually on south-west facing slopes (Tölken, 1985); 1000–1500 m.

Threats: None currently known.

Additional notes: No specimens in either WIND or PRE; no

accurate locality data available to produce map; grows on isolated outcrops between Witpütz and Aus.

Crassula mesembrianthemopsis Dinter



pl. 10

Status: LC

Description: Perennial, characteristically growing flat on ground so that leaves are just visible above sand, often right up against rocks. Leaves in dense rosettes, wedge-shaped to almost obpyramidal, 10–20 x 3–6 mm, usually as thick as broad to almost triangular in section, apices truncate, gradually tapering towards base, covered with papillae especially on exposed surfaces, green to brown or grey-green. Inflorescence round-topped and compact, partially hidden by leaves below. Flowers tubular, petals basally fused, white to cream; stamens with yellow anthers (Tölken, 1985; Mannheimer, 2003, pers. comm.).

Rationale: Known from between 6 and 12 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Dark grey dolomite ridges; 163–324 m; very gentle slope; sand between rocks; windblown sand at base of south-facing rose quartz hill; quartzite ridge, quartzite gravel on gentle, north-facing slope; amongst agate rocks in sand; surface limestone; associated with *Psammophora* species, lichens (Tölken, 1985; WIND, 2002).

Threats: Succulent collecting may be a potential threat, but this has not been ascertained.

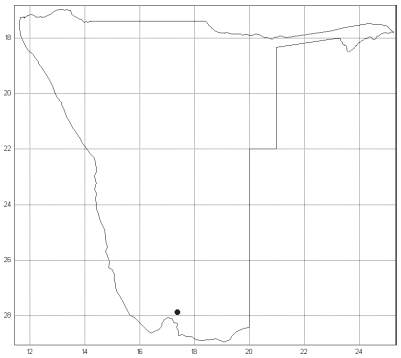
Additional notes: Also occurs in South Africa; localities widely separated; difficult to find (Tölken, 1985).

Crassula namaquensis Schönland & Baker f. subsp. *namaquensis*

Crassula namaquensis Schönland & Baker f.
Crassula namaquensis Schönland & Baker f. var. *brevifolia* Schönland

Status: R

Description: Perennial. Stems short. Leaves in basal rosettes, broadly to narrowly elliptic to oblanceolate or oblong, 15–25 mm long, dorsiventrally flattened but usually slightly convex



on both surfaces in section, densely covered with coarse recurved and adpressed hairs and without cilia, grey-green to blue-green. Inflorescence normally consisting of 3–5 spherical parts. Flowers tubular, petals basally fused, white or cream; stamens with black anthers (Tölken, 1985).

Rationale: Known from 1 or 2 sub-populations and locations.

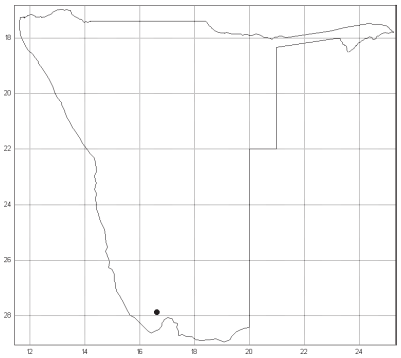
Habitat: Gravelly slopes; rock outcrops; steep rocky slope, at water hole (Tölken, 1985; WIND, 2002).

Threats: Restricted range but no threats currently known.

Additional notes: Known from single specimen in Namibia; also occurs in South Africa (Tölken, 1985; WIND, 2002).

Crassula nemorosa (Eckl. & Zeyh.) Endl. ex Walp.

Crassula coerulescens Schönland
Crassula confusa Schönland & Baker f.
Crassula nivalis (Eckl. & Zeyh.) Endl. ex Walp.



pl. 10

Status: R

Description: Delicate perennial herb. Stems erect or decumbent, 40–100 mm long. Leaves usually in more than 3 pairs, broadly ovate, 3–15 x 4–13 mm, apices usually rounded, margins entire, somewhat fleshy, glabrous, grey-green or greyish brown, often with brown lines; petioles 3–15 mm long. Inflorescence loose, often spike-like. Flowers star- to cup-shaped; petals scarcely fused at base, pale yellowish-green often with brown stripes; stamens with yellow anthers (Tölken, 1985).

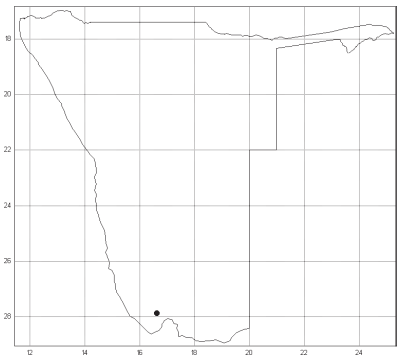
Rationale: Known from between 1 and 3 sub-populations and locations.

Habitat: Shallow soil; under overhanging rocks in shade; usually in rock crevices (Tölken, 1985; WIND, 2002).

Threats: Restricted range but no threats currently known.

Additional notes: One specimen collected in the 1970s in Namibia, but also occurs in South Africa (WIND, 2002).

Crassula numaisensis Friedrich



E

Status: R

Description: Annual. Stems spreading, up to 80 mm long, glabrous. Leaves sessile to sub-petiolate, obovate, 6–15 x 4–10 mm, glabrous, almost membranous, green. Inflorescence rounded with several flower clusters. Flowers cup-shaped; petals scarcely basally fused, white; stamens with yellow anthers (Tölken, 1985).

Rationale: Known from between 2 and 4 sub-populations and locations.

Habitat: Shaded places under overhanging granite rocks (Tölken,1985); 900–1200 m.

Threats: Restricted range but no threats currently known.

Additional notes: Miniscule plant that could easily be overlooked and therefore under-collected.

Crassula oblanceolata Schönland & Baker f.

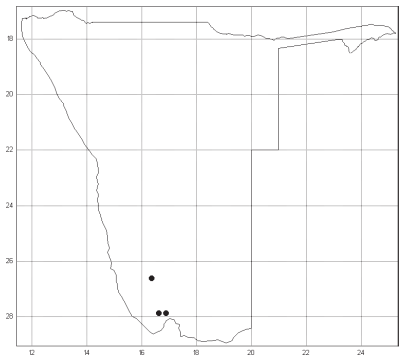
Crassula lambertiana Schönland

Status: LC

Description: Annual. Stems erect, rarely decumbent, 60–120 mm long. Leaves sessile, oblanceolate to narrowly elliptic, 5–8 x 1–4 mm, dorsiventrally flattened in section, glabrous, slightly fleshy, yellowish-green to red. Flowers cup-shaped; petals scarcely basally fused, white, often tinged red; stamens with yellow anthers (Tölken, 1985).

Rationale: Known from between 3 and 6 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Sand in riverbeds; mostly in damp soil in shady areas under overhanging rocks in mountains; in deep gorges;



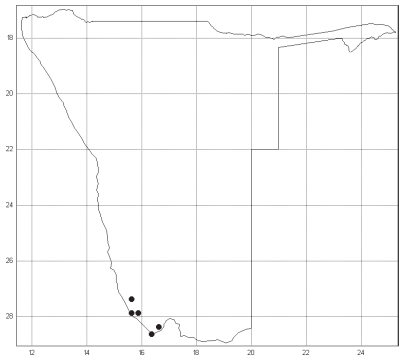
associated with granite (Tölken, 1985; (WIND, 2002).

Threats: None currently known.

Additional notes: Normally grow in dense stands; locally common; often form small lawns or stands (WIND, 2002); also occurs in South Africa (Tölken, 1985); may be under collected.

Crassula plegmatoides Friedrich

Crassula pseudocolumnaris Dinter



pl. 10

Status: LC

Description: Perennial, usually with only one main stem. Stems erect, sometimes becoming decumbent with age, up to 150 mm long. Leaves broadly ovate, 5–8 x 7–13 mm, apices blunt, strongly concave above and convex below in ssection, closely clasping around stem to form four-angled column, densely covered with rounded papillae and short coarse cilia, brownish, rarely grey-green. Inflorescence loose, round; peduncle 30–60 mm long, covered with recurved hairs. Flowers tubular; tepals fused basally, cream fading to brown; stamens with brown anthers (Tölken, 1985; Mannheimer, 2003, pers. comm.).

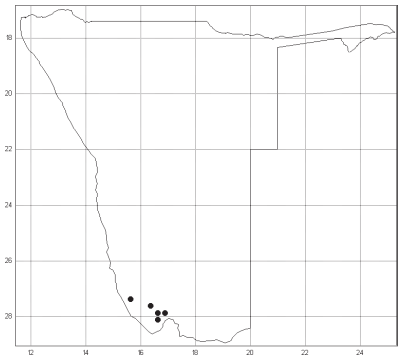
Rationale: Known from between 6 and 12 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Gentle slopes, usually in quartzite gravel towards the summit of hills; rocky, gravelly plains in sand with low succulent dwarf-shrubby vegetation; rocky outcrops; south-west-and northwest-facing slopes in dolomite and grey schist (Tölken, 1985; WIND, 2002); 100–300 m.

Threats: None currently known.

Additional notes: Very delicate plants with horticultural potential (WIND, 2002); also occurs in South Africa (Tölken, 1985).

Crassula pseudohemisphaerica Friedrich



pl. 10

Status: LC

Description: Perennial, up to 0.2 m high when flowering. Leaves in rosettes, adpressed and four-ranked, obovate to orbicular, 8–30 x 10–35 mm, apices acuminate or mucronate, dorsiventrally flattened in section, scarcely fleshy, glabrous except for dense row of recurved cilia, green to yellowish green to brown and usually with red spots. Inflorescence elongated, usually with many flower clusters. Flowers tubular; petals fused basally, pale yellow, often tinged with brownish red; stamens with yellow anthers (Tölken, 1985).

Rationale: Known from between 4 and 8 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Shaded areas usually on south-facing slopes; often associated with larger rocks or rock faces; sheltered spots of rock crevices on upper slopes and summits of mountains and hills; sandstone and quartzite gravel; full sun on gentle, north-facing slope (Tölken, 1985; WIND, 2002); 50–200 m.

Threats: None currently known.

Additional notes: Locally common (WIND, 2002); considerable variation in size and shape of plants; also occurs in South Africa (Tölken, 1985); horticultural potential (Mannheimer, pers. comm. 2003).

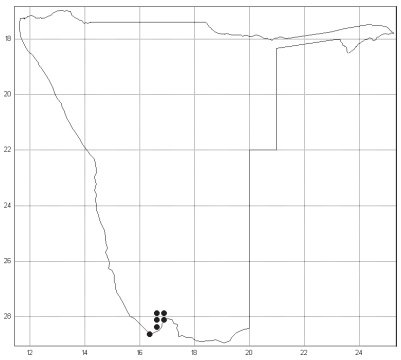
Crassula rupestris Thunb. subsp. *commutata* (Friedrich) Tölken

Crassula commutata Friedrich

pl. 10

Status: LC

Description: Perennial shrublets, up to 0.5 m high, usually much branched. Leaves oblong to lanceolate, 5–10 x 3–4 mm, apices acute to pointed, scarcely fused basally, flat or concave above, strongly convex below in section, glabrous, glaucous,



green to reddish brown to purple in parts and with red or yellow horned margin. Inflorescence rounded. Flowers tubular; petals basally fused, white and tinged pink or red; stamens with brown anthers (Tölken, 1985).

Rationale: Known from between 6 and 12 sub-populations and locations; no significant continuing decline in number of mature plants known.

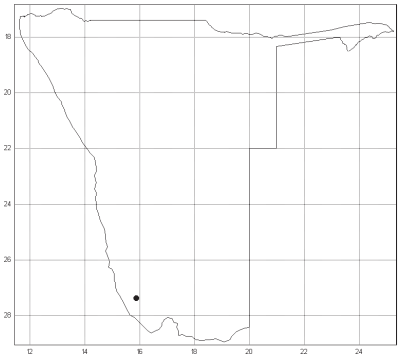
Habitat: Restricted to west-facing mountain slopes near the Orange river mouth; usually on south-facing rocky slopes or among boulders in kloofs; gentle to steep southwest-facing slopes, ridges and outcrops in full sun; heavily weathered schist, granite and dolomite (Tölken, 1985; WIND, 2002); 100–1100 m.

Threats: Mining may be a potential threat to at least one sub-population, but this has not been ascertained.

Additional notes: Locally occasional to common (WIND, 2002); also occurs in South Africa (Tölken, 1985);

Crassula thunbergiana Schult. subsp. *minutiflora* (Schönland & Baker f.) Tölken

Crassula minutiflora Schönland & Baker f.



Status: R

Description: Annual. Stems decumbent, wiry. Leaves sessile, lanceolate to narrowly elliptic, 2–6 x 1–1.5 mm, apices blunt, covered with blister-like papillae, flat above and usually strongly convex below in section, fleshy, yellowish green to brownish red. Flowers cup shaped; petals scarcely fused basally, white turning brown (Tölken, 1985).

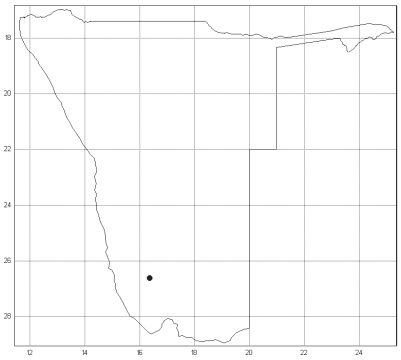
Rationale: Known from between 1 and 3 sub-populations and locations.

Habitat: Sandy soil; dry riverbed; north-facing slope (Tölken, 1985; WIND, 2002); 1100–1500 m.

Threats: Restricted range but no threats currently known.

Additional notes: May be under-collected (WIND, 2002); also occurs in South Africa (Tölken, 1985).

Tylecodon aridimontanus G.Will.



E

Status: NT

Description: Succulent, ca. 45 mm high. Stems up to 3, occasionally rebranching toward apex; younger branches with flat leaf-scars but lacking phyllopodia. Leaves on dwarf shoots at various intervals on stem, usually arranged in threes, sessile, narrowly ovate to elliptical, 4–5 x 3–4 mm, apices subacute to acute, longitudinally folded, densely covered with minute, white, glandular hairs. Peduncle 10–12 mm long. Flowers ca. 12 mm long; sepals dark olive-green; corolla tube cylindrical, pea-green with dense white hairs on outer surface, 11 x 4.5 mm; corolla lobes shiny pinkish-lilac, recurved (Williamson, 1995).

Rationale: Known from 1 or 2 sub-populations and locations; AOO estimated to be smaller than 20 km^2.

Habitat: 1000 m, facing extreme, sandblasting winds; south-west-facing slopes; receives condensation from fog; with *Conophytum klinghardtense* subsp. *klinghardtense*, geophytes and *Aloe erinacea* (Williamson, 1995); 600–1000 m.

Threats: Restricted range; succulent collecting a potential threat.

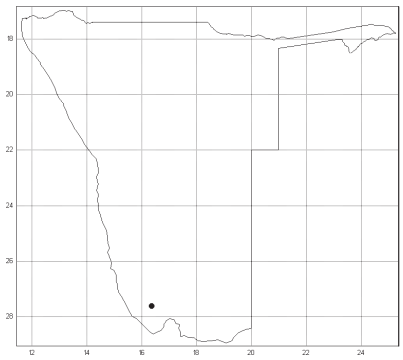
Additional notes: Recent discovery; flower colour similar to that of *T. aurusbergensis* (Williamson, 1995); no specimens in WIND.

Tylecodon aurusbergensis G.Will. & Van Jaarsv.

E pl. 10

Status: NT

Description: Perennial dwarf succulent. Stems single, rarely two, erect, woody, up to 80 mm high, covered with distinct light phyllopodia, lower portion dark grey, upper part pow-



dery white giving frosted appearance. Leaves clustered terminally, dark green, ovate to ovate-spatulate, 10–15 x 8–10 mm and ca. 2 mm thick, densely hairy. Inflorescence with 1–3 flowers; peduncle 8–20 mm long, purplish-brown. Flowers hairy; corolla tube light green, cylindrical, up to 12 mm long; corolla lobes pink to lilac-pink, strongly recurved with longish hairs; anthers purplish-brown, curved at right angles (Williamson, 1992).

Rationale: Known from between 2 and 5 sub-populations and locations; AOO estimated to be less than 20 km^2.

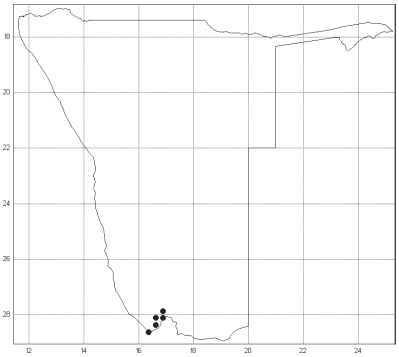
Habitat: Vertical cliffs on south-facing slopes near summit in well protected spots; with *Holothrix filicornis*, *Aloe erinacea*, *Conophytum ernianum*, several *Crassula* species and other succulent vegetation; area receives considerable fog precipitation (Williamson, 1992); 900–1082 m.

Threats: Restricted range; succulent collecting at least a potential threat.

Additional notes: Attractive with horticultural potential.

Tylecodon buchholzianus (Schuldt & Stephens) Tölken subsp. *buchholzianus*

Cotyledon buchholziana Schuldt & Stephens



pl. 10

Status: LC

Description: Perennial, with somewhat swollen, irregular base, much branched. Stems usually with pale brown to grey flaking bark, up to 0.3 m long. Leaves linear, 5–15 x 2–3 mm, apices cuneate, cylindrical or slightly grooved above in section, usually curved upwards, glabrous, usually dull green, often with brown striations. Inflorescence with 1 or 2 flowers, glabrous or almost so. Flowers glabrous outside, pink to deep

red; corolla tube cylindrical, 10–13 mm long, fine hairs in throat; corolla lobes recurved (Tölken, 1985).

Rationale: Known from between 6 and 12 sub-populations and locations; no significant continuing decline in number of mature plants known.

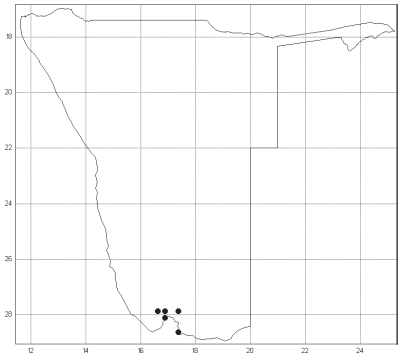
Habitat: Dolomite outcrops in protected and exposed rock crevices; mid-slope, 300–600 m (WIND, 2002).

Threats: Mining a threat to one sub-population.

Additional notes: Densely clumped (WIND, 2002); shape and size of leaves show considerable variation and never develop in some plants; also occurs in South Africa (Tölken, 1985).

Tylecodon hallii (Tölken) Tölken

Cotyledon hallii Tölken



pl. 11

Status: LC

Description: Perennial. Stems fleshy, up to 60 mm in diameter at base, up to 0.25 m long, much branched towards apices, usually with dark grey flaking bark. Leaves linear to lanceolate, 8–35 x 3–5 mm, cylindrical, sometimes with groove on upper surface in section, with minute glandular hairs to glabrous, yellowish-green to brown. Peduncle 15–35 mm long. Flowers with glandular hairs, yellowish green and brown-tinged; corolla tube cylindrical, 10–14 mm long, with scattered hairs inside; corolla lobes erect to somewhat recurved (Tölken, 1985).

Rationale: Known from between 10 and 20 sub-populations and locations; no significant continuing decline in number of mature plants known.

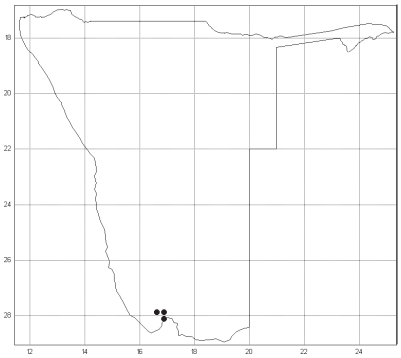
Habitat: Bare, gravelly, lower slopes; in quite exposed positions (Tölken, 1985); dry, west-facing slopes; 700–832 m; rock crevices; ridges; white quartzite and dolomite (WIND, 2002).

Threats: Succulent collecting may be a potential threat; habitat of one sub-population damaged by development of infrastructure.

Additional notes: Locally common (WIND, 2002); also occurs in South Africa (Tölken, 1985); an attractive succulent with horticultural potential.

Tylecodon racemosus (Harv.) Tölken

Cotyledon chloroleuca Dinter ex Friedrich



Status: R

Description: Succulent perennial. Stems few, erect, up to 0.4 m high, bark pale brown and peeling with age. Leaves linear to obovate, 20–45 x 5–25 mm, cylindrical or slightly grooved to dorsiventrally flattened in section, hairy to glabrous, green to grey-green. Peduncle 30–50 mm long, green. Flowers with minute glandular hairs to glabrous; corolla tube cylindrical but slightly broadened at mouth, 7–10 mm long, glabrous inside, pale green; corolla lobes recurved, white and pink-tinged (Tölken, 1985).

Rationale: Known from between 3 and 6 sub-populations and locations.

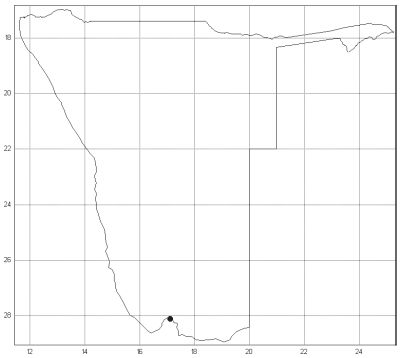
Habitat: Lower gravelly slopes; often in somewhat sheltered localities such as ravines or larger rock outcrops; rock crevices on almost vertical cliffs in ravines (Tölken, 1985; WIND, 2002); 200–1000 m.

Threats: Restricted range but no real threats currently known.

Additional notes: Occurs in a nature reserve (WIND, 2002); considerable variation in size and shape of leaves and amount of hairiness in different populations; also occurs in South Africa (Tölken, 1985).

Tylecodon singularis (R.A.Dyer) Tölken

Cotyledon singularis R.A.Dyer



pl. 11

Status: R

Description: Perennial succulent. Leaves single, rarely two, shortly petiolate, hairy, orbicular, 50–80 mm in diameter, bases deeply cordate, apices rounded, dorsiventrally flattened in section, green with paler veins above, pale purple below. Peduncle 150–350 mm long. Flowers pale yellowish-green; corolla tube almost cylindrical but slightly widened at mouth, 10–13 mm long, hairy; corolla lobes recurved or recoiled later (Tölken, 1985).

Rationale: Known from 2 or 3 sub-populations and locations.

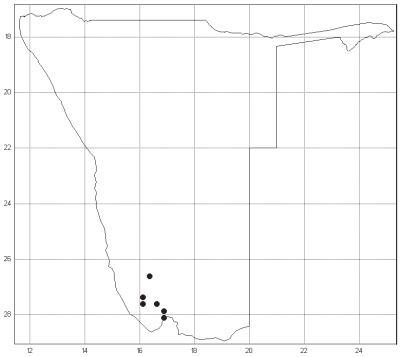
Habitat: Only known to grow in rock crevices, often on rock faces (Tölken, 1985); 800–1100 m.

Threats: Restricted range but no threats currently known.

Additional notes: Also occurs in South Africa (Tölken, 1985); no specimens in WIND.

Tylecodon wallichii (Harv.) Tölken subsp. *ecklonianus* (Harv.) Tölken

Cotyledon dinteri Baker f.
Cotyledon eckloniana Harv.



pl. 11

Status: LC

Description: Much branched perennial. Stems erect, up to 0.8 m high, with elongated phyllopodia that are rarely completely replaced by peeling bark. Leaves linear, 60–120 x 1.5–3 mm, cylindrical or slightly grooved above in section, glabrous or rarely hairy, grey-green to grey-brown. Peduncle up to 0.6 m long. Flowers yellowish-green, glabrous or with scattered glandular hairs; corolla tube cylindrical, 5–8 mm long; corolla lobes recurved or recoiled (Tölken, 1985; WIND, 2003).

Rationale: Known from between 14 and 20 sub-populations and locations; no significant continuing decline in number of mature plants known.

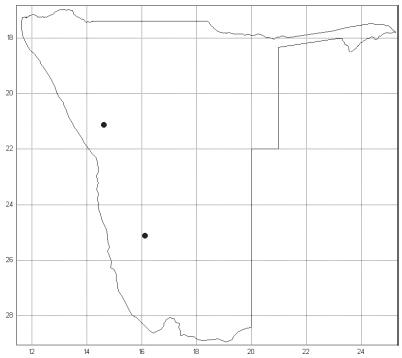
Habitat: Moderate, lower, east-facing, rocky slopes; in quartzite gravel (WIND, 2002).

Threats: None currently known.

Additional notes: Common name: *kandelaarbos* (Afrikaans). Reported as very poisonous, causing sheep losses; common. (WIND, 2002); also occurs in South Africa (Tölken, 1985).

CUCURBITACEAE

Cucumella clavipetiolata J.H.Kirkbr.



E

Status: LC

Description: Dioecious perennial creeper. Stems with short stiff hairs bent or directed upward or forward. Leaves up to 5-lobed, very broadly ovate, up to 30 x 30 mm, bases cordate, margins strongly waved, with short stiff hairs above and on veins below; petioles club-shaped; tendrils 15–35 mm long. Flowers small, yellow; male flowers solitary or clustered, sessile, bell-shaped, ca. 4 mm long; female flower solitary, floral tube hour-glass shaped, ca. 3 mm in diameter. Fruit globose to ellipsoid; ca. 15–20 mm long, 15 mm in diameter, blunt at apex; fruit wall thin, with sparse, long stiff hairs; seeds ovate, smooth (Kirkbride, 1994).

Rationale: Known from between 4 and 8 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Steep slopes on escarpment in semi-shade; slopes and plateau of great Gamsberg; 1900–2332 m altitude (WIND, 2002).

Threats: None currently known.

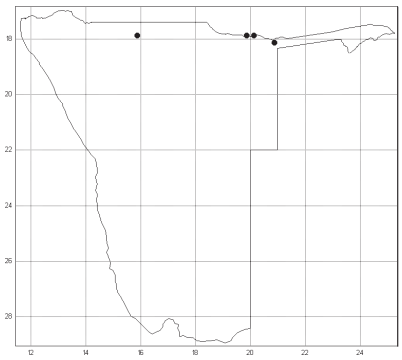
Additional notes: Rare (WIND, 2002); club-shaped petioles, thin fruit wall and lack of prickles on fruit distinguish this species from *C. aspera* (Cogn.) C. Jeffrey (Kirkbride, 1994).

CYPERACEAE

Volkiella disticha Merxm. & Czech

Status: NT

Description: Small, tufted annual. Stems bristly, 0–25 mm high, with basal nodes. Leaves basal; sheath closed, adaxial apex truncate; lamina without keeled midrib, profile crescentiform. Inflorescence with 2–4 spikes; subtending bracts erect, very long; spikes 5–6 x 3.5 mm, laterally compressed. Spikelet bracts in two opposite rows in same plane, 2.5–4 mm long, ending in awn some 1–7 mm long; stamens 2; style short, branches 3, 2–



3 times as long as nutlet. Nutlet yellow-brown, obovate, three-angled, 1 mm long, papillate (Archer, 2000).

Rationale: EOO estimated to be smaller than 25000 km^2; known from between 4 and 8 sub-populations and locations; suspected continuing decline in number of mature plants and quality of habitat.

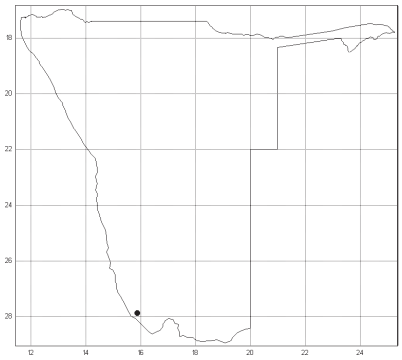
Habitat: River terrace; depression; drying pan with black clay in centre and white sand around margin; associated with northern Kalahari riverine vegetation (WIND, 2002); 1000–1095.

Threats: Over grazing, over-utilization of water resources and trampling.

Additional notes: Common; plants largely underground, with only leaves penetrating above soil level (WIND, 2002); also occurs in south tropical Africa (Archer, 2000).

ERIOSPERMACEAE

Eriospermum buchubergense Dinter



E

Status: R

Description: Geophyte. Leaves solitary; leaf sheath wiry, 50 mm long, basally softly hairy; lamina elliptic, 20 x 10 mm, glabrous. Peduncle 60 mm long; peduncular bract 40 mm long, brown, membranous, apiculate, covered in short hairs. Inflorescence dense, with pedicels up to 50 mm long (Perry, 1994).

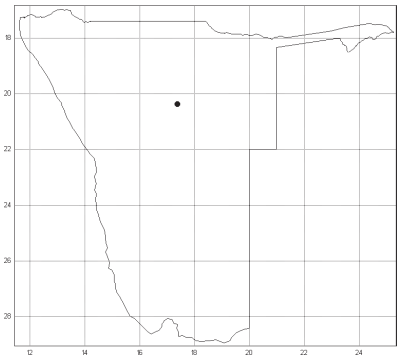
Rationale: Known from 1 to 2 sub-populations and locations.

Habitat: Narrow cleft of mica schist hill on east-facing slope in coastal desert (Perry, 1994).

Threats: Restricted range but no threats currently known.

Additional notes: Known from type specimen only, from which bulb and flowers were absent (Perry, 1994); no specimens in WIND.

Eriospermum citrinum P.L.Perry



E

Status: R

Description: Geophyte. Leaves solitary, appearing after flowers; lamina erect to spreading, densely hairy at base, broadly ovate to orbicular-cordate, up to 85 x 105 mm, dark green above, surface green with silvery sheen below, thick, tough and leathery. Inflorescence a raceme, ca. 300 mm high, with ca. 25 flowers. Flowers bell-shaped, 10–12 mm across; tepals subequal, pale lemon yellow with green midnerve (Perry, 1994).

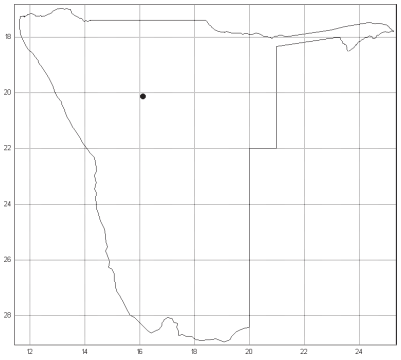
Rationale: Known from 1 or 2 sub-populations and locations.

Habitat: Upper, south-facing, slopes, in shade of woodland and krantzes, amongst sandstone outcrops and boulders" (Perry, 1994).

Threats: Restricted range but no threats currently known.

Additional notes: Occurs in a nature reserve (Waterberg Plateau Park); no specimens in WIND.

Eriospermum flexum P.L.Perry



E

Status: R

Description: Geophyte. Leaves small, solitary, appearing after flowers; sheath wiry, frequently kinked or spiralled, dark reddish at base becoming glaucous above, lamina held vertically, obovate or elliptic to orbicular, up to 34 x 25 mm, glaucous, somewhat thick, tough and leathery, glabrous, margin yellow. Inflorescence up to 50 mm high, with up to 20 flowers. Flowers spreading to recurved, 9–10 mm in diameter; tepals subequal, white with pale green midnerve overlaid with red streaking (Perry, 1994).

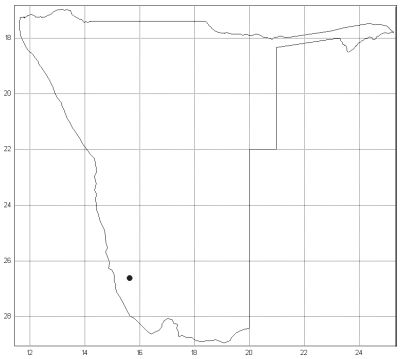
Rationale: Known from 1 or 2 sub-populations and locations.

Habitat: On top of a limestone ridge, with grasses as the only other vegetation (Perry, 1994).

Threats: Restricted range but no threats currently known.

Additional notes: Known from only one collection (WIND, 2002); no specimens in WIND.

Eriospermum halenbergense Dinter



E

Status: VU D2

Description: Geophyte. Leaves solitary, suberect, appearing after flowers; sheath covered with straight hairs; lamina orbicular-cordate to broadly ovate, up to 25 x 35 mm, somewhat fleshy, sparsely hairy above, pubescent below, margin somewhat crisped to crenate and thickened. Inflorescence conical, lax, 130 mm high, with 9–18 flowers. Flowers small, cup-shaped; tepals free, equal to sub-equal, elliptic, ca. 4 x 1.5 mm, whitish with green midnerve; filaments flat, triangular (Perry, 1994).

Rationale: Known from 1 or 2 sub-populations and locations.

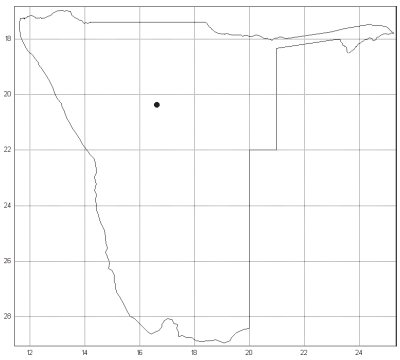
Habitat: Coastal desert, on gravelly, sandy plain; northwest-facing side of a group of hills (Perry, 1994).

Threats: Restricted range; vehicle disturbance.

Additional notes: Rare (WIND, 2002).

Eriospermum lavranosii P.L.Perry

E



Status: R

Description: Geophyte. Leaves solitary, prostrate, appearing after flowers; sheath hairy; lamina broadly orbicular, deeply cordate, up to 54 x 28 mm, glaucus above, densely hairy, sparsely hairy below. Inflorescence lax, up to 175 mm high, with 10–18 flowers. Flowers bell-shaped to spreading or upper half recurved, opening in the afternoon, up to 8 mm across; tepals subequal, basally greenish-yellow, upper part lemon yellow with green midnerve (Perry, 1994).

Rationale: Known from 1 or 2 sub-populations and locations.

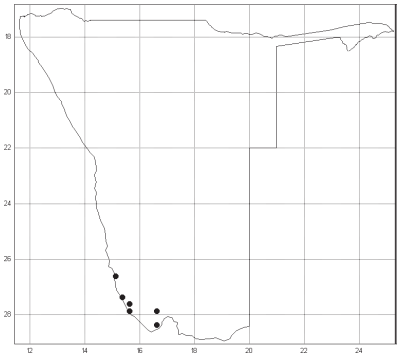
Habitat: Cracks in crystalline limestone (Perry, 1994).

Threats: Restricted range but no threats currently known.

Additional notes: No specimens in WIND; seems to be a poorly known species.

EUPHORBIACEAE

Euphorbia angrae N.E.Br



E C2 pl. 11

Status: LC

Description: Dwarf succulent shrub, densely branched from base, up to 120 mm high and 150 mm in diameter. Stems with short joints up to 25 x 6 mm, glabrous, constricted at nodes. Leaves deciduous, scale-like, ca. 1.5 x 2.5 mm, fleshy, reddish-brown. Inflorescence bearing 1–3 bisexual flowers; involucre cup-shaped, ca. 3 mm in diameter with 5 yellow, almost kidney-shaped glands. Capsule, 3-lobed, glabrous, 4 mm in diameter (Williamson, 1996).

Rationale: Known from between 5 and 12 sub-populations and locations; no significant continuing decline in number of mature plants known.

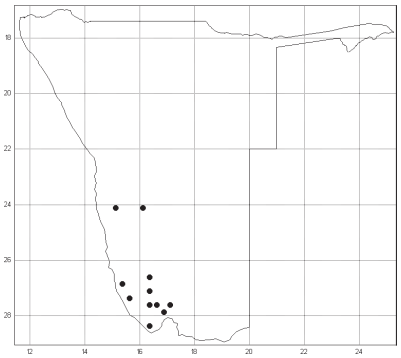
Habitat: Gentle mid-slopes with rock and yellow dune sand (WIND, 2002); quartz or schist outcrops within coastal fog zone (Williamson, 1996); 5–152 m.

Threats: Mining activities at least a potential threat to one sub-population.

Additional notes: Occasional to very abundant (WIND, 2002).

Euphorbia cibdela N.E.Br.

Euphorbia pseudobrachiata Dinter



C2

Status: LC

Description: Dioecious dwarf shrub, up to 0.6 m high, branching from base and above, Stems initially succulent, becoming woody when mature, then dying off, all stems straight, grey yellowish-green after rains, becoming pink as dry season progresses; secondary stems opposite, diverging from each other at ca. 50°, becoming shorter with each forking until outer stems are very short and truncate. Leaves opposite, very fleshy, even persistent on dead branches, red to black, more or less triangular, 1 x 1 mm. Flowers solitary and terminal or in terminal and lateral, shortly pedunculate cymes, with leaf-like bracts at bases. Capsule subsessile, subglobose, obscurely 3-lobed, ca. 3.5 mm in diameter (Williamson, 1996).

Rationale: Known from between 10 and 20 sub-populations and locations; no significant continuing decline in number of mature plants known.

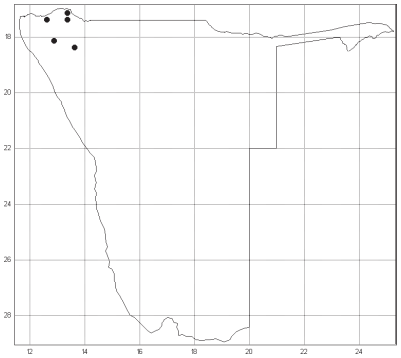
Habitat: Moderate, north- or east-facing slopes; rocky outcrops; steep rocky ridges; flat areas on plateaus; valleys; sand pockets on black dolomite; loamy soil; quartz; areas with a stone and rock substrate (WIND, 2002); up to 800 m.

Threats: Mining may be a potential threat to 1 or 2 sub-populations but this has not been ascertained.

Additional notes:. Rare, occasional, often common but very localised (WIND, 2002); also occurs in South Africa (Williamson, 1996).

Euphorbia eduardoi L.C.Leach

Euphorbia conspicua sensu P.G.Meyer in FSWA



C2 pl. 11

Status: LC

Description: Succulent, spiny, candelabriform tree, up to 10 m high. Main stem unbranched with small crown of more or less whorled stems. Stems ascending, usually simple, slightly and unevenly constricted, ca. 75 mm in diameter, 4- or 5-angled (usually 5) with margins generally slightly wavy. Spines stout, 10–15 mm long, ca. 3 mm in diameter at base, straight or slightly curved, in diverging pairs (Leach, 1968).

Rationale: Known from between 9 and 10 sub-populations and locations; no significant continuing decline in number of mature plants known.

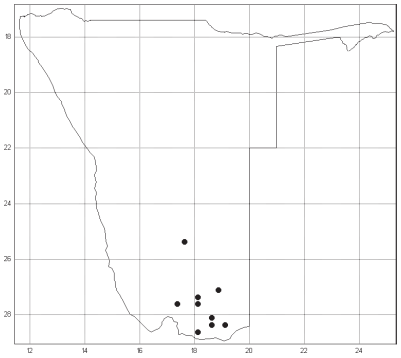
Habitat: Stony and rocky hills (Leach, 1968); both sides of a rocky ravine (Jacobsen, 1994); 450–550 m.

Threats: None currently known.

Additional notes: Common name: *Baumeuphorbie* (German). Thought to be fairly long-lived; also occurs in Angola (Leach, 1968).

Euphorbia friedrichiae Dinter

Euphorbia namaquensis N.E.Br.
Euphorbia multiramosa Nel



C2 pl. 12

Status: LC

Description: Dwarf succulent shrub, solitary, not forming

clumps, up to 300 mm high, up to 200 mm in diameter. Main stem ca. 100 mm thick, with numerous dense, tapering peduncles projecting beyond main plant body giving plant rugged, untidy appearance; stems prominently tuberculate, rebranch freely and in good years covered with small leaves. Leaves soon deciduous, narrowly linear, glabrous. Inflorescence with 1–3 bisexual flowers from tips of short, protected, young stems, usually low down on leeward aspect of plant; persistent peduncles present; glands 5, olive green, broadly triangular with basal lip-flap and 4–6 fine, yellow, triangular processes. Capsule sessile, globose, glabrous, distinctly 3-locular, 7 mm in diameter (Williamson, 1996).

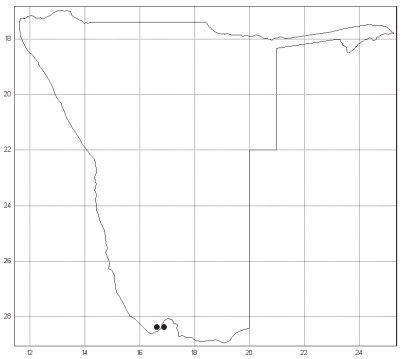
Rationale: Known from between 9 and 18 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Dry river valleys and other flat areas in full sun (WIND, 2002); 800–900 m.

Threats: None currently known.

Additional notes: Rare in one sub-population; also occurs in South Africa (Germishuizen & Meyer, 2003).

Euphorbia herrei White, Dyer & Sloane



C2 pl. 12

Status: NT

Description: Monoecious, miniature succulent, up to 120 mm high, spineless. Main stem thickened from which numerous segmented, erect to horizontal stems arise forming dense, rounded shrublet; stems sharply 4- or 5-angled, angles with slightly papillate ridges, older segments brownish-green with new growth maroon. Inflorescence consisting of one terminal, bisexual flower or up to 3 shortly pedunculate, lateral flowers; peduncle with 2–4 minute bracts; glands 5, yellow-orange to dark maroon. Capsule subglobose, glabrous, 2.5 mm in diameter, brown to maroon-black with red streaks, exerted on slender, recurved , yellowish to red pedicel (Williamson, 1996).

Rationale: Known from between 3 and 6 sub-populations, number of locations unknown; past population reduction suspected; no significant continuing decline in number of mature plants known.

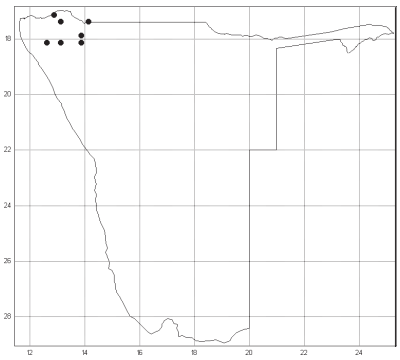
Habitat: Grey-blue to black schistose rocky outcrops; quartzitic depressions (Williamson, 1996); 10–125 m.

