Supporting Document

NDF Assessment for *Euphorbia schoenlandii*

Approved by the Scientific Authority of South Africa (19-20 May 2021)

Last information update: September 2024

Summary of finding

Euphorbia schoenlandii is included in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). In terms of Article IV of the Convention, an export permit shall only be granted for an Appendix II species when a Scientific Authority of the State of export has advised that such an export will not be detrimental to the survival of that species in the wild. This document details the undertaking of a non-detriment finding (NDF) assessment for *Euphorbia schoenlandii*. The assessment is based on the best available information compiled through a review of all relevant scientific literature and reports (see reference list) as well as deliberations held at an expert workshop convened by the South African National Biodiversity Institute on the 10th and 11th of November 2020 (see list of workshop participants at the end of this document), and amended through various further consultations with experts.

Euphorbia schoenlandii is a perennial, spiny stem succulent that is endemic to a small region along the west coast of South Africa. The typically single-stemmed plants are slow-growing and long-lived with populations characterised by slow recruitment and adult plant persistence. The species reproduces primarily by seed but dispersal is limited to short distances. Seed production and recruitment as well as plant growth is restricted primarily to the winter rainfall season. Populations of the species generally require sustained high rainfall episodes in successive years to regenerate and pulses of population renewal may occur at intervals of years, decades or even centuries. Plants are most often found growing in close association with the surrounding vegetation, and nurse objects are thought to be important for the species recruitment and regeneration.

Euphorbia schoenlandii is confined to the southernmost portions of the Namaqualand Sandveld and Knersvlakte Bioregions (within the Succulent Karoo) in the Western Cape Province. Populations occur at low altitudes along fertile slopes closer to the coast where even temperature ranges and moisture from fog and dewfalls provide more favourable climatic conditions within an arid environment. The species is known from four localities with three of the populations varying in size from approximately 945 to 23 839 individuals. There is an estimated total of 29 152 plants remaining in the wild occupying an area of 100 km^2 (EOO: ~1 682 km^2). A recent comprehensive study conducted on the population biology of the species provides an indication of limited to no recruitment across the populations and a dominance of small sized adult individuals. Slightly negative size class distribution slopes suggest that the populations may be shrinking. The species is currently assigned a national status of Vulnerable (B1ab(ii,iii,iv,v)+2ab(ii,iii,iv,v)) in line with the IUCN's (International Union for Conservation of Nature) Red List Categories and Criteria, but new information supports an uplisting of the species to the Endangered (B1ab(ii,iii,iv,v)+2ab(ii,iii,iv,v)) category due to the ongoing loss in the size and quality of its habitat.

Euphorbia schoenlandii was reportedly much more widespread than at present. Irreversible habitat loss as a result of agricultural and mining activities, has left the remaining populations severely isolated from one another. These activities continue across parts of the species range. The largest of the three surveyed populations is heavily fragmented and disturbed. The smallest population was found to be most severely infested with the larvae of a destructive, alien stem-boring moth (*Nephopteryx divisella*), which may have serious implications for the persistence of this population. Erosion and habitat degradation as a result of overgrazing present additional threats to the species, whilst herbivory by wild animals and domestic livestock poses a low to moderate risk. Illegal collection of wild plants for the horticultural market and to establish nursery stocks is likely to have taken place in the past with negative impacts on populations in certain areas. Four cases involving the illegal harvest of wild plants and seeds have been reported in 2024, which may indicate that illegal activities involving the species are increasing.

Data for exports of *E. schoenlandii* from South Africa are monitored on a regular basis, although the quality of the data is not as good as it should be owing to errors in reporting. South Africa is by far the largest exporter of *E. schoenlandii* plants, accounting for more than 85% of global exports since 1980. A total of 3 222 specimens have been exported from the country between 1980 and 2020, 95% of which have been declared as artificially propagated. Levels of legal international trade are currently stable. There are two South African nurseries known to be actively propagating *E. schoenlandii* and there are more than enough plants produced at present to meet the current demand for the species. Nevertheless, increased levels of succulent plant poaching within the species distribution range does place some populations at risk of opportunistic harvesting for trade. There is currently no field monitoring programme for the species.

Protection of the species and its habitat is inadequate. None of the known extant populations occur within any protected areas and access to the populations is fairly unrestrictive. *Euphorbia schoenlandii* is listed as a protected plant in the Western Cape's Nature and Environmental Conservation Ordinance No. 19 of 1974. Cape Nature have not issued any permits for the wild collection of *E. schoenlandii* plants from anywhere in the province but due to limited staff capacity as well as a lack of specific skills and appropriate mechanisms, it remains challenging to effectively implement harvest controls and to monitor the status of wild populations or any legal or illegal activities involving the species. There is no quota system for harvesting *E. schoenlandii* plants and any offtake at present is unmanaged with no oversight. There is no management plan for the species, and no incentives for species or habitat conservation as it relates to wild harvesting.

