

Supporting document

NDF Assessment for *Aloe plicatilis* (= *Kumara plicatilis*)

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Last information update: May 2015

Summary of findings

Aloe plicatilis (the fan aloe) 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) for *Aloe plicatilis* and is based on the best available information, current as of May 2015.

Aloe plicatilis is endemic to the Boland region of the Western Cape. The species has a restricted distribution between the mountains north of Tulbagh and the mountains southeast of Franschhoek, and occurs in fragmented subpopulations of 30 to >100 000 plants. *Aloe plicatilis* plants grow mostly in exposed open areas, and sometimes among other shrubs and trees, and are typically confined to well-drained, acidic soils on steep rocky slopes and rocky outcrops that afford plants some protection from fynbos fires. The known national population comprises 31 subpopulations and the abundance of the species is estimated to be well over the 153 000 individuals estimated for the 19 subpopulations surveyed by Cousins *et al.* (2014) during a detailed study of the species' population biology and ecology.

The well-branched shrub/ small tree aloe is relatively slow growing with adult plants averaging 1.5 m – 2 m in height at an age of > 50 – 70 years. Exceptionally large individuals may reach 4 m – 5 m and are possibly older than 130 – 160 years. *Aloe plicatilis* regenerates mainly sexually by seed produced by reproductive adults every summer but can also propagate asexually by means of branches that break off and root. Seed dispersal however is limited and poor (Cousins *et al.* 2013). Populations of the species are generally dominated by medium-to-large adults with sparse seedlings, indicative of slow seedling recruitment (Cousins *et al.* 2014). The short-term study conducted on the population biology of the species indicated that the population is apparently stable. *Aloe plicatilis* subpopulations were confirmed to be extant at all nine historically known localities, and the majority of the 19 subpopulations surveyed in 2014 had stable size structures with adequate numbers of small, medium and large individuals present. Only two subpopulations showed no evidence of recent seedling recruitment and only one was apparently in decline.

The predominant threat to *A. plicatilis* is invasive alien species encroachment. Although fairly small and/or light infestations of alien tree species have been recorded in 12 *A. plicatilis* subpopulations, these alien species spread relatively rapidly. The fire frequency in the Boland mountains is increasing, and repeated short interval fires are therefore a potential threat to *A. plicatilis*.

Although it can be difficult to grow outside of its natural distribution, the striking and unusual appearance of the species makes *A. plicatilis* a popular garden plant. Most of the demand for the species is met by plants propagated in nurseries. At least seven nurseries in the Western Cape sell *A. plicatilis* plants. Nurseries usually stock small plants in small quantities (5-20 plants) and larger plants (stems less than 1 m tall) are occasionally

available. *Aloe plicatilis* has been propagated from tissue culture in fairly large numbers. Between 2002 and 2011, a total of 4119 *A. plicatilis* specimens were exported from South Africa (CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK). Approximately 25% of these specimens were reported to be wild-sourced; however, an export of 500 plants in 2006 was later confirmed to have been erroneously reported as source code “wild”. Data for exports of *A. plicatilis* from South Africa are effectively monitored by South Africa’s Scientific Authority, although the quality of the data is not as good as it should be due to errors in reporting. There is currently no monitoring programme for the species.

Limited illegal wild harvesting of plants has had a negligible impact on the species. While no direct evidence of harvesting was observed at any of the subpopulations studied by Cousins *et al.* (2014), there have been two confirmed illegal harvesting events of *A. plicatilis* – one on privately owned land outside of Worcester and the other from an area in Du Toit’s Kloof. In 2012 an estimated 50-100 *A. plicatilis* plants were observed for sale at a succulent nursery outside Robertson. These individuals were too large to have been propagated from seed relative to the time at which they were reportedly germinated.

Aloe plicatilis is well protected, with fourteen of the 31 known subpopulations occurring in reserves managed by CapeNature. Access to CapeNature reserves, either by car or on foot, is not granted without a permit, and this system appears to be well-managed. Fencing is however inadequate and some subpopulations occurring in the vicinity of public roads are easily accessible by car or on foot. The species is also listed as a protected plant in the Western Cape Nature Conservation Laws Amendment Act No. 3 of 2000. No permits have ever been issued for the harvest of wild *A. plicatilis* plants. There is no quota system for harvesting *A. plicatilis* from the wild and there is no management plan for the species. CapeNature does not have sufficient staff capacity or the required budget to implement existing harvest controls and there is currently a lot of illegal harvesting of plants in the Boland region and in the fynbos in general.