Threats: Mining at least a potential threat to 3 sub-populations; restricted range.

Additional notes: Common but very localised; associated vegetation includes *Lithops herrei* L. Bolus and *Astridia citrina* (L. Bolus) L. Bolus; also occurs in South Africa (Williamson, 1996).

Euphorbia kaokoensis (White, Dyer & Sloane) L.C.Leach

Euphorbia subsalsa Hiern. subsp. *kaokoensis* White, Dyer & Sloane



E C2 pl. 12

Status: LC

Description: Low, stout, dense, spiny shrub, up to 0.5 m high. Stems 20 mm thick, 5–7 ribbed. Spines brown at base of branches, but rufous towards branch apex, giving plant red crown when viewed from distance. Male flowers apparently persistent, forced away from axis by closely set bisexual lateral flowers (Leach, 1976; Jacobsen, 1994; WIND, 2003).

Rationale: Known from between 8 and 20 sub-populations; number of locations unknown; no significant continuing decline in number of mature plants known.

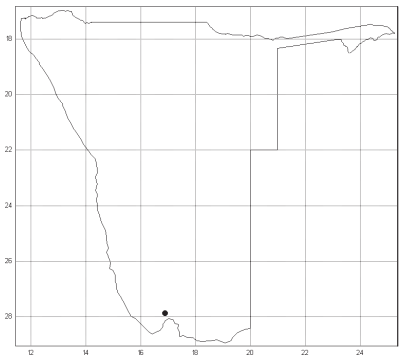
Habitat: Rocky slopes; crevices on flat rock slabs in mopane woodland (WIND, 2002); limestone ridges and rock fissures (Leach, 1976); stony soils and along rocky outcrops (Jacobsen, 1994); up to 770 m.

Threats: None currently known.

Additional notes: Occurs in colonies (WIND, 2002); arrangement of male flowers quite unusual in the group; spine pairs more closely set than those of *E. subsalsa* (often appearing to arise almost from common point while third, much shorter pair may be developed on or at base of upper pair); capsule slightly larger, often somewhat pointed, much darker coloured; seed longer (3 mm), more narrowly ovoid and somewhat pointed (Leach, 1976; Jacobsen, 1994).

Euphorbia lavrani L.C.Leach

E C2



Status: R

Description: Dioecious, much-branched, spineless dwarf shrub, up to 200 mm high. Stems rigid, succulent but become woody with age, cylindrical, with small tubercles arranged in pairs. Inflorescence a terminal cyme with numerous flowers. Flowers clustered; glands 4 or 5, yellow-green spreading, fleshy. Capsule glabrous, pale buff-coloured, obtusely 3-lobed, up to 2.5 mm long and 2.5 mm in diameter; seeds obscurely 4-angled, rugose (Leach, 1981).

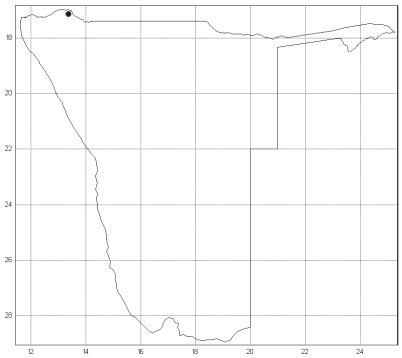
Rationale: Known from 1 or 2 sub-populations and locations.

Habitat: Limestone outcrops (Leach, 1981); ±1650 m.

Threats: Restricted range but no threats currently known.

Additional notes: No specimens in WIND; differs from *E. juttae* in its sub-woody, rigid branches tapering to very small apex, its sessile, strongly recurved, mostly arrow head-shaped, with divergent lobes at base, dark red, deciduous leaves and its clustered inflorescence covered with short soft hairs, in which smaller capsule is only partly exerted (Leach, 1981).

Euphorbia leistneri R.H.Archer



E C2 pl. 12

Status: VU D2

Description: Erect, woody to succulent shrub, glabrous, 1 m high, sparsely to abundantly branched. Main stem with prominent tubercles. Inflorescence usually 4 at branch tips. Capsule erect, deeply 3-lobed, 8 mm long and 10 mm in diameter; seeds light grey with prominent black spots (Archer, 1998).

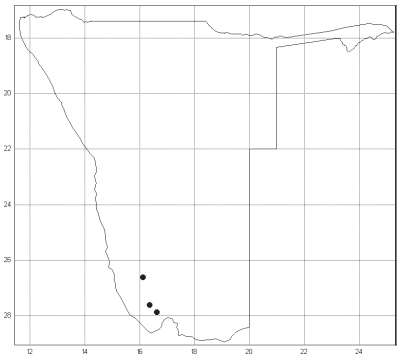
Rationale: Known from 1 or 2 sub-populations and locations.

Habitat: White calcareous soil (WIND, 2002); shallow soil with very coarse to fine rock particles with little clay or organic material (Archer, 1998); ± 1080 m.

Threats: Restricted range; succulent collecting; habitat destruction due to future development of hydro-electric scheme along Kunene river.

Additional notes: Superficially similar to *E. monteiroi* in its thick succulent branches with prominent tubercles, but involucral glands green and pitted, in contrast with red/purple glands with conspicuous processes of *E. monteiroi*; close in inflorescence and leaf structure to *E. transvaalensis* Schltr., but *E. leistneri* differs distinctly from this species in its thick succulent branches up to 70 mm in diameter, thick succulent segments formed by annual growth and prominent tubercles (Archer, 1998); a very attractive species.

Euphorbia melanohydrata Nel



C2 pl. 12

Status: LC

Description: Dwarf succulent, up to 230 mm high, main root often gives rise to clump of stems when older. Stems short, numerous, covering plant, cylindrical, ca. 20 mm long, covered with tubercles. Inflorescence a cyme with 2 or 3 sessile or pedunculate bisexual flowers at branch tips; peduncles persistent, 2- or 3-branched, giving a star-like appearance; involucre very shallowly cup-shaped; glands 5, well-separated, nearly square, dark olive green, ca. 3 mm long, with 3 cream to yellowish, hair-like processes on outer margin. Capsule sessile, distinctly 3-lobed, glabrous, ca. 6 mm in diameter, green becoming purplish-brown with age (Williamson, 1996).

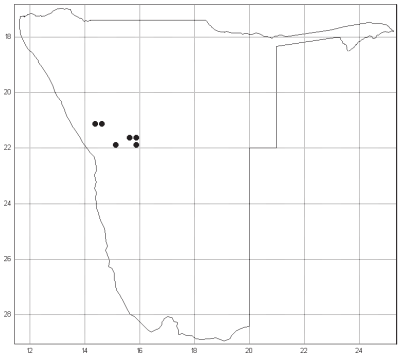
Rationale: Known from between 7 and 14 sub-populations, number of locations unknown; no significant continuing decline in number of mature plants known.

Habitat: Sandy plains with calcrete or quartzite in full sun (WIND, 2002); 50–250 m.

Threats: Mining has partially destroyed one sub-population; collecting may be a potential threat.

Additional notes: Sub-populations small and localised, frequent, occasional to common; also occurs in South Africa (Williamson, 1996; WIND, 2002).

Euphorbia monteiroi Hook.f. subsp. *brandbergensis* B.Nord.



E C2 pl. 12

Status: LC

Description: Glabrous, erect, succulent-stemmed perennial. Stems simple or sparingly branched above, usually 1–3 m high, up to 100–200 mm thick, leafless, with spirally arranged tubercles. Peduncles crowded apically, persistent after withering lower down, giving stem spiny appearance; glands 5, yellow or yellowish-green, with two short, tongue-shaped, lateral lobes ca. folded outwards. Capsule on curved, thick peduncle, slightly three-angled with rounded-obtuse angles, ca. 8 x 7 mm, glabrous, faintly reticulate (Nordenstam, 1974; Bruyns, 1992).

Rationale: Known from between 6 and 12 sub-populations and locations; no significant continuing decline in number of mature plants known.

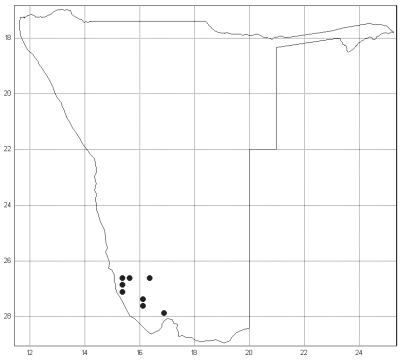
Habitat: On stony to rocky slopes; 1700–2573 m; sheltered area (Nordenstam, 1974; Bruyns, 1992; WIND, 2002).

Threats: Collecting may be a potential threat.

Additional notes: Subsp. *brandbergensis* generally much higher, with thicker main stem than subsp. *monteiroi*, which has nearly club-shaped stem normally only ca. 0.3 m high (rarely up to 1 m); subsp. *brandbergensis* has shorter peduncles (50–250 mm long), 5 instead of 4 yellow or greenish-yellow, not red glands (Nordenstam, 1974; Bruyns, 1992).

Euphorbia namibensis Marloth

Euphorbia argillicola Dinter



E C2 pl. 13

Status: LC

Description: Dwarf, spineless succulent producing numerous, short branches in upper half to two thirds of plant. Main stem globose, cream-coloured, up to 200 mm high and ca. 150 mm in diameter. Branches 20–60 mm long, ca. 10–15 mm thick, with prominent spirally arranged tubercles, tipped with whitish leaf scar. Leaves produced apically on young branches and only after good rains, soon deciduous, up to 30 mm long, linear and longitudinally folded. Inflorescence emerging in cluster on peduncles from branch tips; peduncles persistent, up to 10 mm long; involucre shallowly cup-shaped, ca. 8 mm in diameter; glands 5, well separated, dark olive-green, with 3 or 4 mildly recurving, simple, occasionally forked, yellowish processes. Capsule, 3-lobed, ca. 6 mm in diameter, pale brown when mature (Williamson, 1996).

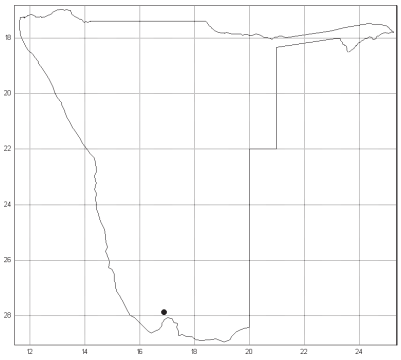
Rationale: Known from between 8 and 16 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Always on open windswept sandy places; gentle, northwest-facing slopes; sand in rock crevices; shallow sand on calcrete; in surface limestone; aeolian sand on granite; red sand; open and sparse dwarf scrub vegetation on plains (Williamson, 1996; WIND, 2002); 1000–1300 m.

Threats: Collecting may be a potential threat.

Additional notes: Rare, occasional, frequent, common (WIND, 2002); attractive succulent.

Euphorbia namuskluftensis L.C.Leach



E C2 pl. 12

Status: R

Description: Dwarf, dioecious succulent, much branched, spineless. Stems crowded, seldom more than 20 mm high, ca. 5mm thick, tuberculate, very slightly rough. Infloresence axillary, at branch tips. Flowers single, unisexual, borne on short peduncle, glabrous, green at base becoming purplish above, 2–3 mm long, ca. 3 mm in diameter; glands 5, erect, somewhat wedge-shaped, dark green. Capsule glabrous, subglobose, shallowly 3-grooved, dark brown (Leach, 1983).

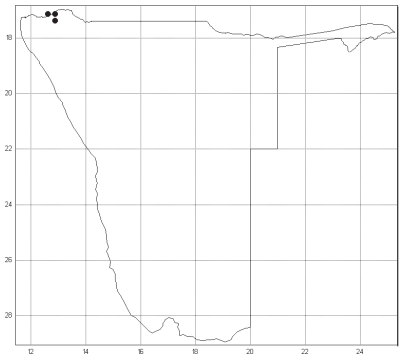
Rationale: Known from 1 sub-population and 1 location.

Habitat: White limestone outcrop; with *Euphorbia lavranii* (Leach, 1983), *Aloe erinacea* (Euphorbia Journal 3, 1985), *Ruschianthus falcatus* (Loots *et al*. pers. obs); 1200 m on a plateau (WIND, 2002).

Threats: Restricted range but no threats currently known.

Additional notes: Field assessment done recently; extremely localised (Loots *et al*. pers. obs).

Euphorbia otjipembana L.C.Leach



E C2 pl. 13

Status: R

Description: Succulent spiny subshrub with fresh green epidermis, usually less than 300 mm high, branched from base. Stems relatively stout, angular, with or without short branchlets, mostly towards branch tips, usually 150–200 mm long, 20–30 mm thick, constricted at base, usually slightly constricted into segments 20–50 mm long, 4–6-angled with angles compressed, sometimes wing-like, even or slightly sinuate margins. Spines paired, with horned spine shields. Inflorescence with 3 horizontally arranged flowers; involucre ca. cup-shaped; glands 5, fleshy, yellow, with upper surface lightly pitted, rugulose with narrow smooth margin. Capsule deeply 3-lobed, ca. 3 mm long and 3 mm in diameter (Leach 1976).

Rationale: Known from 1 or 2 sub-populations and locations.

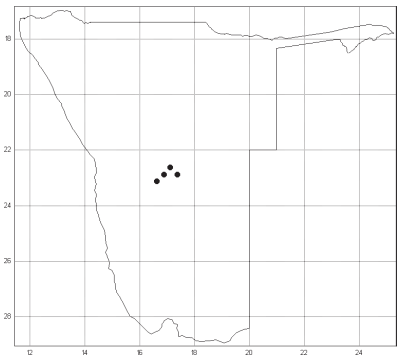
Habitat: Stony, east-facing slopes in dwarf mopane woodland in association with a *Cyphostemma* species (Leach, 1976); 1333 m.

Threats: Restricted range but no threats currently known.

Additional notes: Uncommon, scattered, rare, infrequent; not collected for 27 years (WIND, 2002); Smaller than *Euphorbia subsalsa* subsp. *fluvialis*, with leaves proportionally wider but much shorter, leaving narrow transverse scars; also similar to *E. kaokoensis* but *E. otjipembana* has quite different spines, particularly the much shorter down-curved upper pair of spines (Leach 1976).

Euphorbia pseudoduseimata White, Dyer & Sloane

C2 pl. 13



Status: NT

Description: Spineless dwarf succulent, up to 60 mm high. Stems rise at first to a little above ground level, producing few or several branches, then with age, due to injury or natural causes, growing tips die and up to four stem-like branches develop from below ground level, each with few aerial branches; aerial branches 25–75 long and 5–9 mm in diameter, with ca. 5 spirally twisted rows of prominent tubercles. Flowers solitary, 1–3 on branch tips; peduncles 3–5 mm long, some persistent. Involucre cup-shaped; glands 5, greenish-white, faintly spotted with red; lobes 5, subquadrate, margins ciliate. Capsule appear to be 3-lobed, 5–7 mm in diameter (White, *et al*., 1941).

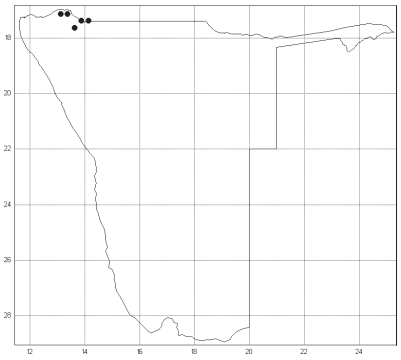
Rationale: Known from between 5 and 8 sub-populations and between 1 and 4 locations; no significant continuing decline in number of mature plants known.

Habitat: Quartzite plain; gravel on gentle north-facing slope in full sun in association with *Anacampseros* sp.; highland savannah vegetation;1800 m (Loots *et al*., pers. obs., 2002; WIND, 2002).

Threats: Succulent collecting at least a potential threat; insect herbivory on seeds: damage to capsules severe in some sub-populations observed; no recruitment in 2 sub-populations observed (White, *et al*., 1941; Loots *et al*., pers. obs., 2002).

Additional notes: Extremely rare in cultivation; extremely sensitive to excess watering (Schwartz & Lafon, 1985); attractive succulent.

Euphorbia subsalsa Hiern subsp. *fluvialis* L.C.Leach



C2 pl. 13

Status: LC

Description: Spiny shrub with robust habit, ca. 0.6 m high. Main stem stout, up to 50 mm thick; secondary branches develop randomly from angles of initial stem, densely branched and rebranched, strongly spiny, 4-angled, ca. 10 mm thick, grey-green. Spines strong, variable in length, lower pair ca. 10 mm long. Inflorescence pedunculate, with single axillary cymes of 3 horizontally arranged flowers; involucral glands suberect, separate, spreading, contiguous and concave. Capsule partially exerted, become brownish at early stage, but sometimes remain green almost up to dehiscence; seeds brownish, 2 mm long, heavily verrucose (Leach, 1976).

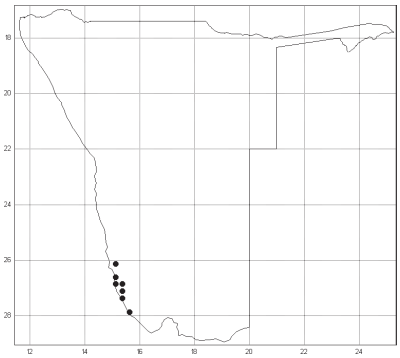
Rationale: Known from between 5 and 10 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Rocky sites on both banks of Kunene River, especially near falls and rapids (Leach, 1976); calcrete slopes of rocky hills and mountains under mopane bushes in sparse scrub mopane woodland; plains (WIND, 2002); ±1080 m.

Threats: None currently known.

Additional notes: Common name: *oháhí* (Otjiherero).
Locally abundant; also occurs in Angola (Leach, 1976, WIND, 2002); slightly smaller but more robust, rather greyish coloured shrubs more common on calcrete in sparse scrub mopane woodland on Namibian side of Kunene River; the flowers are slightly larger than those of *E. kaokoensis* and more orange in colour, the concave glands are almost red; fascicles of male flowers are very distinctly separate; see *E. kaokoensis* for more differences between the two species.

Euphorbia verruculosa N.E.Br.



E C2 pl. 13

Status: LC

Description: Dioecious, miniature succulent, up to 130 mm high, branching from base, mainly decumbent. Main stems up to 60 mm long, 6 mm thick, secondary branches 5–10 mm long, cylindrical, all branches finely but distinctly warty, grey but with new growth reddish to green. Inflorescence with shortly peduncled cymes of 1–3 unisexual flowers at young branch tips or at forks of older ones; involucre cup-shaped; glands 5, shiny, yellow to orange, entire. Capsule globose, slightly verrucose, brownish-green, ca. 4 mm in diameter, on short, decurved pedicel (Williamson, 1996).

Rationale: Known from between 8 and 16 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Very windy areas on west-facing slopes; gravelly hills; rocky outcrops; plains; sand; schist, quartzite and dolomite (WIND, 2002); 10–250 m.

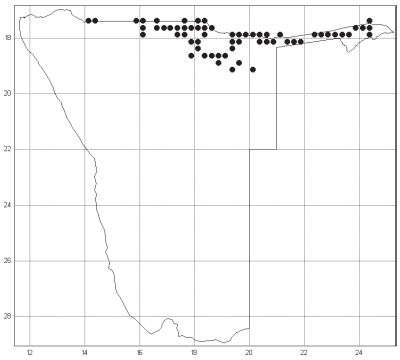
Threats: One sub-population may be affected by proposed wind-farm.

Additional notes: Rare to common but localised (WIND, 2002).

FABACEAE

CAESALPINIOIDEAE

Baikiaea plurijuga Harms



pl. 13

Status: NT

Description: Tree, up to 20 m high, with spreading crown. Bark grey or brown, rough or sometimes ca. smooth; young branches hairy. Leaves paripinnate, hairy at least when young; leaflets narrowly elliptic or oblong-elliptic. Inflorescence a long axillary raceme. Flowers with 5 petals, pale pink to mauve or magenta. Pods woody, compressed, oblanceolate, densely rusty-hairy; seeds rusty brown, flat, disc-shaped (Ross, 1977).

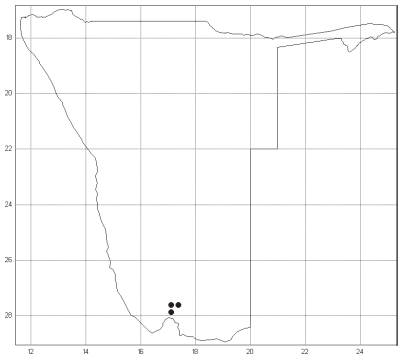
Rationale: Suspected population size reduction of between 1 and 10% over last 3 generations, next 3 generations or any 3 generations, based on decline in quality of habitat and actual levels of exploitation; continuing decline in AOO and number of mature trees.

Habitat: Deep white, red and orangy sand and sandy loam; on plateaus, plains, sand dunes, *omurambas*, dense bushes, dense woodland, bushveld, dry deciduous forests and dry grassland; with *Croton*, *Terminalia sericea*, *Combretum*, *Bauhinia petersiana* subsp. *macrantha*, *Burkea*, *Pterocarpus* and *Acacia* species; up to 1100 m (WIND, 2002; Kolberg, pers. comm.).

Threats: Fire; commercial logging; low regeneration; clearing of land for agriculture and residential purposes; heavy browzing of small trees; slow growth; human population growth, specifically logging small and medium sized trees for building of homesteads (Erkkilä ,2001).

Additional notes: Common names: Rhodesian teak (English); *omupapa* (Oshikwanyama)
Occasional, frequent, common, abundant (WIND, 2002); also occurs in other southern African countries (Ross, 1977).

Caesalpinia merxmuellerana A.Schreib.



E pl. 14

Status: LC

Description: Shrub, 0.8–4 m high. Bark of older branches grey; younger branches red-brown with hooked thorns. Leaves with 1–7 pairs of pinnae, each having pinnules with 4–10 leaflet pairs; bracteoles red, apex densely hairy, glandular, recurved, enclosing flower buds until flowering. Flowers in short crowded racemes at branch tips, completely unarmed, rose red to luminous lilac red, top petal often with sulphurous yellow mark. Pods obliquely pear-shaped, slightly inflated, glabrous (Schreiber, 1980).

Rationale: Known from between 5 and 10 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Black calcrete terraces and very rocky dolomite or shale slopes; winter and summer rainfall area; with *Berkheya chamaepeuce* (WIND, 2002).

Threats: None currently known.

Additional notes: Locally common; forms dense stands in places but is generally scattered; could be under-collected in more inaccessible areas (WIND, 2002).

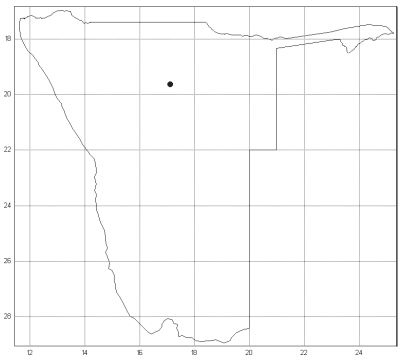
PAPILIONOIDEAE

Decorsea dinteri (Harms) Verdc.

Phaseolus dinteri Harms

E

Status: R



Description: Sparsely hairy climber. Leaves trifoliolate; leaflets grey-green, leathery, with scattered downy hairs. Flowers axillary and clustered, appearing before leaves; petals light blue, spurred, glabrous. Pod narrow lanceolate, flat, with tip bent slightly upwards, thickened margins, glabrous, multiseeded (Schreiber, 1973).

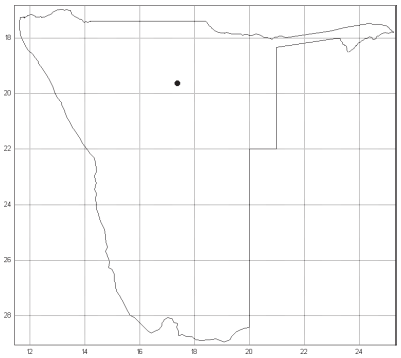
Rationale: Known from between 1 and 3 sub-populations and locations.

Habitat: Fringe of a spring in association with *Pavetta zeyheri* (WIND, 2002).

Threats: Restricted range; over-extraction of water causing springs to recede may be a potential threat but this has not been ascertained.

Additional notes: May be more widely distributed than indicated by records.

Eriosema harmsiana Dinter



E

Status: R

Description: Perennial herb, up to ca. 100 mm high. Leaves simple, linear-lanceolate to elliptic, with sessile gland on lower surface. Inflorescence terminal with 1 or 2 flowers. Flowers yellow, with red or dark markings, standard petal 6–7 mm long, with numerous glands on upper surface; calyx 5-lobed, with long protruding hairs and sessile glands. Pod compressed, obliquely ovate (Schreiber, 1970).

Rationale: Known from 1 or 2 sub-populations and locations.

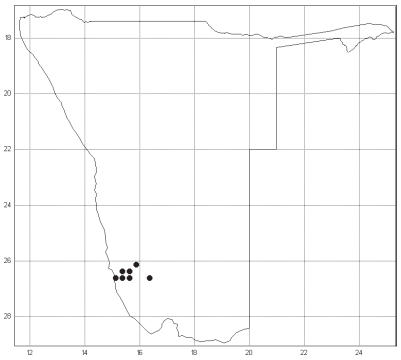
Habitat: Otavi highlands.

Threats: Agriculture may be a potential threat but this has not been ascertained.

Additional notes: Only known from type specimen collected in the 1930's; poorly known; no specimens in WIND.

Lebeckia dinteri Harms

Lebeckia candicans Dinter



E

Status: LC

Description: Shrub, up to 1.3 m high. Young shoots very densely hairy, white-grey; twigs spiny, relatively short, brownish-yellow, grooved to nearly quadrangular, glabrate; branch tips and peduncles mostly spiny. Leaves simple, lanceolate to narrowly spathulate, broad below apex, narrowing towards base, densely hairy. Inflorescence a raceme, up to 200 mm long, loosely flowered. Flowers pale yellow, sometimes blueish or nearly entirely grey. Pod straight to slightly bent, flat to cylindrical, splitting in 2 at maturity (Schreiber, 1970).

Rationale: Known from between 6 and 12 sub-populations and locations; no significant continuing decline in number of mature plants known.

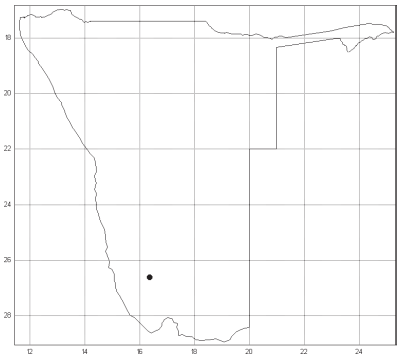
Habitat: Gravelly, sandy soil; red sand dunes (WIND, 2002); up to 1300 m.

Threats: None currently known.

Additional notes: May be more widespread than indicated by distribution records (WIND, 2002).

Lotononis mirabilis Dinter

Amphinomia mirabilis (Dinter) A.Schreiber



E

Status: R

Description: Prostrate shrub, up to 0.5 m high. Stems thick, woody. Leaflets broadly obovate, longitudinally folded along midrib, densely hairy. Flowers densely hairy, yellow. Pod 6–8 mm long, with short, adpressed hairs (Schreiber, 1970; Van Wyk, 1991).

Rationale: Known from between 3 and 5 sub-populations and locations.

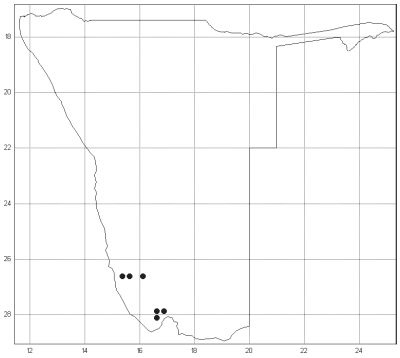
Habitat: Low, flattish granite hills and mountains (Van Wyk, 1991)

Threats: Restricted range but no threats currently known.

Additional notes: No specimens in WIND.

Lotononis pachycarpa Dinter ex B.-E. van Wyk

Amphinomia leptoloba (Bolus) A.Schreiber



E

Status: LC

Description: Small annual, up to 100 mm high and 300 m in diameter. Stems widely spreading, slender, sparsely leafy; all mature parts (except corolla) densely but minutely hairy. Leaves trifoliolate, leaflets oblanceolate to obovate. Flowers small, yellow. Pods ovoid, inflated (Van Wyk, 1990).

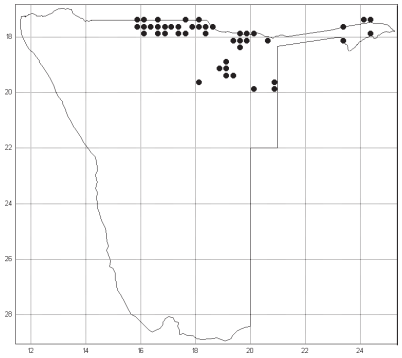
Rationale: Known from between 4 and 8 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Open flood plain; gentle slope (WIND, 2002).

Threats: Habitat destruction in the form of vehicle disturbance may affect one sub-population, but this has not been ascertained.

Additional notes: Closely related to *L. linearifolia* B.-E. van Wyk, but differs in the oblanceolate (not linear) leaflets, much larger stipules, more spreading stems and ovoid, inflated pods; differs from *L. curtii* Harms in shape and size of flowers, fiddle-shaped standard petal, longer pedicels, and pod shape (Van Wyk, 1990).

Pterocarpus angolensis DC.
Pterocarpus bussei Harms



pl. 14

Status: NT

Description: Deciduous tree, 5–20 m high with open, spreading crown, sometimes shrub 2–4 m high. Stems with bark greyish-brown to dark grey, rough. Leaves compound; leaflets broadly lanceolate to elliptic, hairy, generally soon glabrescent above, sometimes below. Inflorescence a raceme; develops before leaves, produced on older branches or in axils of young leaves. Flowers yellow to yellow-orange. Fruit almost circular with broad undulate wing; central, thickened, seed bearing part with mass of long, rigid, persistent bristles (Ross, 1973).

Rationale: Suspected population size reduction of between 1 and 10% for last 3 generations, next 3 generations or any 3 generations, based on continuing decline in quality of habitat and actual levels of exploitation; continuing decline in AOO and number of mature trees.

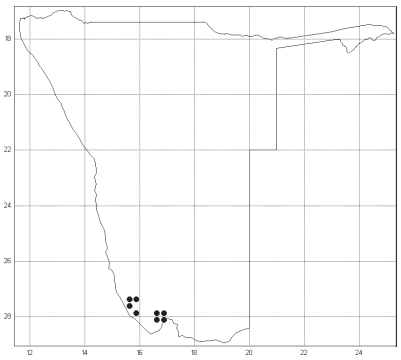
Habitat: Dry, deciduous woodland; open bushveld; on dunes and plains; deep red sand and deep white sand mixed with fine black clay; sometimes grows in pure stands, but also associated with *Terminalia sericea*, *Burkea africana* and *Combretum* species (WIND, 2002); 300–1550 m.

Threats: Fire; excessive logging; low recruitment; slow growth; clearing of land for agriculture and residential purposes; expanding human population; heavy browsing of small trees.

Additional notes: Common names: African teak (English); *ghughuva* (Thimbukushu); *omuguya* (Oshindonga); *kiaat*, *dolf* (Afrikaans). Rare, occasional, frequent , common, very common (WIND, 2002); not easily cultivated from seed; also occurs in other southern African countries (Ross, 1973). Protected under Forestry legislation.

GERANIACEAE

Pelargonium klinghardtense R.Knuth
Pelargonium paradoxum Dinter
Pelargonium jacobii R.A.Dyer



Status: LC

Description: Deciduous stem succulent, branched mostly from base, up to 0.8 m high. Stems of two kinds: long stems and dwarf shoots, succulent, smooth, glaucous green to light yellowish-green. Leaves simple, succulent, without glandular hairs, faintly aromatic, light glaucus green; lamina obovate-spathulate, base triangular, merging gradually into petiole, apex rounded, margins lobed, undulate, dentate to varying degrees. Flowers white, without markings (Van Der Walt and Vorster, 1981).

Rationale: Known from between 10 and 20 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Moderate southwest- and west-facing, lower sunny hill slopes; rocky plains; along drainage lines; limestone, quartzite, granite, shcist, dolomite; often wedged between rocks; fog precipitation may supplement water supply of the plants; normally associated with variety of widely spaced succulents, like *P. crassicaule* (Van Der Walt and Vorster, 1981; WIND, 2002).

Threats: Two sub-populations may be affected by mining but this has not been ascertained.

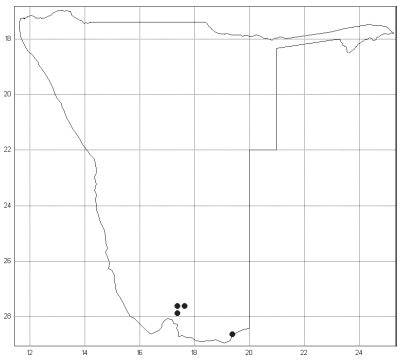
Additional notes: Rare and scattered to frequent and common (WIND, 2002); one location with thousands of plants; also occurs in South Africa; easily recognised by characteristic leaves borne on dwarf shoots and smooth, sparsely branched stems (Van Der Walt and Vorster, 1981).

HYACINTHACEAE

Bowiea volubilis Harv. ex Hook.f. subsp. *gariepensis* (Van Jaarsv.) Bruyns
Bowiea gariepensis Van Jaarsv.

Status: LC

Description: Geophyte, glabrous in all parts. Stems annual, pendulous, scrambling, much branched, softly succulent. Leaves appear before inflorescence, lanceolate, channeled or longitudinally grooved, striate, wither shortly before flowering. Flowers open in day time, relatively few, scented; perianth 25 mm in diameter. Tepals oblong to lanceolate, white with green stripe (Van Jaarsveld, 1983).



Rationale: Known from between 4 and 10 sub-populations and locations; no significant continuing decline in number of mature plants known.

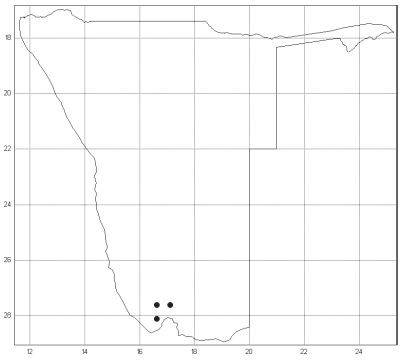
Habitat: Mostly on shady south-facing slopes of rocky hills and mountains in lower Orange river valley; rock pool; associated with mafic lava rocks (Van Jaarsveld, 1983; WIND, 2002).

Threats: None currently known.

Additional notes: Unusual; common, locally abundant; also occurs in South Africa; *B. gariepensis* has glaucous, pendulous stems with conspicuous, white, larger corolla and spreading segments, which easily distinguish it from *B. volubilis*; which has bright green branches and inconspicuous green corolla with distinctly reflexed segments; bulb of *B. gariepensis* covered with grey membranous sheaths, which are lacking in *B. volubilis* (Van Jaarsveld, 1983; WIND, 2002).

Drimia fasciata (B.Nord) J.C.Manning & Goldblatt

Rhadamanthus fasciatus B.Nord.



Status: R

Description: Geophyte; Leaves solitary, linear to thread-like, glabrous, only appearing after flowers; sheaths with conspicuous, transverse, dark brown stripes. Inflorescence a raceme, upright; peduncle glabrous. Flowers few to many, attached on all sides of flower stalk, relatively small, nodding, brownish-white with broad brown central stripe, bowl- or bell-shaped; tepals fused at base; anthers rounded at base, smooth. Fruit a capsule splitting into 2 segments (Sölch *et al.*, 1970; WIND, 2002).

Rationale: Known from between 3 and 6 sub-populations and locations.

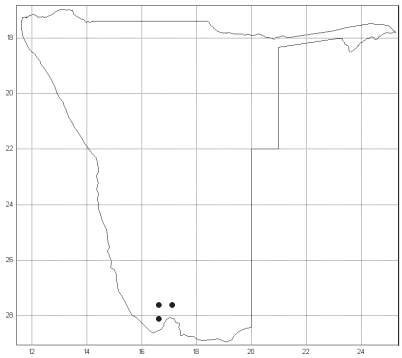
Habitat: Stone crevices in white quartzite hill (WIND, 2002); up to 1160 m.

Threats: None currently known.

Additional notes: Only one specimen in WIND, from 1965 (WIND, 2002); also occurs in South Africa (Sölch *et al.*, 1970).

Drimia namibensis (Oberm.) J.C.Manning & Goldblatt

Rhadamanthus namibensis Oberm.



E

Status: R

Description: Geophyte. Leaves 2–4 per shoot, erect, linear, ca. 150–240 mm long, longitudinally grooved, firm, glaucous, appearing after flowers, margins smooth, dying back from tips. Inflorescence a simple raceme, up to 0.7 m high; peduncle ca. 0.4 m long. Flowers many, laxly spaced on rachis, bell-shaped, ca. 9 mm long, pale mauve, shiny, with dark base; tepals ca. 5 mm long with transparent margins; stamens short, erect. Fruit a capsule splitting into 2 segments (Sölch *et al.*, 1970; Obermeyer, 1980).

Rationale: Known from between 3 and 6 sub-populations and locations.

Habitat: Plateau; dolomite ridges; red dunes; soil pockets on black limestone terraces (WIND, 2002).

Threats: None currently known.

Additional notes: Flowers attractive.

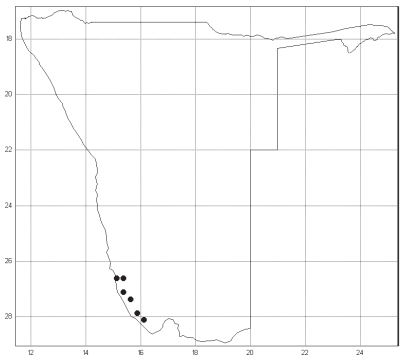
Drimia secunda (B.Nord.) J.C.Manning & Goldblatt

Rhadamanthus secundus B.Nord.

E

Status: R

Description: Geophyte. Leaves numerous, thread-like, glabrous, only appear after flowers. Inflorescence a raceme. Flowers few to many, attached on only one side of flower stalk, slightly nodding, glabrous, relatively short, greenish with pink tips, bowl- or bell-shaped, tepals fused at base. Fruit a capsule splitting into 2 segments (Sölch *et al.*, 1970; WIND, 2002).



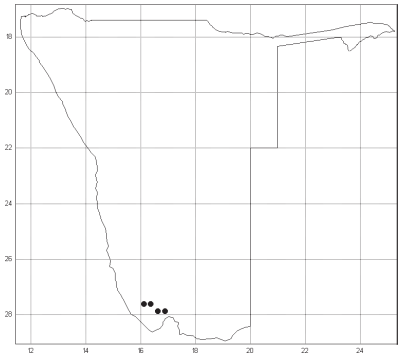
Rationale: Known from between 8 and 16 sub-populations and locations.

Habitat: Wind-blown sand between rocks a mountain base; on south-facing slope (WIND, 2002).

Threats: None currently known.

Additional notes: Growing in small colonies (WIND, 2002).

Lachenalia buchubergensis Dinter



pl. 14

Status: R

Description: Dwarf geophyte. Leaves solitary, lanceolate, sickle-shaped, spotted below, banded with maroon on clasping leaf base. Inflorescence few-flowered, 60–70 mm high. Flowers tubular; outer tepals olive green or blue green, with greenish-brown gibbosity; inner tepals slightly protruding, bright green with purple or maroon tips (Duncan, 1988).

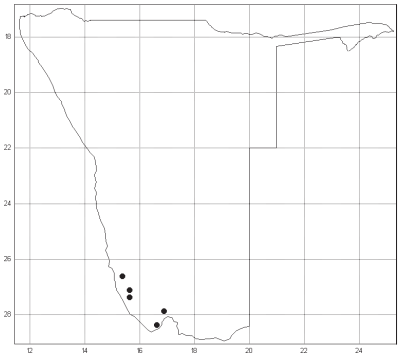
Rationale: Known from between 6 and 12 sub-populations and locations.

Habitat: Very gentle slopes in sandy washes; southwest-facing slopes; in red sand mixed with calcrete; quartz gravel plains; 770 m (Duncan, 1988; WIND, 2002).

Threats: None currently known.

Additional notes: Rather unattractive; rare; in small localised groups; also occurs in South Africa (Duncan, 1988; WIND, 2002; Mannheimer, 2003, pers. comm.).

Lachenalia klinghardtiana Dinter



E pl. 14

Status: R

Description: Geophyte. Leaves solitary, glaucus, lanceolate, plain or lightly spotted above, base banded or spotted with purple. Inflorescence 60–160 mm high; peduncle usually conspicuously swollen. Flowers dull white; outer tepals gibbous, may be spotted with purple; inner tepals protrude, brown marking near tips (Duncan, 1988).

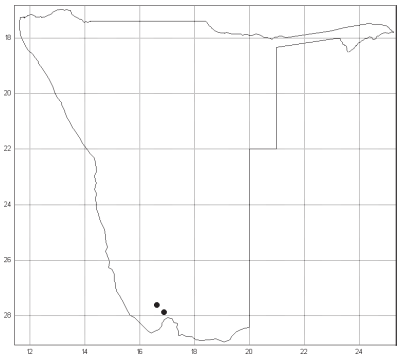
Rationale: Known from between 5 and 10 sub-populations and locations.

Habitat: Sandy soil at mountain base; schist pavement (WIND, 2002).

Threats: None currently known.

Additional notes: Usually common but localised (Mannheimer, 2003, pers. comm.); performs poorly in cultivation (Duncan, 1988).

Lachenalia namibiensis W.F.Barker



E

Status: R

Description: Geophyte. Leaves 1 or 2, semi-succulent, blue-green, sickle-shaped, conduplicate, with depressed midrib, apices obtuse, minutely apiculate. Inflorescence a many-flowered raceme, up to 100 mm high. Flowers large, bell-shaped, white, gibbous (Barker, 1987).