The export of wild-sourced specimens of *E. schoenlandii* would place the wild population at a high risk of overharvesting and render trade detrimental. The species' biology, which is characterized by a poor dispersal ability and slow growing long-lived adults that regenerate predominantly from seed, renders E. *schoenlandii* particularly vulnerable to overutilization (Fig. 1 & 2). The demand for *E. schoenlandii* is however largely met by plants propagated in nurseries from seed (and through micropropagation), and there is no evidence to suggest that the trade in artificially propagated specimens is detrimental to the species. Export should therefore be restricted to seedlings/small plants (measuring ≤5.5 cm in plant height) produced from nursery facilities that have been audited for compliance with CITES Resolution Conf. 11.11 (Rev. CoP18), specifically in relation to the definition of artificial propagation, and any other relevant legal requirements.

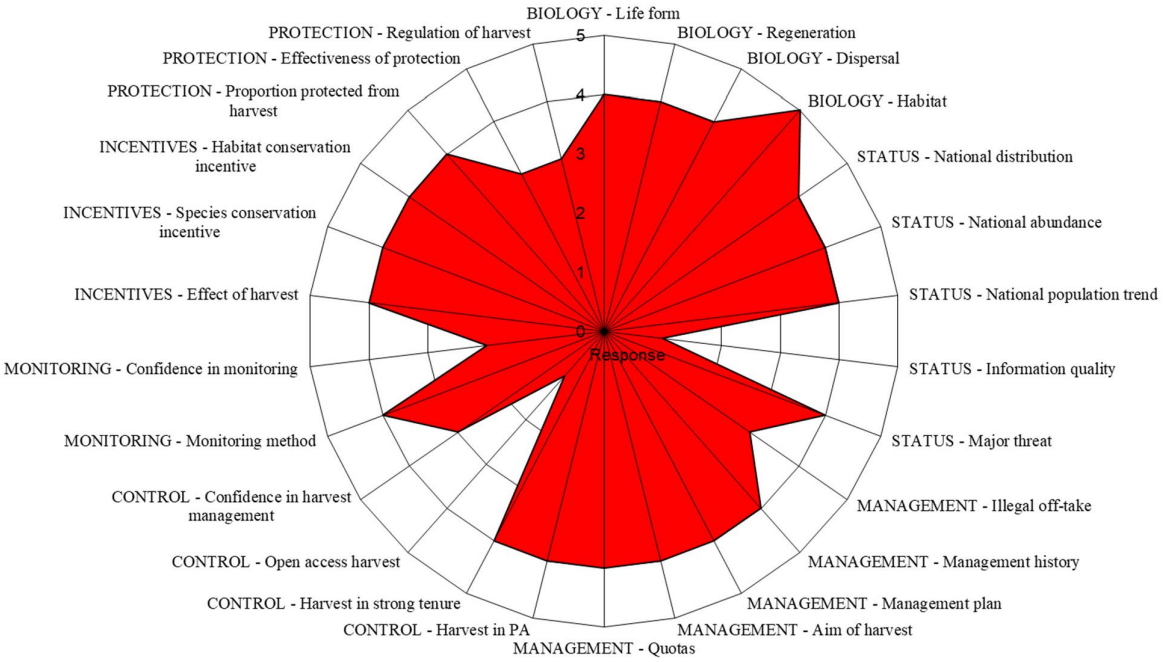

Figure 1: Radar chart summarizing the non-detriment finding assessment undertaken for *Euphorbia schoenlandii* in accordance with the CITES NDF checklist. Explanations of scores given are detailed in Table 1. Higher scores are indicative of higher risks to the species. The shaded area in the radar chart demonstrates a high risk to the species.

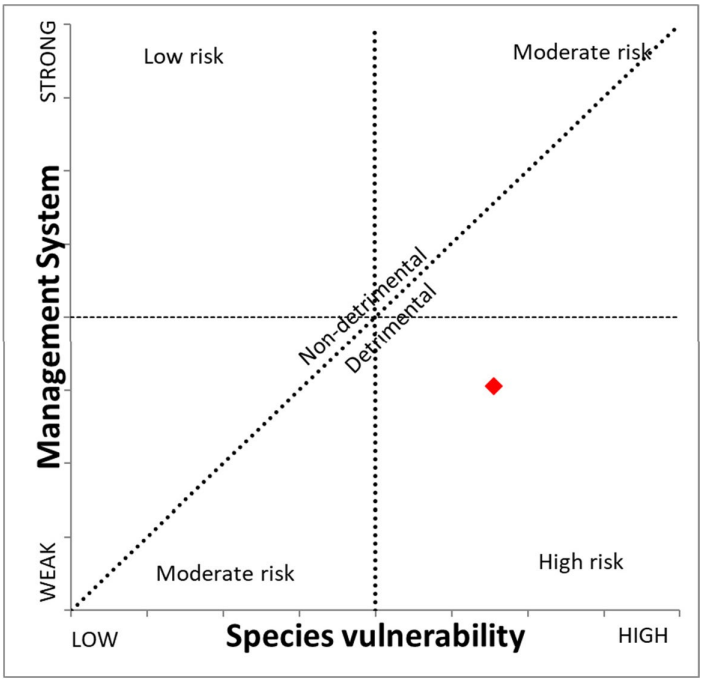

Figure 2: The risk of trading in *Euphorbia schoenlandii* as represented by the relationship between species vulnerability (biology and status) and the strength of the management system to which the species is subjected (management, control, monitoring, incentives and protection). The figure shows that the species is at a high risk and trade is currently detrimental.