Excepting for large plants (with stems greater than 1 m tall), the demand for *A. plicatilis* is largely met by plants propagated in nurseries from seed or through tissue culture and there is no evidence to suggest that current international trade is detrimental to the species. As such, the export of artificially propagated specimens may continue. Under the current management regime export of wild-sourced specimens would place the wild population of *A. plicatilis* at a moderate to high risk of overharvesting and render trade detrimental (Figure 1, point A in Figure 2). Available data suggest that there are however methods that could be employed to ensure sustainable harvest, but the management system for the species must be improved (point B in Figure 2) before wild harvest can be considered. Any wild harvest must be conducted in accordance with a harvest plan that specifies restrictions to prevent overuse, and this must be accompanied by monitoring, improved access control to wild populations and a dedicated permitting system.

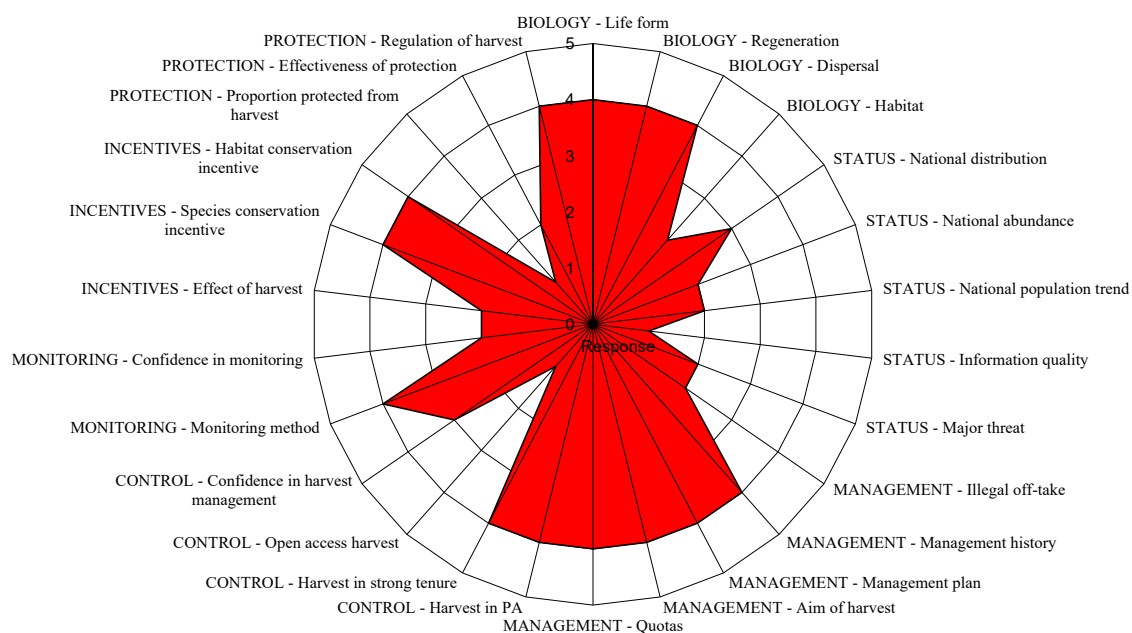


Figure 1. Radar chart summarizing the non-detriment finding assessment undertaken for *Aloe plicatilis* in accordance with the CITES NDF checklist. Explanations of scores given are detailed in Table 1. Higher scores are indicative of higher risks to the species. The shaded area in the radar chart demonstrates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