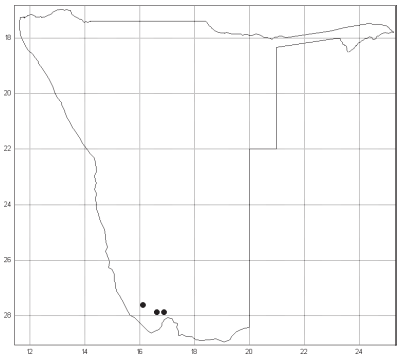
Rationale: Known from between 2 and 4 sub-populations and locations.

Habitat: Succulent steppe.

Threats: Restricted range but no threats currently known.

Additional notes: Charming and attractive; plants in cultivation twice the size of wild ones, making it an excellent subject for cultivation (Barker, 1987, Duncan, 1988); no specimens in WIND.

Lachenalia nordenstamii W.F.Barker



Status: R

Description: Geophyte. Leaves solitary, lanceolate to sickle-shaped, channeled or grooved longitudinally, banded. Inflorescence a raceme, 50–120 mm high, few-flowered; pedicels spreading to decurved. Flowers short, nodding, widely bell-shaped, stamens well-exerted, with spreading, stout maroon filaments (Barker, 1983).

Rationale: Known from between 2 and 4 sub-populations and locations.

Habitat: Sheltered rock cracks; dolomite reef projecting from plain at base of dolomite hills (Duncan, 1999; WIND, 2002).

Threats: Restricted range but no threats currently known.

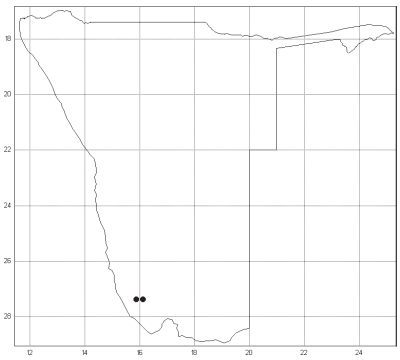
Additional notes: Very rare to occasional; also occurs in South Africa (Duncan, 1999; WIND, 2002); seeds are some of the largest in the genus, distinctly longer than broad; leaf similar to that of *L. buchubergensis*, which has very distinct, narrowly cylindrical flowers with only slightly exerted stamens (Duncan, 1999).

Lachenalia nutans G.D.Duncan

E

Status: R

Description: Geophyte. Leaves solitary, lanceolate to broadly lanceolate, glaucous, dark green and unmarked with depressed longitudinal veins above, unmarked or barred with dark green transverse bands below, margins dark maroon. Inflorescence a dense raceme, 35–110 mm high; upper part of



peduncle and lower part of rachis slightly to conspicuously swollen. Flowers oblong-bell-shaped, distinctly nodding, creamy white with yellowish-green or brownish-green gibbosities; stamens well exerted (Duncan, 1998).

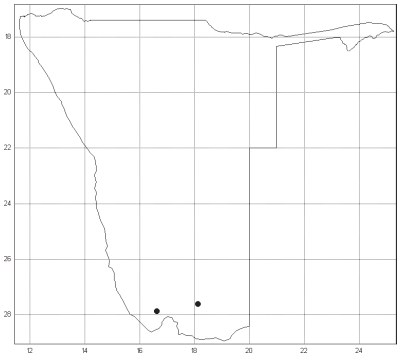
Rationale: Known from between 2 and 4 sub-populations and locations.

Habitat: Sandy gravel; red sandy plains and hills in full sun; 650–800 m (Duncan, 1998; WIND, 2002).

Threats: Restricted range but no threats currently known.

Additional notes: Single or in groups; common or abundant but localised (Duncan, 1998; WIND, 2002).

Ornithogalum deltoideum Baker



Status: R

Description: Geophyte 70–180 mm high. Leaves 2–4, linear, 20 mm long, margins with long hairs and dense short fringe. Inflorescence a raceme; peduncle erect, up to 180 mm high. Flowers 1–8, delicate, open in late afternoon, young buds in drooping position; tepals pinky cream or pale fawn with faint green midrib, narrowly elliptical, 12 mm long (Obermeyer, 1978).

Rationale: Known from between 2 and 4 sub-populations and locations.

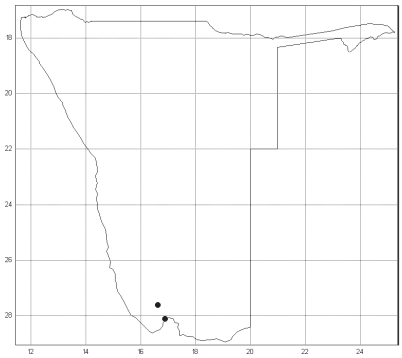
Habitat: Dry, karroid, hilly country; slopes and flats (Obermeyer, 1978; Müller-Doblies, 1996) ; 400–490 m.

Threats: Restricted range but no threats currently known.

Additional notes: Rare; also occurs in South Africa

(Obermeyer, 1978).

Ornithogalum geniculatum Oberm.



Status: R

Description: Small straggling plant varying in size; lower leaves weak, limp, lying on ground, oblong, variable in size, 40–50 x 20 mm, upper leaves much reduced, margins fringed with long, coarse hairs. Inflorescence a raceme, peduncle wiry. Flowers up to 10, possibly open at night, tepals shiny white, narrowly elliptical, 10 mm long (Obermeyer, 1978).

Rationale: Known from between 2 and 4 sub-populations and locations.

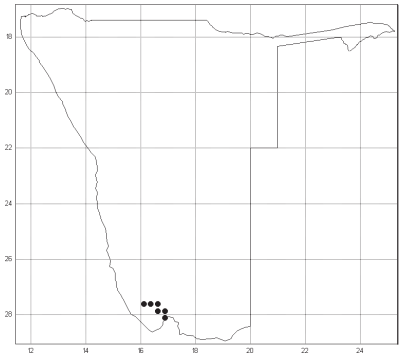
Habitat: Shade; midslope in quartzite crevice; sandy area below a rocky plate (Obermeyer,1978; WIND, 2002); 190–800 m.

Threats: Restricted range but no threats currently known.

Additional notes: Rare; also occurs in South Africa (Obermeyer,1978); could be confused with *O. hispidum* Hornem., but is smaller and its usually corymbose inflorescence and peculiar acute angle of peduncle below, separate it from this species (Obermeyer, 1978).

Ornithogalum puberulum Oberm. subsp. *puberulum*

Ornithogalum merxmuelleri Roessler



E pl. 14

Status: LC

Description: Geophyte, 60–280 mm high. Leaves 3, broadly to narrowly oblong, 50–90 x 12–24 mm, soft, minutely hairy, margins fringed with long, coarse hairs. Inflorescence a raceme, nearly flat topped or convex, indeterminate, elongated, usually many-flowered; peduncle 30–180 mm high; Flowers white; tepals membranous, narrowly elliptical, 10–12 x 5 mm (Obermeyer, 1978).

Rationale: Known from between 10 and 18 sub-populations and locations.

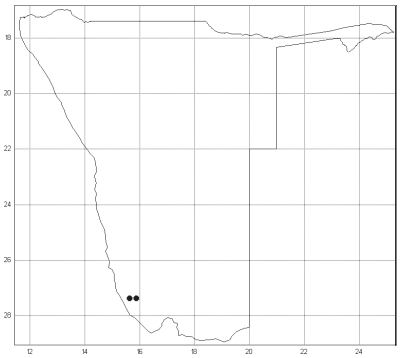
Habitat: West- and southwest-facing mountain slopes amongst loose quartzite pebbles and loose slate; near mountain summits; in semi-shade of steep rocky slopes; in crevices of overhanging reefs; rock cracks; vertical slopes (Obermeyer, 1978, WIND, 2002).

Threats: None currently known.

Additional notes: Locally rare; also occurs in South Africa (Obermeyer, 1978).

IRIDACEAE

Babiana longicollis Dinter



E

Status: R

Description: Geophyte. Stems very short. Leaves linear-lanceolate, ca. strongly ribbed, lamina 60–100 x 2–4 mm, with bent and mostly also twisted point, slightly folded. Inflorescence a spike. Flowers 3–5, blue-violet, zygomorphic; tube funnel-shaped, over 25 mm long; free tepals aslways shorter (Sölch, 1969).

Rationale: Known from 1 or 2 sub-populations and locations.

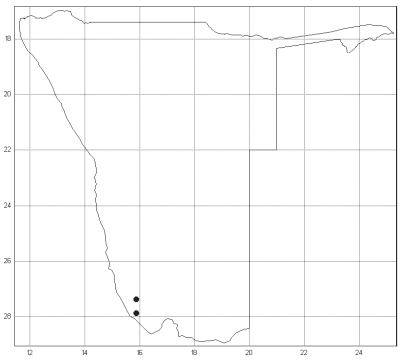
Habitat: Succulent steppe.

Threats: Restricted range but no threats currently known.

Additional notes: Known from type specimen only; no specimens in WIND.

Babiana namaquensis Baker

pl. 14



Status: R

Description: Geophyte. Stems very short. Leaves 30–70 x 2–4 mm, spirally twisted, scarcely folded. Inflorescence 1–3-flowered. Peduncles originating below ground level. Flowers dark pink to crimson, rarely white; tube funnel shaped, 18–25 mm long; free tepals 25–40 mm long. (Sölch, 1969; Mannheimer *et al*., 2001, pers obs.).

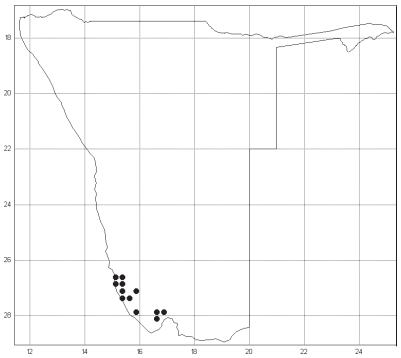
Rationale: Known from between 2 and 4 sub-populations and locations.

Habitat: Deep, red dune sand on rather flat areas in desert vegetation; with other geophytes and dwarf succulent shrubs; 650 m (WIND, 2002).

Threats: Restricted range but no threats currently known.

Additional notes: Very attractive flowers (WIND, 2002); frequent but localised (Loots *et al.*, pers. obs.); also occurs in South Africa (Sölch, 1969).

Ferraria schaeferi Dinter



pl. 15

Status: LC

Description: Geophyte. Stems 150–400 mm high, rather stout, leaflike, flattened, covered with leaf sheaths; Leaves sword-shaped, up to 300 mm long, in two opposite rows in same plane, somewhat succulent, glaucous. Inflorescence ca. 50 mm long, with 2 flowers. Flowers rather sweetly scented, yellow with dark brown spots and blotches, widely bell-shaped, 8 mm deep, 12–15 mm in diameter (De Vos, 1979).

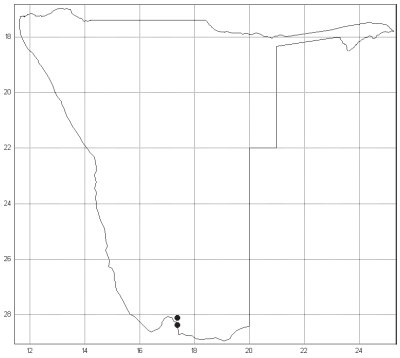
Rationale: Known from between 15 and 30 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Bases and crests of dunes, in deep, red Kalahari sand; on granite mountains; in dry water bodies; on rocky outcrops; between quartzite stones; red sandy plains; moderate, west-facing hill slopes; 419 m; habitat known to be very windy; with *Cladoraphis spinosa* (De Vos, 1979; WIND, 2002).

Threats: Collecting may be a potential threat to a few sub-populations, but this has not been ascertained; mining has affected one sub-population but the extent thereof could not be determined.

Additional notes: Very attractive flowers, remain open only for 1 day; rather sparsely distributed; rare to common but localized; also occurs in South Africa (De Vos, 1979; WIND, 2002).

Moraea garipensis Goldblatt



E

Status: NT

Description: Geophyte, 0.25–0.5 m high. Stems erect, 2–6-branched. Leaves several, soft-textured, pale green, at base and inserted on stem, lowermost usually as long as stem, 8–10 mm wide; Peduncle branched. Flowers unusually large, yellow, sweetly scented; tepal claws short; filaments long, anthers bright orange-red, well above tepals; outer tepals 36 mm long (Goldblatt, 1986).

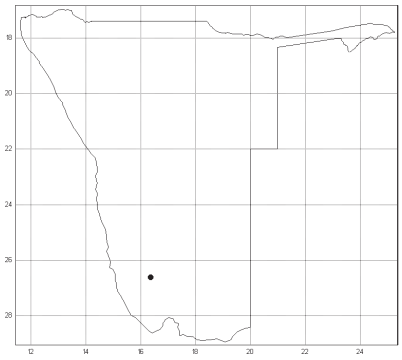
Rationale: Known from between 1 and 3 sub-populations and locations; EOO estimated to be less than 2000 km^2; suspected continuing decline in quality of habitat.

Habitat: Rock crevices of south-facing slopes of granite hills and rocky outcrops above lower Orange river; among rocks in riverbed (Goldblatt, 1986; WIND, 2002).

Threats: Collecting may be a potential threat but this has not been ascertained; restricted range; low densities; goat farming and other agricultural activities potential threats.

Additional notes: Flowers very attractive, open in early afternoon, fade at sunset; rare to common but localised (Goldblatt, 1986; WIND, 2002).

Moraea graniticola Goldblatt



E

Status: R

Description: Geophyte, up to 50 mm high. Stems subterranean or produced shortly above ground, with several stems clustered near base. Leaves usually 2, second much smaller than basal, grey-green, channeled, spreading, white along midline, somewhat twisted, margins undulate, up to 200 x 5–6 mm; Flowers blue-violet with yellow nectar guides; tube well developed, 5–6 mm long, white; outer tepals 18–20 mm long (Goldblatt, 1986).

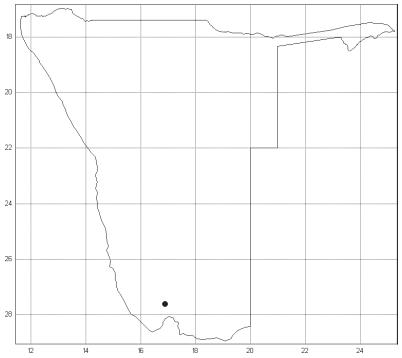
Rationale: Known from 1 or 2 sub-populations and locations.

Habitat: Sandy soil around granite domes (Goldblatt, 1986).

Threats: Restricted range; collecting may be a potential threat but this has not been ascertained.

Additional notes: Attractive; locally rare (Goldblatt, 1986); no specimens in WIND.

Moraea hexaglottis Goldblatt



E

Status: R

Description: Geophyte, 80–100 mm high. Stems somewhat coarsely wavy, 1- or 2-branched. Leaves 1 or 2, basal, slender, linear, often tightly channeled, sometimes twisted above, ca. twice as long as plant, margins inrolled. Flowers blue-violet with pale yellow nectar guides on outer tepals; style branches short, each divided into slender paired ascending arms (Goldblatt, 1986).

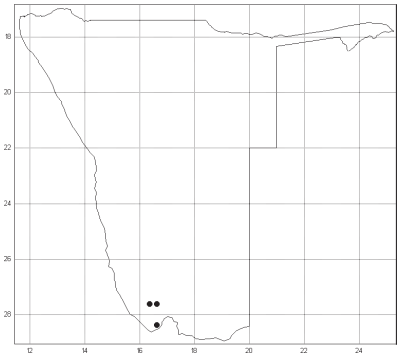
Rationale: Known from between 1 and 5 sub-populations and locations.

Habitat: Black limestone in silt; 1200–1400 m; on top of a plateau (Goldblatt, 1986; WIND, 2002).

Threats: Restricted range; collecting may be a potential threat but this has not been ascertained.

Additional notes: Possibly more widespread than indicated by records; flowers open mid-afternoon, fade in early evening (Goldblatt, 1986).

Moraea namibensis Goldblatt



Status: R

Description: Erect geophyte, 120–400 mm high. Stem erect, usually several-branched. Leaves solitary, inserted at ground level, linear, channelled, exceeding inflorescence. Flowers white or pale blue, with yellow nectar guides on outer tepals; outer tepals up to 40 mm long; inner tepals up to 35 mm long (Goldblatt, 1986).

Rationale: Known from between 3 and 6 sub-populations and locations.

Habitat: Sandy flats among low scattered bushes and small annuals (Goldblatt, 1986)

Threats: Restricted range; collecting may be a potential threat but this has not been ascertained.

Additional notes: May be more widespread than indicated by records (WIND, 2002); also occurs in South Africa (Germishuizen & Meyer).

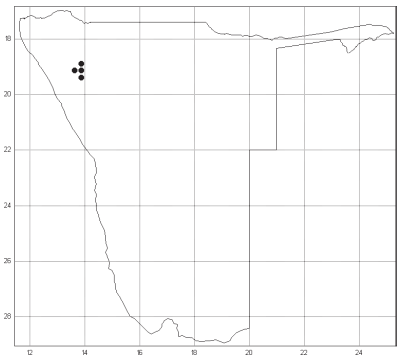
KIRKIACEAE

Kirkia dewinteri Merxm. & Heine

E pl. 15

Status: R

Description: Tree up to 10 m high; crown rounded or flattish.



Bark smooth, yellowish with small black or grey scattered spots. Leaves 130–160 mm long, rachis very narrowly winged; leaflets becoming distinclty smaller towards apices, glabrous, margins toothed. Inflorescence 4–5 mm long, hairy. Flower with 4 petals, white. Fruit 7 x 7 mm, almost globose, hairy (Stannard, 1981; Coates Palgrave, 2002).

Rationale: Known from between 3 and 6 sub-populations and locations.

Habitat: North-facing slopes of dolomite hills and ridges; moderate mountain slopes in shady area of a valley; with *Commiphora* species (WIND, 2002); 750–1350 m.

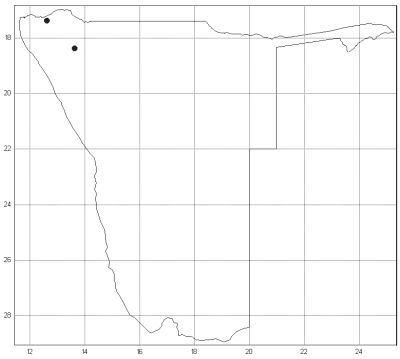
Threats: Restricted range; fire may be a potential threat but this has not been ascertained.

Additional notes: Common to abundant (WIND, 2002); differs from *K. acuminata* Oliv. by having much narrower leaflets (Curtis, 2003, pers. comm.).

LAMIACEAE

Plectranthus unguentarius Codd

Plectranthus amboinicus sensu Launert & A.Schreiber



E

Status: VU D2

Description: Perennial, erect, robust, dwarf shrub, 1–1.5 m high. Stems woody at base, obscurely 4-angled, sparingly branched, densely hairy, with minute glands. Leaves semi-fleshy, slightly aromatic, hairy, freely dotted with minute reddish-brown glands; lamina broadlly obovate to almost round, 40–60 x 40–60 mm, margins coarsely crenate except in the lower third. Inflorescence a terminal spike-like raceme. Flowers ca. 20, covered in dense, matted, woolly hairs; corolla white, 10–12 mm long, glandular-hairy, tube slightly bent about the middle; upper lip short and erect, lower lip boat-shaped and horizontal (Codd, 1975).

Rationale: Known from 2 sub-populations and locations.

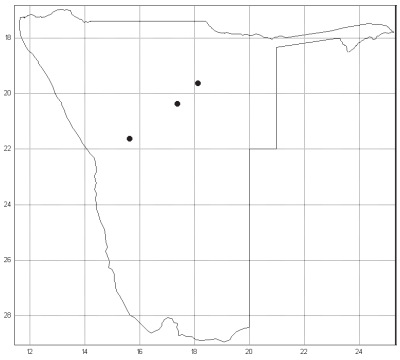
Habitat: Dry mopane woodland; on high rocky places up to 2300 m; limestone and dolomite (Codd, 1975)

Threats: Restricted range; collecting—roots used traditionally.

Additional notes: Not collected since 1960; (WIND, 2002); no specimens in WIND; several attempts to find this species have failed.

LOBELIACEAE

Lobelia hereroensis Schinz



E

Status: VU B1ab(iii)c(iv)

Description: Annual herb. Stems upright, up to 300 mm high, with sparse bristles around base. Leaves ca. equally spread along stem, upper leaves elliptic-lanceolate, up to 20 x 6 mm, lower leaves roundish ovate, up to 18 x 15 mm, all bluntly, sinuately notched. Inflorescence a loose raceme. Flowers in axils of small bracts; corolla 3–4 mm long, blue to white, often with spots, upper lip two-lobed, lower lip three-lobed (Roessler, 1966).

Rationale: EOO estimated to be < 3000 km^2; known from between 3 and 8 sub-populations and locations; inferred continuing decline in quality of habitat.

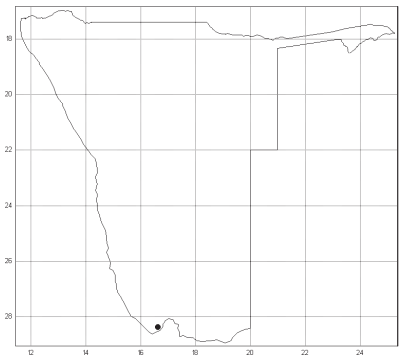
Habitat: In moss at water-bodies (WIND, 2002); ±1150 m.

Threats: Overuse and drying out of water-bodies.

Additional notes: May be overlooked due to its small size and therefore under-collected.

MESEMBRYANTHEMACEAE

Amphibolia obscura H.E.K.Hartmann



P

Status: NT

Description: Broad shrub, up to 0.4 m high and 0.7 m in diameter. Leaves succulent, bright light green, club-shaped to circular in cross section, 15–45 mm x 5–10 mm. Inflorescence a cyme. Flowers 1–3, 18 mm in diameter; petals purplish-pink; anthers white. Capsule base short, funnel-shaped, top raised, but rims low, 6-locular (Hartmann, 2001).

Rationale: EOO estimated to be smaller than 2000 km^2 known from between 1 and 5 sub-populations and locations; suspected continuing decline in quality of habitat.

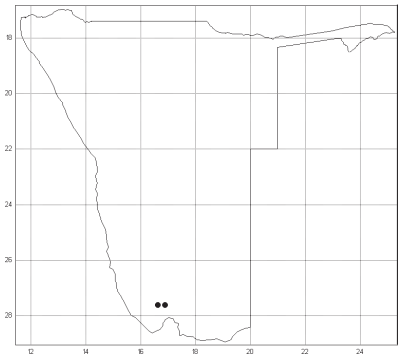
Habitat: Mountain slope in full sun; rocky soil with desert vegetation; 110–490 m; lower Orange river; sandstone with quartzite or limestone in shallow places; may be fog dependent (Hartmann, 2001; WIND, 2002).

Threats: Restricted range; mining related activities, especially bulldozing lower hillsides for gravel to build roads.

Additional notes: Also occurs in South Africa (Hartmann, 2001); seed accession collected for *ex situ* conservation.

Antimima argentea (L.Bolus) H.E.K.Hartmann

Ruschia argentea L.Bolus



E P

Status: R

Description: Compact plant. Leaves succulent, three sided with faces concave, decreasing in width and thickness from base to pointed tip, with silvery papillae. Flowers solitary, petals pink. Capsule pedicels 20–30 mm long, top raised from high rims, base deeply bowl-shaped, bulging at back of each locule; locules 5 or 6; closing body large, brownish (Hartmann, 2001).

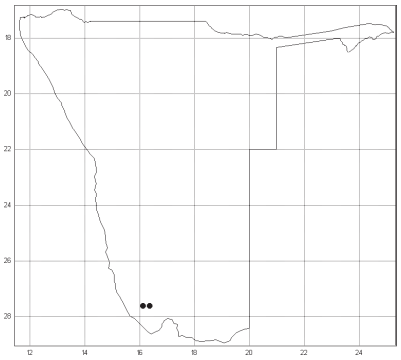
Rationale: Known from 1 or 2 sub-populations and locations.

Habitat: Succulent steppe; possibly fog dependent; 20–400 m.

Threats: Restricted range; collecting may be a potential threat but this has not been ascertained.

Additional notes: Very attractive flowers; locally common (Mannheimer, 2002, pers. comm.); no specimens in WIND; poorly known species.

Antimima aurasensis H.E.K.Hartmann



E P pl. 15

Status: R

Description: Almost compact shrub. Few stems longer than rest of plant; internodes up to 20 mm long, but hidden inside plant. Leaves three sided with faces concave, ca. 10 x 5 mm. Inflorescence a small cyme. Flowers ca. 17 mm in diameter, petals purple, filaments purple with white bases. Capsule top with low rims, base short, funnel- or bowl-shaped, 5-locular, closing body large to very large (Hartmann, 1998, 2001).

Rationale: Known from between 2 and 4 sub-populations and locations.

Habitat: Rocky crevices of quartzite or sandstone (Hartmann, 1998, 2001); 300–900 m.

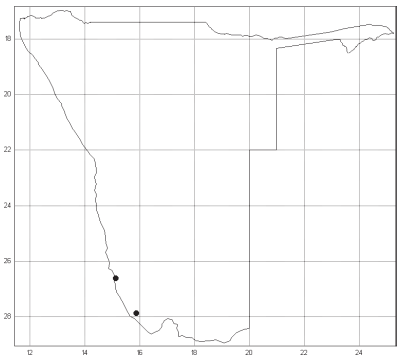
Threats: Restricted range but no threats currently known.

Additional notes: Locally occasional (WIND, 2002); similar to *A. perforata* (L.Bolus) H.E.K. Hartmann and *A. quarzitica* in growth and leaves, but closing bodies differ; those of *A. perforata* (L.Bolus) H.E.K. round, white and large, those of *A. quarzitica* rather small and oval, with long axis pointing into locule (Hartmann, 1998, 2001).

Antimima buchubergensis (Dinter) H.E.K.Hartmann

Ruschia buchubergensis Dinter

E P



Status: R

Description: Compact, low, succulent shrub. Few stems longer than rest of plant, lateral. Leaves three-angled with bulging, convex sides, leaf pair forming pea-shaped and pea-sized Bodies as lateral branch. Inflorescence a cyme. Flowers 1–3, petals purple; filaments white. Capsule top and base low bowl-shaped, rims low, 5-locular, ca. 5 mm in diameter, closing body round, large, white (Hartmann, 2001).

Rationale: Known from 1 or 2 sub-populations and locations.

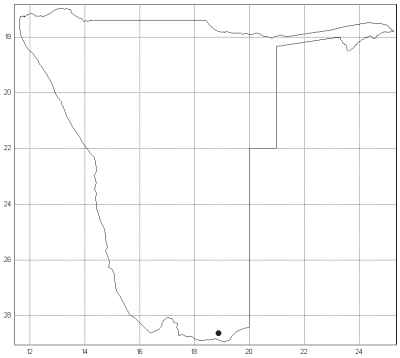
Habitat: Especially on southwest-facing slopes but also on other aspects; in rocky crevices (WIND, 2002; Hartmann, 2001); 500–1000 m.

Threats: Restricted range but no threats currently known.

Additional notes: Locally abundant (WIND, 2002); similar to *A. dolomitica* (Dinter) H.E.K. Hartmann, but has smaller bodies formed by leaf pair, long erect shoots with long internodes absent (Hartmann, 2001).

Antimima eendornensis (Dinter) H.E.K.Hartmann

Mesembryanthemum eendornense Dinter



E P

Status: VU D2

Description: Rather dense, almost compact shrub. Leaves triquetrous, 10 x 5 mm, densely papillate. Flowers solitary, petals red. Capsule base rounded with pronounced bulges, top slightly elevated, rims low, 6-locular (Hartmann, 2001).

Rationale: Known from 1 or 2 sub-populations and locations.

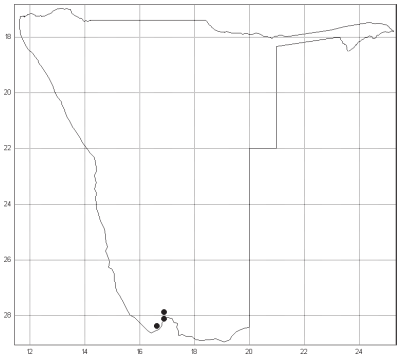
Habitat: Gentle slope of quartz outcrop, in full sun; seems to prefer quartzitic slopes (Hartmann, 2001; WIND, 2002); 800–1000 m.

Threats: Restricted range; succulent collecting; agriculture a potential threat.

Additional notes: Locally common (WIND, 2002).

Antimima modesta (L.Bolus) H.E.K.Hartmann

Ruschia modesta L.Bolus forma *glabrescens* L.Bolus
Ruschia modesta L.Bolus forma *modesta*



E P

Status: R

Description: Shrub with compact base. Stems long, erect, stiff; internodes whitish-grey, up to 8 mm in diameter. Leaves at base and on long shoots to 35 mm long, leaf pairs of short shoots about half as long, 7–8 x 9–12 mm, basally fused, boat-shaped with bulging, convex sides, apices mucronate, recurved. Inflorescence a cyme. Flowers 2 or 3, rarely more; calyx with mostly 5, rarely 6 lobes, petals basally white and purple at apices; filaments white-purple. Capsule top with central dip, base funnel-shaped (Hartmann, 2001).

Rationale: Known from between 3 and 6 sub-populations and locations.

Habitat: Mountain slopes; crevices of granitic rocks; sandy loam in rocky soil; in full sun; with desert vegetation (Hartmann, 2001, WIND, 2002); 50–300 m.

Threats: Restricted range but no threats currently known.

Additional notes: Seed accession collected for *ex situ* conservation.

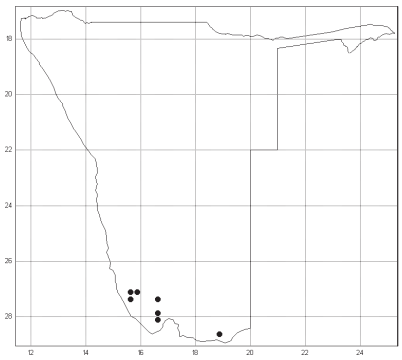
Antimima quarzitica (Dinter) H.E.K.Hartmann

Corpuscularia quartzitica (Dinter) Schwantes
Ruschia quarzitica (Dinter) Dinter & Schwantes

E P pl. 15

Status: LC

Description: Shrub with compact centre from which stems develop. Stems short, with several leaf pairs at first, develop-



ing long internodes later. Leaves basally fused, triquetrous, acuminate and mucronate, 10–11 x 4–5 mm, 4–5 mm thick. Inflorescence a cyme. Flowers 1–3, petals as long as calyx lobes, pink to purple. Capsule 5-locular, 5 mm in diameter (Hartmann, 2001).

Rationale: Known from between 6 and 12 sub-populations; no significant continuing decline in number of mature plants known.

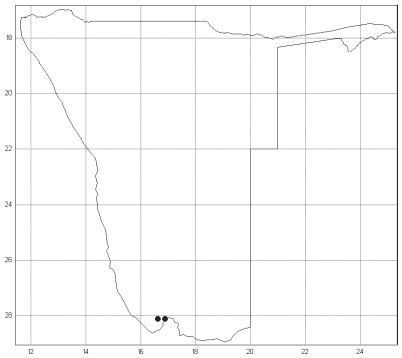
Habitat: Quartzitic hills; mountain slopes; in sandy loam in rocky soil; with desert vegetation; in full sun; 560 m (Hartmann, 2001; WIND, 2002); 50–560 m.

Threats: Collecting a potential threat to one sub-population; mining a threat to another sub-population; impact of threats could not be determined.

Additional notes: Common but localised (WIND, 2002); differs from *A. dolomitica* (Dinter) H.E.K. Hartmann in the long, slender, sharp-pointed leaves (Hartmann, 2001).

Astridia citrina (L.Bolus) L.Bolus

Astridia rubra (L.Bolus.) L.Bolus var. *citrina* L.Bolus



E P

Status: R

Description: Erect, densely branched shrub. Leaves semi-lunate, 50–70 x 8–12 mm, 13–19 mm thick. Flowers 36–65 mm in diameter, petals lemon coloured, filamentous staminodes deep yellow and form dark eye in centre. Capsule pedicels 5–7 mm long, rims about 4 mm high, 6-locular (Hartmann, 2001).

Rationale: Known from between 2 and 4 sub-populations and locations.

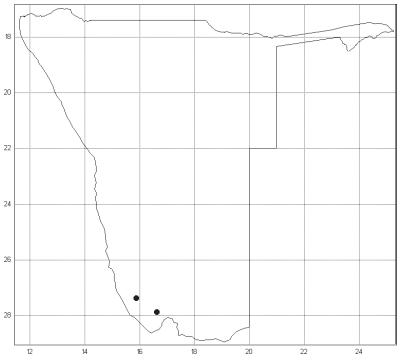
Habitat: Prefers rocky places like quartzite crevices; foot slopes of hill, in strongly weathered schist (Hartmann, 2001; WIND, 2002); 300–1100 m.

Threats: Restricted range; mining may be a potential threat but this has not been ascertained.

Additional notes: Locally occasional to numerous or common (WIND, 2002); can best be distinguished from other light yellow-flowered species by the big semi-lunate leaves (Hartmann, 2001).

Astridia hallii L.Bolus

Astridia ruschii L.



E P pl. 15

Status: R

Description: Erect shrub. Stems up to 0.6 m high, densely leaved. Leaves often 50–70 x ca. 15 mm, up to 30 mm thick in middle, velvety to touch. Flowers white. Capsule 15–17 mm long, rims about 3 mm high; seeds dark brown with rather long, erect, turnip-shaped projections (Hartmann, 2001).

Rationale: Known from between 6 and 10 sub-populations and locations.

Habitat: Rock crevices; in kloof on loose, rocky, southwest-facing slope (Hartmann, 2001; WIND, 2002); 300–1100 m.

Threats: None currently known.

Additional notes: Attractive; localised (WIND, 2002); seed accession collected for *ex situ* conservation; leaves longer than that of *A. velutina* (Hartmann, 2001).

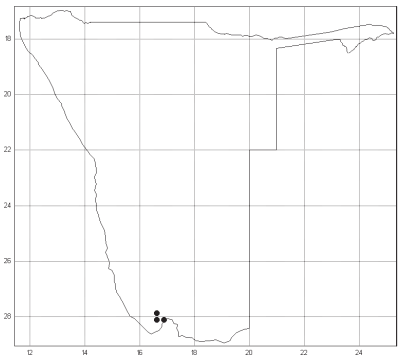
Astridia longifolia (L.Bolus) L.Bolus

Astridia latisepala L.Bolus
Astridia vanbredai L.Bolus
Ruschia jacobseniana L.Bolus

P pl. 15

Status: R

Description: Erect shrub, up to 0.5 m high. Leaves slender, boat-shaped, 40–90 x 8–10 mm, 15–16 mm thick, with parallel margins over most of their length. Flowers 50–80 mm in di-



ameter, petals brick red, orange or yellow in outer ring, paler toward base; filamentous staminodes whitish; stamens with deep yellow to orange anthers. Capsule pedicels 9–12 mm long, rims 4–5 mm high; seeds with turnip-shaped projections (Hartmann, 2001).

Rationale: Known from between 3 and 6 sub-populations and locations.

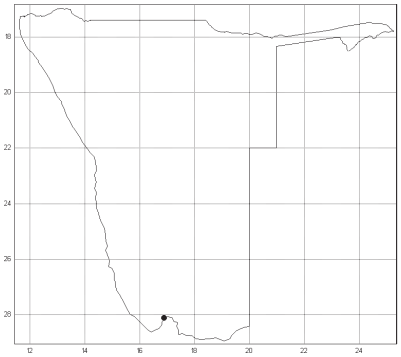
Habitat: Crevices on steeper slopes (Hartmann, 2001); up to 1300 m.

Threats: Collecting may be a potential threat to 2 sub-populations but this has not been ascertained.

Additional notes: Also occurs in South Africa (Hartmann, 2001); very attractive flower; no specimens in WIND.

Astridia speciosa L.Bolus

Astridia swartpoortensis L.Bolus



P

Status: NT

Description: Shrub, up to 300 mm high. Leaves semi-lunate, 35–50 x 10–16 mm, 18–20 mm thick. Flowers 35–55 mm in diameter, petals red to purple with whitish bases; filamentous staminodes with red tips, overtopping stamens. Capsule about 20 mm long, rims 3–4 mm high (Hartmann, 2001).

Rationale: Known from between 2 and 4 sub-populations and locations.

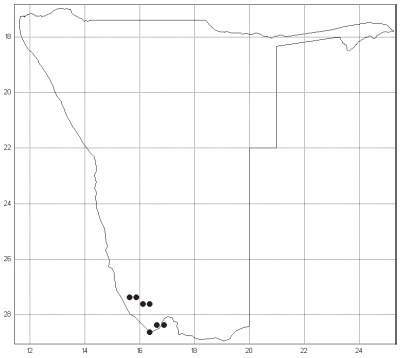
Habitat: Gravelly soil near rocks (Hartmann, 2001); 300–1000 m.

Threats: Collecting may be a potential threat; mining at least a potential threat; goat farming a potential threat.

Additional notes: Very attractive; no specimens in WIND; differs from *A. longifolia* by the semi-lunate leaves; also occurs in South Africa; (Hartmann, 2001).

Astridia velutina Dinter & Schwantes

Astridia blanda L.Bolus var. *blanda*



E P pl. 16

Status: LC

Description: Shrub, up to 0.5 m high, developing into big dense bush when older. Stems erect when young; internodes up to 30 mm long. Leaves semi-lunate, 30–50 x ca. 15 mm, 15–22 mm thick, surface velvety to touch. Flowers 30–70 mm in diameter, petals white to lilac pink. Capsule 12–18 mm long, rims 3–4.5 mm; seeds light brown with appearance of hedgehog or porcupine (Hartmann, 2001).

Rationale: Known from between 6 and 12 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Sandstone, dolomite, quartzite, granite, granite-pegmatite, gravel, sandy and loose rocky soil; moderate south-, southeast- and west-facing slopes of outcrops, ridges, hills and mountains; plains; 580 m; with *Pelargonium cortusifolium*, *P. grandicalcaratum* and other Succulent Karroo vegetation (Hartmann, 2001, WIND, 2002; Mannheimer, 2003, pers, comm.); 300–1100 m.

Threats: Mining is a threat to 1 sub-population.

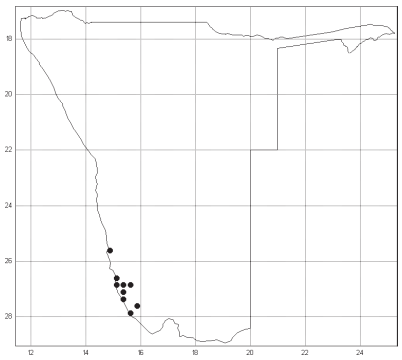
Additional notes: Quite widely distributed; most common Astridia in Namibia; locally uncommon to frequent or common but localised; also occurs in South Africa; similar to *A. hallii*, but differs by the spongy seeds and shorter leaves (Hartmann, 2001, WIND, 2002; Mannheimer, 2003, pers, comm.); seed accessions collected from some sub-populations for ex situ conservation.

Brownanthus namibensis (Marloth) Bullock

Psilocaulon namibense (Marloth) Friedrich

E pl. 16

Status: LC



Description: Procumbent to erect shrub, often forming circular tuft to 150 mm high, ca. 300 mm in diameter. Internodes dull dark green, cup-shaped, bladder cells long and narrow. Leaves ovately boat-shaped, shortly fused when young, partly persisting as papery bristles, with persistent papery and coarsely ciliate sheath at base, cilia wearing off with age. Flowers solitary, seldomly as large as 15 mm in diameter, petals white or cream. Capsule 2–3 mm in diameter, 5-locular (Hartmann, 2001; Mannheimer, 2003, pers. comm.).

Rationale: Known from between 9 and 18 sub-populations and locations; no significant continuing decline in number of mature plants known.

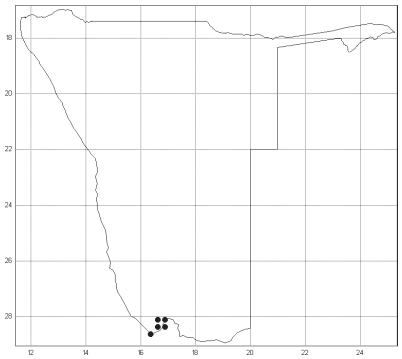
Habitat: West-facing slopes of quartzite ridges and schist outcrops; hill summits; gravel plains, brackish springs; shallow water courses on plains in sandy soil (WIND, 2002); 20–200 m.

Threats: Mining has reduced size and quality of habitat of one sub-population (pers. obs.).

Additional notes: Common but scattered; one sub-population found in small, undisturbed pockets within a severely disturbed habitat (WIND, 2002).

Brownanthus pubescens (N.E.Br. ex C.A.Maas) Bullock

Psilocaulon pillansii (L.Bolus) Friedrich



Status: LC

Description: Procumbent to erect shrub, up to 250 mm high and 0.8 m in diameter. Internodes dull light green, cup-shaped, bladder cells long and narrow. Leaves almost cylindrical, shortly fused when young, with basal ring of conspicuous white cilia, distinctly shorter than internodes and wear away in time to leave white ring on internode, bladder cells hair-like, giving pubescent appearance. Flower solitary, 10–15 mm in diameter, petals white to cream. Capsule 3–6 mm in diameter, with 5 locules (Hartmann, 2001; Mannheimer, 2003, pers. comm.).

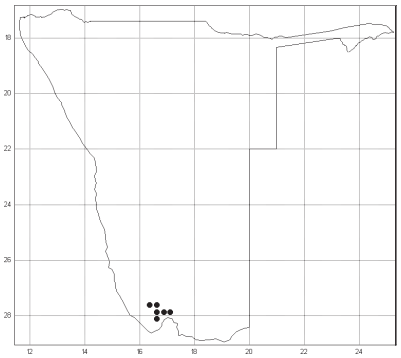
Rationale: Known from between 5 and 10 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Mountain base; dry river course; rocky bank of dry sandy water course; rocky north-facing slope; sandy plains between rocks in full sun; 200–300 m; often in stony soils on quartzite (WIND, 2002).

Threats: Mining may be a potential threat but this has not been ascertained.

Additional notes: Very striking species, locally common (Hartmann, 2001; WIND, 2002); may be confused with *B. ciliatus* (Aiton) Schwantes, which has cilia almost as long as internodes, and differs in leaf characters (Hartmann, 2001).