Table 1: Detailed NDF assessment for *Euphorbia schoenlandii* undertaken in accordance with the CITES NDF checklist. Scores assigned to each question are indicated (bold text and shaded blocks) along with detailed explanations/justifications where relevant. Higher scores are indicative of higher risks to the species.

Biological characteristics		
1. Life form: What is the life form of the species?	Annual	1
	Biennial	2
	Perennials (herbs)	3
	Shrub and small trees (max. 12m.)	**4**
	Trees	5

Euphorbia schoenlandii is a perennial, spiny stem succulent comprised of an erect, cylindrical stem covered with prominent, spirally disposed ovoid-conic tubercles that have a triangular cavity on the upper slope just below the apex (Fig. 3). Solitary, woody spines formed from modified sterile peduncles are produced from the uppermost portion of the cavity of each tubercle and a tuft of rudimentary leaves appear at the northward tilted apex of the stems during the growing season but are soon deciduous with the onset of spring (White *et al.* 1941). Fertile peduncles arise from the lower portion of the tubercular cavities, directly beneath the spine and carry the bisexual cyathia (flowering structures) singularly or in cymes of three. The plants are typically single stemmed but multi-stemmed specimens do occur. The species is thought to be long lived and slow reproducing with growth activity typically concentrated around the rainy winter months when conditions are more favourable (Jabar, 2019).

Figure 3: *Euphorbia schoenlandii* plants pictured in habitat. Photo by Laaiqah Jabar

2. Regeneration potential: What is the regenerative potential of the species concerned?	Fast vegetatively	1
	Slow vegetatively	2
	Fast from seeds	3
	Slow or irregular from seeds or spores	**4**

	Uncertain	5

Euphorbia schoenlandii reproduces sexually by means of seed produced by reproductive individuals every winter. This monoecious species is reported to flower between April and July (Goldblatt and Manning, 2000; Jabar, 2019) and pollination is facilitated by several species of ants, beetles and flies (Jabar, 2019). Seed capsules of *Euphorbia* species are trilocular, carrying up to three seeds each. The seeds are forcefully ejected by explosive dehiscence of the capsules and recruitment is episodic (Jabar, 2019). In arid regions, recruitment and seedling establishment is generally related to rainfall timing and quantity with populations requiring sustained high rainfall episodes in successive years to regenerate (Witkowski and Liston, 1997; Esler, 1999; Adie and Yeaton, 2013; Milton and Dean, 2015). Pulses of population renewal may occur at intervals of years, decades or even centuries (Milton *et al.,* 1999). Whilst succulent *Euphorbia* species are not known to maintain persistent seed banks (Milton *et al.* 1999), seeds of this species may reportedly take up to seven years to germinate (CapeNature, 2021). In cultivation, seed grown plants reach sexual maturity at around 30 months whilst plants produced from stem cuttings have a faster growth rate producing flowers within 18 months (CapeNature, 2021).

Recent surveys of *E. schoenlandii* populations showed variable recruitment, with higher percentages of juvenile plants (6-16%) observed in populations situated on south-westerly aspects closer to the coast and those growing in more fertile areas (Jabar, 2019). The onshore flow of air from the Atlantic Ocean creates fog and heavy dew on the west coast (Desmet, 2007), which is a far more reliable source of moisture for plant growth than rainfall in terms of frequency and predictability of occurrence. Since fog is greatest closer to the coast, it stands to reason that the higher occurrence of moisture accounts for the greater recruitment rates of *E. schoenlandii* plants in these coastal areas. The populations are generally dominated by plants in the first adult size class (151 – 1 150 cm^3 plant volume) with successively lower numbers of individuals in the larger size classes (>1 150 cm^3). Reproductive output is weakly proportional to plant size (Jabar, 2019). Most *E. schoenlandii* plants (63%) were associated with surrounding vegetation cover (with a slight preference for non-succulent shrubs), indicating the importance of nurse objects for recruitment and regeneration in the species (Jabar, 2019).