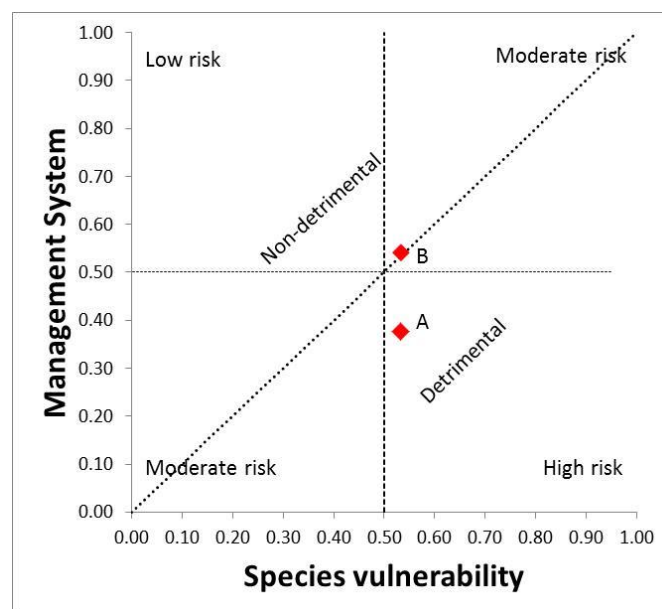


Figure 2. The risk of trading in wild specimens of *Aloe plicatilis* as represented by the relationship between species vulnerability (biology and status) (0 = low vulnerability; 1 = high vulnerability) and the management system to which the species is subjected (management, control, monitoring, incentives and protection) (0 = weak management system; 1 = strong management system). The species is currently at a moderate to high risk and trade is detrimental (point A), but with an improvement in the management system, the species will be at a low to moderate risk and trade will be non-detrimental (point B).

Table 1. Non-detriment finding assessment for *Aloe plicatilis* 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
<i>Aloe plicatilis</i> (recently reinstated as <i>Kumara plicatilis</i> , the fan aloe) is classified as a tree aloe. It is a relatively slow-growing, well-branched shrub to small tree, with dichotomously branching stems, each of which ends in a set of 12–16 alternate, fleshy leaves in a fan-like arrangement. Adult plants average 1.5–2 m in height and are estimated to be more than 50–70 years old (based on measurements of the growth rates of plants in cultivation), but exceptionally large individuals may reach 4–5 m. Since growth rates are slower in the wild, plants of this size are very likely to be more than 130–160 years old.		
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
<i>Aloe plicatilis</i> flowers from August to October, producing reddish-orange, tubular flowers that are arranged in laxly flowered racemes. The longitudinally-dehiscent fruit capsules release the small, black wind-dispersed seeds in December/January. <i>Aloe plicatilis</i> regenerates mainly sexually by seed produced by reproductive adults every summer but can also propagate asexually by means of branches that break off, fall to the ground and begin growing if they land in suitable sites (Cousins <i>et al.</i> , 2013). Populations of the species are generally dominated by medium-to-large adults, and seedlings are scarce, indicating that regeneration by seedling recruitment is slow (Cousins <i>et al.</i> , 2014).		
3. Dispersal efficiency: How efficient is the species' dispersal mechanism?	Very good	1
	Good	2
	Medium	3
	Poor	4
	Uncertain	5
Data from seed dispersal experiments on <i>A. plicatilis</i> indicate that the species' seed is dispersed up to only three times the height of the plant (Cousins <i>et al.</i> , 2013). Although harvester ants may carry the seed further, the potential for recolonization or establishment of new populations is poor. This finding is in line with the general consensus in the literature that aloe seeds tend to be poorly dispersed (Cousins and Witkowski, 2012).		

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

Aloe plicatilis typically occurs in fynbos vegetation on mountain slopes. It grows in well-drained, acidic soils on steep rocky slopes and rocky outcrops that afford it some protection from fires, but it also has thick, corky bark, which provides further protection against fire. The plants grow mostly in open, exposed areas, or sometimes among other trees and shrubs in bush clumps. Since fynbos is a fire-prone vegetation type, *A. plicatilis* habitats may be in any stage of succession from pioneer to climax depending on the time since the last fire. Fynbos fires within the range of *A. plicatilis* generally occur every 7-15 years.

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

Aloe plicatilis is endemic to the Boland region of the Western Cape. It has a restricted distribution that extends from the Franschhoek Mountains in the Hottentots–Holland Nature Reserve in the south, to the Grootwinterhoek Mountains near Tulbagh in the north. East to west, it occurs from the Du Toit's Kloof Mountains near Rawsonville/Worcester to the Paardeberg between Malmesbury and Wellington. *Aloe plicatilis* does not, however, occur continuously within its distribution range, but is found in discrete (fragmented) populations that range in size from 30 to >100 000 plants (Figure 3).