Cephalophyllum compressum L.Bolus



E P

Status: LC

Description: Succulent, often with head-like, dense centre. Stems creeping, but not rooting at nodes; internodes long. Leaves boat-shaped, with sharp tip, tapering to ends, spreading, often decumbent, with basal pustule, grey-green to yellowish, 40–65 mm long. Inflorescence terminal. Flowers 5–7, petals yellow. Capsule with sturdy, high valve rims (Hartmann, 2001; Mannheimer, 2003, pers. comm.).

Rationale: Known from between 6 and 12 sub-populations and locations; no significant continuing decline in number of mature plants known.

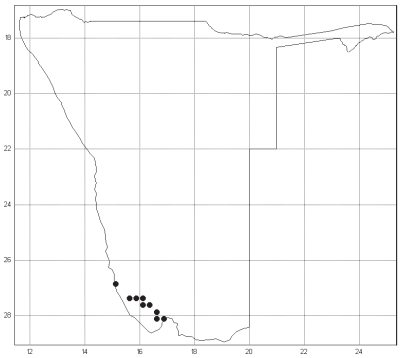
Habitat: Finely grained soils of old river terraces in open Succulent Karroo vegetation (Hartmann, 2001); 50–1000 m.

Threats: Mining may be a potential threat but this has not been ascertained.

Additional notes: Common (WIND, 2002); *C. compressum* distinguished from *C. ebracteatum* (Pax ex Schltr. & Diels) Dinter

& Schwantes by its spreading, seemingly withering leaves (Hartmann, 2001).

Cephalophyllum confusum (Dinter) Dinter & Schwantes



E P pl. 16

Status: LC

Description: Compact, rarely mat-forming succulent. Leaves erect, quill-shaped, dark green, 20–60 mm long. Flowers 1–3, petals yellow. Capsule with robust valve rims (Hartmann, 2001).

Rationale: Known from between 9 and 18 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Mountain bases, moderate northwest-, south- and west-facing slopes and summits; foothills; scree slopes; river beds; plains; red sand between grey-brown quartzite gravel, granite-pegmatite, sandstone gravel, limestone and wind-blown sand; with species of *Zygophyllum* and *Conophytum*; in Succulent Karroo vegetation (WIND, 2002; Loots, 2002, pers. obs); up to 1000 m.

Threats: Collecting may be a potential threat to a few sub-populations; mining has reduced the size and quality of one sub-population; proposed wind farm may be a potential threat to one sub-population but this has not been ascertained.

Additional notes: Two sub-populations face a very high risk of destruction in near future; seed collections made from some sub-populations for *ex situ* conservation; common but localised (WIND, 2002; Loots, 2002, pers. obs); growth and leaf form separate this species from *C. ebracteatum* (Pax ex Schltr. & Diels) Dinter & Schwantes, which is a creeper with acute, boat-shaped leaves (Hartmann, 2001).

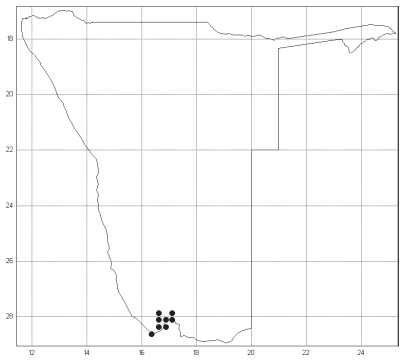
Cephalophyllum herrei L.Bolus

Cephalophyllum pallens L.Bolus

P pl. 16

Status: NT

Description: Erect to ascending shrub. Leaves mostly quill-shaped, also boat-shaped, dark to grey-green to yellowish-



green, 45–100 mm long. Flowers yellow with light yellow stamens. Capsule in persistent, erect, richly branched cymes developing over several years, valve rims robust and erect (Hartmann, 2001).

Rationale: Known from between 16 and 20 sub-populations and 10 locations; past reduction in population size suspected; suspected continuing decline in quality of habitat of at least 3 sub-populations.

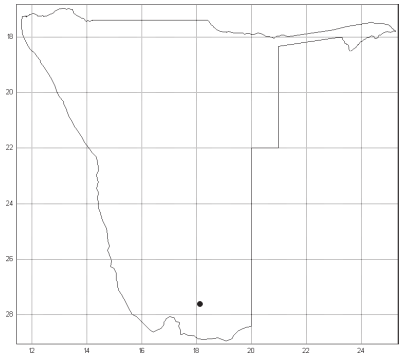
Habitat: Shaly slopes, with shrubby succulents; banks of river valley; rocky slopes and schist pavement; on rocky banks with *Sarcocaulon* (Hartmann, 2001; WIND, 2002); up to 1000 m.

Threats: Three sub-populations threatened by intensive mining activities (Mannheimer, 2003, pers. comm.); collecting may be a potential threat to a few sub-populations.

Additional notes: Also occurs in South Africa (Hartmann, 2001).

Chasmatophyllum musculinum (Haw.) Dinter & Schwantes

Stomatium musculinum (Haw.) Schwantes



P pl. 16

Status: NT

Description: Compact to mat-forming succulent, sometimes rooting at nodes. Leaves boat-shaped to triquetrous, 10–25 mm long, 4–5 mm broad and thick, keel and margin with 0–4 teeth, epidermis rough from raised whitish warts. Flower almost sessile, petals bright egg-yolk-yellow, often purplish suffused outside, closed flowers therefore looking pink. Capsule stalk long and top of capsule almost flat, rims very low, raised a little in centre, closing bodies absent (Hartmann, 2001;

Mannheimer, 2003, pers. comm.).

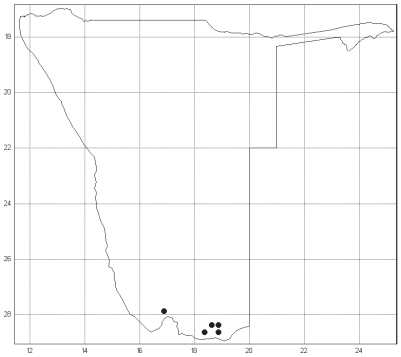
Rationale: Known from between 1 and 4 sub-populations and locations.

Habitat: Quartzitic mountain slope; gentle, southwest-facing hill slope in quartzitic gravel (WIND, 2002); coarser sand or finer gravel in flats; sometimes in pans or rocks; with summer rainfall vegetation (Hartmann, 2001); 980–1700 m.

Threats: Restricted range; collecting is at least a potential threat.

Additional notes: Common names: *Geelbergvygie*, *geelswaelstertvygie* (Afrikaans) (Smith *et al*., 1998); attractive plant with pretty flower; fairly easily cultivated; flower opening in afternoon; also occurs in South Africa (Smith *et al*., 1998; Hartmann, 2001).

Conophytum angelicae (Dinter and Schwantes) N.E.Br. subsp. *angelicae*



P pl. 16

Status: R

Description: Mat-forming dwarf succulent, densely aggregated in age. Bodies pale brown to fleshy pink, slightly wrinkled or smooth, apices round to slightly kidney-shaped in cross section, swollen tannin cells distributed over entire surface, size variable; earth-coloured. Flowers nocturnal, powerfully scented, petals reddish to brown. Capsule 4 to 8-locular (Hammer, 1993; Hammer in Hartmann, 2001; Mannheimer, pers. comm., 2003).

Rationale: Known from 6 sub-populations and locations.

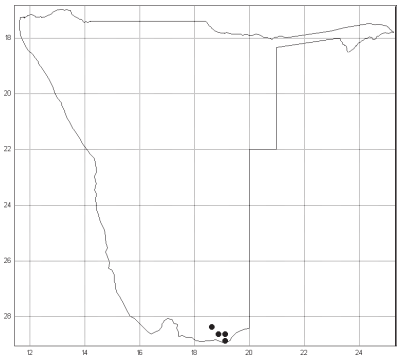
Habitat: Deep quartzite and granite rock crevices or exposed on quartz plains (Hammer, 1993); 900–1100 m.

Threats: Collecting may be a potential threat but plants very hard to see (Hammer, 2004, pers. comm.).

Additional notes: Rare and unique; small number of specimens in collections may be ascribed to excellent camouflage; faceted bodies unique in the genus; also occurs in South Africa (Hammer, 1993; Hammer in Hartmann, 2001); no specimens in WIND; probably the rarest of Namibian taxa (Hammer, 2004, pers. comm.).

Conophytum friedrichae (Dinter) Schwantes

Conophytum renominatum G.D.Rowley
Conophytum schwantesii G.D.Rowley
Ophthalmophyllum friedricheae (Dinter) Dinter & Schwantes
Ophthalmophyllum dinteri Schwantes ex H.Jacobsen
Ophthalmophyllum triebneri Schwantes
Ophthalmophyllum vanheerdei L.Bolus



P pl. 16

Status: LC

Description: Dwarf succulent, solitary or rarely forming 2- or 3-bodied clusters. Bodies cylindrical to urn-shaped, lobes closely united, apices convex, soft, brownish, never green, windows mainly apical, rounded, size variable. Flowers diurnal, slightly scented or scentless, petals white to pink. Capsule 6-locular (Hammer, 1993; Hammer in Hartmann, 2001).

Rationale: Known from more than 100 sub-populations, number of locations unknown; no significant continuing decline in number of mature plants known.

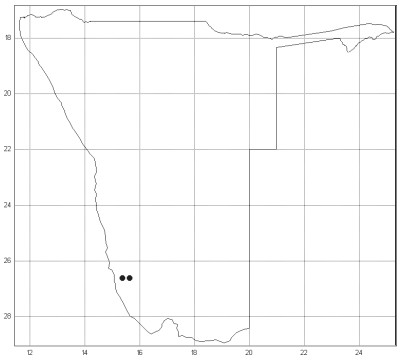
Habitat: Sunken, on quartz plains or in crevices; with a wide range of *Lithops* species and *Lapidaria margaretae* (Hammer, 1993, 2002; Hammer in Hartmann, 2001); rocky slope in full sun (Mannheimer, pers. comm.; 2003); 900–1100 m.

Threats: None currently known.

Additional notes: Widely scattered; no specimens in WIND; also occurs in South Africa (Hammer, 1993, 2002; Hammer in Hartmann, 2001).

Conophytum halenbergense (Dinter & Schwantes) N.E.Br.

Conophytum cuneatum Tischer



E P

Status: VU D2

Description: Dwarf succulent, forming tight mat, peculiarly asymmetric. Bodies of irregular and variable shape, pale dull green to brownish-green, always spotted with swollen tannin cells, especially on keels; keels distinct, often with irregular secondary "keels" (ridges marked with large swollen tannin cells), size variable. Flowers large, initially nocturnal, later remaining open during day, sweetly scented, petals usually coppery, whitish to yellow-orange or rarely wine-magenta. Capsule 4 to 5-locular (Hammer, 1993; Hammer in Hartmann, 2001).

Rationale: Known from between 2 and 4 sub-populations and locations.

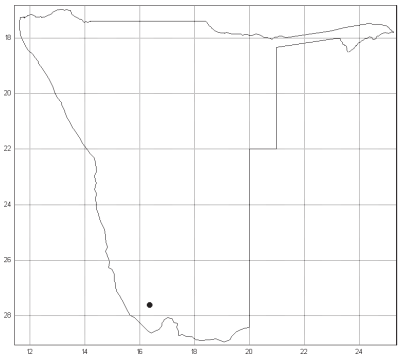
Habitat: Granite slopes and sometimes in detritus pans; seems to prefer vertical faces and crevices on gneiss and quartzite cliffs; frequently associated with *Lithops francisci* (Hammer, 1993, 2002); 530–670 m.

Threats: Collecting; restricted range.

Additional notes: Very pretty flower; related to *C. klinghardtense*, but geographically separated (Hammer, 1993; Hammer in Hartmann, 2001); no specimens in WIND.

Conophytum klinghardtense Rawe subsp. *baradii* (Rawe) S.A.Hammer

C. hirtum Schwantes var. *baradii* (Rawe)



E P

Status: R

Description: Dwarf succulent, forming tight mat. Bodies faintly marked, keeled, pale greyish-green, with fine papillae; markings sparse, more distinct on keels, red striations absent, size variable. Flowers initially nocturnal, later remaining open in day, sweetly scented, petals white, yellow to rose-pink. Capsule 4-locular (Hammer, 1993; Hammer in Hartmann, 2001; Mannheimer, pers. comm., 2003).

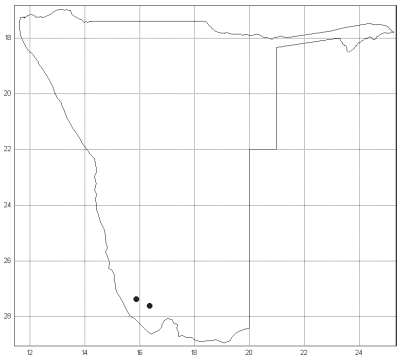
Rationale: Known from between 2 and 4 sub-populations and locations.

Habitat: Gravelly conglomerate formations; in pans of conglomerate; reddish sandstone (Hammer, 1993, 2002; Hammer in Hartmann, 2001); 290–1000 m.

Threats: Restricted range but no threats currently known.

Additional notes: Locally abundant (Hammer, 1993, 2002; Hammer in Hartmann, 2001); no specimens in WIND.

Conophytum klinghardtense Rawe subsp. *klinghardtense*



E P

Status: R

Description: Dwarf succulent forming tight domed mat up to 100 mm in diameter. Bodies pale yellowish-green, with distinct papillae, distinctly keeled, marked with red striations or spots, especially on keels, size variable. Flowers initially nocturnal, later remaining open in day, scented, petals coppery-pink to whitish, sometimes banded. Capsule 4 to 6-locular (Hammer, 1993; Hammer in Hartmann, 2001; Mannheimer, pers. comm., 2003).

Rationale: Known from 3 sub-populations and locations.

Habitat: Dwarf shrub and succulent steppe; on sandstone or granite hill slopes; cliffs; in rock crevices; in pegmatite troughs and gneiss / conglomerate formations (Hammer 1993, 2002; Hammer in Hartmann, 2001; WIND, 2002); 700–1120 m.

Threats: Restricted range but no threats currently known.

Additional notes: Locally common to abundant; similar to *C. quaesitum*, but this species has peculiar, smooth, putty-like epidermis; similar to *C. loeschianum*, which is much more slender (Hammer 1993, 2002; Hammer in Hartmann, 2001; WIND, 2002).

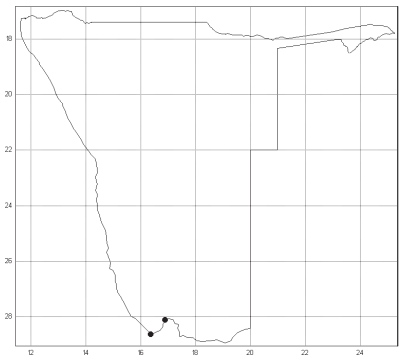
Conophytum loeschianum Tischer

Conophytum intermedium L.Bolus
Conophytum rubricarinatum Tischer
Conophytum saxetanum (N.E.Br.) var. *loeschianum* (Tischer) Rawe

P

Status: LC

Description: Dwarf succulent, forming small or large mat.



Bodies strongly keeled, pale green to yellowish-green, glabrous, very smooth, keels usually red-lined, size variable. Flowers nocturnal, strongly scented, petals coppery-orange to reddish or white. Capsule 5- or 6-locular (Hammer, 1993; Hammer in Hartmann, 2001).

Rationale: Known from at least 24 and possibly more than 200 sub-populations, number of locations unknown; no significant continuing decline in number of mature plants known.

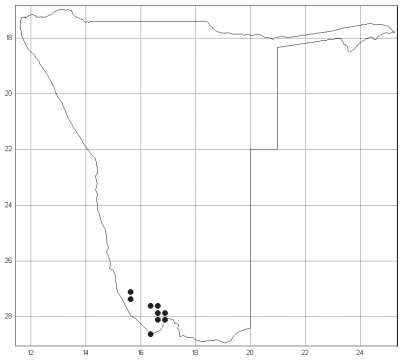
Habitat: Sandstone, quartz or granite slopes and summits; usually in half-shade; in highly arid situations; with *Tylecodon hallii* (Hammer, 1993, 2002; Hammer in Hartmann, 2001; WIND, 2002); 540–1200 m.

Threats: Restricted range but no threats currently known.

Additional notes: Also occurs in South Africa; differs from *C. saxetanum* by its more distinct, often bright-red keels (Hammer, 1993; Hammer in Hartmann, 2001);

Conophytum pageae (N.E.Br.) N.E.Br.

Conophytum johannis-winkleri (Dinter & Schwantes) N.E.Br.



P pl. 17

Status: LC

Description: Sparsely to highly branched dwarf succulent, forming compact or leggy mat. Bodies inversely cone-shaped, apices usually end abruptly, sometimes convex, chalky whitish green to bluish-green, usually unmarked, glabrous, fissure and sides often reddened. Flowers nocturnal, strongly scented, petals yellow to reddish, ivory white, rarely pink. Capsule 4–8-locular; sizes and colouration of bodies highly variable (Hammer, 1993; Hammer in Hartmann, 2001).

Rationale: Known from between 100 and 200 sub-populations, number of locations unknown; no significant continuing decline in number of mature plants known.

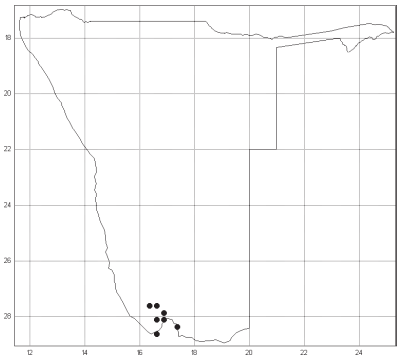
Habitat: Granite, shale, quartz, gypsum, dolerite, crumbling permatite and sandstone; exposed or in crevices; near a mountain summit (Hammer in Hartmann, 2001, WIND, 2002; Hammer, 2002).

Threats: Mining and collecting may affect a few sub-populations but this has not been ascertained.

Additional notes: Most widespread *Conophytum* species but scattered; also occurs in South Africa (Hammer in Hartmann, 2001, WIND, 2002; Hammer, 2002).

Conophytum quaesitum (N.E.Br.) N.E.Br. subsp. *quaesitum* var. *quaesitum*

Conophytum quaesitum (N.E.Br.) N.E.Br. subsp. *quaesitum* var. *rostratum* (Tischer) S.A.Hammer
Conophytum rostratum Tischer
Derenbergia quaesita (N.E.Br.) Schwantes
Conophytum quarziticum Tischer
Conophytum modestum L.Bolus



P pl. 17

Status: LC

Description: Dwarf succulent forming large cushions. Bodies obovoid with keeled apices, lobes long to rather short and beak-like, gaping, sometimes minutely hairy, usually at least faintly spotted with green or maroon spots. Flowers initially nocturnal, heavily scented, petals white to cream or pinkish. Capsule 4–6-locular; plants vary in size, shape and flower colour (Hammer, 1993; Hammer in Hartmann, 2001; Mannheimer, 2003, pers. comm.).

Rationale: Known from between 10 and 22 sub-populations and locations; no significant continuing decline in number of mature plants known.

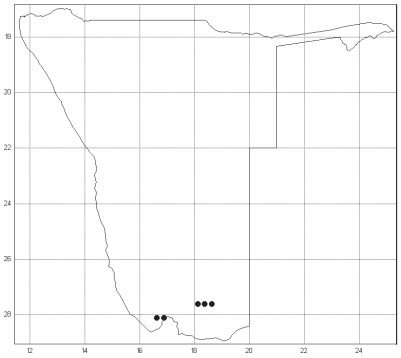
Habitat: In shade or half shade; on steep slopes with quartz and gneiss and ironstone formations; hills north of Orange River; often grows on steep faces and deep narrow crevices (Hammer, 1993; Hammer in Hartmann, 2001).

Threats: Collecting and mining may affect a few sub-populations but this could not be ascertained.

Additional notes: Widespread in southern Namibia; locally abundant; also occurs in South Africa; (Hammer, 1993; Hammer in Hartmann, 2001).

Conophytum quaesitum (N.E.Br.) N.E.Br. subsp. *densipunctum* (L.Bolus) S.A.Hammer

Conophytum densipunctum (Tischer) L.Bolus



E P

Status: LC

Description: Dwarf succulent forming large cushions. Bodies obovoid with bluntly keeled apices, lobes very short, not gaping, pale chalky green, always densely spotted, keels often yellowish, size variable. Flowers initially nocturnal, later remaining open in day, highly scented, petals white. Capsule 4–7-locular (Hammer, 1993; Hammer in Hartmann, 2001).

Rationale: Known from between 4 and 10 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Steep, lower to upper southeast-facing mountain and hill slopes; in quartzite crevices in the shade; with *Lithops karasmontana* (Hammer, 1993; Hammer in Hartmann, 2001; WIND, 2002; Hammer, 2002); 1050–1200 m.

Threats: Collecting may be a potential threat but this has not been ascertained.

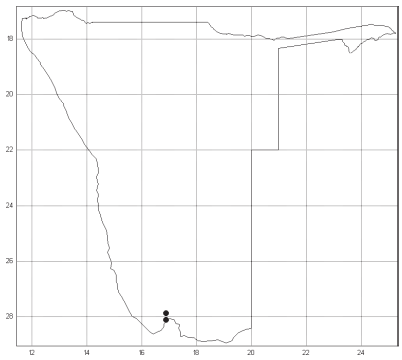
Additional notes: Distinguished from subsp. *quaesitum* by its very pale, yellowish-green, densely spotted epidermis, even keels, often larger, pure white flowers and generally more robust nature (Hammer, 1993; Hammer in Hartmann, 2001).

Conophytum ricardianum Loesch & Tischer subsp. *ricardianum*

E P pl. 17

Status: LC

Description: Dwarf succulent, forming thick cushion of overlapping bodies. Bodies inversely cone-shaped, size variable, apices end abruptly, pale green, heavily spotted, old swollen tannin cells blackened, sloughing off, fissure not sunken, minute. Flowers have to tear their way through tiny fissures, open in mid-afternoon, slightly scented, petals pure white.



Capsule 4–6-locular (Hammer, 1993; Hammer in Hartmann, 2001).

Rationale: Known from between 3 and 20 sub-populations and locations; no significant continuing decline in number of mature plants known.

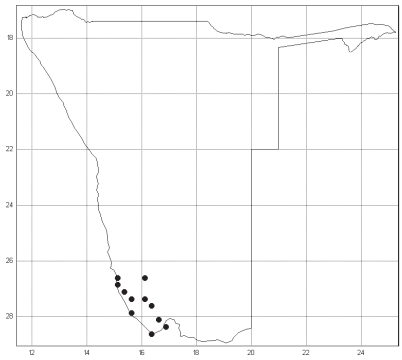
Habitat: Steep, shaded slopes in treacherous, grey-brown, eroding schist in shade; quartzite hills in full sun or half shade, wedged between rocks in clay-loam; just below summit of east facing mountain slope (Hammer, 1993; Hammer in Hartmann, 2001; Loots *et al*., pers. obs., 2002); 690–970 m.

Threats: Restricted range; collecting is a potential threat but this could not be ascertained.

Additional notes: Common but localised and scattered in one sub-population, plants very attractive (Loots *et al*., pers. obs., 2002).

Conophytum saxetanum (N.E.Br.) N.E.Br.

Conophytum exiguum N.E.Br.
Conophytum misellum N.E.Br.
Conophytum graessneri Tischer
Conophytum namibense N.E.Br.
Conophytum saxetanum (N.E.Br.) N.E.Br. forma *hallianum* G.D.Rowley
Conophytum saxetanum (N.E.Br.) N.E.Br. var. misellum (N.E.Br.) Rawe
Conophytum vescum N.E.Br.
Derenbergia saxetana (N.E.Br.) Schwantes



P pl. 17

Status: LC

Description: Dwarf succulent, forming tight mat or dome.

Bodies round to heart-shaped, ovate in outline, size variable, pale green, bluish-green to brownish or (often) red, glabrous, sometimes marked with translucent dots. Flowers nocturnal, scented, petals white, yellow to pale pink or apricot. Capsule 4–6-locular (Hammer, 1993; Hammer in Hartmann, 2001; Mannheimer, 2003, pers. comm.).

Rationale: Known from between 30 and 60 sub-populations and locations; no significant continuing decline in number of mature plants known.

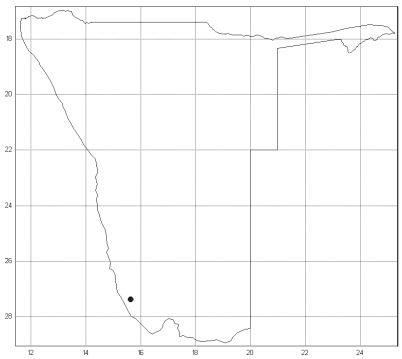
Habitat: Rocky areas in shale, gneiss, grey schist, granite or dolomite gravel; rock crevices, especially near the coast; foothills and summits; gentle west- and south-facing slopes; in full sun; with *Lithops optica* (Hammer in Hartmann, 2001; WIND, 2002; Hammer, 2002); 20–1125 m.

Threats: Mining may affect a small number of sub-populations.

Additional notes: Widespread and locally common; also occurs in South Africa (Hammer, 1993; Hammer in Hartmann, 2001; WIND, 2002).

Conophytum taylorianum (Dinter & Schwantes) N.E.Br. subsp. *taylorianum*

Conophytum lavranosii Rawe var. *cuneatum* Rawe
Conophytum lavranosii Rawe var. *lavranosii*



E P pl. 17

Status: R

Description: Dwarf succulents forming flat mats or compact domes. Bodies pale greyish-green, rarely emerald, densely spotted, spots quite prominent, apices flattish, not coloured, keels not as prominent as those of subsp. *ernianum*. Flowers short-tubed, often occurring in pairs, diurnal, scentless, petals pale to rose pink. Capsule 4–6-locular (Hammer, 1993; Hammer in Hartmann, 2001).

Rationale: Known from 5 to 6 sub-populations and locations.

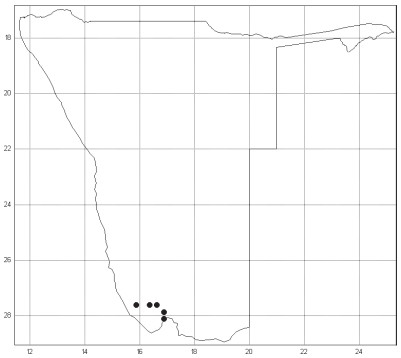
Habitat: Sandstone cliffs; pans of sandstone rubble; crevices of pale, weathered sandstone; shaded hollows; undersides of projecting rocks; with *C. saxetanum*; also adapted to sunny positions (Hammer, 1993, 2002; Hammer in Hartmann, 2001); 650–1125 m.

Threats: Restricted range but no threats currently known.

Additional notes: Locally abundant but very localised (Hammer, 1993, 2002); no specimens in WIND.

Conophytum taylorianum (Dinter & Schwantes) N.E.Br. subsp. *ernianum* (Loesch & Tischer) de Boer ex S.A.Hammer

Conophytum ernianum Loesch & Tischer



E P pl. 17

Status: LC

Description: Dwarf succulent, forming flat mats, compact domes or clumps. Bodies pale green to chalky whitish, apices wedge shaped, often deeply wrinkled, densely spotted, spots often prominent; keels well developed and jagged, often cartilaginous, pinkish. Flowers sometimes appear in summer, often long-tubed, nocturnal, slightly scented, petals pink to magenta. Capsule 4–6-locular (Hammer, 1993; Hammer in Hartmann, 2001).

Rationale: Known from 10 to 12 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Granite, white quartz, sandstone, gneiss; exposed patches of red sand; wet, shady crevices with ferns; south- and west-facing rocks; moderate to steep southwest-facing slopes and cliffs; with *C. pageae*, lichens, *Tylecodon aurusbergensis*, *T. similis* and *Astridia velutina* (Hammer, 1993, 2002; Hammer in Hartmann, 2001; Loots, pers. obs, 2002); 600–1114 m.

Threats: Mining at least a potential threat to one sub-population; infrastructure development has reduced the number of mature plants of one sub-population due to decline in size of habitat.

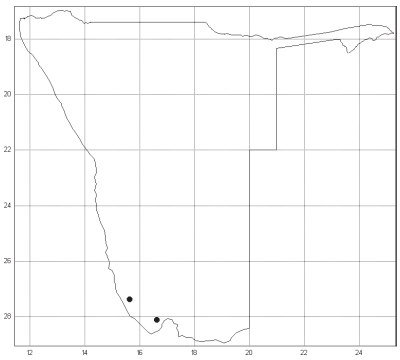
Additional notes: Rare to locally common (Loots, pers. obs. 2002); seed accession collected for *ex situ* conservation.

Delosperma klinghardtianum Dinter & Schwantes

pl. 18

Status: R

Description: Dense shrubs 0.1–0.15 m high, to 0.2 m in diameter. Stems erect with soft wood, almost fleshy, to 7 mm in



diameter, dark brownish-grey. Leaf pairs mostly near stem tips, 8-10 mm long, 3–4 mm thick, elongate-ovate, rounded apically, densely covered with round bladder cells. Flowers mostly one, pedicels 3–4 mm long, densely covered with round bladder cells, 17 mm in diameter; petals white to dark pink. Capsule top markedly raised and rounded, 4–5 m in diameter base convex,

Rationale: Known from between 3 and 6 sub-populations and locations.

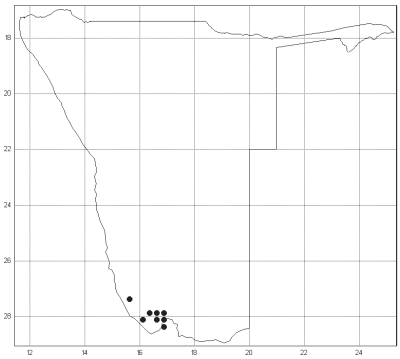
Habitat: On quartzitic mountains (WIND, 2003); 120–800 m.

Threats: Mining may be a potential threat to one sub-population but this could not be ascertained.

Additional notes: Rare (Burke, pers. comm. 2003); in Klinghardt mountains in large numbers, flowering in September (WIND, 2003).

Eberlanzia schneideriana (A.Berger) H.E.K.Hartmann

Ruschia hallowayana L.Bolus
Ruschia hollowayana L.Bolus
Ruschia pillansii L.Bolus
Ruschia schneideriana (A.Berger) L.Bolus
Ruschia spathulata L.Bolus
Ruschia sphaerophylla Dinter
Ruschia velutina L.Bolus



P pl. 17

Status: LC

Description: Erect shrub up to 0.5 m high, mostly higher than broad. Internodes white, with papillae. Leaves densely arranged, with distinct papillae, boat-shaped to crescent-shaped with convex sides, keeled or nearly globose, 10–30 x 5–6 mm and 5–6 mm thick, glaucous, grey. Flowers in terminal and sub-terminal, mostly three-flowered, candelabra-like inflorescences, spreading in three dimensions, stout, petals purple with lighter coloured base. Capsule 5-locular (Hartmann, 2001).

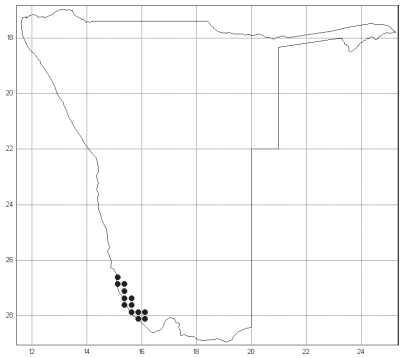
Rationale: Known from between 16 and 32 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Hills, mountains, rocky ridges, river-beds and rock crevices; north-, south-, and southwest-facing moderate to steep slopes; in full sun; limestone, windblown sand, granite and quartz gravel and loam terraces (Hartmann, 2001; WIND, 2002); 190–850 m.

Threats: Mining at least a potential threat to one or more sub-populations.

Additional notes: Locally occasional to common (WIND, 2002); also occurs in South Africa; plants somewhat variable (Hartmann, 2001).

Fenestraria rhopalophylla (Schltr. & Diels) N.E.Br. subsp. *rhopalophylla*



E P pl. 18

Status: LC

Description: Compact to mat-forming dwarf succulent. Bodies subterranean, only leaf apices ("windows") visible at surface. Leaves club-shaped, dark green. Flowers usually smaller than 50 mm in diameter, petals porcelain white. Capsule decumbent on long stalk, breaking off for dispersal as tumble-fruit (Hartmann, 2001).

Rationale: Known from between 18 and 30 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Plains; ridges; steep and gentle lower west-facing slopes; hill summits; rocky crevices; outcrops; windblown sandy pockets; lichen fields; quartzite, schist, sandstone, gneiss, dolomite, limestone and calcrete; sand, gravel or sandy loam; 20–320 m; with *Juttadinteria*, *Cephalophyllum*, *Zygophyllum* and *Limonium* species (Hartmann, 2001; WIND, 2002).

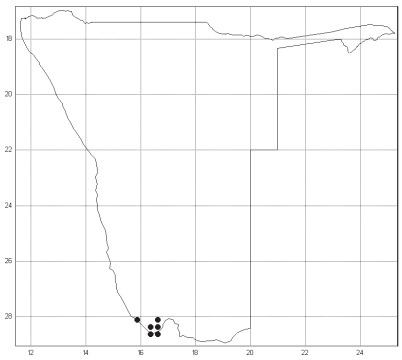
Threats: Collecting may be a potential threat to a few sub-

populations, but this has not been ascertained; mining has affected one sub-population.

Additional notes: Common names: Window plant, baby toes (English); *Vensterplant* (Afrikaans) (Smith et al., 1998); fairly widespread; occasional to common but localised; both plant and flower very attractive (Hartmann, 2001; WIND, 2002); seed accessions collected from several sub-populations for *ex situ* conservation.

Fenestraria rhopalophylla (Schltr. & Diels) N.E.Br. subsp. *aurantiaca* (N.E.Br.) H.E.K.Hartmann

Fenestraria aurantiaca N.E.Br.



P pl. 18

Status: NT

Description: Compact to mat-forming dwarf succulent. Bodies subterranean, only leaf apices ("windows") visible at surface. Leaves club-shaped, dark green. Flowers 1 or 2, erect, up to 70 mm in diameter, petal colour richly variable, yellow to coppery, externally purplish suffused, often pink at tips, lighter to white at base. Capsule decumbent on long stalk (Hartmann, 2001).

Rationale: Small past reduction in population size inferred.

Habitat: Plains; lower west- and southwest-facing slopes of hills and small dolomite outcrops; calcrete, granite, sandstone, dolomite and limestone; windblown sand pockets; deep sand (Hammer, 2001; WIND, 2002); 20–250 m.

Threats: Mining and road construction.

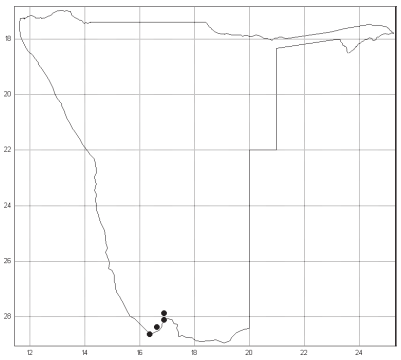
Additional notes: Common name: Window plant (English); *Vensterplant* (Afrikaans) (Smith et al., 1998); rare to frequent or common but always localised; also occurs in South Africa (Hammer, 2001; WIND, 2002); very attractive plant and flower; seed accession collected for *ex situ* conservation.

Hartmanthus hallii (L.Bolus) S.A.Hammer

pl. 18

Status: LC

Description: Densely leaved, compact dwarf shrubs, up to



200 mm x 250 mm. Some stems elongate, ca. erect; internodes pinkish, flattened in upper parts. Leaves sharply triquetrous, glaucous, epidermis finely rough, like sand paper, withering into parchment-like dry leaves, persisting for many years on plant. Flowers usually solitary or in short, protruding, perennial, broad umbels, 45–55 mm in diameter, petals white to pink. Capsule 8–10-locular (Hartmann, 2001; Mannheimer, pers, comm., 2003).

Rationale: Known from between 5 and 12 sub-populations and locations; no significant continuing decline in number of mature plants known.

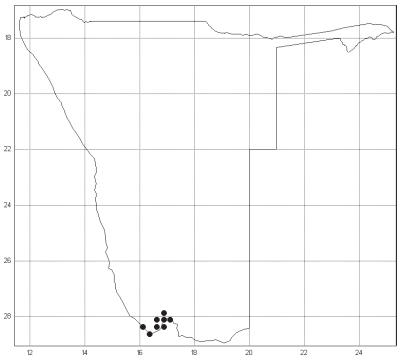
Habitat: Rocky bank of dry sandy drainage channel; on moderate west- and southeast-facing mountain slopes; quartzite; on dolomitic slopes; in sand, loamy soil and gravel; with *Pachypodium namaquanum* (Hartmann, 2001; WIND, 2002; Mannheimer, pers, comm., 2003); 190–850 m.

Threats: Collecting may be a potential threat but this has not been ascertained.

Additional notes: Also occurs in South Africa (Hartmann, 2001); seed accession collected for *ex situ* conservation.

Hartmanthus pergamentaceus (L.Bolus) S.A.Hammer

Delosperma pergamentaceum (L.Bolus) var. *pergamentaceum*
Delosperma pergamentaceum (L.Bolus) var. *roseum* Lavis



pl. 18

Status: LC

Description: Densely leaved, compact shrubs, up to 300 mm high, mostly becoming higher than broad. Stems erect, high, developing from compact centre; internodes orange-coloured,

flattened in upper parts. Leaves sharply triquetrous, glaucous, withering into parchment-like dry leaves persisting for many years on plant, epidermis smooth, glaucous. Flowers in perennial cymes, 45–55 mm in diameter, petals white to pink. Capsule top flat to forming low cone, usually strictly 5-locular (Van Jaarsveld & De Villiers Pienaar, 2000; Hartmann, 2001).

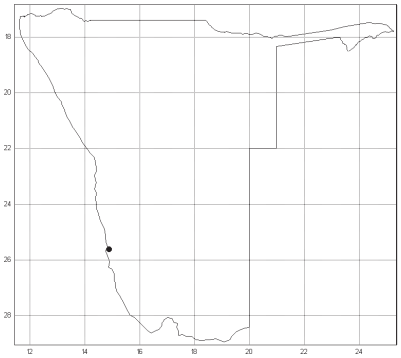
Rationale: Known from between 8 and 16 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Moderate lower slopes of quartzite outcrops; very fine soil; sand; bare rock (WIND, 2002); 190–1100 m.

Threats: Mining may be a potential threat to 1 sub-population.

Additional notes: Rare to common but localised; plants in some sub-populations in a poor condition (WIND, 2002; Loots *et al*., pers. obs., 2002); seed accessions collected from some sub-populations for *ex situ* conservation; also occurs in South Africa (Hartmann, 2001).

Jensenobotrya lossowiana A.G.J.Herre



E P pl. 18

Status: NT

Description: Densely leaved, compact, decumbent shrub hanging down cliffs like bunches of grapes. Internodes remain soft, spongy. Leaves shortly club-shaped to almost spherical, greyish pink to yellowish-green, glaucous. Flowers 20–35 mm in diameter, petals pale pink, often basally white, filaments white, anthers yellow. Capsule soft, withering quickly, funnel shaped with slightly convex sides, 5-locular (Hartmann, 2001; Mannheimer, pers, comm., 2003).

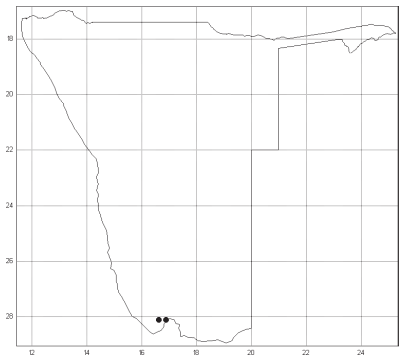
Rationale: Known from between 3 and 5 sub-populations and locations.

Habitat: Northwest- and southwest-facing cliffs exposed to strongly saline moisture; rocky outcrops and ridges near the sea; lower riverbed; depressions and crevices; often under gneiss rocks; in semi shade (WIND, 2002; Mannheimer & Burke, pers, comm., 2001); 20–100 m.

Threats: Restricted range; collecting may be a potential threat; increased tourism may become a potential threat in the future.

Additional notes: Very attractive and unusual; only species in the genus; easily cultivated (Hartmann, 2001; WIND, 2002).

Juttadinteria albata L.Bolus



P pl. 18

Status: CR B2ab(ii,iii,v)

Description: Low shrub up to 400 mm high. Stems ascending to erect. Leaves 50–80 mm long, more than 20 mm thick, boat-shaped, always with triangular apical part and often distinctly pointed at apex. Flowers 33–55 mm in diameter, petals white. Capsule less than 19 mm long, 9–11 mm in diameter, 8–9 locular (Hartmann, 2001; Mannheimer, 2003, pers. comm).

Rationale: AOO estimated to be < 10 km^2 sub-populations suspected to be severely fragmented; continuing decline in AOO, quality of habitat and number of mature plants.

Habitat: Mica schist, quartzite, dolomite, clayish soil, gravel and soils with high calcareous contents; mountain and hill summits, bases and slopes; south-facing river terraces, where plants seem to be dependant on fog coming from the river (Hartmann, 2001; WIND, 2002; Mannheimer, 2002, pers. comm.); 50–590 m.

Threats: Mining; agriculture.

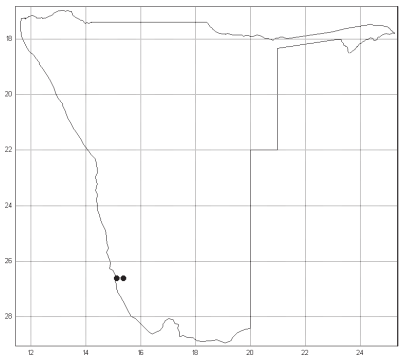
Additional notes: Survey underway to establish global distribution range; negotiations underway to protect part of the biggest known sub-population; one sub-population already fenced off for conservation; also occurs in South Africa; combination of fat leaves and rather small seeds distinguishes *J. albata* from all other species (Hartmann, 2001; WIND, 2002; Mannheimer, 2003, pers. comm.; Burke, 2003, pers. comm.); seed accession collected of one sub-population for *ex situ* conservation.