3. Dispersal efficiency: How efficient is the species' dispersal mechanism?	Very good	1
	Good	2
	Medium	3
	Poor	**4**
	Uncertain	5

Euphorbia schoenlandii employs a ballistic dispersal mechanism, and myrmecochory (i.e. secondary dispersal by ants) has been discounted due to the absence of elaiosomes (i.e. nutrient rich seed coat) on emergent seeds (Jabar, 2019). Ballistic dispersal alone typically scatters seeds to within a short distance (typically <10m) around the parent plant (Stamp and Lucas, 1990; Narbona *et al.,* 2005; Tamme *et al.* 2014) dependent on plant height. There is anecdotal information which suggests that mice may aid in the dispersal of this species (W. Hornimann- Conservation Services Officer, CapeNature, pers. comm.). Incidences of pre- dispersal seed predation for this species were observed, but not quantified (Jabar, 2019).

4. Habitat: What is the habitat preference of the species?	Disturbed open	1
	Undisturbed open	2
	Pioneer	3
	Disturbed forest	4
	Climax	**5**

Euphorbia schoenlandii habitat occurs within the unique Namaqualand Sandveld Bioregion (NSB) and, to a lesser degree, the Knersvlakte Bioregion (KB) within the Succulent Karoo biome (Rutherford *et al*., 2006). Plants occur at altitudes of between 10 and 137 meters above sea level, with populations inhabiting nearly

level ground (0.1-1.1 degrees) to moderate slopes (5-8.5 degrees). *Euphorbia schoenlandii* can be found predominantly on south-westerly and westerly aspects, and mainly on or around "heuweltjies" (circular mounds of earth measuring from 10-32 m in diameter and 0.5-2 m in height). Mean annual precipitation over the distribution range of the species varies between 164 mm and 187 mm, along a north-south gradient (successively wetter to the south). The habitat of the species is described as Sandveld areas with deep, red Aeolian sands where plants can be found on lower, fertile loamy slopes (alkaline), often occurring in fairly dense vegetation (Raimondo, 2007). Vegetation type associated with the species' habitat varies from Namaqualand Strandveld to Knersvlakte Dolomite Vygieveld and Knersvlakte Quartz Vygieveld (SANBI, 2012). Up to 37% of plants grow in the open but most individuals are typically found growing in close association with the surrounding succulent and non-succulent shrubbery where modified microclimatic conditions beneath the vegetation canopies ameliorate abiotic stresses and facilitate not only germination and establishment of seedlings, but also promote seedling survival (López *et al*., 2007; Munguía-Rosas and Sosa, 2008; Vlok and Schutte-Vlok, 2015). The species is thus sensitive to disturbance of the surrounding vegetation. Degradation of its habitat, including the destruction of heuweltjies and removal of nurse vegetation (caused in these areas by mining and agricultural activities), impacts the specific microhabitat conditions required for the species recruitment and survival (A. Schutte-Vlok – Regional Ecologist, CapeNature, pers. comm.). Passive recovery of perennial vegetation following cultivation and other forms of land degradation in the Succulent Karoo may take upward of 300 years to occur (Milton and Dean, 2015), and once disturbed, *E. schoenlandii* may never be able to re-colonise.

National status

5. National distribution: How is the species distributed nationally?	Widespread, contiguous in country	1
	Widespread, fragmented in country	2
	Restricted and fragmented	3
	Localized	**4**
	Uncertain	5

Euphorbia schoenlandii is restricted to the southernmost portion of the Namaqualand Strandveld in the Western Cape Province of South Africa (Fig. 4). Populations are separated by distances of between 32 km and 88 km and are thus very isolated from one another. The species has an estimated extent of occurrence (EOO) of 1 682 km^2 and an area of occupancy (AOO) of 100 km^2 (Jabar, 2019).

Figure 4: Distribution of *Euphorbia schoenlandii* along the west coast of the Western Cape Province, South Africa

Precipitation in the driest month and isothermality (the extent to which the diurnal (day to night) temperatures fluctuate relative to the annual (summer to winter) temperature oscillations) are projected to have the most significant influence on the distribution of the species. The availability of moisture (including fog and dewfalls) as well as less extreme temperature fluctuations closer to the coast provides more favorable conditions to the species in its arid environment (Jabar, 2019).

6. National abundance: What is the abundance nationally?	Very abundant	1
	Common	2
	Uncommon	3
	Rare	**4**
	Uncertain	5

Recent field surveys revealed three extant populations varying in size from approximately 945 to 23 839 individuals, with a total estimated national abundance of approximately 29 152 plants in the wild (Jabar, 2019). The species may also be present at one other locality, but this population has not yet been surveyed. The spatial arrangement of *E. schoenlandii* populations does not display any real geographic center, and plant abundance among the populations varies greatly (Jabar, 2019). Densities of plants vary from 3.79 plants/ha to 22.45 plants/ha (Jabar, 2019). Plants are typically more abundant closer to the shoreline, with the number of plants decreasing further inland (Jabar, 2019). This is postulated to be an artefact of the emergent environmental conditions along the coast.