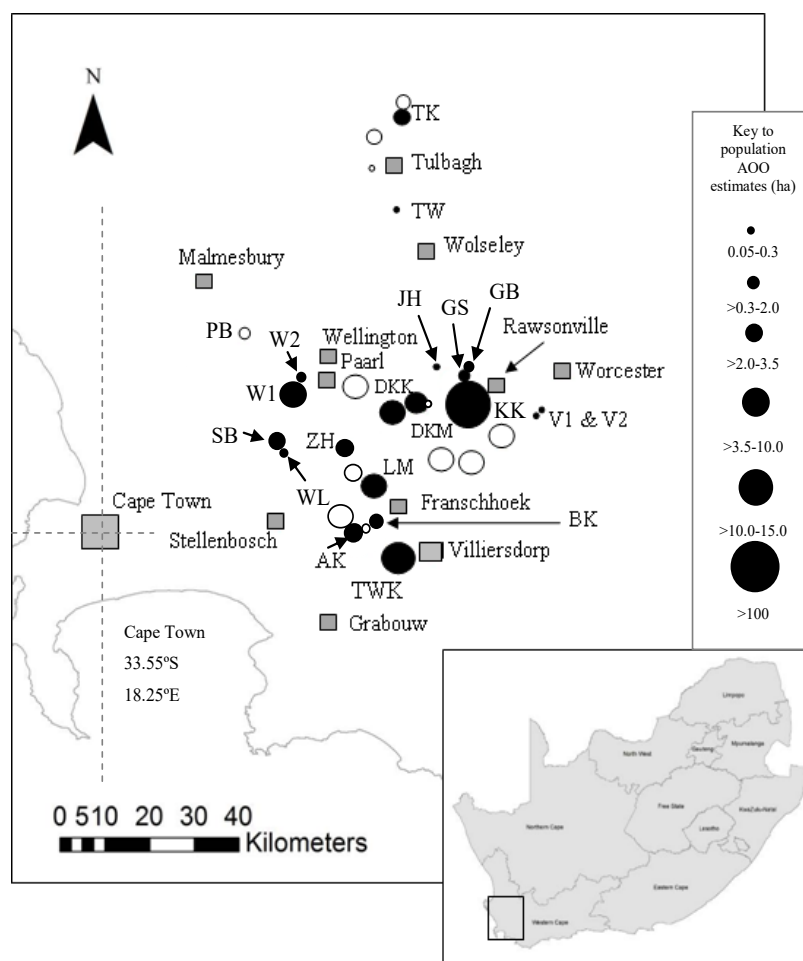


Figure 3. Distribution of the 31 known subpopulations of *Aloe plicatilis* in the Western Cape, South Africa. Shaded circles

represent the 19 subpopulations that were surveyed by Cousins *et al.* (2014), and open circles represent non-surveyed subpopulations. Grey squares denote major towns or cities. The sizes of the circles correspond with the estimated subpopulation Area of Occupancy (AOO).

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

The species is common within its distribution. The number of *A. plicatilis* individuals in the wild is estimated to be well over 153 000. This estimate is based on the number of plants in the 19 subpopulations studied by Cousins *et al.* (2014). There are an additional 12 known subpopulations for which population size estimates have not been calculated. The number of plants in these subpopulations will likely add considerably to the estimate of 153 000.

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

Based on a short-term study, the population appears to be stable. *Aloe plicatilis* subpopulations were confirmed to be extant at all nine historically known localities. Seventeen out of the 19 subpopulations surveyed by Cousins *et al.* (2014) had stable size structures, with adequate numbers of small, medium and large individuals present. The other two subpopulations showed no recent recruitment, but only one was deemed to be declining due to poor seed output and hence negligible seedling recruitment (Cousins *et al.*, 2013).