Juttadinteria kovisimontana (Dinter) Schwantes

E P pl. 19

Status: VU D2

Description: Tufted perennial, up to 200 mm high. Internodes concealed by leaf bases. Leaves greenish-white, covered with whitish, projecting tubercles, obtusely keeled, upper surface flat or slightly concave, 15–22 mm long, 10–18 mm thick near



apex, 10 mm broad at base and 20 mm broad across upper surface, margins with inconspicuous, flattish processes at broad, triangular tip. Flowers with peduncle 22 mm long, no diameter given, petals white. Capsule 5–11-locular (Walgate, 1939).

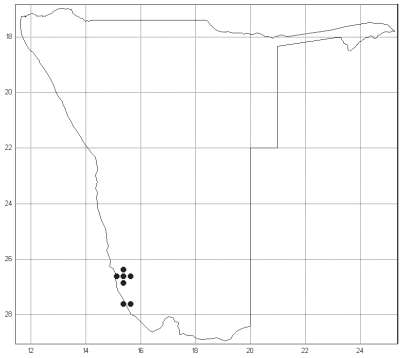
Rationale: Known from between 2 and 4 sub-populations and locations.

Habitat: Gneissic rocks on lower mountain slopes (Mannheimer, 2003, pers. comm.)

Threats: Restricted range; collecting.

Additional notes: Very attractive plant, poorly known.

Juttadinteria simpsonii (Dinter) Schwantes



E P pl. 19

Status: NT

Description: Dwarf shrub up to 250 mm high. Internodes short and visible. Leaves broadly boat-shaped, always with triangular apical part, margins and keel, often also faces, with fierce teeth, sometimes smoother. Flowers 20–35 mm in diameter, petals white. Capsule 13–18 mm long, 8–12-locular (Hartmann, 2001).

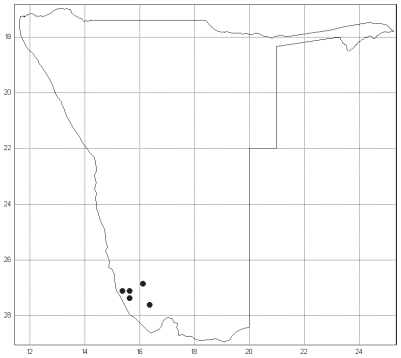
Rationale: Known from between 7 and14 sub-populations and locations; possible continuing decline in quality of habitat and number of mature plants.

Habitat: Lower to mid south-facing mountain slopes; sandy soil, on granite, dolomite, gneiss, mica, quartzite and rocky or sandy plains and pockets; with *Sarcocaulon*, *Pelargonium* and *Eberlanzia* (Hartmann, 2001; WIND, 2002).

Threats: At least one sub-population threatened by collecting; off-road driving causes habitat destruction in one sub-population.

Additional notes: Very attractive; seed accession collected for *ex situ* conservation.

Juttadinteria suavissima (Dinter) Schwantes



E P pl. 19

Status: LC

Description: Perennial up to 300 mm high. Stems 2–4, erect or decumbent; internodes often red, up to 15 mm long. Leaves light grey-green, reddish near tip, few tiny pores just visible through waxy layer on surface, obtusely 3-angled, apex obtuse or recurved, 20–43 mm long, 10–15 mm thick, margins on one or both sides shortly 1–6-dentate upwards. Flower with peduncle 40 mm long, 45–50 mm in diameter, petals white (Walgate, 1939).

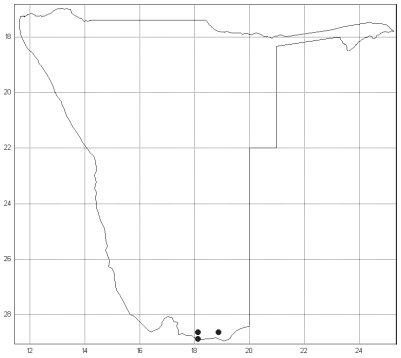
Rationale: Known from between 5 and 10 sub-population and locations; no significant continuing decline in number of mature plants known.

Habitat: Open sandy-pebble plains (WIND, 2002).

Threats: None currently known.

Additional notes: Pleasantly scented; pretty flower; locally common (WIND, 2002).

Lapidaria margaretae (Schwantes) Dinter & Schwantes



P pl. 19

Status: NT

Description: Compact succulent perennial with at least 2 pairs of keeled leaves. Leaves rounded-triangular, as thick as wide, with minutely rough texture; keel and margins hard and prominent, usually dark pink or orange with rest of leaf paler. Pedicels short, laterally compressed, winged. Flowers solitary, golden yellow. Capsule flat on top with distinct ridges, 6–8-locular; expanding keels with broad, membranous margins, covering membranes present, closing bodies absent (Smith et al., 1998; Hartmann, 2001).

Rationale: Known from between 5 and 15 sub-populations and locations; suspected continuing decline in number of mature plants.

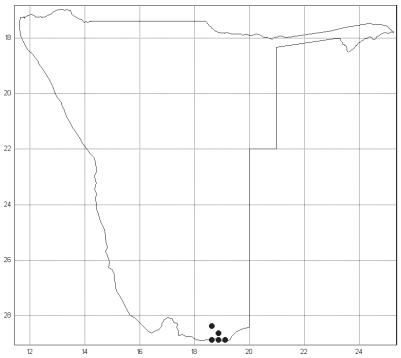
Habitat: Northeast-facing gentle hill slope in dwarf shrub and succulent steppe with other dwarf succulents; in quartzite strewn red sand; on gentle quartz-strewn slope; approximately 760–840 m; with *Lithops* sp. and *Anacampseros quinaria.*

Threats: Collecting a real threat, although extent thereof unknown.

Additional notes: Locally common (WIND, 2003); very attractive with or without flowers; also occurs in South Africa (Smith *et al*., 1998).

Lithops dinteri Schwantes subsp. *dinteri*

Lithops brevis L.Bolus
Lithops dinteri Schwantes subsp. *dinteri* var. *brevis* (L.Bolus) B.Fearn



E P pl. 19

Status: LC

Description: Dwarf succulent. Leaves truncate in profile, faces mostly ca. 20 x 15 mm; fissures fairly deep; margins usually distinct and fairly regular; markings distinct. Rubrications rarely absent, usually dots, occasionally dashes and/or hooks, usually distinct and prominent, blood red. Flowers yellow. Capsule mostly 5-locular, top ca. flat (Cole, 1988).

Rationale: Known from between 5 and 15 sub-populations; no significant continuing decline in number of mature plants known.

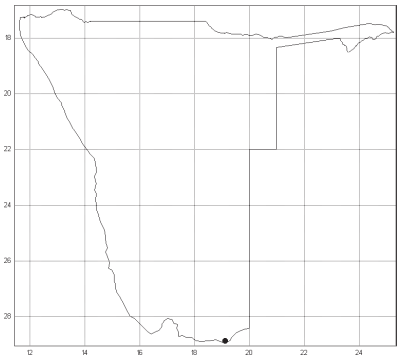
Habitat: Coarse white, grey-white, pink, or light brown pegmatite (Cole, 1988); 910–1070 m.

Threats: Collecting a potential threat although extent difficult to determine.

Additional notes: No specimens in WIND; seems to be a fairly poorly known taxon.

Lithops dinteri Schwantes subsp. *multipunctata* (de Boer) D.T.Cole

Lithops dinteri Schwantes var. *multipunctata* de Boer



E P

Status: VU D2

Description: Dwarf succulent. Leaves truncate in profile; faces mostly 20 x 15 mm; fissures fairly deep; margins indistinct and irregularly dentate or sinuate; markings distinctly reticulate. Rubrications numerous bold red lines, dashes, hooks and dots, light to dark blood-red. Flowers yellow. Capsule 5-locular, top ca. flat (Cole, 1988).

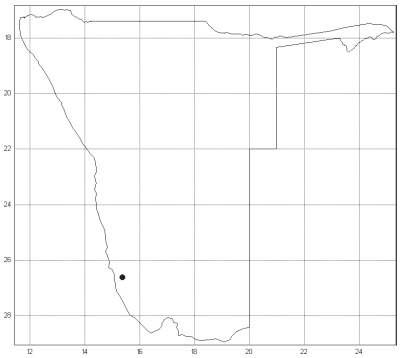
Rationale: Known from 1 to 3 sub-populations and locations.

Habitat: White, pink, brown and reddish-brown pegmatite, sheared, fine grained, mica quartz feldspar rock (Cole, 1988); 860–1080 m.

Threats: Collecting a real threat; restricted range.

Additional notes: No specimens in WIND; generally slightly larger than subsp. *dinteri*; with much bolder and more extensive linear markings (Cole, 1988).

Lithops francisci (Dinter & Schwantes) N.E.Br.



E P pl. 19

Status: VU D2

Description: Dwarf succulent. Leaves cordate-truncate, usually distinctly convex in profile, faces slightly elevated, elliptic reniform, smooth to very slightly rugose, mostly 24 x 17 mm, fissures deep; margins usually not clearly distinguishable, very irregular; markings clearly visible and very numerous dusky dots. Rubrications absent. Flowers yellow. Capsule 5-locular, top ca. flat (Cole, 1988).

Rationale: Known from 2 to 4 sub-populations and locations.

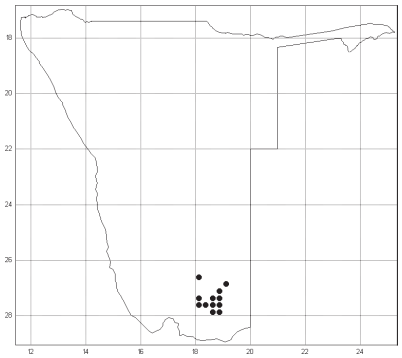
Habitat: Grey-white, light brown or black gneiss and schist (Cole, 1988); 530–670 m.

Threats: Collecting a real threat, highly probable that same collectors return annually to collect live plants, thereby causing continuing decline in population size; restricted range.

Additional notes: No specimens in WIND.

Lithops fulviceps (N.E.Br.) N.E.Br.

Lithops fulviceps (N.E.Br.) N.E.Br. var. *lactinea* D.T.Cole



P pl. 19

Status: LC

Description: Dwarf succulent. Leaves truncate in profile, faces flush, elliptic-reniform, slightly rugose, variable in colour, fissures shallow; margins not clearly distinguishable or absent; markings ca. reticulate, the usually very numerous and slightly raised dusky dots like miniature blisters over whole face. Rubrications occasionally absent, usually few to many slightly impressed dots, dashes or slender and irregularly branched lines, which are often indistinct, but sometimes form a conspicuous network, deep yellow to orange-brown to red. Flowers yellow. Capsule 5-locular, top flat to slightly convex (Cole, 1988).

Rationale: Known from between 11 and 30 sub-populations and locations; no significant continuing decline in number of mature plants known.

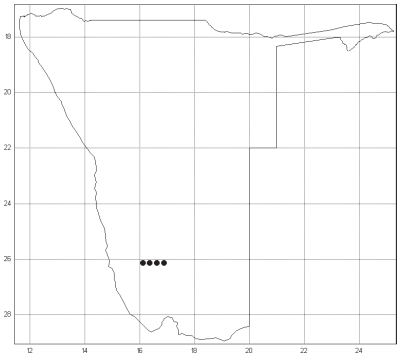
Habitat: Light to dark brown or reddish-brown, white or grey-white quartzite, gneiss, schist and grey-white calcrete; gentle limestone slope (Cole, 1988); 700–1150 m.

Threats: Collecting a potential threat but extent thereof unknown.

Additional notes: Also occurs in South Africa (Cole, 1988); very attractive plant.

Lithops gesineae de Boer

Lithops annae de Boer
Lithops francisci (Dinter & Schwantes) N.E.Br. var. *annae* (de Boer) B.Fearn
Lithops gesineae de Boer var. *annae* (de Boer) D.T.Cole



E P

Status: LC

Description: Dwarf succulent; relatively uniform. Leaves cordate-truncate in profile, distinctly convex, mostly ca. 28 x 20 mm, lobes slightly divergent; faces flush to slightly elevated, elliptic to slightly reniform, smooth, fissures fairly deep; margins usually distinct but irregularly dentate and sinuate; markings reticulate. Rubrications absent. Flowers yellow. Capsule mostly 6-locular, top flat to slightly convex (Cole, 1988).

Rationale: Known from between 6 and 12 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Reddish-brown weathered gneiss (Cole, 1988).

Threats: Collecting a potential threat but extent thereof unknown.

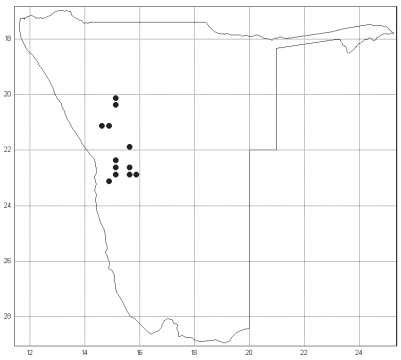
Additional notes: No specimens in WIND.

Lithops gracilidelineata Dinter subsp. *gracilidelineata*

Lithops streyi Schwantes
Lithops gracilidelineata Dinter subsp. *gracilidelineata* var. *waldronia*e de Boer
Lithops pseudotruncatella (A.Berger) N.E.Br. var. *gracilidelineata* (Dinter) B.Fearn
Lithops pseudotruncatella (A.Berger) N.E.Br. var. *gracilidelineata* (Dinter) B.Fearn forma *waldronae* (de Boer) B.Fearn

P

Status: LC



Description: Dwarf succulent. Leaves truncate in profile, usually somewhat convex, faces usually distinctly rugose, occasionally smooth, mostly ca. 35 x 25 mm, fissures shallow; margins not clearly distinguishable; markings finely reticulate. Rubrications occasionally absent, usually a number of fine dots, dashes or short lines, obscure, with a wide variety of colours. Flowers yellow. Capsule 6- or 7-locular, top ca. flat to slightly concave or convex, quite often peaked (Cole, 1988).

Rationale: Known from between 15 and 30 sub-populations and locations; no significant continuing decline in number of mature plants known.

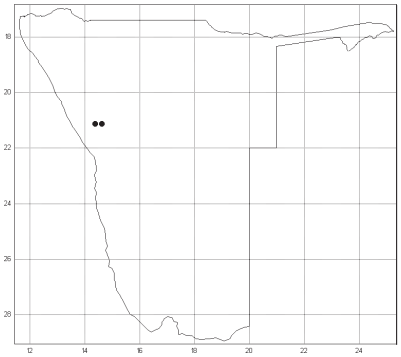
Habitat: Quartzite, fine feldspathic quartzite gravel and pegmatite gravel of various colours; rock crevice in a mountain (Cole, 1988; WIND, 2002); 180–1430 m.

Threats: Collecting a potential threat but extent thereof unknown.

Additional notes: Fairly widespread with many sub-populations; pale grey-white colour distinctive (Cole, 1988).

Lithops gracilidelineata Dinter subsp. *brandbergensis* (de Boer) D.T.Cole

Lithops pseudotruncatella (A.Berger) N.E.Br. var. *brandbergensis* de Boer



E P pl. 19

Status: NT

Description: Dwarf succulent. Leaves truncate in profile, usually somewhat convex, faces slightly rugose, mostly ca. 36 x 28 mm; fissures shallow; margins not clearly distinguishable; markings reticulate with a bold, fairly regular network of lines, dots sparse, scattered irregularly over face. Rubrications a bold, fairly regular network of lines, blood-red or brownish or purplish red. Flowers yellow. Capsule mostly 6-locular, top convex to peaked (Cole, 1988).

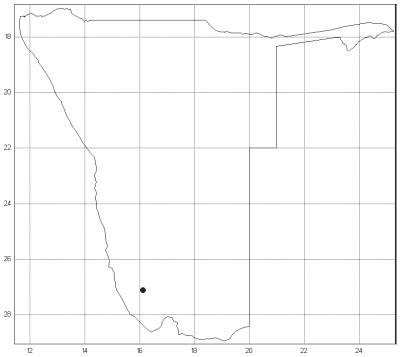
Rationale: Known from 1 or 2 sub-populations and locations.

Habitat: Weathered brown granitic gravel (Cole, 1988); 1900–2574 m.

Threats: Collecting a potential threat: part of population may have disappeared, but this has not been ascertained (Mannheimer, 2002, pers. comm.); restricted range.

Additional notes: Occurs at greatest altitude yet recorded for *Lithops* habitats (Cole, 1988). no specimens in WIND.

Lithops hermetica D.T.Cole



E P

Status: VU D2

Description: Dwarf succulent. Leaves truncate in profile, lobes mostly unequal, faces slightly elevated and rugose, mostly ca. 18 x 12 mm, fissures shallow; margins distinct but very irregularly shaped; markings reticulate, dusky dots numerous. Rubrications absent. Flowers yellow, 15–25 mm in diameter. Capsule mostly 5-locular, slightly convex (Cole, 2000).

Rationale: Known from 1 or 2 sub-populations and locations.

Habitat: Calcrete beds between dark blue-grey dolomite rocks (Cole, 1988); 20–180 m.

Threats: Collecting at least a potential threat; restricted range.

Additional notes: No specimens in WIND.

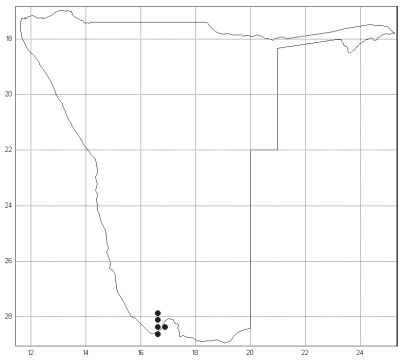
Lithops herrei L.Bolus

Lithops herrei L.Bolus var. *plena* L.Bolus
Lithops translucens L.Bolus

P pl. 20

Status: LC

Description: Dwarf succulent. Leaves cordate-truncate in profile, lobes mostly somewhat unequal; faces flush to slightly elevated, mostly ca. 23 x 17 mm; elliptic-reniform, smooth to



slightly rugose, fissures deep; margins usually irregular; markings reticulate. Rubrications absent. Flowers yellow, sometimes bronze-yellow, with white centre. Capsule mostly 5-locular, top ca. flat, usually with a dark line ca. 1 mm wide just below edge, cell-lid edges very distinct (Cole, 1988).

Rationale: Known from between 5 and 15 sub-populations and locations; no significant continuing decline in number of mature plants known.

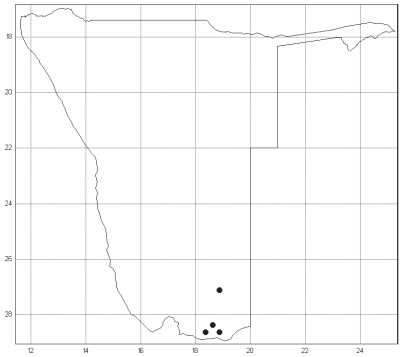
Habitat: Quartzite, schist, gneiss, lava and calcrete of various colours and combinations; quartzite outcrop (Cole, 1988; WIND, 2002); 100–640 m.

Threats: Collecting a potential threat; mining may be a potential threat in 2 sub-populations.

Additional notes: Restricted distribution in Namibia, but more widespread in South Africa (Cole, 1988).

Lithops julii (Dinter & Schwantes) N.E.Br. subsp. *julii*

Lithops lactea Schick & Tischer
Lithops chrysocephala Nel
Lithops fulleri N.E.Br. var. *chrysocephala* (Nel) de Boer)
Lithops julii (Dinter & Schwantes) N.E.Br. var. *littlewoodii* de Boer
Lithops julii (Dinter & Schwantes) N.E.Br. var. *reticulata* Tischer ex de Boer



E P pl. 20

Status: NT

Description: Dwarf succulent. Leaves truncate in profile, faces mostly ca. 25 x 20 mm, fissures fairly deep, lobes sometimes divergent; margins usually rather obscure, irregularly indented, usually with greyish-brown lip smear along inner margins; markings reticulate, enormously variable. Rubrications usually a network of lines, sometimes very bold and prominent, often reduced to a number of isolated and obscure short lines, hooks and/or dots, bright to dark red. Flowers white. Capsule 5-locular, top ca. flat (Cole, 1988).

Rationale: Known from between 8 and 16 sub-populations and locations; suspected past reduction and continuing decline in population size.

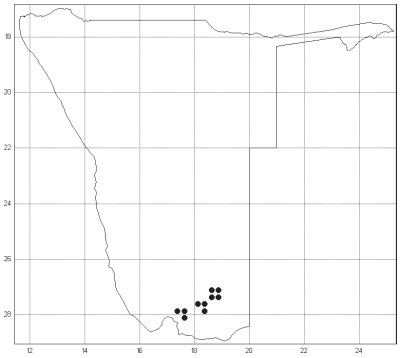
Habitat: Fine- or coarse-grained pegmatite or pegmatite gravel of various colours (Cole, 1988); 550–1069 m.

Threats: Collecting a real threat: seeds and live plants still collected from the wild and despite being freely available in cultivation, a popular succulent journal advertised "field collected" capsules and seed for sale.

Additional notes: The 'peppermint crème' form is particularly sought after; no specimens in WIND.

Lithops karasmontana (Dinter & Schwantes) N.E.Br. subsp. *karasmontana*

Lithops karasmontana (Dinter & Schwantes) N.E.Br. subsp. *karasmontana* var. *aiaisensis* (de Boer) D.T.Cole
Lithops karasmontana (Dinter & Schwantes) N.E.Br. subsp. *karasmontana* var. *lericheana* (Dinter & Schwantes) D.T.Cole
Lithops karasmontana (Dinter & Schwantes) N.E.Br. subsp. *karasmontana* var. *tischeri* D.T.Cole
Lithops bella N.E.Br. var. *lericheana* (Dinter & Schwantes) de Boer & Boom
Lithops damarana (N.E.Br.) N.E.Br.
Lithops erniana Tischer ex H.Jacobsen var. *aiaisensis* de Boer
Lithops karasmontana (Dinter & Schwantes) N.E.Br. var. *mickbergensis* (Dinter) de Boer & Boom
Lithops karasmontana (Dinter & Schwantes) N.E.Br. var. *opalina* (Dinter) de Boer & Boom
Lithops karasmontana (Dinter & Schwantes) N.E.Br. var. *summitatum* (Dinter) de Boer & Boom
Lithops lateritia Dinter
Lithops lericheana (Dinter & Schwantes) N.E.Br.
Lithops lericheana Dinter & Schwantes
Lithops lericheana (Dinter & Schwantes) Dinter & Schwantes
Lithops mickbergensis Dinter
Lithops opalina Dinter
Lithops summitatum Dinter



E P pl. 20

Status: LC

Description: Dwarf succulent. Leaves truncate or cordate-truncate in profile, faces mostly ca. 25 x 20 mm, fissures fairly deep; margins usually obscure, sometimes well-defined but irregularly indented; markings reticulate or broad and uniform. Rubrications sometimes absent, usually a number of short lines, hooks, triangles and dots which maybe linked into a network, dark brown, red or purplish red. Flowers white. Capsule with 5- or 6-locular, top ca. flat (Cole, 1988).

Rationale: Known from between 10 and 30 sub-populations; no significant continuing decline in number of mature plants known.

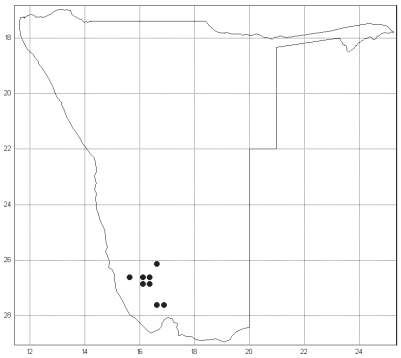
Habitat: Various shades, colours and combinations of pegmatite, quartzite, gneiss, calcrete, and sandstone (Cole, 1988); 1200–2200 m.

Threats: Collecting a threat to some sub-populations.

Additional notes: Markings extremely variable, some specimens opaque and uniformly coloured, others with extensive network of markings; colours also vary greatly (Cole, 1988); no specimens in WIND.

Lithops karasmontana (Dinter & Schwantes) N.E.Br. subsp. *bella* (N.E.Br.) D.T.Cole

Lithops bella N.E.Br. var. *bella*



E P pl. 20

Status: LC

Description: Dwarf succulent. Leaves truncate or cordate-truncate in profile, faces flush to slightly elevated, elliptic reniform, smooth to slightly rugose, fissures fairly deep; margins distinct but usually irregularly indented; markings coarsely reticulate. Rubrications usually absent, occasionally a few obscure red lines and dots. Flowers white. Capsule 5-locular, top ca. flat (Cole, 1988).

Rationale: Known from between 8 and 16 sub-populations and locations; no significant continuing decline in number of mature plants known.

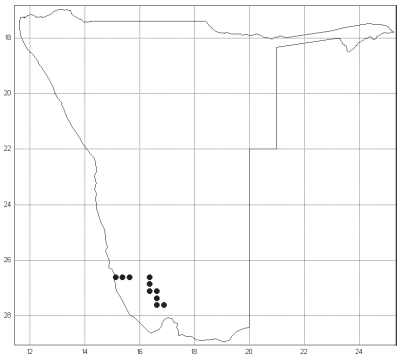
Habitat: Granitic gravel in mountains; feldspathic granitic gneiss and pegmatite (Giess, 1972; Cole, 1988); 1200–1300 m.

Threats: Collecting a potential threat but extent thereof unknown.

Additional notes: Distinguished from subsp. *karasmontana* by its very distinct translucent windows (Cole, 1988): no specimens in WIND.

Lithops karasmontana (Dinter & Schwantes) N.E.Br. subsp. *eberlanzii* (Dinter & Schwantes) D.T.Cole

Lithops bella N.E.Br. var. *eberlanzii* (Dinter & Schwantes) de Boer & Boom
Lithops eberlanzii (Dinter & Schwantes) N.E.Br.
Lithops edithiae N.E.Br.
Lithops erniana Tischer ex H.Jacobsen
Lithops erniana Tischer ex H.Jacobsen var. *witputzensis* de Boer
Lithops halenbergensis Tischer (insufficiently known sp.)



E P

Status: LC

Description: Dwarf succulent. Leaves cordate-truncate in profile, faces flush to slightly elevated, elliptic reniform, smooth to slightly rugose, mostly about 25 x 20 mm, fissures fairly deep; margins usually not clearly distinguishable, with irregular indentations; markings reticulate. Rubrications sometimes absent, usually a network of slender branched lines, very often reduced to a number of dots, hooks and/or short lines, with a wide variety of colours. Flowers white. Capsule 5-locular, top ca. flat (Cole, 1988).

Rationale: Known from between 10 and 20 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Gneiss, biotic gneiss, calcrete, pegmatite and quartzite (Cole, 1988); 1000–1550 m.

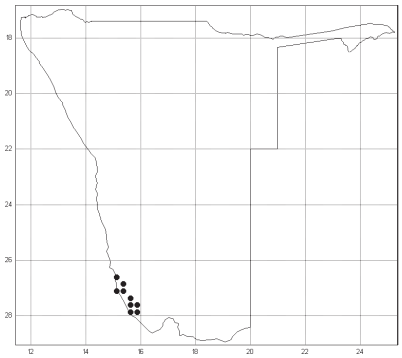
Threats: Collecting a potential threat but extent thereof unknown.

Additional notes: Colours and markings extremely variable (Cole, 1988).

Lithops optica (Marloth) N.E.Br.

Lithops elevata L.Bolus

Lithops optica (Marloth) N.E.Br. cv. "*rubra*" (Tischer) H.Jacobsen



E P pl. 20

Status: NT

Description: Dwarf succulent. Leaves cordate-truncate in profile, occasionally ca. flat, faces slightly elevated, mostly ca. reniform, smooth, mostly ca. 20 x 15 mm, fissures deep; margins distinct, regular to slightly irregular, in maculate form often irregularly indented; markings may be reticulate but islands usually absent. Rubrications absent. Flowers white, often with pink tips. Capsule 5-locular, top ca. flat, usually with dark line, up to 1 mm wide, just below edge (Cole, 1988).

Rationale: Known from between 15 and 30 sub-populations and locations; suspected reduction in population size, suspected continuing decline in number of mature plants.

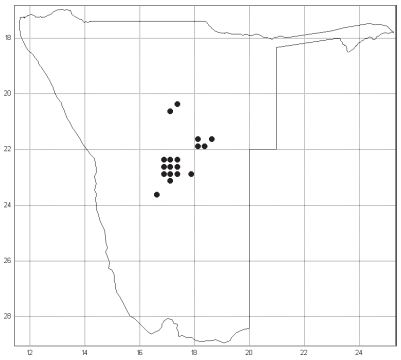
Habitat: Various forms, colours and combinations of gneiss, quartzite, pegmatite, sandstone, calcrete, limestone and shale; rock pavements and sand covered fissures in rocks; 50 m (Cole, 1988; WIND, 2002); 50–450 m.

Threats: Collecting a real threat: no specimens could be found when looked for recently in two sub-populations where plants were once plentiful (Cole, 2003, pers. comm.).

Additional notes: Usually recognizable by its greenish-grey colour and open windows; red form especially sought after (Cole, 1988).

Lithops pseudotruncatella (A.Berger) N.E.Br. subsp. *pseudotruncatella*

Lithops pseudotruncatella (A.Berger) N.E.Br. subsp. *pseudotruncatella* var. *elisabethiae* (Dinter) de Boer & Boom
Lithops pseudotruncatella (A.Berger) N.E.Br. subsp. *pseudotruncatella* var. *riehmerae* D.T.Cole
Lithops alpina Dinter
Lithops elisabethiae Dinter
Lithops edithiae sensu H.Jacobsen misapplied name
Lithops edithiae sensu Schwantes misapplied name
Lithops mundtii Tischer
Lithops pseudotruncatella (A.Berger) N.E.Br. forma *mundtii* (Tischer) H.Jacobsen
Lithops pseudotruncatella (A.Berger) N.E.Br. var. *alpina* (Dinter) Boom
Lithops pseudotruncatella (A.Berger) N.E.Br. var. *alta* Tischer
Lithops pseudotruncatella (A.Berger) N.E.Br. var. *edithiae* (N.E.Br.) de Boer & Boom)
Lithops pseudotruncatella (A.Berger) N.E.Br. var. *mundtii* (Tischer) H.Jacobsen
Lithops pseudotruncatella (A.Berger) N.E.Br. var. *pseudotruncatella* forma *albiflora* H.Jacobsen



E P pl. 20

Status: LC

Description: Dwarf succulent. Leaves truncate in profile, faces ca. reniform, smooth to very slightly rugose, usually ca. 25–40 x 20–30 mm, fissures shallow; inner margins usually fairly distinct, outer margins not clearly distinguishable; markings reticulate and dotted, dense and branching, of various colours. Rubrications usually irregularly and extensively branched, often connected to form a broken network, sometimes a scattering of short lines, dashes and dots, with a wide variety of colours. Flowers yellow. Capsule 5- or 6-locular, flat to slightly peaked (Cole, 1988).

Rationale: Known from between 20 and 30 sub-populations; no significant continuing decline in number of mature plants known.

Habitat: Quartz, quartzite, gneiss and mica schist of various colours; gentle slope; in foothills of mountains (Cole, 1988; WIND, 2002); 1800–2080 m.

Threats: Collecting may become a threat: one sub-population reported to have disappeared completely due to collecting.

Additional notes: Characterised by its usually densely and ramosely branched channels and rubrications, and its very numerous dusky dots (Cole, 1988); rare to common but localised (WIND, 2002; Loots et. al., pers. obs).

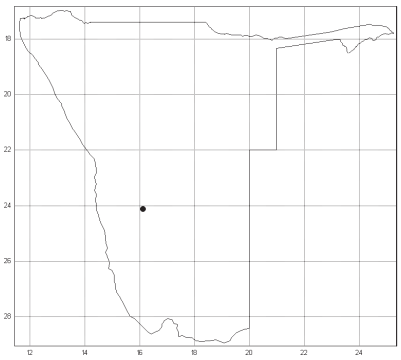
Lithops pseudotruncatella (A.Berger) N.E.Br. subsp. *archerae* (de Boer) D.T.Cole

Lithops archerae de Boer
Lithops pseudotruncatella (A.Berger) N.E.Br. var. *archerae* (de Boer) D.T.Cole

E P

Status: VU D2

Description: Dwarf succulent. Leaves truncate in profile, face



round-elliptic, smooth to very slightly rugose, mostly ca. 35 x 25 mm, fissures shallow; margins usually absent or very obscure; markings finely reticulate, sometimes dotted. Rubrications rarely entirely absent, usually a number of broken lines, hooks and dots, orange-brown, brown or red. Flowers yellow. Capsule 5–7-locular, top flat to peaked (Cole, 1988).

Rationale: Known from 1 or 2 sub-populations and locations.

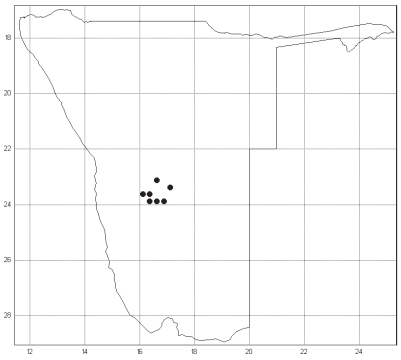
Habitat: Dolomite and limestone of different colours (Cole, 1988); 1500–1770 m.

Threats: Collecting at least a potential threat; restricted range; a 4 x 4 trail a potential threat.

Additional notes: Milky grey-green colour distinctive; occurs in protected area (Namib Naukluft Park) (Cole, 1988); no specimens in WIND.

Lithops pseudotruncatella (A.Berger) N.E.Br. subsp. *dendritica* (Nel) D.T.Cole

Lithops dendritica Nel
Lithops pseudotruncatella (A.Berger) N.E.Br. var. *dendritica* (Nel) de Boer & Boom



E P pl. 20

Status: NT

Description: Dwarf succulent. Leaves truncate in profile, faces mostly round-elliptic, smooth to slightly rugose, mostly ca. 35 x 28 mm, fissures shallow; margins usually not clearly distinguishable, irregularly incised; markings usually distinctly but finely reticulate, sometimes with dots. Rubrications sometimes absent, usually an extensive fairly regular network of connected lines, sometimes reduced to few or many dashes, hooks or dots, with a wide variety of colours. Flowers yellow. Capsule 6–8-locular, top flat to slightly convex, occasionally slightly peaked (Cole, 1988).

Rationale: Known from between 10 and 30 sub-populations and locations; suspected reduction in population size; suspected continuing decline in number of mature plants.

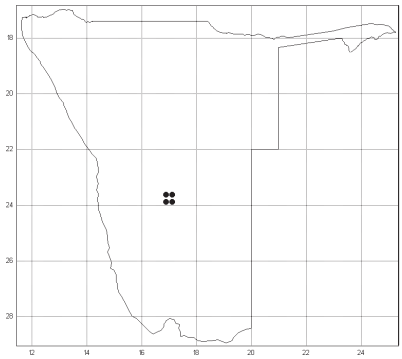
Habitat: Quartzite of various colours (Cole, 1988); 1500–1870 m.

Threats: Collecting a real threat; small stock farming at least a potential threat.

Additional notes: Reddish coloured and strongly marked forms very attractive and highly sought after; distinguished from subsp. *pseudotruncatella* by its more regularly branched patterns, usually more reddish colour and few dusky dots (Cole, 1988); no specimens in WIND.

Lithops pseudotruncatella (A.Berger) N.E.Br. subsp. *groendrayensis* (H.Jacobsen) D.T.Cole

Lithops pseudotruncatella (A.Berger) N.E.Br. var. *groendrayensis* H.Jacobsen
Lithops vallis-mariae (Dinter & Schwantes) N.E.Br. var. *groendraaiensis* (H.Jacobsen) de Boer



E P

Status: VU D2

Description: Dwarf succulent. Leaves truncate, faces round-elliptic, smooth, minutely rugose or dotted with minute 'pin-pricks', mostly ca. 35 x 30 mm, fissures shallow; margins absent or very obscure; markings finely reticulate or completely absent. Rubrications usually absent. Flower yellow. Capsule 6–8-locular, top flat, sometimes slightly convex or peaked (Cole, 1988).

Rationale: Known from between 4 and 8 sub-populations and locations, and within a very small AOO.

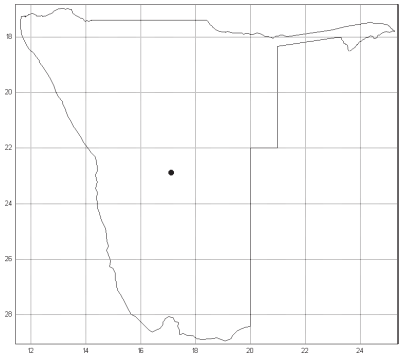
Habitat: Quartzite of various shades and colours (Cole, 1988); 1490–1520 m.

Threats: Collecting a real threat; small stock farming at least a potential threat.

Additional notes: Distinguished by its opaque grey-white colour and plants are mostly only one-headed (Cole, 1988); no specimens in WIND.

Lithops pseudotruncatella (A.Berger) N.E.Br. subsp. *volkii* (Schwantes ex de Boer & Boom) D.T.Cole

Lithops pseudotruncatella (A.Berger) N.E.Br. var. *volkii* Schwantes ex de Boer & Boom



E P

Status: VU D2

Description: Dwarf succulent. Leaves truncate in profile, faces mostly slightly reniform, smooth to very slightly rugose, somewhat polished and marble-like, mostly ca. 30 x 20 mm, fissures shallow; margins absent or not clearly distinguishable; markings faintly reticulate, with few or no dots. Rubrications sometimes absent, usually a number of lines, dashes and dots, usually very obscure, occasionally constituting a faint broken network, dull brown or red-brown. Flowers yellow. Capsule 6–8-locular, top flat to peaked (Cole, 1988).

Rationale: Known from 1 or 2 sub-populations and locations.

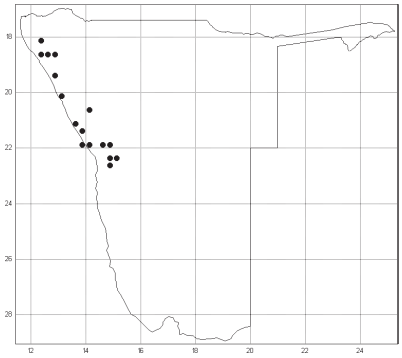
Habitat: Quartzite with some calcite of various colours (Cole, 1988); 2000–2260 m.

Threats: Collecting a real threat; restricted range.

Additional notes: Distinguished by its pale bluish-white colour (Cole, 1988); no specimens in WIND.

Lithops ruschiorum (Dinter & Schwantes) N.E.Br.

Lithops ruschiorum (Dinter & Schwantes) N.E.Br. var. *lineata* (Nel) D.T.Cole



E P pl. 21

Status: LC

Description: Dwarf succulent. Leaves cordate in profile, usually very distinctly convex, faces white to fleshy coloured, somewhat elevated, elliptic reniform, smooth to very slightly rugose, mostly ca. 25 x 20 mm, fissures deep; margins absent; markings finely reticulate. Rubrications often completely absent, otherwise a number of lines, dashes or dots, sometimes forming a coarse broken network, often obscure, dull orange-brown to orange-red. Flowers yellow. Capsule 5–6-locular, top flat to slightly peaked (Cole, 1988).

Rationale: Known from between 16 and 30 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Different forms, combinations and colours of quartz, pegmatite, calcrete, chert, calcite, tourmaline, gneiss and quartzite; shallow soil, sand, gravel and pebbles in rock desert; arid, low, open vegetation; level to gentle slopes; low ridge (Cole, 1988; WIND, 2002); 100–550 m.

Threats: Collecting a potential threat to some sub-populations; mining a real threat to one sub-population as it will be destroyed by planned expansion of tailings dam.

Additional notes: Plants vary considerably in size and presence or absence of markings but cordate shape characteristic (Cole, 1988); some sub-populations occur in the Skeleton Coast Park.

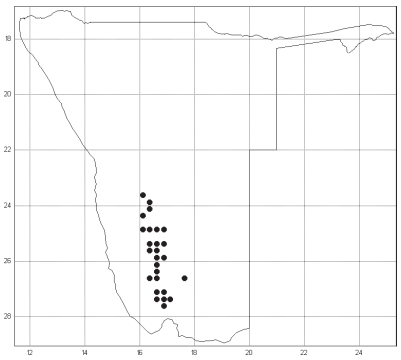
Lithops schwantesii Dinter subsp. *schwantesii*

Lithops schwantesii Dinter subsp. *schwantesii* var. *marthae* (Loesch & Tischer) D.T.Cole
Lithops schwantesii Dinter subsp. *schwantesii* var. *rugosa* (Dinter) de Boer
Lithops schwantesii Dinter subsp. *schwantesii* var. *urikosensis* (Dinter) de Boer & Boom
Lithops christinae de Boer
Lithops dinteri Schwantes var. *marthae* (Loesch & Tischer) B.Fearn
Lithops gulielmi L.Bolus
Lithops kuibisensis Dinter ex H.Jacobsen
Lithops kunjasensis Dinter
Lithops marthae Loesch & Tischer
Lithops rugosa Dinter
Lithops schwantesii Dinter var. *christinae* (de Boer) B.Fearn
Lithops schwantesii Dinter var. *kunjasensis* (Dinter) de Boer & Boom
Lithops schwantesii Dinter var. *nutupsdriftensis* de Boer
Lithops schwantesii Dinter var. *triebneri* (L.Bolus) de Boer & Boom
Lithops triebneri L.Bolus
Lithops urikosensis Dinter

E P pl. 21

Status: LC

Description: Dwarf succulent. Leaves truncate in profile, faces flush, mostly elliptic-reniform, smooth to rugose, mostly ca. 25 x 20 mm, fissures shallow; margins often prominently banded, but usually rather fuzzy, not clearly defined; mark-



ings sparsely or obscurely reticulate. Rubrications usually an entire or broken network of bold lines, fairly regular, occasionally in a honeycomb pattern, sometimes reduced to a number of isolated short lines, dashes and dots, dull to bright blood-red or purplish red. Flowers yellow, often with longish pedicels. Capsule 5-locular, top flat to slightly convex (Cole, 1988).

Rationale: Known from between 30 and 40 sub-populations and locations; no significant continuing decline in number of mature plants known..