7. **National population trend**: What is the recent national population trend?	Increasing	1
	Stable	2
	Reduced, but stable	3
	Reduced and still decreasing	**4**
	Uncertain	5

Signs of recent recruitment were low for the majority of the populations, with one locality showing no recruitment at all (Jabar, 2019). Inconstant quotients between successive size classes observed for all populations may be indicative of episodic recruitment or unstable populations (Venter and Witkowski, 2010; Shackleton *et al*., 2015), whilst slightly negative size class distribution slopes obtained for the majority of populations suggest that they may be shrinking, i.e. decreasing plant densities (Niklas *et al.,* 2003; Jabar, 2019).

Populations of *E. schoenlandii* have been heavily impacted by habitat loss as a result of farming activities and mining. Historical records and species distribution models suggest that *E. schoenlandii* was once considerably more widespread within its distribution range. White *et al.* (1941) give the type locality as "Clanwilliam district" which could indicate that the species' distribution extended much further to the south than at present. Hall (1984) also noted that the species was formerly extremely abundant but that thousands of individuals were destroyed when, following an exceptionally heavy wet spell in the 1960's, some farmers tried to grow wheat. The resultant damage remains evident and, with the added pressures concomitant with the construction of roads and railway lines within the landscape, it is unlikely that the species would be able to recolonise these areas without assistance (Jabar, 2019).

Owing to the continued decline in the species geographic range, quality of its habitat and number of individuals, it is suggested that the current conservation status of *E. schoenlandii* be up-listed from Vulnerable (B1ab(ii,iii,iv,v)+2ab(ii,iii,iv,v)) to Endangered (B1ab(ii,iii,iv,v)+2ab(ii,iii,iv,v)) in line with the IUCN's Red List Categories and Criteria (Jabar, 2019).

	Quantitative data, recent	**1**

8. Quality of information: What type of information is available to describe abundance and trend in the national population?	Good local knowledge	2
	Quantitative data, outdated	3
	Anecdotal information	4
	None	5
A detailed study on the population biology and ecology of the species was undertaken, and provides recent, quantitative data on the national status and abundance of *E. schoenlandii* (Jabar, 2019).		
9. Major threats: What major threat is the species facing (underline following: overuse/ habitat loss and alteration/ invasive species/ other) and how severe is it?	None	1
	Limited/Reversible	2
	Substantial	3
	Severe/Irreversible	**4**
	Uncertain	5
Habitat loss and degradation were identified as the most serious threats to *E. schoenlandii* (Jabar, 2019). The species' habitat has been irreversibly destroyed as a result of agricultural and mining activities, leaving the remaining populations quite isolated from one another (Jabar, 2019). *Euphorbia schoenlandii* was reported to occupy a much wider distribution range than at present, with much of the species preferred habitat transformed by the expansion of vineyards and wheat farming onto deep Aeolian sands where the plants grow (Raimondo, 2007). The largest of the three surveyed populations is heavily fragmented and disturbed with two of the subpopulations transected by a number of dirt road and off-road tracks, and a third subpopulation likely to be affected by planned expansions of agricultural fields. The presence of rubbish dumps and a quarry close to these subpopulations presents additional disturbances to plants in the area. Even though the plants are armored with rigid spines, herbivory of *E. schoenlandii* by goats, sheep and small buck was observed at some localities, with varying degrees of impact (Jabar, 2019). The smallest *E. schoenlandii* population was found to be most severely infested with the larvae of a destructive, alien stem- boring moth (*Nephopteryx divisella*), which may have serious implications for the persistence of this population. Up to 47% of individuals in this population were affected with damage to the soft tissue of plants (primarily around the growing tip of individuals) as well as to the flowers and immature fruits (Jabar, 2019). Erosion and habitat degradation (including the destruction of surrounding shrubbery and nurse vegetation) as a result of overgrazing present additional threats to the species. Parts of the species habitat has already been extensively transformed by diamond mining activities (Desmet, 1998; Desmet and Helme, 2005) and overgrazing and trampling will likely exacerbate the erosion evident here (Jabar, 2019). Most recently, the species has been targeted by illegal plant harvesters with both live plants and seeds confiscated in the field and whilst in transit (CapeNature 2024).		
Harvest management		
10. Illegal off-take or trade: How significant is the national problem of illegal or unmanaged off-take or trade?	None	1
	Small	2
	Medium	**3**
	Large	4
	Uncertain	5
Whilst no direct evidence of wild plant harvesting was observed at any of the three populations studied by Jabar (2019), there have been infrequent reports of some ongoing localized collections (L. Jabar - Analyst: Biodiversity Enforcement, Department of Forestry, Fisheries and the Environment (DFFE), pers. comm.; C. Birss - Executive Director: Biodiversity Capabilities, CapeNature, pers. comm.). However, given the increasing incidences of illegal succulent plant collection across the Knersvlakte region of the province (W. Hornimann, pers. comm.) the species remains at risk of opportunistic as well as possible targeted removals. So far in 2024, four cases of illegal harvesting involving the species have been reported by CapeNature, the provincial nature conservation body within the Western Cape. This includes two cases involving bags filled with *E. schoelanndii* plants (~250 specimens) that were found abandoned in the field and, two cases where		

a combined quantity of more than 22 000 (wild-collected) seeds were seized (L. Muller – Conservation Officer, CapeNature, pers. comm.).