8. Quality of information: What type of information is available to describe abundance and trend in the national population?	Quantitative data, recent	1
	Good local knowledge	2
	Quantitative data, outdated	3
	Anecdotal information	4
	None	5

The detailed study by Cousins *et al.* (2014) on the population biology and ecology of *A. plicatilis* provides data on individual population sizes for 19 subpopulations, which is likely to be a fair representation of the overall status of the national population (which comprises 31 known subpopulations in total).

9. Major threats: What major threat is the species facing (underline following: overuse/ habitat loss and alteration/ <u>invasive species</u> / other) and how severe is it?	None	1
	Limited/Reversible	2
	Substantial	3
	Severe/Irreversible	4
	Uncertain	5

The predominant threat to *A. plicatilis* is invasive alien species encroachment. Fairly small and/or light infestations of alien tree species (*Pinus*, *Eucalyptus*, *Acacia* and *Hakea*) occur in close proximity to 11 *A. plicatilis* subpopulations, and *Acacia mearnsii* has started colonizing the area occupied by the subpopulation at the old tunnel in Du Toit's Kloof between Paarl and Worcester. According to CapeNature, these alien species are spreading relatively rapidly in the Boland region. The subpopulations that should be monitored for alien invasions (ideally these invasions should be eradicated while they are still fairly small) are listed in Table 6.2 on page 188 in Cousins (2013).

Aloe plicatilis is well adapted to fire (Cousins, 2013). However, CapeNature has indicated that the fire frequency in the Boland region is increasing. Repeated short interval fires are therefore a potential threat to *A. plicatilis*.

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

At the time that the study by Cousins *et al.* (2014) was initiated, only nine subpopulations of *A. plicatilis* had been documented, most of which were in low-lying, fairly accessible areas, where illegal collection could negatively impact the number of plants persisting in the wild. No direct evidence of harvesting was however observed at any of the 19 subpopulations studied by Cousins *et al.* (2014). There has been confirmed illegal harvesting of *A. plicatilis* at a subpopulation on privately-owned land outside Rawsonville/Worcester in the Breede River Valley. The landowner did give permission for the removal of plant material, but she stipulated that only cuttings (branches) should be harvested. It appears that the harvester did not have a collection permit, since CapeNature does not have any record of such a permit. The harvester removed a bakkie-load of whole plants without the landowner seeing this happen, although she did observe the perpetrator driving off with the plants when it was too late to stop him. At a subsequent visit to the same subpopulation, the harvester was confronted by the landowner and barred from returning again. According to staff at the Karoo Desert Botanical Garden, the same perpetrator reportedly removed an unknown quantity of *A. plicatilis* plants from the wild in Du Toit's Kloof.

In 2012 many large *A. plicatilis* plants (stems 0.5-1.0m tall) were seen for sale on the premises of a large cactus and succulent nursery outside Robertson. It was difficult to estimate the number of plants as they were packed very close together, but there were probably 50-100. The nurseryman stated that the plants were grown from seed around 2006, but given the size of the plants, it is highly unlikely that this was indeed the case. After six years an *A. plicatilis* plant grown from seed would have a stem no longer than 10cm. It is probable that these plants were wild-sourced.

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

The striking and unusual appearance of the species makes *A. plicatilis* a popular garden plant, although it can be difficult to grow outside of its natural distribution. There has been no formal management of legal wild-harvesting of *A. plicatilis* to date and most of the demand for *A. plicatilis* is met by plants propagated in nurseries. In 2012 CapeNature registered three Western Cape nurseries that sold *A. plicatilis*. Another four nurseries in the province are known to have sold *A. plicatilis* since 2012. The species has been propagated from tissue culture in fairly large numbers (e.g. the 500 plants exported to Australia in 2006). Nurseries usually stock small plants (i.e. plants that have leaves only and have not yet developed emergent stems) in small quantities (5-20 plants). Large plants are occasionally available, but these are typically plants with stems less than 1m tall. If a plant collector wanted to obtain an *A. plicatilis* plant larger than this, he/she would probably only be able to source it from the wild.

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 approved management plan related to the harvest of *Aloe plicatilis*, only informal unplanned management.