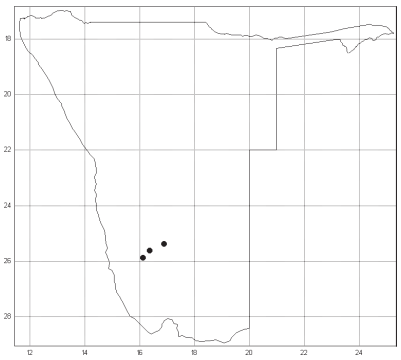
Habitat: Various forms, combinations and colours of sandstone, quartzite, gneiss, granitic gravel, pegmatite, calcrete, limestone, dolomite and shale; 1190 m, on very gentle slopes and plains (Cole, 1988; Loots *et al*., pers. obs., 2002); 1100–1500 m.

Threats: Illegal collecting reported by farmers for one sub-population; small stock farming may be a potential threat; herbivory: armoured crickets severely damaged approximately half of mature plants in at least one sub-population, thereby diminishing chances of recruitment (Loots *et al*., pers. obs., 2002).

Additional notes: Colours are extremely variable (Cole, 1988); no specimens in WIND.

Lithops schwantesii Dinter subsp. *gebseri* (de Boer) D.T.Cole

Lithops schwantesii Dinter var. *gebseri* de Boer



E P

Status: VU D2

Description: Dwarf succulent. Leaves truncate in profile, faces flush, mostly elliptic-reniform, smooth to rugose, mostly ca. 30 x 25 mm, fissures shallow; margins not usually clearly distinguishable; markings distinctly and finely reticulate. Rubrications usually a broken network of fine branched lines, dashes, hooks and/or dots, blood-red, purplish red, orange-brown. Flowers yellow, often with longish pedicels. Capsule 5- or 6-locular, top flat to slightly convex (Cole, 1988).

Rationale: Known from 1 to 3 sub-populations and locations.

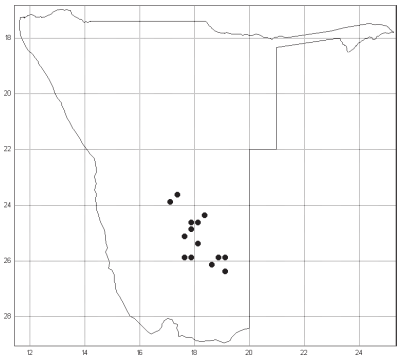
Habitat: Dark brown ferruginous sandstone (Cole, 1988); 1200–1650 m.

Threats: Collecting a real threat.

Additional notes: Plants appear to be softer to the touch than those of subsp. *schwantesii*, has finer network of markings (Cole, 1988); no specimens in WIND.

Lithops vallis-mariae (Dinter & Schwantes) N.E.Br.

Lithops vallis-mariae (Dinter & Schwantes) N.E.Br. var. *margarethae* de Boer



E P

Status: LC

Description: Dwarf succulent. Leaves truncate in profile, faces flush, mostly ca. reniform, opaque pale grey-white or grey-white, mostly ca. 30 x 23 mm, fissures shallow; margins absent or very obscure; markings very minutely reticulate or extensively dotted with pin-pricks, sometimes quite deeply pitted. Rubrications absent. Flowers straw yellow, sometimes orange-yellow, may be tinged with bronze or pink. Capsule 5-locular, flat, occasionally slightly convex (Cole, 1988).

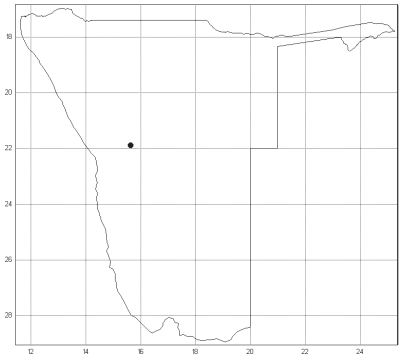
Rationale: Known from between 14 and 28 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Various colours of rounded quartzite and sandstone, calcrete and in clay in a shallow pan with very few sandstone and quartzite pebbles (Cole, 1988); 1100–1300 m.

Threats: Collecting: two sub-populations reported to have disappeared (Seifert, 2001, pers. comm.); but this has not been confirmed; agriculture may be a potential threat.

Additional notes: No specimens in WIND.

Lithops werneri G.Schwantes & H.Jacobsen



E P

Status: VU D2

Description: Dwarf succulent. Leaves cordate to truncate in profile, faces flush, elliptic, somewhat rugose, mostly ca. 20 x 15 mm, fissures relatively deep; outer margin usually not clearly distinguishable, inner margin often a continuous line; markings reticulate and dotted, dots scattered irregularly over whole face. Rubrications usually an entire or broken network of slender branched lines, often broader at junctions, which usually extend digitately onto shoulders; occasionally a number of indistinct dashes and dots, dark reddish brown. Flowers yellow. Capsule 5- or 6-locular, top flat to peaked; small bodies (Cole, 1988).

Rationale: Known from 1 sub-population and location.

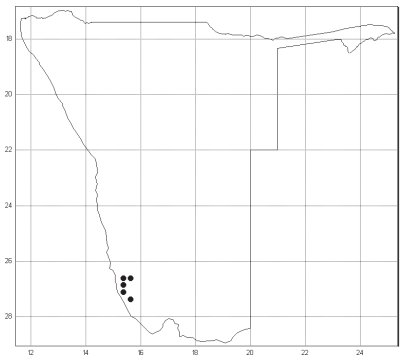
Habitat: Light brownish white and light brown weathered granitic gravel in shallow troughs; 1600 m; with dwarf *Aristida* (Schwantes, 1957;Cole, 1988); 1750–2300 m.

Threats: Restricted range; past reduction causing genetic erosion, as discoverer removed several hundred specimens for sale; collecting may be a potential threat currently but this could not be ascertained.

Additional notes: One of the smallest *Lithops*; distinctive branched markings and facial shape characteristic (Cole, 1988); no specimens in WIND.

Namibia cinerea (Marloth) Schwantes

Juttadinteria longipetala L.Bolus



E P pl. 21

Status: NT

Description: Compact perennial, forming dense, semi-globose body. Leaves fat, boat-shaped, with bulging sides, surface mostly markedly velvety to touch, 20–40 x 15–30 mm. Flowers solitary, without bracts, 45–65 mm in diameter, calyx lobes 5, petals white, stamens erect in central column. Capsule top raised in centre, covering membranes absent, expanding keels radial and parallel to each other, 8–14 locules (Hartmann, 2001; Mannheimer, 2003, pers. comm.).

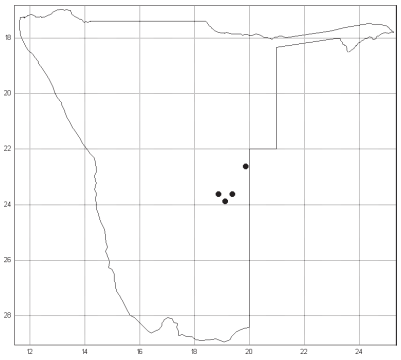
Rationale: Known from between 5 and 10 sub-populations and locations; suspected continuing decline in number of mature plants.

Habitat: Koppies and ridges; gravelly plains; mountain summits; vertical outcrops; lower to upper steep, west-facing slopes; rocky crevices; weathered granite between granite rocks; dune sand; blue dolomite limestone, marble, gneiss, granite, shell granite, quartzite between granite and sandstone-limestone conglomerate; 44–263 m; with *Euphorbia virosa*, *E. gummifera*, *Eberlanzia*, *Sarcocaulon*, *Pelargonium crassicaule*, *Cotelydon* and lichens (WIND, 2002).

Threats: Collecting a threat to at least one sub-population; restricted range.

Additional notes: Occasional to common but very localised (WIND, 2002); *Namibia* differs from *Juttadinteria* in growth form, leaf shape, and epidermis, as well as in flower and capsule morphology (Hartmann, 2001).

Nananthus margaritiferus L.Bolus



P

Status: NT

Description: Compact perennial. Leaves erect, boat-shaped, with rounded, acuminate tip, up to 30 x 8 mm and up to 7 mm thick, grey-spotted from white warts, surfaces ca. flat above, humped near apices below, dark green between warts. Flowers solitary, bracteoles at base almost as big as foliage leaves; sepals 5; petals yellow with darker yellow stripes, pink outside. Capsule breaking off and distributed as tumble fruits, mostly 8-locular, top flat to conically raised, covering membranes absent or as very narrow flaps, expanding keels di-

verging only slightly at their tips, valve wings rectangular and mostly much broader than expanding keels (Hartmann, 2001).

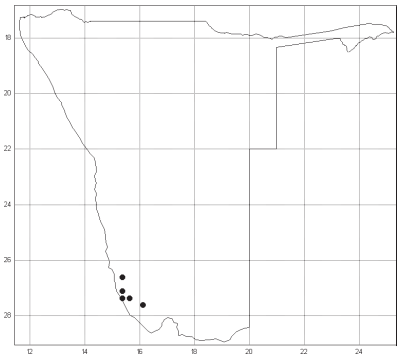
Rationale: Known from between 4 and 8 sub-populations and locations.

Habitat: Crevices of hard limestone ledges; in seasonally inundated calcrete pan (Hartmann, 2001; WIND, 2002); 900–1300 m.

Threats: Collecting a real threat; habitat destruction in the form of agriculture may be a potential threat but this has not been ascertained.

Additional notes: Also occurs in Botswana and South Africa (Hartmann, 2001); very attractive.

Psammophora nissenii (Dinter) Dinter & Schwantes



E P pl. 21

Status: LC

Description: Compact, perennial dwarf succulent, up to 100 mm in diameter, sunken in ground for most of leaf length, only triangular leaf tips visible. Stems up to 12. Leaves broadening towards tip, forming recurved triangle there, exhibiting leaf surface in this part, 20–40 x up to 15 mm, sand particles adhere to leaves in great quantity, forming secondary protective layer over leaf surface. Flowers 20–30 mm in diameter; sepals 5; petals white. Capsule with poorly developed covering membranes, valve wings broader than expanding keels, 5, rarely 6-locular (Hartmann, 2001).

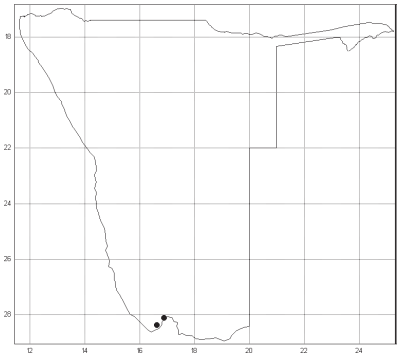
Rationale: Known from between 6 and 16 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Gravel on gentle, north-facing hill slopes; outcrops; well-drained stony soil; extensive plains in tiny hummocks of sand; quartzite (WIND, 2002); 20–550 m.

Threats: None currently known.

Additional notes: Very attractive; locally common (WIND, 2002); may be under-collected due to its obscure nature.

Psammophora saxicola H.E.K.Hartmann



E P

Status: R

Description: Shrub up to 0.6 m high. Leaves crowded near stem tips, crescent-shaped, light to bright green, slightly sticky with sand adhering. Flowers 35–40 mm in diameter; sepals 4; petals white. Capsule with covering membranes touching each other, but often reduced in width and length, 8-locular (Hartmann, 2001).

Rationale: Known from between 1 and 5 sub-populations and locations .

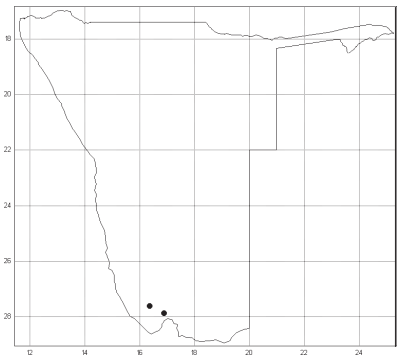
Habitat: Full sun on rocky slopes and plains in areas that receive sparse winter rainfall; amongst stones on south-facing shale slopes (Hartmann, 2001; WIND, 2002); 10–300 m.

Threats: Restricted range but no threats currently known; mining may become a potential future threat.

Additional notes: Differs from other *Psammophora* species in habit and in the bright green leaves in habitat, probably due to thinner sand cover and a reduced production in the sticky substance (Hartmann, 2001).

Ruschia namusmontana Friedrich

Ruschia foliosa L.Bolus



E P pl. 21

Status: R

Description: Sparse, erect shrub up to 1m high, internodes

brown. Leaves grouped at stem tips, crescent-shaped, yellowish-green, epidermis smooth, 5–35 x 5–10 mm, ca. 10 mm thick. Flowers solitary between last leaf pair, bracteoles at base of peduncle; sepals 6; petals pink. Capsule top low cone with low rims, base short, funnel-shaped, covering membranes convex, closing body absent, expanding keels ending in long awns, valve wings narrow and tapering to base and tip, 6-locular (Hartmann, 2001; Loots, 2002, pers. obs.).

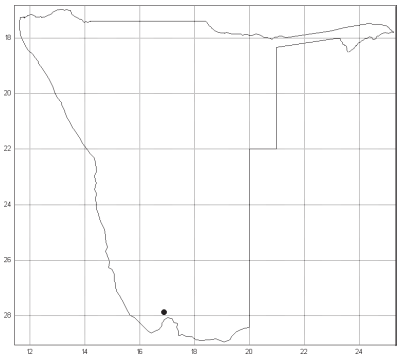
Rationale: Known from between 2 and 4 sub-populations and locations.

Habitat: Rocky south-facing, fog-catching slopes; steep gorge with sandstone, granite and soft black rock; with *Conophytum*, *Crassula* and *Aloe dichotoma* (Hartmann, 2001; Loots, pers. obs., 2002); 450–1000 m.

Threats: Restricted range but no threats currently known.

Additional notes: Common but extremely localised (Loots, pers. obs., 2002); seed accession collected for *ex situ* conservation.

Ruschianthus falcatus L.Bolus



E P pl. 21

Status: VU D2

Description: Compact perennial. Leaves sickle-shaped, spreading, in a dense arrangement, light grey, glaucus, tough and leathery. Flowers on short peduncles enclosed by leaves; petals greenish-yellow. Capsule 5-locular, covering membranes absent, valve wings narrow (Smith et.al., 1998).

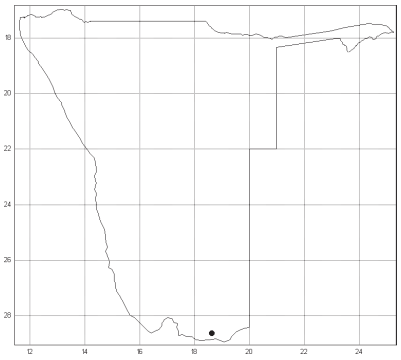
Rationale: Known from 1 sub-population and location; AOO estimated to be < 1 km^2.

Habitat: West-facing slope of limestone outcrop only; with *Euphorbia namuskluftensis*; 1182 m.

Threats: Restricted range; collecting is a potential threat.

Additional notes: Sickle-shaped leaves in stemless tuft and greenish yellow petals diagnostic. Field assessment recently conducted; population seems fairly healthy, having no signs of excessive mortality; vulnerable to over-collecting (Loots *et al.*, pers. obs.)

Schwantesia constanceae N.Zimm.



E P

Status: VU D2

Description: Compact perennial. Leaves erect to spreading, boat-shaped, 17–27 x 9–14 mm, asymmetrical when starting to flower, often very skewed due to oblique keel; keel parallel, distinct, acuminate; margins parallel, sharp, minutely toothed and maroon. Pedicels winged, persistent, keeping capsule erect between leaves. Flowers solitary, bright yellow, often basally white, seemingly without bracts, 30–40 mm in diameter. Capsule top slightly cone-shaped, rims low, meeting in centre, base bowl-shaped (Hartmann, 2001).

Rationale: Known from 1 sub-population and location.

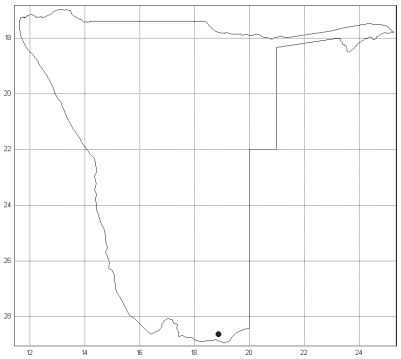
Habitat: Gneissic shales (Hartmann, 2001); 800–980 m.

Threats: Restricted range; collecting a real threat; agriculture may be a potential threat.

Additional notes: Very attractive; no specimens in WIND.

Titanopsis hugo-schlechteri (Tischer) Dinter & Schwantes

Titanopsis hugo-schlechteri (Tischer) Dinter & Schwantes var. *alboviridis* Dinter



P

Status: NT

Description: Compact dwarf succulent, sunken into ground. Leaves spathulate, with flattish purplish or rosy (rarely dark green), semi-translucent (not pearly) warts on dark green to

purplish background; wart size variable, dark dots between them. Flowers yellow. Capsule stalks breaking early from capsule, base shortly funnel-shaped, top mostly flat, less than 5mm high, valve wings narrower towards tip, but not tapering, closing bodies always absent; seeds smooth, white (Hartmann, 2001).

Rationale: Known from 3 to 5 sub-populations and locations; suspected continuing decline in number of mature plants.

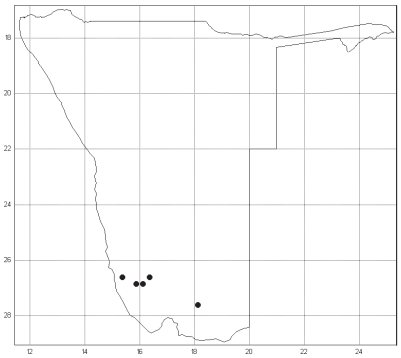
Habitat: Red sand overlying limestone or in limestone flats (Hartmann, 2001); 550–1500.

Threats: Restricted range; collecting a real threat; agriculture may be a potential threat but this has not been ascertained.

Additional notes: One of the most attractive of all the mesemb species, therefore extremely vulnerable to illegal collecting; cryptic nature possibly affords some level of protection; also occurs in South Africa (Hammer, 1990); no specimens in WIND.

Titanopsis schwantesii (Schwantes) Schwantes

Titanopsis luederitzii Tischer
Titanopsis primosii L.Bolus



E P pl. 21

Status: NT

Description: Compact dwarf succulent, often well above ground, sometimes almost orbicular in shape, tends to grow into semi-globose humps. Leaves triangular, with regular dense pattern of fine, pearl-like warts on tips. Flowers yellow. Capsule less than 5 mm high, valve wings narrowing only slightly to their tips; dispersed as tumble fruit; seeds smooth, white (Hartmann, 2001).

Rationale: Known from between 5 and 15 sub-populations and locations; suspected continuing decline in number of mature plants.

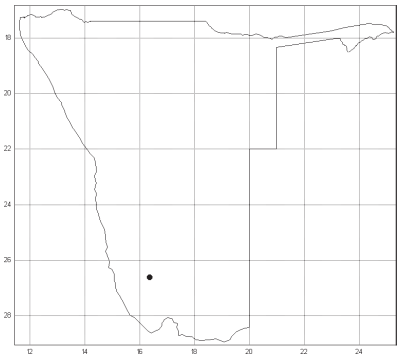
Habitat: Gravel plains; outcrops in gravel or sand; most often in calcrete, but also limestone and quartz (Hartmann, 2001; WIND 2002); 100–1000 m.

Threats: Collecting a real threat but extent thereof unknown.

Additional notes: Very attractive; locally very rare to abundant; also occurs in South Africa (Hammer, 1990; Hartmann, 2001; WIND 2002).

MOLLUGINACEAE

Suessenguthiella caespitosa Friedrich



E

Status: R

Description: Cushion-forming perennial herb, glabrous, 10–40 mm high x 80 mm in diameter. Stems short, many, densely arranged, arising from woody base. Leaves borne in semi-whorl, needle-like, 5–10 mm long, apices apiculate. Stipules 2 mm long, persistent. Flowers mostly in three's, axillary; tepals 5, ovate-oblong, apices hood-shaped; stamens 5, shorter than tepals, fused into cup at base. Capsule 3-angled, as long as or only a little shorter than tepals (Friedrich, 1960, 1968).

Rationale: Known from 1 or 2 sub-populations and locations.

Habitat: Crevices and narrow cracks in granite mountains; 1400 m (Friedrich, 1960).

Threats: Restricted range but no threats currently known.

Additional notes: Poorly known; not collected since 1929 (WIND, 2002); no specimens in WIND; distinguished from *S. scleranthoides* (Sond.) Friedrich by the perennial, dense cushion-shaped growth, and shorter and less conspicuous stipules (Friedrich, 1960, 1968).

ORCHIDACEAE

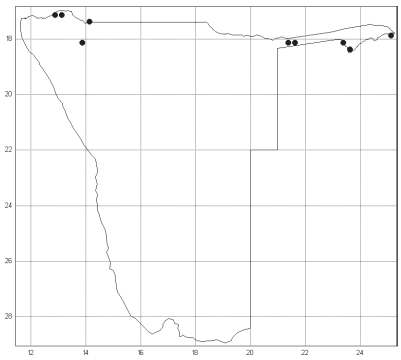
Ansellia africana Lindl.

Ansellia africana Lindl. var. *australis* Summerh.
Ansellia africana Lindl. var. *nilotica* Baker
Ansellia gigantea Reichb.f. var *gigantea*
Ansellia gigantea Reichb.f. var *nilotica* (Baker) Summerh.

C2 P pl. 22

Status: LC

Description: Epiphytic orchid, usually forming large clumps, often in dead trees; Roots ascending, forming a basket at the



base of the plant. Stems 0.1–1 m long and 10–15 mm in diameter. Leaves 4–8, strap shaped to elliptic, fan-shaped 150–350 x 15–35 mm, leathery, with prominent veins, old sheaths persisting on stem. Inflorescence branched, 200–400 mm long, laxly flowered. Flowers 30–50, large, 20–50 mm in diameter, yellow or greenish, con-colourous or variously dotted or marked with brown or maroon; lip 3-lobed (Linder and Kurzweil, 1999).

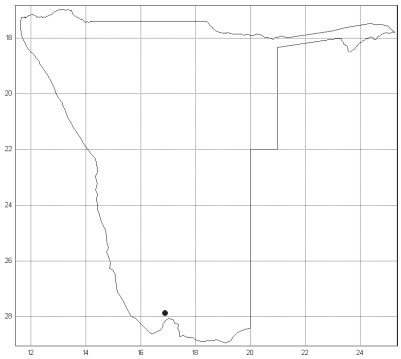
Rationale: Known from between 8 and 20 sub-populations and locations.

Habitat: On *Colophospermum mopane* and sausage trees (*Kigelia africana*); in gravelly mountainous areas (Kunene Region) and woodlands (Caprivi Region); savanna or scrub-forest (Linder and Kurzweil, 1999; WIND, 2002); 75–1065 m.

Threats: Habitat destruction in the form of deforestation may be a potential threat; collecting may be a potential threat.

Additional notes: Common names: *dikogha* (Thimbukushu); *omhandakani* (Oshikwanyama);
omhandakani (Oshindonga); Tiger orchid, Tree orchid, Leopard orchid (English).
Also occurs in South Africa, Zimbabwe and Botswana (Linder and Kurzweil, 1999); very attractive flower.

Bartholina etheliae Bolus



C2 P pl. 21

Status: NT

Description: Ground orchid, up to 300 mm high. Leaves solitary, basal, broadly cordate to orbicular, 10–36 x 8–24 mm. Inflorescence with large, sheathing bracts. Flowers hairy, with white terminal club-shaped structures; petals and lip pale lilac-blue; sepals green, linear-lanceolate, 10–20 mm long; petals linear-lanceolate, 8–20 mm long, lip spreading, fan-shaped, up to 40 x 35 mm with 4–6 lobes divided into many filiform segments with white terminal club-shaped appendages (Linder and Kurzweil, 1999).

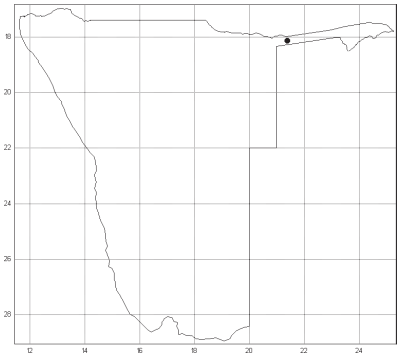
Rationale: Known from 1 or 2 sub-populations and locations.

Habitat: Usually among and inside bushes of a small *Pteronia* species (Bruyns, 1989); from near sea level to ± 1800 m (Linder and Kurzweil, 1999).

Threats: Collecting; restricted distribution; low densities.

Additional notes: Common names: Spider orchid (English); *Spinnekopblom* (Afrikaans) (Linder and Kurzweil, 1999).
Very rare; exquisite flower; also in South Africa (Linder and Kurzweil, 1999); no specimens in WIND.

Bonatea steudneri (Rchb.f.) T.Durand & Schinz



C2 P

Status: NT

Description: Robust ground orchid up to 1 m high. Leaves scattered along stem, densely overlapping, elliptic to lanceolate. Inflorescence lax, to 300 mm long; bracts similar to leaves. Flowers 4–14, green and white, up to 130 mm long; median sepal erect, helmet-shaped, apices acute, recurved, lateral sepals oblique, reflexed, acute; petals deeply bilobed, upper lobe narrowly linear, acute; lower lobe narrowly linear to filiform, attenuate, curved; lip 3-lobed from narrow, undivided base, central lobe slightly broader than side lobes (Linder and Kurzweil, 1999).

Rationale: Known from 1 or 2 sub-populations and locations.

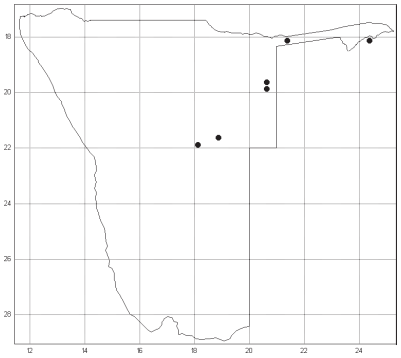
Habitat: Grassland and savanna; 800-2000 m; banks of Okavango River, in sandy soil in the shade of trees (Linder and Kurzweil, 1999; WIND, 2002).

Threats: Restricted range; human population expansion and increasing agriculture.

Additional notes: Widespread through tropical and sub-tropical Africa, but in southern Africa only in Namibia (Linder and Kurzweil, 1999).

Eulophia hereroensis Schltr.

Eulophia lissochiloides auct. non Lindl.



C2 P pl. 22

Status: LC

Description: Orchid with subterranean to partly aerial pseudobulbs. Leaves thinly textured, up to 450 x 20 mm. Peduncle 250-550 mm high. Inflorescence lax and elongate. Flowers 7-25; sepals yellowish green, sometimes tinged purple, petals and lip pale yellowish green, crests pale lemon yellow; median and lateral sepals similar, 13–16 mm long, oblong or slightly oblanceolate, obtuse; petals spreading, slightly shorter than sepals, lip 3-lobed, crests consisting of thin, subentire plate-like extensions, finely hairy at base (Linder and Kurzweil, 1999).

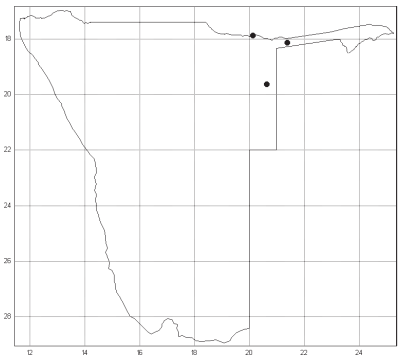
Rationale: Known from between 6 and 12 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Open tree savannas in the shade of *Acacia* species; mostly in white sand; hard pan clay soil overlying calcrete (WIND, 2002); 715–1210 m.

Threats: Collecting for food and horticulture may be potential threats; low densities.

Additional notes: Common names: Wild mango (English). Very attractive; locally rare, frequent or common; appears to be restricted to a few small colonies of up to 20 plants; flowering recorded to occur rarely; used as food source by the San; also occurs in South Africa (Linder and Kurzweil, 1999; WIND, 2002).

Eulophia leachii Greatrex ex A.V.Hall



C2 P pl. 22

Status: NT

Description: Orchid with pseudobulbs mostly aerial. Leaves somewhat leathery, up to 200-300 x 8-15 mm. Peduncle 450–600 mm high. Inflorescence lax. Flowers 3–24; sepals and petals yellowish- green, tinged purple, lip-greenish yellow basally to white distally, crests white with minute purple speckles near lip base; sepals and petals subequal, sepals erect, median and lateral sepals similar, 15–19 mm long, narrowly oblong-lorate to sub-oblanceolate, acute; petals as long as sepals, lanceolate to narrowly ovate, acute, apices recurved; lip obscurely 3-lobed, crests consisting of densely crowded papillae, flanked by low ridges, central lobe recurved (Linder and Kurzweil, 1999).

Rationale: Known from 2 to 4 sub-populations and locations.

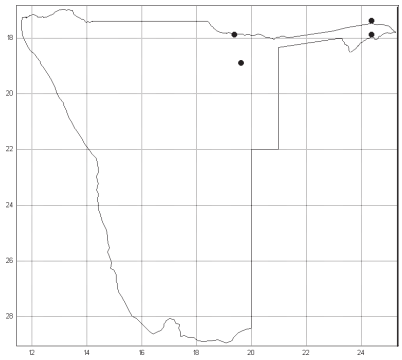
Habitat: White sand in dense, dry woodland and bushveld in partial shade under trees (WIND, 2002); up to 1120 m.

Threats: Habitat destruction due to increased human population growth and agriculture are potential threats.

Additional notes: Scattered or may form large colonies; very attractive flower; also in South Africa (Linder and Kurzweil, 1999; WIND, 2002).

Eulophia livingstoniana (Rchb.f.) Summerh.

Eulophia jumelleana Schltr.
Lissochilus jumelleanus (Schltr.) Schltr.
Lissochilus livingstonianus Rchb.f.



C2 P

Status: R

Description: Orchid with thin-textured leaves. Peduncle 300–700 mm high. Inflorescence somewhat lax. Flowers 3–12, large, sepals and petals white, side lobes of lip pale brown, central lobe purplish-pink; sepals and petals spreading to reflexed, subequal, 9–19 x 4–6 mm; lip 3-lobed, crests consisting of 2 broad, warty ridges; central lobe convex at base of gynostemium; side lobes erect, rounded (Linder and Kurzweil, 1999).

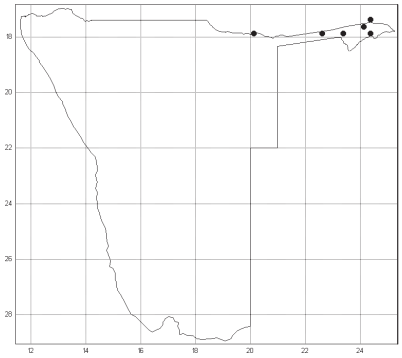
Rationale: Known from between 4 and 8 sub-populations and locations.

Habitat: Sandy loam soil around omurambas; in black soil on slopes (WIND, 2002).

Threats: Increased human population growth and agriculture may be potential threats but this has not been ascertained.

Additional notes: Tends to form dense stands; also occurs in South Africa and Botswana (Linder and Kurzweil, 1999; WIND, 2002).

Eulophia walleri Kraenzl.



C2 P pl. 22

Status: LC

Description: Orchid with subterranean rhizomes. Leaves slender, fan-shaped, up to 750 x 24 mm. Peduncle up to 1.3 m high. Inflorescence somewhat dense, elongate. Flowers 5–15; sepals and petals partly spreading, deep yellowish orange, lip deep reddish orange; median sepal linear, acute, 30–45 mm long; lateral sepals similar but longer; petals two thirds as long, broader; lip 3-lobed, side lobes recurved; slender lip mid-lobe twice as long as basal portion (Linder and Kurzweil, 1999).

Rationale: Known from between 6 and 12 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Vlei; grassy marshland and tall grassland (WIND, 2002); up to 305 m.

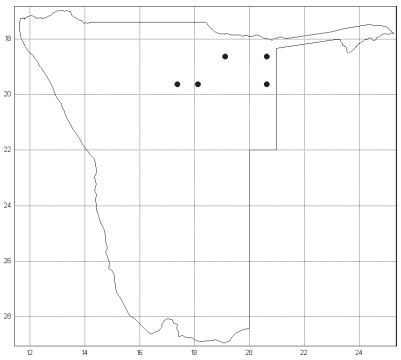
Threats: Collecting, use of fire for rangeland management, habitat fragmentation due to removal of thatching grass and livestock farming may be potential threats but could not be ascertained.

Additional notes: Locally occasional; very attractive; also occurs in other southern African countries (Linder and Kurzweil, 1999; WIND, 2002).

Habenaria epipactidea Rchb.f.

Habenaria schinzii Rolfe
Habenaria perfoliata Kraenzl
Orchis foliosa Swartz
Bonatea foliosa (Swartz) Lindl.

C2 P



Status: LC

Description: Stout orchid, to 500 mm high, usually densely leafy. Leaves scattered along stem, suberect to spreading, ovate to lanceolate or narrowly oblong-lanceolate, acute, up to 150 x 40 mm. Inflorescence dense, many-flowered; bracts mostly shorter than flowers. Flowers green with greenish-white petals and white lip, curved outwards; median sepal erect, ovate or elliptic, subacute, 8–12 mm long, lateral sepals deflexed or spreading, longer and narrower than median; petals simple, elliptic to orbicular, rounded or quadrate, longer than median sepal, 9–15 mm long; lip pendent; central lobe narrowly oblong, side lobes reduced, filamentous (Linder and Kurzweil, 1999).

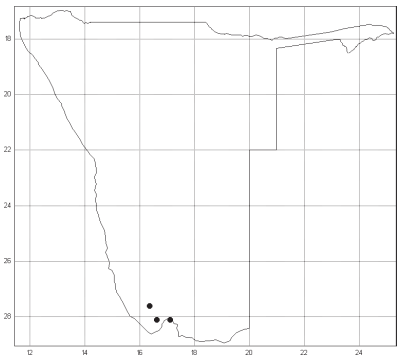
Rationale: Known from between 5 and 10 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Dry sandy area on a small dune in an omuramba; seasonally damp or marshy grasslands and on rocky slopes; from near sea level to 2400 m (Linder and Kurzweil, 1999; WIND, 2002).

Threats: Human population expansion and agriculture may be potential threats but this could not be ascertained.

Additional notes: One of the less attractive orchid species; also occurs in South Africa and Botswana; plants from more arid areas are more slender and lax with narrower leaves (Linder and Kurzweil, 1999; WIND, 2002).

Holothrix filicornis Immelman & Schelpe



C2 P

Status: LC

Description: Erect orchids, 65–260 mm high. Leaves 1 or 2, ovate or orbicular, flat on ground, glabrous. Peduncle erect, without bracts. Inflorescence a spike. Flowers: sepals glabrous, 1.5–2 x 0.5–1 mm , green tinged with red; petals with three lobes, lobes slightly fleshy, comprising $^{1}/_{2}$ to $^{2}/_{3}$ of total petal length, petal 3–8 x 0.5–1 mm, greenish-white; lip 5-lobed, slightly fleshy, greenish-white, spur slightly curved (Linder and Kurzweil, 1999).

Rationale: Known from between 3 and 6 sub-populations and locations; no significant continuing decline in number of mature plants known.

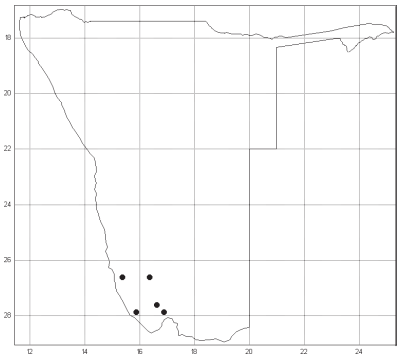
Habitat: Rock crevices and on stony slopes; moderate south- and west-facing gravel slopes in rock crevices and under bushes; 1080 m (Bruyns, 1989; Linder and Kurzweil, 1999; WIND, 2002).

Threats: Habitat destruction in the form of increasing human population growth, associated agriculture and mining may be potential threats but this has not been ascertained.

Additional notes: Also occurs in South Africa; divided petals are unusual (Linder and Kurzweil, 1999).

OXALIDACEAE

Oxalis ausensis R.Knuth



Status: LC

Description: Delicate, mainly glabrous herb, with deep underground bulbs. Aerial stem not well developed, up to 100 mm high. Leaves with two with 2 threadlike bracts; leaflets 3, mid-leaflet obcordate to wedge shaped, clearly lobed, up to 5 x 5 mm, other leaflets only slightly cordate or not at all lobed. Flowers single; sepals with or without orange coloured to blackish callus on margin; petals spurred, very delicate, pure yellow (Schreiber, 1968).

Rationale: Known from between 5 and 10 sub-populations and locations; no significant continuing decline in number of mature plants known.

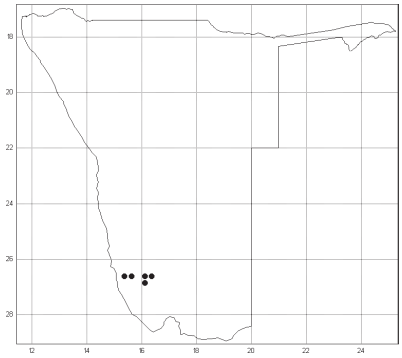
Habitat: Gravel at 1400 m; on coarse sandy plain at mountain base (WIND, 2003).

Threats: Road building will partially damage 1 or 2 sub-populations in the near future.

Additional notes: Locally common; may be under collected as years with good rain are favoured. (Schreiber, 1967; WIND, 2002).

Oxalis luederitzii Schinz

Oxalis halenbergensis Dinter
Oxalis knuthiana Dinter ex Range
Oxalis kubusensis R.Knuth
Oxalis pusilla R.Knuth in part



E pl. 22

Status: LC

Description: Delicate herb with deep underground bulbs. Aerial stems absent or reduced. Leaves in basal rosette; bracts broad, tip swollen, rusty brown; leaflets broadly kidney-shaped, lobed at apex and base, up to 10 x 17 mm, glabrous or at most having few minute, rust brown glands at base. Inflorescence many-flowered. Flowers white with yellow base or entirely yellow, up to 18 mm long (Schreiber, 1966).

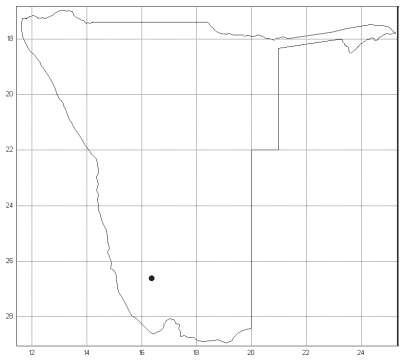
Rationale: Known from between 5 and 12 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Plains; mountain base; northwest-facing foothills; sand, coarse sandy soil, gravelly sand and gneiss (Schreiber, 1967; WIND, 2002); 50–100 m.

Threats: None currently known.

Additional notes: Possibly under-collected.

Oxalis schaeferi R.Knuth



E

Status: R

Description: Delicate herb with deep underground bulbs, up to 200 mm high, aerial stems well developed, entire plant glabrous, ca. upright. Leaves terminally clustered, leaflets very broadly wedge- shaped to obcordate, up to 7 x 1 mm; terminal bracts swollen, rusty brown. Inflorescence a corymb. Flowers yellow, up to 12 mm long; sepals with few minute, reddish brown glands at apex (Schreiber, 1966).

Rationale: Known from 1 or 2 sub-populations and locations.

Habitat: Succulent steppe; ± 1500 m.

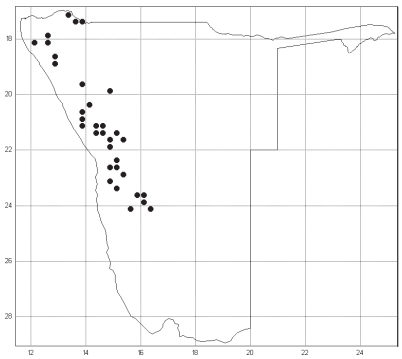
Threats: None currently known.

Additional notes: Poorly known; not collected since 1920's; no specimens in WIND.

PASSIFLORACEAE

Adenia pechuelii (Engl.) Harms

Echinothamnus pechuelii Engl.



E pl. 22

Status: NT

Description: Woody perennial, reaching over 1 m in diameter. Stem tuberlike, swollen, with numerous short, thick, rigid, pointed, grooved twigs. Leaves sessile to very shortly petiolate, elongated to lanceolate, up to 50 x 20 mm, thick, leathery, blue-green, margins entire. Flowers in clusters, olive green-yellow, tube funnel-shaped to cup-shaped; petals lanceolate, smaller than sepals; female flowers with awl-like staminodes; style simple with globular, fringed stigma (Schreiber, 1968; WIND, 2002).

Rationale: Known from between 30 and 35 sub-populations, number of locations unknown; suspected continuing decline in number of mature plants.

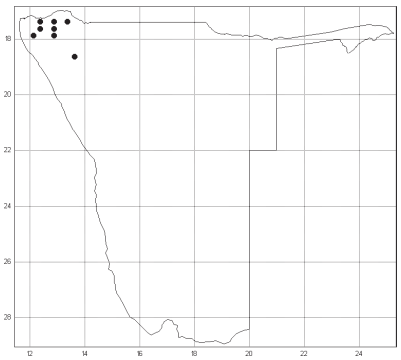
Habitat: Northwest-facing hill and mountain slopes; steep rocky slope in river gorge; steep rocky overhang above river; in shade under rocks; conglomerate, granite and mica schist; rocky outcrops (WIND, 2002); 200-1600 m.

Threats: Collecting— international pachycaul trade; some plants unisexual, which could mean skewed sex ratios in some sub-populations.

Additional notes: Common name: Elephant's foot (English) *Wüstenkohlrabi* (German)
Mostly uncommon to rare, sometimes common, often localised; once recorded as locally abundant (WIND, 2002; Tree Atlas Project, 2003).

PEDALIACEAE

Sesamothamnus sp.