Thus far, only 82 of the more than 3 000 plants exported from South Africa have been reported as wild, although CapeNature have no record of having issued CITES export permits for wild harvested specimens of this species (C. Arendorf – Law Admin Officer, CapeNature, pers. comm.), and this may therefore have been a reporting error. Illegal laundering of wild plants is suspected to have occurred through the Eastern Cape Province on one occasion (Jabar, 2019). Six South African nurseries were found to be cultivating the species (Jabar, 2019). Production of plants in these nurseries occurs primarily with seed harvested from parental plants; the origin of parental stock for some of these nurseries could however not be determined (Jabar, 2019). It is likely that wild plants were acquired initially to begin propagation initiatives. Plant stocks at one of the nurseries (which had the highest number of plants) displayed characteristics consistent with wild plants (Jabar, 2019). This nursery was not actively involved in propagating plants at the time of the survey, and only two of the six nurseries were found to be actively propagating the species. Nevertheless, three of the six nurseries are all able to produce artificially propagated *E. schoenlandii* plants and each one on its own has the production capacity to yield enough plants to meet the present average observed demand of ±75 plants per year. One nursery in particular has a high production capacity and grows plants primarily from seed harvested off mother plants but also utilises micropropagation (the multiplication of plant material using in vitro or tissue culture techniques) as a means of plant production which allows for a faster rate of proliferation and results in plants with a faster growth rate (Jabar, 2019).

The species does, however, not appear to be in high demand in trade and a snapshot internet survey to assess the general availability of the species in the online marketplace (conducted over two days in December 2015 and July 2016), found just four adverts for *E. schoenlandii* with plants available at an average online retail price of R 162 ± 104 (Jabar, 2019). Seed advertisements were more prevalent than live plant advertisements for this species (Jabar, 2019).

11. Management history: What is the history of harvest?	Managed harvest: ongoing with adaptive framework	1
	Managed harvest: ongoing but informal	2
	Managed harvest: new	3
	Unmanaged harvest: ongoing or new	**4**
	Uncertain	5

There has been no formal management of wild-harvesting of *E. schoenlandii* to date. The species is listed as a protected plant in the Western Cape's Nature and Environmental Conservation Ordinance no. 19 of 1974. In line with the terms set out in the ordinance, no person may pick (i.e. uproot) a protected plant without a permit (except in the case where a person is the owner of such land or a relative of such owner and any fulltime employee of such owner acting on the instructions or with the consent of the owner). The collection of seed from private lands is permissible with written landowner permission. To date, CapeNature have not issued any permits for the wild collection of the species from anywhere in the province (C. Arendorf – Law Admin Officer, CapeNature, pers. comm.) and they have a management guideline to exercise precaution in the assessment of granting permits for wild collection (C. Birss, pers. comm.). Previous harvest of the species may have taken place to establish nursery stocks but these offtakes would have been opportunistic, illegal and unmanaged.

12. Management plan or equivalent: Is there a management plan related to the harvest of the species?	Approved and co-ordinated local and national management plans	1
	Approved national/state/provincial management plan(s)	2
	Approved local management plan	3

	No approved plan: informal unplanned management	**4**
	Uncertain	5
There is no management plan for the species.		
13. Aim of harvest regime in management planning: What is harvest aiming to achieve?	Generate conservation benefit	1
	Population management/control	2
	Maximize economic yield	3
	Opportunistic, unselective harvest, or none	**4**
	Uncertain	5
Any current wild-collecting is opportunistic and for the personal benefit/use of the harvester.		
14. Quotas: Is the harvest based on a system of quotas?	Ongoing national quota: based on biologically derived local quotas	1
	Ongoing quotas: "cautious" national or local	2
	Untried quota: recent and based on biologically derived local quotas	3
	Market-driven quota(s), arbitrary quota(s), or no quotas	**4**
	Uncertain	5
There is currently no quota system for harvesting *E. schoenlandii* from the wild.		
Control of harvest		
15. Harvesting in Protected Areas: What percentage of the legal national harvest occurs in State-controlled Protected Areas?	High	1
	Medium	2
	Low	3
	None	**4**
	Uncertain	5
There is no known legal wild-harvesting of *E. schoenlandii* taking place within the country. The species is listed as a protected plant in the Western Cape's Nature and Environmental Conservation Ordinance no. 19 of 1974. CapeNature have not issued any permits for the wild collection of plants from anywhere in the province (C. Arendorf, pers. comm.) and it is unlikely that they would allow harvest within any of their protected areas. None of the known *E. schoenlandii* populations occur in any formally protected areas.		
16. Harvesting in areas with strong resource tenure or ownership: What percentage of the legal national harvest occurs outside Protected Areas, in areas with strong local control over resource use?	High	1
	Medium	2
	Low	3
	None	**4**
	Uncertain	5
There is no known legal harvest of *E. schoenlandii* taking place in South Africa. Several of the *E. schoenlandii* populations occur on privately owned lands. The species is listed as a protected plant in the Western Cape's Nature and Environmental Conservation Ordinance no. 19 of 1974. CapeNature have not issued any permits for the wild collection of *E. susannae* from anywhere in the province (C. Arendorf, pers. comm.) but it remains challenging to keep track of any legal (seed) harvest occurring within private land.		
17. Harvesting in areas with open access: What percentage of the legal	**None**	**1**
	Low	2