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

Wild-collecting is opportunistic and for the financial gain 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 <i>A. plicatilis</i> 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 legal harvest of <i>A. plicatilis</i> in South Africa. The species is listed as a protected plant in the Western Cape Nature Conservation Laws Amendment Act No. 3 of 2000. CapeNature has not issued any permits for the wild harvesting/collection of <i>A. plicatilis</i> . (During an email conversation in 2012, a permit officer at CapeNature stated that "According to our records no licenses were issued to harvest wild [<i>A. plicatilis</i>] material and there are currently no registered sellers of wild harvested <i>Aloe plicatilis</i> in the Western Cape.")		
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 legal harvest of <i>A. plicatilis</i> in South Africa. The species is listed as a protected plant in the Western Cape Nature Conservation Laws Amendment Act No. 3 of 2000. CapeNature has not issued any permits for the wild-harvesting/collection of <i>A. plicatilis</i> .		
17. Harvesting in areas with open access: What percentage of the legal national harvest occurs in areas where there is no strong local control, giving <i>de facto</i> or actual open access?	None	1
	Low	2
	Medium	3
	High	4
	Uncertain	5
There is no legal harvest of <i>A. plicatilis</i> in South Africa. The species is listed as a protected plant in the Western Cape Nature Conservation Laws Amendment Act No. 3 of 2000. CapeNature has not issued any permits for the wild-harvesting/collection of <i>A. plicatilis</i> .		

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
There is currently a lot of illegal harvesting of plants in the Boland region and in the fynbos in general. CapeNature does not have sufficient capacity to implement existing harvest controls due to current and future budgetary cuts and limited staff capacity and expertise (e.g. vacant botanist positions).		
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 <i>A. plicatilis</i> from South Africa (extracted from the CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK) are monitored by South Africa's Scientific Authority. Between 2002 and 2011, a total of 4119 <i>A. plicatilis</i> specimens were exported from South Africa (CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK), with approximately 25% of these specimens reported to be wild-sourced (two separate exports in 2003 and 2006). However, CapeNature confirmed that the 2006 export of 500 plants was incorrectly reported as "wild-collected". The plants were actually artificially propagated and CapeNature issued an export permit for them. CapeNature did not, however, have any record of the 503 supposedly wild-collected plants exported to Japan in 2003. There is currently no monitoring programme for the species.		
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 in reporting of export data.		
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
Illegal wild harvesting of the species has had a negligible impact on 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 harvest of <i>A. plicatilis</i> in South Africa. The species is listed as a protected plant in the Western Cape Nature Conservation Laws Amendment Act No. 3 of 2000. CapeNature has not issued any permits for the wild-harvesting/collection of <i>A. plicatilis</i> .		
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 harvest of <i>A. plicatilis</i> in South Africa. The species is listed as a protected plant in the Western Cape Nature Conservation Laws Amendment Act No. 3 of 2000. CapeNature has not issued any permits for the wild-harvesting/collection of <i>A. plicatilis</i> .		
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
Fourteen of the 31 known <i>A. plicatilis</i> populations occur in reserves managed by CapeNature.		
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 CapeNature reserves either by car or on foot is not granted without a permit, and this system appears to be well-managed. Gates on the access roads leading into reserves are kept locked at all times. Fencing is however inadequate and some subpopulations occur in the vicinity of public roads and are therefore easily accessible by car or on foot (e.g. Du Toitskloof Pass).		
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
There is no legal harvest of <i>A. plicatilis</i> in South Africa. The species is listed as a protected plant in the Western Cape Nature Conservation Laws Amendment Act No. 3 of 2000. CapeNature has not issued any permits for the wild-harvesting/collection of <i>A. plicatilis</i> . However, in the event that a permit was granted for the harvesting of wild specimens of this species, restricting the harvest to cuttings from large plants would be very effective in preventing overuse. The demand for large specimens could be met by taking long branches from big adult plants, provided that the harvesting is spread across the population (i.e. only one branch should be removed from not more than one out of every five plants and not more than once from a specific population; branches should not be harvested from any plants growing on protected areas).		

List of participants

1. Annelise le Roux – CapeNature
2. Lee Saul – CapeNature
3. Michèle Pfab – South African National Biodiversity Institute
4. Stephen Cousins – School of Animal, Plant & Environmental Sciences, University of the Witwatersrand, Johannesburg & Conservation Ecology, Stellenbosch University

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