E pl. 23

Status: LC

Description: Deciduous shrub or small tree up to 3 m high. Stems swollen, often fluted at base, branching fairly high; bark smooth, creamy-yellow, sometimes peeling in papery strips. Spines in threes at nodes; central spine slightly curved, up to 30 mm long, lateral ones up to 10 mm when present. Leaves simple; spirally arranged or clustered on dwarf shoots, broadly obovate; sparsely hairy; midrib prominent below with fine hairs; margins entire; apices rounded; base extending down petiole. Flowers white, tubular, corolla tube very narrow, up to 110 mm long, lobes up to 55 mm long. Fruit woody, dry capsule, obovate with pointed tip, splitting open when ripe (Curtis, pers. comm, 2003).

Rationale: Known from 8 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Mixed woodland with predominantly *Colophospermum mopane*, *Euphorbia mauritanica*; mostly on hill slopes; rocky outcrops; in dry river beds (Tree Atlas Project database).

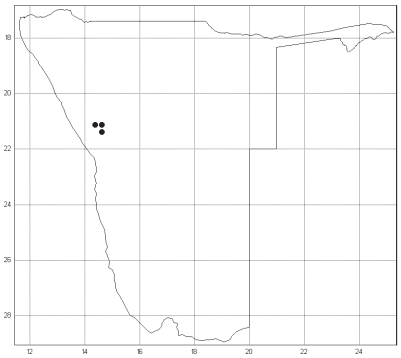
Threats: Collecting may be a potential threat but this has not been ascertained.

Additional notes: Common name: Large-leaved sesame-bush (English)
New species to be described and published by H.D. Ihlenfeldt; rare to common but mostly rare; very distinct from other two species of *Sesamothamnus* by having more tree-like growth

form with more erect, single trunk that branches higher up and is fluted, with peeling bark (Curtis, pers. comm., 2003); no specimens in WIND; very attractive tree.

PLUMBAGINACEAE

Plumbago wissii Friedrich



E pl. 22

Status: R

Description: Shrub scrambling over rocks. Stems striate, up to 1 m long. Leaves linear, up to 50 x 1–2 mm, sparsely covered with small scurfy scales, midrib raised on upper surface, stem-clasping at base but with no definite petiole. Inflorescence a terminal spike; rachis glandular-hairy; calyx tubular, about 8 mm long, with gland-tipped bristle-like hairs; corolla violet-red, violet, yellow, pink or cream; tube about 15 mm long; limb 8–10 mm in diameter (Dyer, 1963; Roessler and Schreiber, 1967; Van Jaarsveld, 2003, pers. comm).

Rationale: Known from 2 or 3 sub-populations and locations.

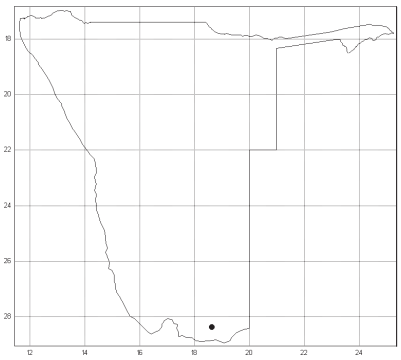
Habitat: High altitudes (2550 m) on the Brandberg (Craven, In Kirk-Spriggs and Marais, 2000).

Threats: Restricted range but no threats currently known.

Additional notes: Locally abundant (Van Jaarsveld, 2003, pers. comm); has possible horticultural potential.

PORTULACACEAE

Anacampseros bayeriana S.A.Hammer



C2 P

Status: R

Description: Succulent dwarf perennial. Stem subterranean, thickened in middle and tapering toward each end, firmly fleshy, short, 12–14 x 4–6 mm, light yellowish brown to greenish at partly exposed apex. Leaves few, impersistent, 2–4 at flowering time, ovate, 2–2.5 x 1.5 mm, longitudinally grooved above, surface deep green suffused with brown, numerous bristles at axils, margins thin, raised. Flowers pale-pinkish to tan (Hammer, 1988).

Rationale: Known from 1 to 3 sub-populations and locations.

Habitat: In association with *Lapidaria margaretae, Sarcocaulon,* other *Anacampseros* spp. and *Lithops* (WIND, 2002); 750–970 m.

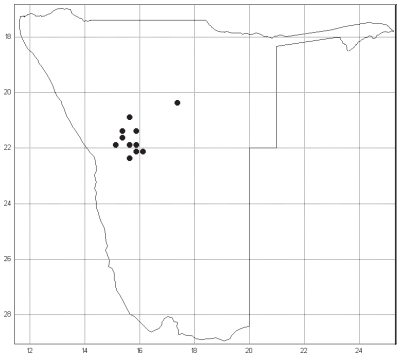
Threats: Restricted range but no threats currently known.

Additional notes: Uncommon (WIND, 2002); smallest known species in the genus, therefore may be under-collected; also occurs in South Africa (Hammer, 1988).

SCROPHULARIACEAE

Chamaegigas intrepidus Dinter

Lindernia intrepidus (Dinter ex Heil) Oberm.



E pl. 23

Status: LC

Description: Water plant with two different types of leaves. Basal leaves submerged and needle-like, divided into two forks or branches; floating leaves in two unequal, opposing pairs, first pair much larger than second pair supporting two flowers, dark green with purple margins and purple below, petiole length depending apparently on depth of water. Flowers exerted from leaf rosette on short pedicels which recurve in fruit, with strong smell of honey; white or light mauve with purple guidelines, two-lipped: upper lip hooded with upper edge recurved, shallow notch at apex, lower lip much longer than upper, three lobed, central lobe ca. 5–7 mm long, broadened and square below, lateral lobes smaller (Smook, 1969).

Rationale: Known from between 15 and 30 sub-populations

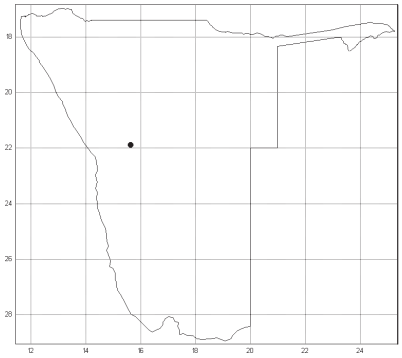
and locations; no significant continuing decline in number of mature plants known.

Habitat: Only in rather shallow pools that develop in granite formations in mountains, inselbergs and outcrops (WIND, 2002; Kolberg, 2003, pers. comm.); 1010–2100 m.

Threats: Over-utilisation of water pools during dry years may be a potential threat.

Additional notes: Common name: *Zwergriese* (German) Unusual, as plants can withstand high temperatures that develop in seasonal rock pools where they grow (Smook, 1969); locally rare, uncommon, common but very localised; considered a "resurrection" plant. (WIND, 2002; Kolberg, 2003, pers. comm.).

Diclis tenuissima Pilg.



E

Status: R

Description: Delicate, annual, prostrate herb, up to 60 mm high, branched from base, often forming a lawn, glandular. Leaves opposite, top ones alternating, clearly petiolate, ovate–roundish, often slightly broader than long, rounded off at base, up to about 25 x 15 mm, margin slightly toothed. Flowers in leaf axils on long peduncles, white, 2-lobed, up to 4 mm long, tube bulging at base, but not clearly spurred; upper lip 2 lobed, lower lip 3-lobed (Merxmüller & Roessler, 1968; WIND, 2002).

Rationale: Known from between 2 and 5 sub-populations and locations.

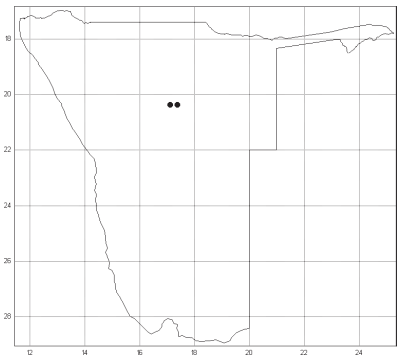
Habitat: Granite mountain slope; under rocks and in moist places; in mossy ground; in cave at fountain; usually grows in shady places (WIND, 2002).

Threats: Restricted range but no threats currently known.

Additional notes: Differs from *D. petiolaris* Benth. in that corolla tube is clearly spurred and corolla is up to 10 mm long (Roessler, 1967); may be under-collected due to its delicate nature.

Dintera pterocaulis Stapf

E



Status: NT

Description: Small, herbaceous, glabrous, lawn-forming aquatic plant. Stems ca. 100 mm long, branching especially near base, 4-winged towards tips; wings over 1 mm broad; internodes up to 10 mm long. Leaves opposite, ovate, half clasping stem, up to 6 x 4 mm, pointed, slightly recurved, becoming thicker at margins. Flowers single in leaf axils, sessile, self-pollinating, do not open; corolla 1.5–2.5 mm long, 2-lipped, upper lip weakly 2-lobed, slightly longer than 3-lobed lower lip (Merxmüller and Roessler, 1967).

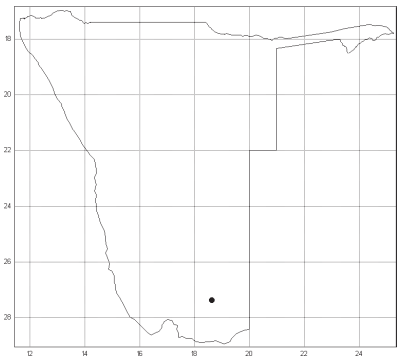
Rationale: Known from 1 sub-population and location.

Habitat: Thornbush shrubland / Northern Kalahari vegetation.

Threats: Restricted range; overuse of water bodies at least a potential threat.

Additional notes: Belongs to a monospecific, endemic genus; known from type specimen only, collected in 1920s (WIND, 2002); no specimens in WIND.

Nemesia karasbergensis L.Bolus



E

Status: R

Description: Erect perennial herb, ca. 200 mm high, branched at base. Leaves opposite, ascending to spreading, sessile to sub-petiolate, lanceolate to ovate, 7–15 mm long, margins acutely serrate. Flowers in lax raceme, ascending; corolla two-lipped, covered with long stiff hairs on outside, light sky-blue, throat white; spur up to 3 mm long (Bolus *et al.*, 1915, Merxmüller and Roessler, 1967).

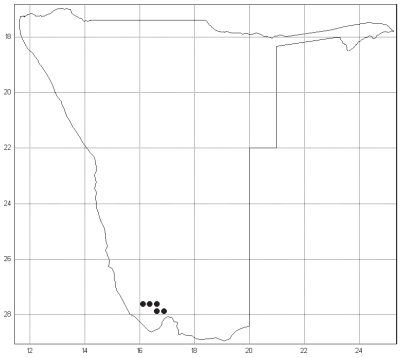
Rationale: Known from 1 or 2 sub-populations and locations.

Habitat: Peak in the Great Karas Mountains; 2300 m (Bolus *et al.*, 1915).

Threats: Restricted range but no threats currently known.

Additional notes: Poorly known; no specimens in WIND; known only from type specimen, collected in 1913.

Nemesia violiflora Roessler



E pl. 23

Status: LC

Description: Annual herb, branched, with short, downy glandular hairs. Leaves ovate, petiolate, upper leaves narrowly lanceolate, sessile, margins entire to slightly notched to toothed. Inflorescence a loose raceme; bracts linear to lanceolate, not heart-shaped at base. Flowers violet-blue, raised projection of lower lip yellow, upper lip 8–10 mm long, tips 4–5 x 4–5 mm; lower lip 6 x 6 mm; spur broad, bag-shaped, 2.5–3 x 2.5–3 mm. Capsule linear with 2 horns (Merxmüller and Roessler, 1967).

Rationale: Known from between 8 and 10 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: River bank between rocks; moderate mountain slopes and summits; deep rocky gorges in semi-shade or shady, wet places underneath rocks; in sand and gulleys in shady hollows; on river banks between rocks; granite (WIND; 2002).

Threats: None currently known.

Additional notes: Locally rare (WIND, 2002); very attractive.

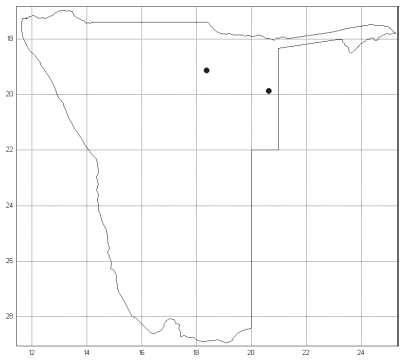
Cromidon pusillum (Roessler) Hilliard

Walafrida pusilla Roessler

E

Status: NT

Description: Erect annual herb, soon branching from base and higher. Stems ca. 30–100 mm long, decumbent or ascending, hairy with acute, spreading hairs, minutely glandular, moderately leafy. Leaves each subtending a branch, 2–20 x 1–5 mm, elliptic, tapering into petiolar part, apices acute to subacute, hairy, margins entire or with 1 or 2 pairs of obscure teeth. Flowers crowded in globose heads, ca. 5 mm in diameter, elongating to 10–15 mm in fruit, solitary at stem tips, these forming very loose panicles in well-grown plants, tube 1.4–1.5 mm long, broadly funnel shaped, all lobes tinged pink or mauve in bud, opening white, upper lip well bearded; stamens all well exerted (Hilliard, 1990).



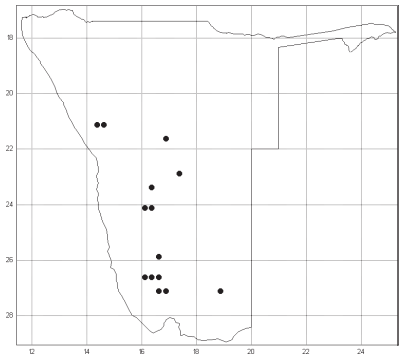
Rationale: Known from 2 to 4 sub-populations and locations.

Habitat: Damp ground around the margins of pans and water holes in Karstveld (Hilliard, 1990).

Threats: Restricted range; habitat destruction due to over-utilisation of pans and water holes at least a potential threat.

Additional notes: Possibly occurs in Botswana also; seems to be only species of *Cromidon* in which calyx is constantly 3-lobed (Hilliard, 1990); no specimens in WIND.

Selago lepida Hilliard



E

Status: LC

Description: Woody shrublet, 100–600 mm high. Stems tufted from stout woody taproot; young parts minutely hairy. Leaves initially opposite, alternate toward upper part of stem, weakly clustered, largest primary leaves 7–18 x 1–3 mm, narrowly oblanceolate or narrowly elliptic, margins entire, thickened. Inflorescence long, narrow, oblong or pyramidal terminal panicle. Flowers pale to deep shades of violet blue, tube 2–3 mm long, broadly funnel-shaped; flowering time March to May (Hilliard, 1999).

Rationale: Known from between 14 and 20 sub-populations and locations; no significant continuing decline in number of mature plants known.

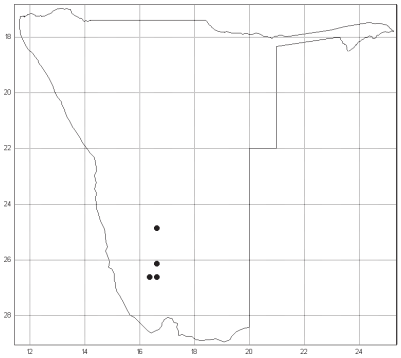
Habitat: Prefers sites among boulders and was recorded at an altitude of 2000 m; stony loam in a pan; on dolomite; savannah transition zone vegetation (Hilliard, 1999; WIND, 2002).

Threats: None currently known.

Additional notes: Locally rare or uncommon (WIND, 2002).

Selago nachtigalii Rolfe

Walafrida nachtigalii (Rolfe) Rolfe in part



E

Status: LC

Description: Herb, possibly perennial. Stems several, tufted, ca. 150–300 mm long, simple to loosely branched, erect, ascending or prostrate, minutely hairy. Leaves initially opposite, alternate toward upper part of stem, clustered, largest primary leaves 6–16 x 1–2 mm, narrowly oblong or oblong - elliptic, very minutely rough, margins entire, thickened. Inflorescence composed of small crowded racemes arranged in large, well-branched, corymbose panicles. Flowers pale to deep violet blue, broadly funnel shaped; tube 2.3–3 mm long (smaller when flowers female), flowering time March to November (Hilliard, 1999).

Rationale: Known from between 4 and 8 sub-populations and locations; no significant continuing decline in number of mature plants known.

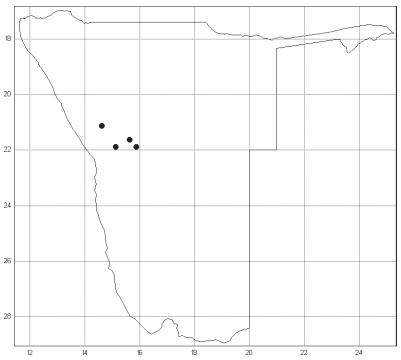
Habitat: Floodplain; sandy plain and other sandy places (Hilliard, 1999; WIND, 2002); 1300–1400 m or higher.

Threats: None currently known.

Additional notes: In small stands (WIND, 2002); bears close resemblance to *S. lepida*, but can be distinguished by calyces (3-lobed in *S. nachtigalii*, 5-lobed in *S. lepida*) and details of covering on leaves, bracts and calyces (Hilliard, 1999).

SOLANACEAE

Nicotiana africana Merxm.



E pl. 23

Status: LC

Description: Perennial herb, up to 2,5 m high, densely covered with glandular hairs; older specimens richly branched, bushy, slightly woody at base. Stems up to 20 mm in diameter. Leaves with unpleasant smell, those along stem ovate to elliptical, 200–380 x 80–180 mm, with short, broadly winged stalk, margin entire, often becoming slightly wavy towards base; those stem tips smaller and less conspicuously eared. Inflorescence very narrow, cylindrical. Flowers trumpet shaped, whitish to light green, densely glandular on outside, 30–40 mm long; calyx densely sticky glandular, cylindrical (Merxmüller and Buttler, 1975; WIND, 2002).

Rationale: Known from between 5 and 10 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Granite; small outcrops and inselbergs; south- and west-facing mountain slopes; between enormous boulders in shade or half shade and under large rocks; in crevices and caves; 960-2350 m (Giess, 1982; WIND, 2002).

Threats: None currently known.

Additional notes: Common name: *Afrikanischer Tabak* (German)
Seeds used in USA and RSA for possible improvement of cultivated tobacco; locally uncommon (Giess, 1982; WIND, 2002); only species of *Nicotiana* indigenous to Africa.

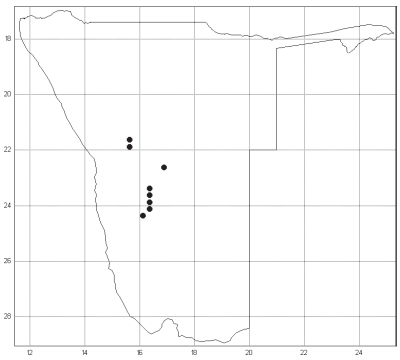
STERCULIACEAE

Dombeya rotundifolia (Hochst.) Planch. var. *velutina* I.Verd.

E pl. 22

Status: LC

Description: Shrub up to 5 m high; bark rough, new growth softly hairy. Leaves almost circular or broadly oblong-orbicular, broadest in upper half, 30–90 x 25–95 mm, velvety on both surfaces, margin dentate, cordate at base, palmately 4–7-nerved. Inflorescence crowded on lateral and terminal branchlets. Flowers white, rarely pale pink; sepals hairy; pet-



als about 7 mm long; ovary and style covered with dense and short star-shaped hairs (not bristly) (Verdoorn and Herman, 1986; Coates Palgrave, 2002).

Rationale: Known from between 9 and 18 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Along rivers; on steep southeast-facing rocky slopes; in a kloof; on granite outcrops and rocks; on bare rock; in well-drained soils (WIND, 2002).

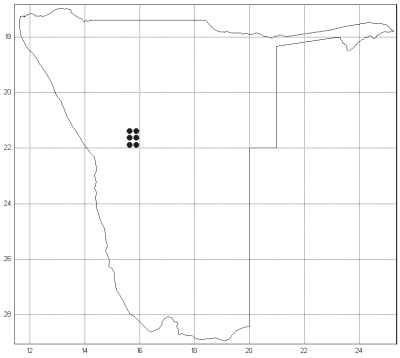
Threats: None currently known.

Additional notes: Locally common; occurs in a protected area (WIND, 2002); may be under-collected; differs from var. *rotundifolia* in the ovary covered with star-shaped hairs, being high, several stemmed shrubs, not trees and the velvety texture of the hairs (Verdoorn and Herman, 1986).

ULMACEAE

Trema orientalis (L.) Blume

Celtis orientalis L.
Celtis guineensis Schumach.
Trema guineensis (Schumach.) Ficalho



pl. 23

Status: LC

Description: Monoecious shrub or tree, 3–6 m high, with light grey smooth bark. Young stems densely hairy. Leaves alternate, shortly petiolate, narrowly ovate, apex acuminate, rounded at base to heart-shaped, with somewhat asymmetrical halves, 50–140 x 25–70 mm, margin closely serrate, more hairy below. Stipules lanceolate, 4–7 mm long, hairy, falling off very early. Inflorescence a cyme. Flowers yellowish-green, unisexual, seldom hermaphroditic. Fruit small, 2–4 mm long, 4–6 mm in diameter, black when ripe (Schreiber, 1968; WIND, 2003; Coates Palgrave, 2002).

Rationale: Known from 9 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Large rock fissures and crevices; below large rocks; in deep sand along the bases of koppies; granite preferred (WIND, 2002).

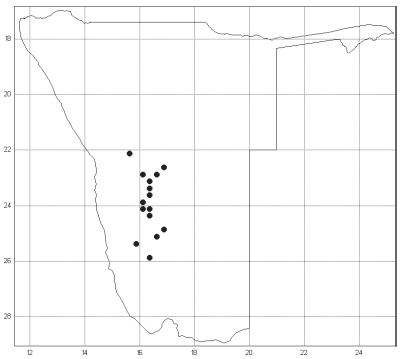
Threats: None currently known.

Additional notes: Widespread and common elsewhere in Africa (Polhill, 1964); locally common (WIND, 2002).

VITACEAE

Cyphostemma bainesii (Hook.f) Desc.

Vitis bainesii Hook.f.
Cissus bainesii (Hook.f.) Gilg & M.Brandt
Cissus seitzianum (Gilg & M.Brandt) Desc.



E pl. 24

Status: LC

Description: Perennial, thickly fleshy, globose stem succulent. Stem up to 1 m in diameter, sometimes cubical to cone shaped with light yellow, papery bark. Petiole not winged, up to 20 mm long. Leaflets 3, densely covered with white or reddish to light rust-coloured felty hairs when mature, later covered with thin spider webby hairs or glabrate; middle leaflet narrower at base, 100–200 x 35–80 mm, obovate-elongated, margins irregularly serrate-dentate; lateral leaflets only slightly shorter. Stipules sickle shaped, pointed, large and persistent. Inflorescence glandular. Flowers not glandular; flower buds often bottleneck-shaped, constricted in middle; petals 4, hood-shaped at apex, greenish, yellowish or whitish, bent backwards after flowering, dropping off very early or frail. Berries mostly red, one seeded, glabrous (Merxmüller and Schreiber, 1969).

Rationale: Known from between 10 and 20 sub-populations, number of locations unknown; no significant continuing decline in number of mature plants known.

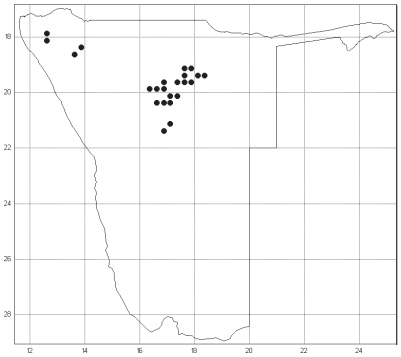
Habitat: Nama Karoo vegetation, tree and shrub savanna on steep south-, northwest- and east-facing rocky slopes; kloofs; summits; granite seems to be preferred rock type (WIND, 2002); 1200–1800 m.

Threats: Collecting and pachycaul trade potential threats but extent thereof unknown: sought after by succulent collectors, landscapers and gardeners.

Additional notes: Common name: Grape tree (English)
Fruit eaten by local people (WIND, 2002); locally rare to occasional or common (Loots *et al*., pers. obs, 2002; WIND, 2003).

Cyphostemma juttae (Dinter & Gilg) Desc.

Cissus juttae Dinter & Gilg



E pl. 24

Status: LC

Description: Short, thickset succulent tree. Main stem up to 2 m high and 0.5 m in diameter, with few thick, short stems; shiny white bark, peeling in papery flakes. Petiole broadly winged. Leaves blue-green, undivided but deeply lobed on young plants, on older ones mostly divided into 3; middle leaflet ovate-elongated, roughly serrate-toothed, ca. 120–350 x 50–150 mm, the 2 lateral ones shorter, becoming broader towards base of stem, glabrous on top, with glands on veins of lower surface. Inflorescence glandular. Flowers greenish cream, glabrous; otherwise as for *C. bainesii* (Merxmüller and Schreiber, 1969; Coates Palgrave, 2002).

Rationale: Known from between 20 and 30 sub-populations and locations; no significant continuing decline in number of mature plants known.

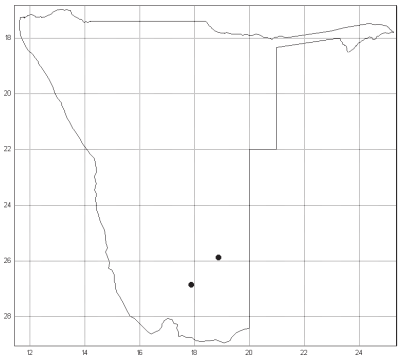
Habitat: North-facing rocky slopes of dolomite hills and mountains; open woodland; shrubland; grassland; well drained rocky, sandy-loam soil and sand (WIND, 2002); 1000–1200 m.

Threats: Collecting and pachycaul trade potential threats but extent thereof unknown: sought after by succulent collectors, gardeners, landscapers.

Additional notes: Locally very rare, occasional or common; stem sap said to be poisonous and has formed an ingredient in bushmen arrow poison; reasonable recruitment observed in one sub-population (WIND, 2002).

ZYGOPHYLLACEAE

Neoluederitzia sericeocarpa Schinz



E pl. 24

Status: R

Description: Shub up to 2 m high, yellow to grey-yellow barked, very short felty to almost glabrous. Leaves alternate, with axillary spines and very small stipules, clustered at both sides of spines on short shoots of older stems, pinnate with 2–5 leaflet pairs. Leaflets grey green, thickish, hairs adpressed, obovate to elongated-obovate, up to 20 x 11 mm. Flowers single, pedicel up to 15 mm long; petals elongated, light yellow, up to 15 mm long, alternating with these are 5 triangular, long, hairy disc scales. Fruit densely covered with upright, yellowish, shiny, stiff hairs (Schreiber, 1966; WIND, 2003).

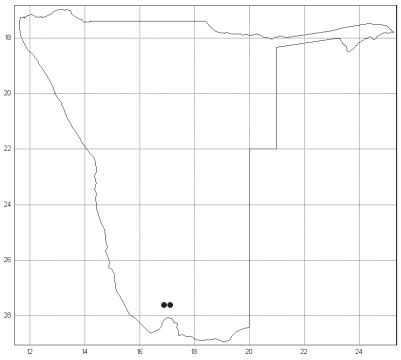
Rationale: Known from 1 to 3 sub-populations and locations.

Habitat: In flood plain and banks of Fish River on flat areas (WIND, 2003).

Threats: Restricted range but no real threats currently known.

Additional notes: Locally common (WIND, 2003).

Zygophyllum giessii Merxm. & A.Schreib.



E

Status: R

Description: Shrublet with woody base, up to 0.3 m high, 0.6 m in diameter. Stems spreading or procumbent; all young parts

with over all greyish-white appearance caused by two-armed hairs. Leaflets obovate with acute apices, margin white with membrane when young. Stipules awl-shaped, white. Flowers white or flushed with pink. Fruit succulent, drooping, cylindric or ellipsoid (Van Zyl, 2000).

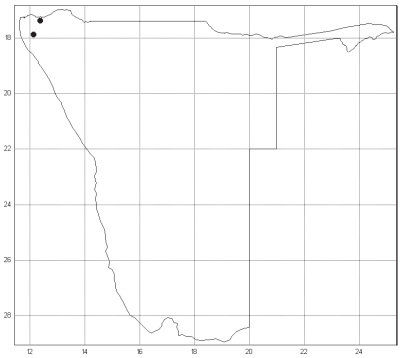
Rationale: Known from 2 to 3 sub-populations and locations.

Habitat: Bare flats and plains; valleys; at the base of low ridges; with various soil types like sand, loam, coarse sand- alluvium, gravel and rocks from limestone, calcrete, black lime plates and dolomite; with *Mesembryanthemum longipapillosum* (Van Zyl, 2000; WIND, 2002); ± 1400 m.

Threats: Restricted range; grazing damage may be a potential threat but this has not been ascertained.

Additional notes: Distinguished from *Z. longicapsulare* Schinz by its different leaflets and stipules. Leaflets of *Z. longicapsulare* orbiculate or obovate with obtuse or rounded apex. Stipules triangular, brownish and 1 x 1.5 mm in size (Van Zyl, 2000).

Zygophyllum inflatum Van Zyl



Status: R

Description: Erect, succulent annual or biennial herb, branched from base, up to 0.3 m high, 0.5 m in diameter. Old stems usually glabrous with slightly swollen nodes, yellow or cream, smooth but when dry usually displaying numerous embedded crystals giving it a warty surface; young stems green or yellow, leafy, with prominent ventral groove. Oldest leaves opposite, younger leaves alternating on stems, sessile, broadly obovoid, succulent, apices obtuse. Stipules triangular, 2 ventral, 2 dorsal. Flowers yellow. Fruit broadly obovoid, 4 mm long and 4 mm in diameter, with 5 inflated chambers (Van Zyl, 2000).

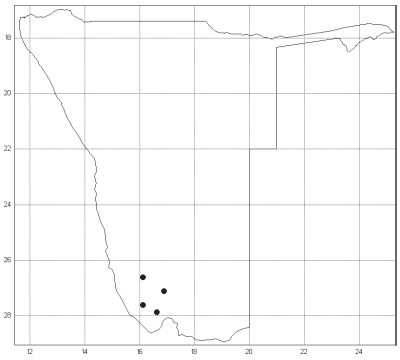
Rationale: Known from 2 to 4 sub-populations and locations.

Habitat: Arid plains and sandy pediments in lower Kunene river basin, in desert and Nama Karoo biomes (Van Zyl, 2000).

Threats: Restricted range but no threats currently known.

Additional notes: Locally common; also occurs in Angola (Van Zyl, 2000); closely related species *Z. simplex* and *Z. spongiosum* are prostrate or decumbent, reaching 0.1 x 1 m (Van Zyl, 2000).

Zygophyllum macrocarpon Retief



pl. 24

Status: LC

Description: Erect or sprawling, many-stemmed shrub up to 1.5 m high, 1 m in diameter, re-sprouting from woody base. Old stems grey, cylindric, hollow, with narrow parallel lines and flaky bark; young stems smooth, glabrous or rarely covered with short, sparse hairs, light green, cylindric, without ridges. Leaves opposite, petiolate. Leaflets 2, glossy, dark green, thinly textured, articulate, asymmetrical, obovate, 35–50 x 30–45 mm, apices rounded, base oblique. Flowers up to 9, axillary, petals 5, deep yellow with red or brown, M-shaped markings at base, 18–23 x 11–14 mm. Fruit a drooping, prism-like, 5-winged capsule, 25–43 x 15–20 mm (Van Zyl, 2000).

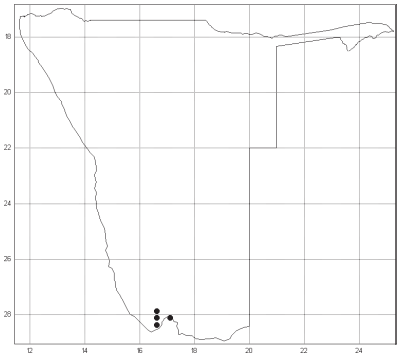
Rationale: Known from between 5 and 10 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: South-facing mountain slopes; at cliffs in a deep kloof; granite rock face on steep slope (Van Zyl, 2000, WIND, 2002; Rügheimer, pers. comm., 2003); 400–1000 m.

Threats: None currently known.

Additional notes: Populations few and small, but seeds numerous and browsing limited; also occurs in South Africa (Van Zyl, 2000).

Zygophyllum pterocaule Van Zyl



pl. 24

Status: LC

Description: Decumbent, succulent, branched shrublet up to 0.15 m high and 0.8 m diameter. Old stems woody, brown, with swollen nodes and rough textured bark; young branches grey, smooth, with two prominent wings in vertical plane. Leaves opposite, sessile, simple, glaucous; lamina articulate, suborbicular, succulent, 20–30 x 20–30 mm. Flowers 1 or 2, small, petals 5, 7–9.5 x 2.5–3.0 mm, white. Fruit drooping, splits open in sections when mature (Van Zyl, 2000).

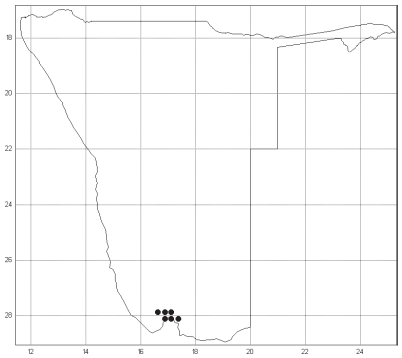
Rationale: Known from between 4 and 8 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Succulent Karroo vegetation in limestone rich, stony soils; gentle slopes; dry stream beds; always associated with other *Zygophyllum* species (Van Zyl, 2000; WIND, 2002); 300–700 m.

Threats: Poor recruitment; low densities; habitat destruction due to increased population pressure along Orange River may be potential threats to 2 sub-populations, but this has not been ascertained.

Additional notes: Also occurs in South Africa (Van Zyl, 2000).

Zygophyllum schreiberanum Merxm. & Giess



E

Status: LC

Description: Erect, many-stemmed shrub, up to 0.8 m high, 1.0 m in diameter. Old stems glabrous, bark rough, black or dark grey, cracked; young stems greenish or reddish-brown, smooth, leafy, densely covered with short, straight hairs, rhombic in cross section, without any ridges. Leaves opposite, petiolate, trifoliolate; typical rachis apices absent, replaced by third leaflet; leaflets cylindrical, elongate, not articulate, khaki-green, in juvenile stage covered with dense, short, straight hairs, 10–20 x 1.5–2 mm. Stipules leaflike. Flowers 1 or 2, axillary, petals 5, lime yellow or dark yellow, variously marked at base with red M- or U-shaped blotches, 13–15 x 5–6 mm (Van Zyl, 2000).

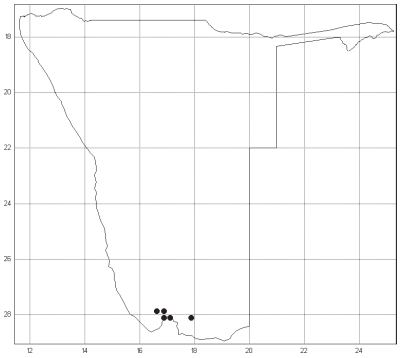
Rationale: Known from between 4 and 8 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: West-facing mountain slopes, rocky slopes; in granitic gravel; rock faces next to river; half shade; rich soils derived from decaying granite and gneiss, sand (Van Zyl, 2000; WIND, 2002).

Threats: None currently known.

Additional notes: Locally occasional to common; trifoliolate leaves and leaflike stipules unique for *Zygophyllum* in southern Africa (Van Zyl, 2000; WIND, 2002); ± 400 m.

Zygophyllum segmentatum Van Zyl ined.



Status: LC

Description: Rounded, many-stemmed, woody shrub of up to 0.6 m high and 1 m in diameter. Old and young stems prominently segmented. Leaves opposite, petiolate, bifoliolate, on flowering branches unifoliolate, sessile; leaflets cylindrical. Flowers 1–3, white, axillary, petals 5, 3–4 x 0.5 mm (Van Zyl, 2000).

Rationale: Known from between 10 and 20 sub-populations and locations; no significant continuing decline in number of mature plants known.

Habitat: Shale mountain slopes; gentle slope in foothills of large mountain; slate or quartz slopes; rocky, chalky stream beds; rich, loamy sands or clays derived from decomposed granite and gneiss, mixed granite and quartzite (Van Zyl, 2000; Rügheimer, 2003, pers. comm.).

Threats: Mining may be a potential threat to some sub-populations, but this has not been ascertained.

Additional notes: Near-endemic, with only one known sub-population in the Richtersveld; *Z. segmentatum* and *Z. cylindrifolium* Schinz are distinguished by their different habits: *Z. segmentatum* is a sturdy shrub with strong, thick, segmented branches, whereas *Z. cylindrifolium* is a shrublet, only 0.3 m high with thin, spreading branches; they are also geographically separated (Van Zyl, 2000).

Glossary

Achene A simple, dry, one-seeded indehiscent fruit.

Acuminate Having a long, slender, sharp point with a terminal angle less than 45°; margins straight to convex.

Acute Sharp-pointed, with a terminal angle between 45° and 90°, margins straight to convex.

Adaxial The side of an organ towards the axis; ventral.

Adpressed Lying flat against.

Aerial Living above the surface of the ground or water.

Apex, Apices The tip; top most part or terminal end.

Apical At, near or belonging to the apex.

Apiculate With a short, sharp abrupt, or acute point; terminated by a short, sharp, flexible point.

Articulate Jointed; having nodes or joints, which are natural points of separation at maturity.

Attenuate With a long, slender taper, more gradual than acuminate.

Axil The angle between the stem axis and a leaf petiole, branch or other appendage attached to it.

Axis The main stem of a plant; the main or central line of development of any plant or organ.

Bifoliolate With two pinnae arising from a common point.

Biosystematics The science of identifying and naming living organisms

Bracteoles A secondary bract, often very small.

Calyx All the sepals of a flower collectively, the lowermost whorl of floral organs.

Campanulate Bell-shaped, with a flaring tube and with flaring lobes.

Capitate Formed like a head; aggregated into very dense clusters or heads.

Ciliate Fringed with conspicuous hairs along the margin (cilia).

Clavate Club-shaped.

Closing bodies See diagram.

Conduplicate Longitudinally folded upward or downward along central axis so that ventral and/or dorsal sides face each other.

Conical Cone-shaped.

Cordate Shaped like a stylized heart; ovate in general outline; in reference to leaves, having the notched end at the base, and the pointed end at the apex. Opposite: obcordate.

Corolla A collective term referring to the petals of a flower; the inner circle or second whorl of floral envelope.

Corona A crown; any appendage between the corolla and stamens, which may be petaloid or staminal in origin.

Corymb A flat-topped or convex, indeterminate, racemose inflorescence, the lower or outer pedicels longer, their flowers opening first.

Covering membranes See diagram.

Crenate Shallowly ascending round-toothed, or teeth obtuse.

Crescentiform Biconcave, resembling the shape of the moon in its first or last quarters.

Cuneate Wedge-shaped; triangular, with the narrow part at the point of attachment.

Cyme A type of inflorescence consisting of a broad, more or less flat-topped flower cluster, with the central flowers opening first.

Decumbent A growing habit in which a portion of the stems or shoots lie close to the ground without rooting adventitiously. The upper parts of the stem are erect or ascending.

Deflexed Reflexed; bent or turned abruptly downward.

Dentate A leaf margin with sharp teeth or indentations pointing outwards at right angles to the midrib.

Denticulate Minutely or finely dentate.

Dichotomous Branching by repeated forking in pairs; the division of forking of an axis into two, more or less equal branches.

Dioecious Having staminate and pistillate flowers on different plants of the same species; having male and female organs on different plants.

Distal Opposite from the point of origin or attachment; toward the apex.

Dorsal The upper surface of a plant body having dorsiventral surfaces; the lower, or under surface of a leaf.

Elliptic In the form of a flattened circle more than twice as long as broad.

Entire Without indentations or incisions on the margin; smooth.

Epiphyte An organism that grows on another plant but is not parasitic on it.

Ex situ conservation Conservation of germplasm outside its natural habitat, for example, in a genebank.

Expanding keels See diagram.

Felty Having dense trichomes as a protective covering; closely matted with interwoven hairs.

Filiform Threadlike, usually flexuous.

Genebank A facility that conserves germplasm *ex situ* under specific storage conditions.

Geophyte A plant with an underground bulb or rhizome.

Germplasm The heritable traits that are passed to offspring via seeds, vegetative parts, and DNA — can be conserved or stored *ex situ* or *in situ.*

Gibbosity, Gibbous With swollen structure on one side near the base.

Glabrous Not hairy.

Glabrate, Glabrescent Nearly or becoming glabrous at maturity.

Glaucous Covered with a removable waxy coating which gives the surface a whitish or bluish cast.

Globose Spherical or rounded.

Gynostemium A compound structure in orchid flowers formed by the union of the stamens and pistil; synonym: column.

Heterogamous Bearing two or more kinds of flowers.

Hirsute Covered with rather rough and stiff trichomes.

Indeterminate inflorescence An inflorescence of which the lateral flowers open first while the primary axis continues to grow, hence the terminal flower is the last to open.

Inflorescence A cluster of flowers.

In situ conservation Conservation of germplasm in its natural habitat, for example, a national park.

Internodes The portion of the stem between two successive nodes.

Involucre One or more whorls of small bracts that subtend a flower or inflorescence.

Islands Opaque areas within the windows on the face of a *Lithops* plant, usually similar in colour to the margins.

Lamina The flat, expanded portion of a leaf, petal or other structure.

Lanceolate Lance-shaped, much longer than broad, widened above the base and tapering toward the apex.

Lacerate Cut irregularly, appearing torn.

Ligulate With a ligule; strap or tongue-shaped.

Limb The upper, expanded portion of a united corolla or calyx above the tube, throat or claw.

Loculicidal capsule (Mesembryanthemaceae) A fruit that splits open when wetted by means of hygroscopic expanding keels and additional structures, such as closing bodies, covering membranes, and valves (which may have wings).

Lorate Strap-shaped, ligulate; often also flexuous with the margins wavy.

Lunate Crescent-shaped; half-moon shaped.

Maculate Spotted or blotched.

Monoecious A plant with separate male and female reproductive structures occurring on the same plant; in angiosperms, having unisexual flowers of different sexes on the same plant.

Monospecific A genus with a single known species.

Mucronate Terminated abruptly by a distinct short, sharp, terminal point.

Nutlet A small nut; one of a group of small seeds.

Obconical Inversely conical, with the point of attachment at the small end.

Oblong Much longer than broad with nearly parallel sides.