national harvest occurs in areas where there is no strong local control, giving *de facto* or actual open access?	Medium	3
	High	4
	Uncertain	5

There is no known legal wild-harvesting of *E. schoenlandii* taking place within the country. The species is listed as a protected plant in the Western Cape's Nature and Environmental Conservation Ordinance no. 19 of 1974. CapeNature have not issued any permits for the wild collection of *E. susannae* from anywhere in the province (C. Arendorf, pers. comm.).

18. Confidence in harvest management: Do budgetary and other factors allow effective implementation of management plan(s) and harvest controls?	High confidence	1
	Medium confidence	2
	Low confidence	**3**
	No confidence	4
	Uncertain	5

Capacity within the conservation sector across the country is an ongoing challenge. Apart from the limited number of staff (and budget) available to manage and monitor species, scientists and practitioners are presently ill-equipped to deal with the evolving pressures put on the country's biodiversity - for example, it is increasingly difficult to detect instances of poaching, smuggling and laundering of succulent plants (that is facilitated largely by the internet and rapidly developing social media platforms) with existing mechanisms. The implementation of current management and harvest controls (particularly outside of protected areas) is therefore limited at present although ad hoc compliance inspections are starting to be implemented in the Western Cape. It has also been acknowledged that new skillsets and mechanisms are needed in-order to effectively detect illegal activities involving endemic species, as well as to improve the management of a legal and sustainable trade in these plants that satisfy both national and international conservation obligations.

Monitoring of harvest

19. Methods used to monitor the harvest: What is the principal method used to monitor the effects of the harvest?	Direct population estimates	1
	Quantitative indices	2
	Qualitative indices	3
	National monitoring of exports	**4**
	No monitoring or uncertain	5

Exports of *E. schoenlandii* from South Africa (extracted from the CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK) are monitored by the South African National Biodiversity Institute (SANBI) on behalf of South Africa's Scientific Authority. South Africa is by far the largest exporter of *E. schoenlandii* plants, accounting for more than 85% (~3 222 live plants) of all global exports (~3 782 live plants) since 1980 (Fig. 5). The United Kingdom, the United States of America and Germany are the predominant importers of the species, with Japan having imported large quantities of seed in the early nineties. Ninety-five percent of exported plants have been declared as artificially propagated and not many wild plants are thought to have left the country legally or through misdeclaration (Jabar, 2019). *Euphorbia schoenlandii* remains one of the lesser traded *Euphorbia* species and levels of South African exports have remained relatively stable since the early 2000s.

There is currently no field monitoring programme for the species.

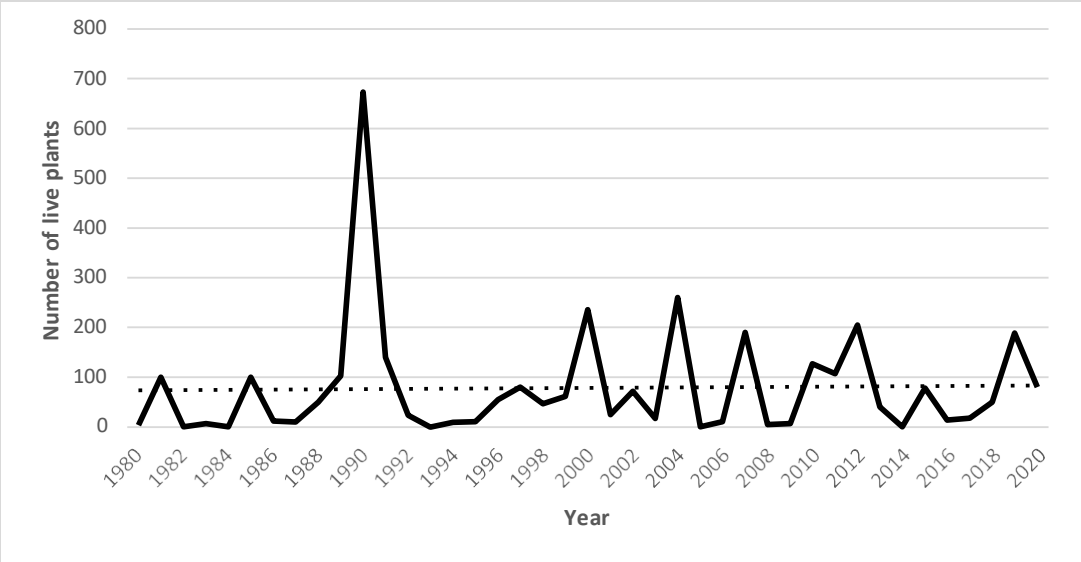

Figure 5: Gross exports of live *Euphorbia schoenlandii* plants from South Africa (with trend in trade over time indicated by the dashed line). An average of 83 plants (± SD 85.18) have been exported annually since the year 2000 (up to 2020).