Obovate Inversely ovate, with the terminal half broader than the basal.

Orbicular More or less circular in outline or shape.

Ovate Egg-shaped in outline, with the axis widest below the middle.

Ovoid A solid object that is oval in outline.

Pachycaul A plant with a short, thick, often succulent stem.

Papillae Soft nipple-shaped protuberances, a type of trichome.

Papillate Bearing papillae.

Pappus A modified outer perianth-limb arising from the summit of the ovary and consisting of hairs, bristles, scales, awns, or otherwise. Thought to be a modified calyx or corolla.

Paripinnate Even pinnately compound, that is, without a terminal leaflet.

Pedicel The stalk of an individual flower in an inflorescence.

Peduncle The stalk of an inflorescence or the stalk of an individual flower.

Perianth A collective term for the floral envelopes, usually the combined calyx and corolla or tepals of a flower.

Petiole The leaf stalk attaching the leaf blade to a stem.

Petiolate Having a petiole

Phyllopodia An expanded, leaflike petiole, but without a true blade, which functions in photosynthesis.

Pseudobulbs A solid, above ground, thickened or bulbiform stem.

Puberulous Slightly hairy

Pubescent Covered with short, soft trichomes.

Pustulate Having scattered, blisterlike or pimplelike elevated areas.

Raceme An unbranched, indeterminate inflorescence, in which the individual flowers are borne on pedicels along the main axis.

Recurved Bent or curved downward or backward.

Reniform Kidney-shaped

Reticulate Forming a network pattern.

Rubrications Red lines or spots in the windows or channels of a *Lithops* plant

Rugose Wrinkled; corrugated; covered with coarse, reticulate lines.

Scarious A thin, non green, dry, membranous structure.

Scurfy Covered with minute, branlike scales; with scaly incrustations.

Serrate Having a saw-toothed margin with sharp teeth pointing forward or toward the apex.

Sessile Without a stalk; sitting directly on its base.

Sinuate Having a strongly wavy margin.

Spathulate Spoon or spatula-shaped.

Spike An unbranched, indeterminate, elongated inflorescence, which bears sessile flowers.

Spikelet A small or secondary spike; the characteristic inflorescence of the grasses (Poaceae) and sedges (Cyperaceae).

Staminode A sterile stamen which does not produce pollen; they are variable in form, petallike and showy in some species.

Standard The uppermost petal of a corolla in the subfamily Papilionoideae of the Fabaceae.

Stipe A supporting stalk, such as the stalk of a pistil.

Stipule A small structure or appendage found at the base of some leaf petioles, usually present in pairs; they are morphologically variable and appear as scales, spines, glands, or leaflike structures.

Subacute Almost acute.

Subclavate Almost clavate.

Subentire Almost entire.

Sub-sessile Almost sessile.

Suffrutex A perennial plant with a base that is only slightly woody.

Taxon A taxonomic unit into which living organisms are classified; for Red Listing purposes, at or below the species level, including subspecies and varieties; pl. taxa.

Tepal A perianth member or segment; term used for perianth parts undifferentiated into distinct sepals and petals.

Terete More or less circular in cross section; cylindrical and elongate.

Trichome An epidermal outgrowth, such as a hair or a scale.

Triquetrous Having three edges, with the faces between them concave.

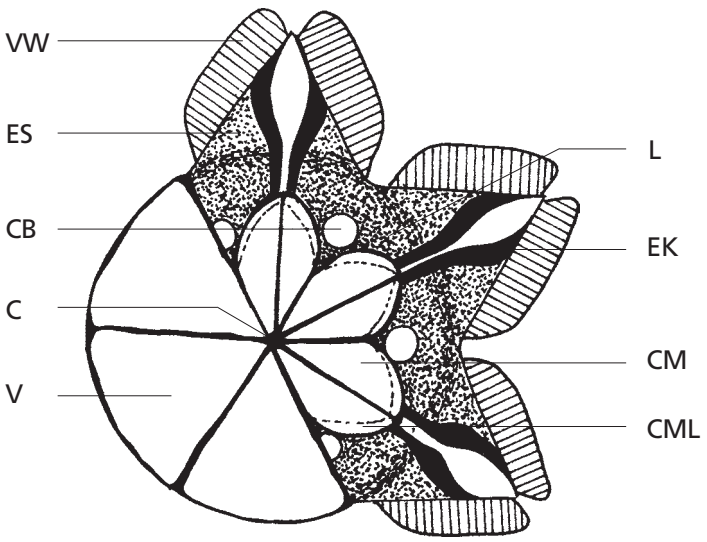
Tubercle A small, tuber-like swelling, nodule or projection.

Umbel A determinate or indeterminate flat-topped or convex inflorescence in which the pedicels all arise from the apex of the peduncle.

Valve (Mesembryanthemaceae) See diagram.

Window The more or less distinctly demarcated area within the margin on the face of a *Lithops* plant. It can be opaque or translucent and often but not always slightly impressed below the level of the margins.

Zygomorphic Bilaterally symmetrical; especially in reference to a flower or corolla; synonym: irregular flower.



VW	Valve Wing
ES	Expanding Sheet
CB	Closing Body
C	Columella
V	Valve
L	Locule
EK	Expanding Keel
CM	Covering Membrane
CML	Covering Membrane Ledge

Diagram of loculicidal capsule (Mesembryanthemaceae). (Drawing by C. Mannheimer)

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Appendix 1

THE 2001 IUCN CRITERIA FOR CRITICALLY ENDANGERED, ENDANGERED AND VULNERABLE Version 3.1
Prepared by the IUCN Species Survival Commission. As approved by the 51st meeting of the IUCN Council Gland, Switzerland. 9 February 2000

CRITICALLY ENDANGERED (CR)

A taxon is Critically Endangered when the best available evidence indicates that it meets any of the following criteria (A to E), and it is therefore considered to be facing an extremely high risk of extinction in the wild:

A. Reduction in population size based on any of the following:

1. An observed, estimated, inferred or suspected population size reduction of ≥90% over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are clearly reversible AND understood AND ceased, based on (and specifying) any of the following:
   (a) direct observation
   (b) an index of abundance appropriate to the taxon
   (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
   (d) actual or potential levels of exploitation
   (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

2. An observed, estimated, inferred or suspected population size reduction of ≥80% over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

3. A population size reduction of ≥80%, projected or suspected to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years), based on (and specifying) any of (b) to (e) under A1.

4. An observed, estimated, inferred, projected or suspected population size reduction of ≥80% over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

Geographic range in the form of either B1 (extent of occurrence) OR B2 (area of occupancy) OR both:

1. Extent of occurrence estimated to be less than 100 km^2, and estimates indicating at least two of a–c:
   a. Severely fragmented or known to exist at only a single location.
   b. Continuing decline, observed, inferred or projected, in any of the following:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) area, extent and/or quality of habitat
      (iv) number of locations or subpopulations
      (v) number of mature individuals.
   c. Extreme fluctuations in any of the following:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) number of locations or subpopulations
      (iv) number of mature individuals.

2. Area of occupancy estimated to be less than 10 km^2, and estimates indicating at least two of a–c:
   a. Severely fragmented or known to exist at only a single location.
   b. Continuing decline, observed, inferred or projected, in any of the following:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) area, extent and/or quality of habitat
      (iv) number of locations or subpopulations
      (v) number of mature individuals.
   c. Extreme fluctuations in any of the following:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) number of locations or subpopulations
      (iv) number of mature individuals.

C. Population size estimated to number fewer than 250 mature individuals and either:

1. An estimated continuing decline of at least 25% within three years or one generation, whichever is longer, (up to a maximum of 100 years in the future) OR

2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals AND at least one of the following (a or b):
   (a) Population structure in the form of one of the following:
      (i) no subpopulation estimated to contain more than 50 mature individuals, OR
      (ii) at least 90% of mature individuals in one subpopulation.

(b) Extreme fluctuations in number of mature individuals.

D. Population size estimated to number fewer than 50 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild is at least 50% within 10 years or three generations, whichever is the longer (up to a maximum of 100 years).

ENDANGERED (EN)

A taxon is Endangered when the best available evidence indicates that it meets any of the following criteria (A to E), and it is therefore considered to be facing a very high risk of extinction in the wild:

A. Reduction in population size based on any of the following:

1. An observed, estimated, inferred or suspected population size reduction of ≥70% over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are clearly reversible AND understood AND ceased, based on (and specifying) any of the following:
   (a) direct observation
   (b) an index of abundance appropriate to the taxon
   (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
   (d) actual or potential levels of exploitation
   (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

2. An observed, estimated, inferred or suspected population size reduction of ≥50% over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

3. A population size reduction of ≥50%, projected or suspected to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years), based on (and specifying) any of (b) to (e) under A1.

4. An observed, estimated, inferred, projected or suspected population size reduction of ≥50% over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, AND where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

B. Geographic range in the form of either B1 (extent of occurrence) OR B2 (area of occupancy) OR both:

1. Extent of occurrence estimated to be less than 5000 km^2, and estimates indicating at least two of a–c:
   a. Severely fragmented or known to exist at no more than five locations.
   b. Continuing decline, observed, inferred or projected, in any of the following:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) area, extent and/or quality of habitat
      (iv) number of locations or subpopulations
      (v) number of mature individuals.
   c. Extreme fluctuations in any of the following:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) number of locations or subpopulations
      (iv) number of mature individuals.

2. Area of occupancy estimated to be less than 500 km^2, and estimates indicating at least two of a–c:
   a. Severely fragmented or known to exist at no more than five locations.
   b. Continuing decline, observed, inferred or projected, in any of the following:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) area, extent and/or quality of habitat
      (iv) number of locations or subpopulations
      (v) number of mature individuals.
   c. Extreme fluctuations in any of the following:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) number of locations or subpopulations
      (iv) number of mature individuals.

C. Population size estimated to number fewer than 2500 mature individuals and either:

1. An estimated continuing decline of at least 20% within five years or two generations, whichever is longer, (up to a maximum of 100 years in the future) OR

2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals AND at least one of the following (a-b):
   (a) Population structure in the form of one of the following:
      (i) no subpopulation estimated to contain more than 250 mature individuals, OR
      (ii) at least 95% of mature individuals in one subpopulation.
   (b) Extreme fluctuations in number of mature individuals.

D. Population size estimated to number fewer than 250 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild is at least 20% within 20 years or five generations, whichever is the longer (up to a maximum of 100 years).

VULNERABLE (VU)

A taxon is Vulnerable when the best available evidence indicates that it meets any of the following criteria (A to E), and it is therefore considered to be facing a high risk of extinction in the wild:

A. Reduction in population size based on any of the following:

1. An observed, estimated, inferred or suspected population size reduction of ≥50% over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are: clearly reversible AND understood AND ceased, based on (and specifying) any of the following:
(a) direct observation
(b) an index of abundance appropriate to the taxon
(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
(d) actual or potential levels of exploitation
(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

2. An observed, estimated, inferred or suspected population size reduction of ≥30% over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

3. A population size reduction of ≥30%, projected or suspected to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years), based on (and specifying) any of (b) to (e) under A1.

4. An observed, estimated, inferred, projected or suspected population size reduction of ≥30% over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, AND where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

B. Geographic range in the form of either B1 (extent of occurrence) OR B2 (area of occupancy) OR both:

1. Extent of occurrence estimated to be less than 20,000 km^2, and estimates indicating at least two of a–c:
a. Severely fragmented or known to exist at no more than 10 locations.
b. Continuing decline, observed, inferred or projected, in any of the following:
(i) extent of occurrence
(ii) area of occupancy
(iii) area, extent and/or quality of habitat
(iv) number of locations or subpopulations
(v) number of mature individuals.
c. Extreme fluctuations in any of the following:
(i) extent of occurrence
(ii) area of occupancy
(iii) number of locations or subpopulations
(iv) number of mature individuals.

2. Area of occupancy estimated to be less than 2000 km^2, and estimates indicating at least two of a–c:
a. Severely fragmented or known to exist at no more than 10 locations.
b. Continuing decline, observed, inferred or projected, in any of the following:
(i) extent of occurrence
(ii) area of occupancy
(iii) area, extent and/or quality of habitat
(iv) number of locations or subpopulations
(v) number of mature individuals.
c. Extreme fluctuations in any of the following:
(i) extent of occurrence
(ii) area of occupancy
(iii) number of locations or subpopulations
(iv) number of mature individuals.

C. Population size estimated to number fewer than 10,000 mature individuals and either:

1. An estimated continuing decline of at least 10% within 10 years or three generations, whichever is longer, (up to a maximum of 100 years in the future) OR

2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals AND at least one of the following (a-b):
(a) Population structure in the form of one of the following:
(i) no subpopulation estimated to contain more than 1000 mature individuals, OR
(ii) all mature individuals are in one subpopulation.
(b) Extreme fluctuations in number of mature individuals.

D. Population very small or restricted in the form of either of the following:

1. Population size estimated to number fewer than 1000 mature individuals.

2. Population with a very restricted area of occupancy (typically less than 20 km^2) or number of locations (typically five or fewer) such that it is prone to the effects of human activities or stochastic events within a very short time period in an uncertain future, and is thus capable of becoming Critically Endangered or even Extinct in a very short time period.

E. Quantitative analysis showing the probability of extinction in the wild is at least 10% within 100 years.

III. DEFINITIONS

1. Population and Population Size (Criteria A, C and D)

The term 'population' is used in a specific sense in the Red List Criteria that is different to its common biological usage. Population is here defined as the total number of individuals of the taxon. For functional reasons, primarily owing to differences between life forms, population size is measured as numbers of mature individuals only. In the case of taxa obligately dependent on other taxa for all or part of their life cycles, biologically appropriate values for the host taxon should be used.

2. Subpopulations (Criteria B and C)

Subpopulations are defined as geographically or otherwise distinct groups in the population between which there is little demographic or genetic exchange (typically one successful migrant individual or gamete per year or less).

3. Mature individuals (Criteria A, B, C and D)

The number of mature individuals is the number of individuals known, estimated or inferred to be capable of reproduction. When estimating this quantity, the following points should be borne in mind:

Mature individuals that will never produce new recruits should not be counted (e.g. densities are too low for fertilization).

In the case of populations with biased adult or breeding sex ratios, it is appropriate to use lower estimates for the number of mature individuals, which take this into account.

Where the population size fluctuates, use a lower estimate. In most cases this will be much less than the mean.

Reproducing units within a clone should be counted as individuals, except where such units are unable to survive alone (e.g. corals).

In the case of taxa that naturally lose all or a subset of mature individuals at some point in their life cycle, the estimate should be made at the appropriate time, when mature individuals are available for breeding.

Re-introduced individuals must have produced viable offspring before they are counted as mature individuals.

4. Generation (Criteria A, C and E)

Generation length is the average age of parents of the current cohort (i.e. newborn individuals in the population). Generation length therefore reflects the turnover rate of breeding individuals in a population. Generation length is greater than the age at first breeding and less than the age of the oldest breeding individual, except in taxa that breed only once. Where generation length varies under threat, the more natural, i.e. pre-disturbance, generation length should be used.

5. Reduction (Criterion A)

A reduction is a decline in the number of mature individuals of at least the amount (%) stated under the criterion over the time period (years) specified, although the decline need not be continuing. A reduction should not be interpreted as part of a fluctuation unless there is good evidence for this. The downward phase of a fluctuation will not normally count as a reduction.

6. Continuing decline (Criteria B and C)

A continuing decline is a recent, current or projected future decline (which may be smooth, irregular or sporadic) which is liable to continue unless remedial measures are taken. Fluctuations will not normally count as continuing declines, but an observed decline should not be considered as a fluctuation unless there is evidence for this.

7. Extreme fluctuations (Criteria B and C)

Extreme fluctuations can be said to occur in a number of taxa when population size or distribution area varies widely, rapidly and frequently, typically with a variation greater than one order of magnitude (i.e. a tenfold increase or decrease).

8. Severely fragmented (Criterion B)

The phrase 'severely fragmented' refers to the situation in which increased extinction risk to the taxon results from the fact that most of its individuals are found in small and relatively isolated subpopulations (in certain circumstances this may be inferred from habitat information). These small subpopulations may go extinct, with a reduced probability of recolonization.

9. Extent of occurrence (Criteria A and B)

Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites of present occurrence of a taxon, excluding cases of vagrancy (see Figure 2). This measure may exclude discontinuities or disjunctions within the overall distributions of taxa (e.g. large areas of obviously unsuitable habitat) (but see 'area of occupancy', point 10 below). Extent of occurrence can often be measured by a minimum convex polygon (the smallest polygon in which no internal angle exceeds 180 degrees and which contains all the sites of occurrence).

10. Area of occupancy (Criteria A, B and D)

Area of occupancy is defined as the area within its 'extent of occurrence' (see point 9 above) which is occupied by a taxon, excluding cases of vagrancy. The measure reflects the fact that a taxon will not usually occur throughout the area of its extent of occurrence, which may contain unsuitable or unoccupied habitats. In some cases (e.g. irreplaceable colonial nesting sites, crucial feeding sites for migratory taxa) the area of occupancy is the smallest area essential at any stage to the survival of existing populations of a taxon. The size of the area of occupancy will be a function of the scale at which it is

measured, and should be at a scale appropriate to relevant biological aspects of the taxon, the nature of threats and the available data (see point 7 in the Preamble). To avoid inconsistencies and bias in assessments caused by estimating area of occupancy at different scales, it may be necessary to standardize estimates by applying a scale-correction factor. It is difficult to give strict guidance on how standardization should be done because different types of taxa have different scale-area relationships.

11. Location (Criteria B and D)

The term 'location' defines a geographically or ecologically distinct area in which a single threatening event can rapidly affect all individuals of the taxon present. The size of the location depends on the area covered by the threatening event and may include part of one or many subpopulations. Where a taxon is affected by more than one threatening event, location should be defined by considering the most serious plausible threat.

Appendix 2: List of data deficient (DD) taxa

Acacia hebeclada DC. subsp. *chobiensis* (O.B.Mill.) A.Schreib
Adenium oleifolium Stapf
Adromischus schuldtianus (Poelln.) Poelln. subsp. *juttae* (Poelln.) Toelken
Adromischus schuldtianus (Poelln.) Poelln. subsp. *schuldtianus*
Aeollanthus namibiensis Ryding
Albuca karasbergensis P.E.Glover
Albuca viscosa L.f.
Albuca setosa Jacq.
Albuca reflexa Dinter & K.Krause
Albuca namaquensis Baker
Albuca maxima Burm.f.
Albuca hereroensis Schinz
Albuca fleckii Schinz
Albuca englerana K.Krause & Dinter
Albuca cooperi Baker
Albuca canadensis (L.) F.M.Leight.
Albuca amboensis (Schinz) Oberm.
Albuca acuminata Baker
Alectra pseudobarleriae (Dinter) Dinter
Aponogeton azureus H.Bruggen
Aptosimum albomarginatum Marloth & Engl.
Aptosimum angustifolium Weber & Schinz
Aptosimum glandulosum Weber & Schinz
Asystasia schimperi T.Anderson
Asystasia welwitschii S.Moore
Barleria megalosiphon Mildbr.
Blepharis macra (Nees) Vollesen
Bolusia amboensis (Schinz) Harms
Brachystelma codonanthum Bruyns
Brachystelma recurvatum Bruyns
Bridelia tenuifolia Müll.Arg.
Bridelia mollis Hutch.
Brunsvigia radula (Jacq.) Aiton
Canthium glaucum Hiern subsp. *frangula* (S.Moore) Bridson var. *frangula*
Ceropegia occidentalis R.A.Dyer
Ceropegia floribunda N.E.Br.
Chenopodium amboanum (Murr.) Aellen
Chrysocoma microphylla Thunb.
Combretum oxystachyum Welw. ex M.A.Lawson
Combretum schumannii Engl.
Commicarpus decipiens Meikle
Commiphora mossambicensis (Oliv.) Engl.
Commiphora viminea Burtt Davy
Conophytum marginatum Lavis var. *littlewoodii* (L.Bolus) Rawe
ophytum ricardianum Loesch & Tischer subsp. *rubiflorum* Tischer
Corbichonia rubriviolacea (Friedrich) Jeffrey
Crassula dependens Bolus
Crassula pallens Schönland & Baker f.
Crassula exilis Harv. subsp. *sedifolia* (N.E.Br.) Toelken
Crassula deltoidea Thunb.
Crassula deceptor Schönland & Baker f.
Crassula corallina Thunb. subsp. *macrorrhiza* Toelken
Crassula columnaris Thunb. subsp. *prolifera* Friedrich
Crassula ausensis Hutchison subsp. *titanopsis* Pavelka
Crassula grisea Schönland
Crinum subcernuum Baker
Crinum rautanenianum Schinz
Crinum parvibulbosum Dinter ex Overkott
Crinum euchrophyllum I.Verd.
Crinum baumii Harms
Crotalaria aurea Dinter ex Baker f.
Crotalaria kurtii Schinz
Croton pseudopulchellus Pax
Cucumis humifructus Stent
Cybistetes longifolia (L.) Milne-Redh. & Schweick.
Cynanchum schistoglossum Schltr.
Cyphostemma puberulum (C.A.Sm.) Wild & R.B.Drumm.
Cyphostemma bororense (Klotzsch) Desc. ex Wild & R.B.Drumm.
Cyrtanthus herrei (F.M.Leight.) R.A.Dyer
Dalbergia nitidula Welw. ex Baker
Dalbergia martinii F.White
Dicoma capensis Less.
Dicoma cuneneensis Wild
Dicoma dinteri S.Moore
Dicoma sessiliflora Harv. subsp. *sessiliflora* var. *membranacea* (S.Moore) S.Ortiz & Rodr. Oubiná
Dinteranthus inexpectatus Dinter ex H.Jacobsen
Dinteranthus microspermus subsp. *impunctatus* N.Sauer
Dinteranthus microspermus subsp. *microspermus*
Dinteranthus puberulus N.E.Br.
Dioscorea asteriscus Burkill
Dioscorea quartiniana A.Rich.
Dioscorea hirtiflora Benth. *pedicelata* Milne-Redhead
Dioscorea hemicrypta Burkill
Dioscorea cochleari-apiculatus De Wild.
Diospyros batocana Hiern
Distephanus angolensis (O.Hoffman) H.Rob. & B.Kahn
Distephanus divaricatus (Steetz) H.Rob. & B.Kahn
Dracophilus dealbatus (N.E.Br.) Walgate

Dracophilus delaetianus (Dinter) Dinter & Schwantes
Dregeochloa pumila (Nees) Conert
Drosanthemum nordenstamii L.Bolus
Eberlanzia ebracteata (L.Bolus) H.E.K.Hartmann
Eberlanzia cyathiformis (L.Bolus) H.E.K.Hartmann
Elephantorrhiza rangei Harms
Elephantorrhiza schinziana Dinter
Elephantorrhiza goetzei (Harms) Harms subsp. *goetzei*
Entandrophragma caudatum (Sprague) Sprague
Entandrophragma spicatum (C.DC.) Sprague
Eragrostis sclerantha Nees subsp. *villosipes* (Jedwabn.) Launert
Eragrostis habrantha Rendle
Eriospermum graniticolum Dinter ex Poelln.
Eriospermum volkmanniae Dinter
Erythrophysa alata (Eckl. & Zeyh.) Hutch.
Erythroxylum zambesiacum N.Robson
Eulophia fridericii (Rchb.f.) A.V.Hall
Euphorbia espinosa Pax
Euphorbia fusca Marloth
Euphorbia hottentota Marloth
Euphorbia ingens E.Mey. ex Boiss.
Euphorbia karroensis (Boiss.) N.E. Br.
Euphorbia matabelensis Pax
Euphorbia siliciicola Dinter
Euphorbia spartaria N.E.Br.
Euphorbia stapelioides Boiss.
Euphorbia venenata Marloth
Euphorbia volkmanniae Dinter
Euphorbia baliola N.E.Br.
Euphorbia ephedroides E.Mey ex Boiss. var. *debilis* L.C.Leach
Euphorbia benthamii Hiern
Excoecaria bussei (Pax) Pax
Exomis microphylla (Thunb.) Aellen var. *microphylla*
Feretia aeruginescens Stapf
Ficus verruculosa Warb.
Fockea multiflora K.Schum.
Galenia fallax Pax
Gardenia ternifolia Schumach. & Thonn. subsp. *jovis-tonantis* (Welw.) Verdc. var. *jovis-tonatis*
Gardenia resiniflua Hiern subsp. *resiniflua*
Geigeria brevifolia (DC.) Harv.
Geigeria nianganensis Dinter ex Merxm.
Geigeria brachycephala Muschl.
Geigeria obtusifolia L.Bolus
Geigeria odontoptera O.Hoffm.
Geigeria otaviensis (Merxm.) Merxm.
Geigeria pilifera Hutch.
Geigeria schinzii O.Hoffm. subsp. *karakowisae* Merxm.
Geigeria schinzii O.Hoffm. subsp. *rhodesiana* (S.Moore) Merxm.
Geigeria schinzii O.Hoffm. subsp. *schinzii*
Geigeria spinosa O.Hoffm.
Geigeria englerana Muschl.
Grewia pachycalyx K.Schum.
Grewia subspathulata N.E.Br.
Grewia monticola Sond.
Habenaria rautaneniana Kraenzl.
Habenaria subarmata Rchb.f.
Haemanthus pubescens L.f. subsp. *arenicola* Snijman
Haemanthus namaquensis R.A.Dyer
Hirpicium gorterioides (Oliv. & Hiern) Roessler subsp. *schinzii* (O.Hoffm) Roessler
Hoodia officinalis (N.E.Br.) Plowes subsp. *officinalis*
Huernia thuretii Cels
Huernia zebrina N.E.Br. subsp. *magniflora* (Phillips) L.C.Leach
Huernia verekeri Stent. var. *verekeri*
Huernia namaquensis Pillans
Huernia levyi Oberm.
Huernia urceolata L.C.Leach
Hypoxis dinteri Nel
Indigofera giessii A.Schreib.
Jatropha decumbens Pax & K.Hoffm.
Juttadinteria ausensis (L.Bolus) Schwantes
Juttadinteria attenuata Walgate
Kalanchoe laciniata (L.) DC.
Kohautia amboensis (Schinz) Bremek.
Lachenalia pearsonii (P.E.Glover) W.F.Barker
Lannea schweinfurthii (Engl.) Engl. var. *tomentosa* (Dunkley) Kokwaro
Lebeckia obovata Schinz
Ledebouria scabrida Jessop
Leptochloa uniflora A.Rich.
Lessertia cryptantha Dinter
Lotononis linearifolia B.-E.van Wyk
Lotononis pallidirosea Dinter & Harms
Lotononis maculata Dummer
Lycium grandicalyx Joubert & Venter
Lycium pilifolium C.H.Wright
Lycium decumbens Welw. ex Hiern
Lycium villosum Schinz
Lycium hirsutum Dunal
Lycium boscifolium Schinz
Lycium eenii S.Moore
Lycium cinereum Thunb. sensu lato
Manulea tenella Hilliard
Moraea rigidifolia Goldblatt
Namibia pomonae (Dinter) Dinter & Schwantes
Namibia ponderosa (Dinter & Schwantes) Dinter & Schwantes
Neopatersonia falcata G.J.Lewis
Nerine pusilla Dinter
Nicolasia nitens (O.Hoffm.) Eyles
Nicolasia heterophylla S.Moore subsp. *affinis* (S.Moore) Merxm.
Nicolasia stenoptera (O.Hoffm.) Merxm. subsp. *stenoptera*
Nicolasia heterophylla S.Moore subsp. *heterophylla*
Nicolasia pedunculata S.Moore
Nidorella resedifolia DC. subsp. *frutescens* Merxm.
Nolletia tenuifolia Mattf.
Orbea maculata (N.E.Br.) L.C.Leach subsp. *kaokoensis* Bruyns
Orbea maculata (N.E.Br.) L.C.Leach subsp. *rangeana* (Dinter & A.Berger) Bruyns
Orbea schweinfurthii (A.Berger) Bruyns
Orbea valida (N.E.Br.) Bruyns subsp. *occidentalis* Bruyns
Orbea lugardii (N.E.Br.) Bruyns
Orbea huillensis (Hiern) Bruyns subsp. *flava* Bruyns
Orbea albocastanea (Marloth) Bruyns
Orbea lutea (N.E.Br.) Bruyns subsp. *vaga* (N.E.Br.) Bruyns
Ornithogalum prasinum Lindl.
Ornithogalum hispidum Hornem. subsp. *hispidum*
Ornithogalum apertum (I.Verd.) Oberm.
Ornithogalum tenuifolium F.Delaroche
Osteospermum armatum T.Norl.
Oxalis laxicaulis R.Knuth
Oxalis pseudo-cernua R.Knuth

Ozoroa insignis Delile subsp. *latifolia* (Engl.) R.Fern.
Ozoroa okavangensis R.R.& A.Fern.
Pachycarpus lineolatus (Decne.) Bullock
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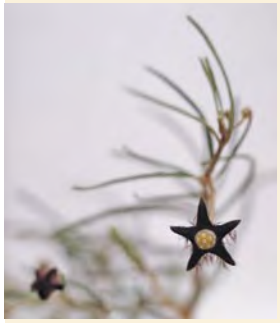

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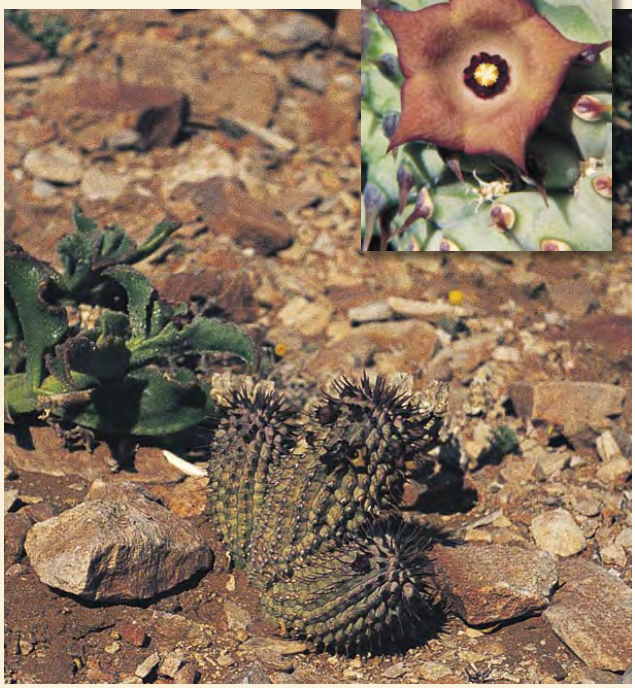

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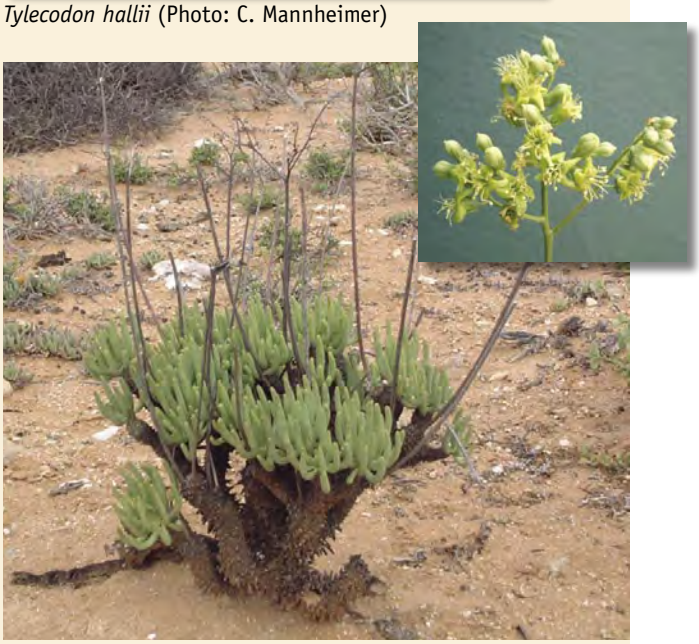

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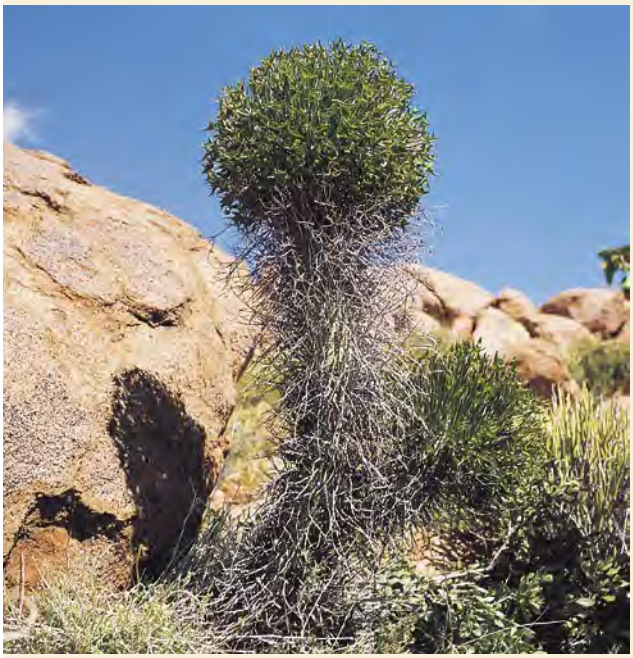

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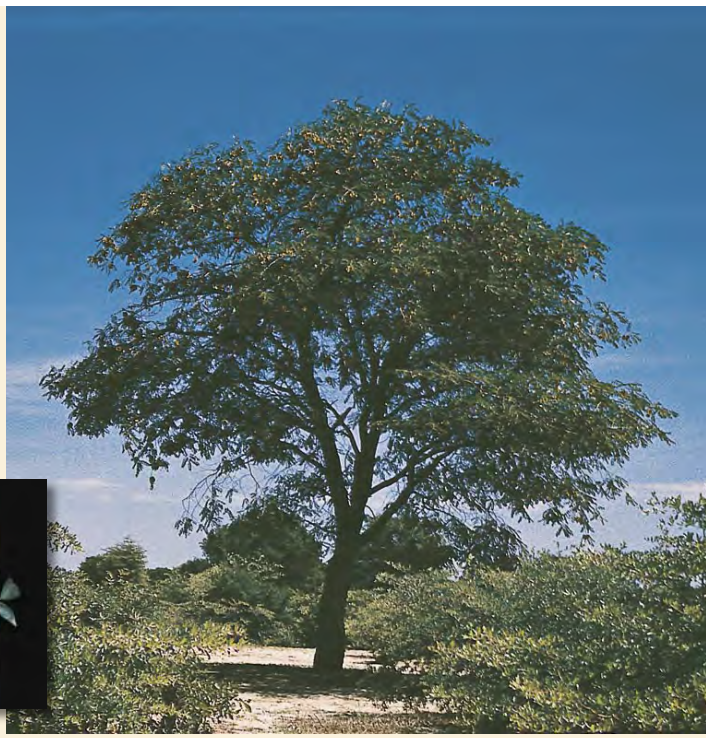

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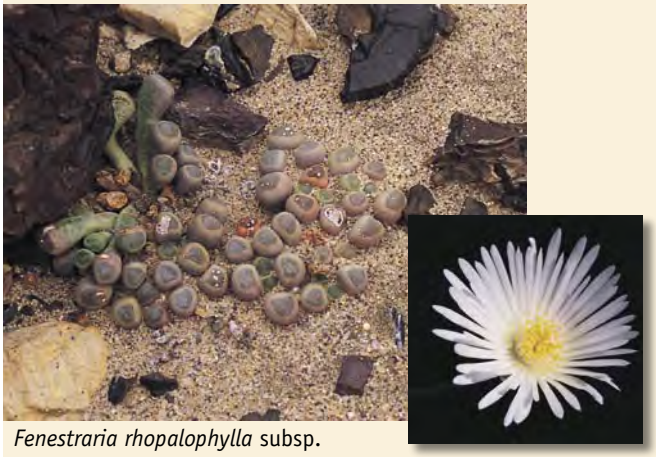

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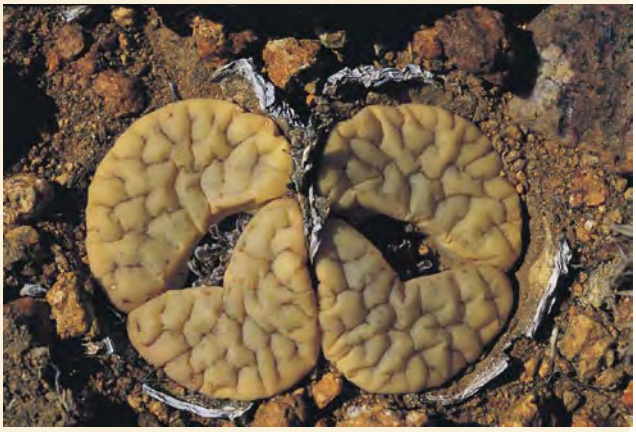
Juttadinteria suavissima (Photo: C. Mannheimer)

Lapidaria margaretae (Photos: left; C. Mannheimer, right; C. Nghidinwa)

Lithops dinteri subsp. *dinteri* (Photo: W. Giess)

Lithops francisci (Photo: P.V. Bruyns)

Lithops fulviceps (Photo: P.V. Bruyns)



Lithops gracilidelineata subsp. *brandbergensis* (Photo: P.V. Bruyns)

Lithops julii subsp. *julii* (Photos, left to right: C. Nghidinwa, P.V. Bruyns, C. Nghidinwa)

Lithops herrei (Photo: P.V. Bruyns)

Lithops karasmontana subsp. *karasmontana* (Photo: P.V. Bruyns)

Lithops karasmontana subsp. *bella* (Photo: P.M. Burgoyne)

Lithops optica (Photo: W. Giess)

Lithops pseudotruncatella subsp. *dentritica* (Photo: H. Kolberg)

Lithops pseudotruncatella subsp. *pseudotruncatella* (Photo: W. Giess)

Lithops ruschiorum (Photo: W. Giess)

Lithops schwantesii subsp. *schwantesii* (Photo: H. Kolberg)

Namibia cinerea (Photo: C. Mannheimer)

Psammophora nissenii
(Photos: left; C. Mannheimer, right; P. Burgoyne)

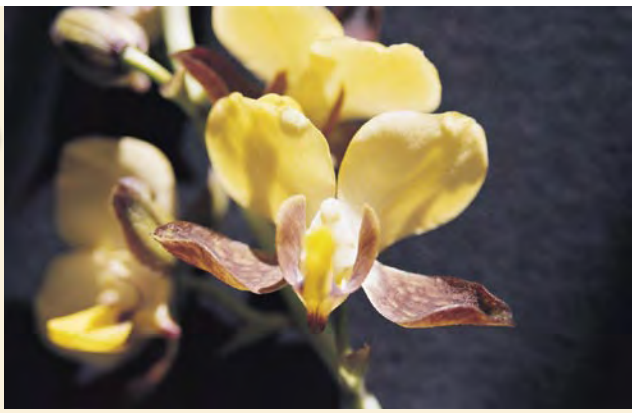
Ruschianthus falcatus
(Photo: S. Loots)

Ruschia namusmontana (Photo: P.M. Burgoyne)

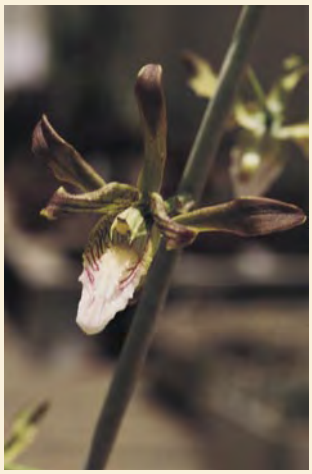
Titanopsis schwantesii
(Photo: W. Giess)

Bartholina etheliae
(Photo: P.V. Bruyns)

Ansellia africana (Photos: left; B. Loutit, insert; H. zur Strassen)



Eulophia hereroensis (Photo: H. Kolberg)



Eulophia leachii
(Photo: C. Hines)

Eulophia walleri
(Photo: M. Müller)

Oxalis luederitzii (Photo: C. Mannheimer)

Plumbago wissii (Photo: E. van Jaarsveld)

Adenia pechuelii (Photo: W. Giess)

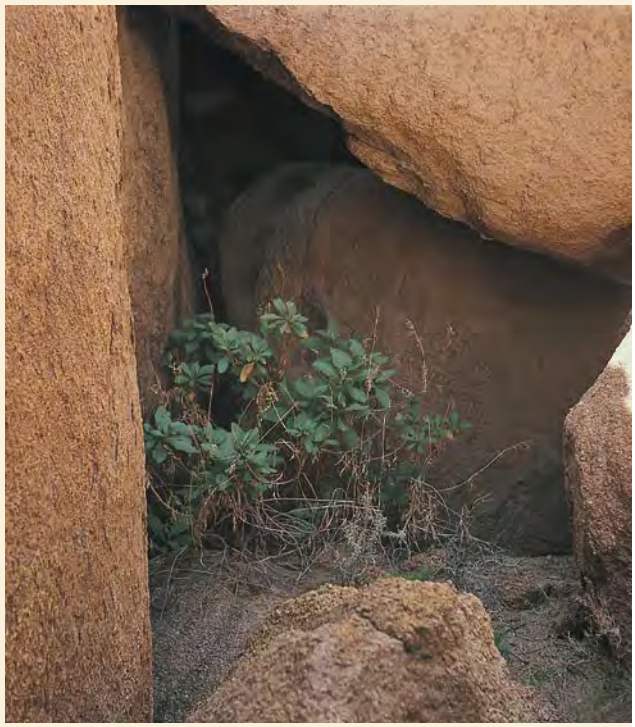
Dombeya rotundifolia (Photo: T. Angula)

Sesamothamnus sp.
(Photos: B. Curtis)

Chamaegigas intrepidus (Photo: W. Giess)

Trema orientalis (Photos: C. Mannheimer)

Nemesia violiflora (Photo: W. Giess)



Nicotiana africana (Photo: W. Giess)

Cyphostemma juttae (Photo: P.M. Burgoyne)

Cyphostemma bainesii (Photo: S. Rügheimer)

Cyphostemma bainesii (Photo: L. Burmeister)

Neoluederitzia sericeocarpa
(Photos: C. Mannheimer)

Zygophyllum macrocarpon (Photo: C. Mannheimer)

Zygophyllum pterocaule (Photo: C. Mannheimer)