20. Confidence in harvest monitoring: Do budgetary and other factors allow effective harvest monitoring?	High confidence	1
	Medium confidence	**2**
	Low confidence	3
	No confidence	4
	Uncertain	5

Trade data are regularly extracted from the CITES Trade Database (UNEP World Conservation Monitoring Centre, Cambridge, UK) and analysed. The quality of the trade data is not as good as it should be due to errors and inconsistencies in reporting. Lack of monitoring across local nursery facilities also undermines the accuracy of the trade data as some nurseries have been known to take advantage of poor oversight loopholes by mis-declaring wild plants as artificially propagated. With an increase in the illegal collection and laundering of wild succulents noted across the country in recent years, provincial conservation authorities are now more aware of the issue and understand the need to commit more resources towards increased and improved monitoring efforts of local exporting nurseries. CapeNature is specifically looking into improvements in compliance monitoring and are undertaking ad hoc inspections of growing and exporting facilities.

Incentives and benefits from harvesting

21. Utilization compared to other threats: What is the effect of the harvest when taken together with the major threat that has been identified for this species?	Beneficial	1
	Neutral	2
	Harmful	3
	Highly negative	**4**
	Uncertain	5

A fair number of mother plants would have been harvested from the wild in the past in order to establish nursery stocks. Historical harvest of the species up till now is nevertheless deemed to have been limited. Nevertheless, while the species appears to be widely available in cultivation, there have been recent reports of plant seizures involving *E. schoenlandii* plants and seed (CapeNature 2024). Succulent plant poaching has been increasing across parts of the species range and indiscriminate harvesting does present a risk to the species given its localilized and rare nature. Any ongoing, opportunistic removals of plants from accessible areas by hobbyist collectors and succulent traders would exacerbate the impact of habitat loss and degradation on the few remaining populations of the species.

22. Incentives for species conservation: At the national level, how much conservation benefit to this species accrues from harvesting?	High	1
	Medium	2
	Low	3
	None	**4**
	Uncertain	5
There is no legal wild-harvesting of *E. schoenlandii* known to be taking place within the country.		
23. Incentives for habitat conservation: At the national level, how much habitat conservation benefit is derived from harvesting?	High	1
	Medium	2
	Low	3
	None	**4**
	Uncertain	5
There is no legal wild-harvesting of *E. schoenlandii* known to be taking place within the country.		
Protection from harvest		
24. Proportion strictly protected: What percentage of the species' natural range or population is legally excluded from harvest?	>15%	1
	5-15%	2
	<5%	3
	None	**4**
	Uncertain	5
All known populations of *E. schoenlandii* are presently unprotected. Several of the populations occur on private lands that fall within a Voluntary Conservation Area which has the potential to be upgraded to a formally protected area depending on several factors relating to stewardship objectives, landowner buy-in, overall biodiversity value as well as management and financial limits, amongst others.		
25. Effectiveness of strict protection measures: Do budgetary and other factors give confidence in the effectiveness of measures taken to afford strict protection?	High confidence	1
	Medium confidence	2
	Low confidence	**3**
	No confidence	4
	Uncertain	5
Access to all of the populations is fairly unrestricted as none of the populations fall within any kind of formally or informally protected area. Although the provincial legislation makes provisions for the management and protection of the species, enforcement of and compliance with the regulations is challenging to guarantee. The spread distribution of the species across remote areas presents additional challenges to monitoring activities.		
26. Regulation of harvest effort: How effective are any restrictions on harvesting (such as age or size, season or equipment) for preventing overuse?	Very effective	1
	Effective	2
	Ineffective	**3**
	None	4
	Uncertain	5
In spite of adequate provincial legislation that prohibits, in the absences of a permit, the harvesting of protected plants across the province (excepting for seed on private lands), limitations with respect to the adequacy of relevant skills and mechanisms within CapeNature, renders existing harvest controls ineffective. These limitations hinder effective field monitoring of the species populations and also hinders the monitoring of nurseries trading in the species thus impeding the ability to detect laundering of wild plants into the trade. Whilst CapeNature have not issued any permits for the wild collection of *E. schoenlandii* from anywhere in		

the province (C. Arendorf, pers. comm.), access to the populations remain unrestricted. The species has experienced low levels of historical harvest up till now, but succulent plant poaching across the species distribution range has increased in recent years.

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